National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

Avifauna of Sierra Nevada Network Parks

Assessing Distribution, Abundance, Stressors, and Conservation Opportunities for 145 Bird Species

(Appendix A – Species Accounts)

Natural Resource Report NPS/SIEN/NRR—2012/506.A

ON THE COVER
Birds of the Sierra Nevada Network parks (clockwise from upper left: Ruby-crowned Kinglet, Western Tanager, Spotted Owl, Dark-eyed Junco nest, Purple Finch, Northern Flickers).
Photographs courtesy of The Institute for Bird Populations

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Species List in Phylogenetic Order

The following list organizes the species assessed in this report in the sequence found in the Checklist of North American Birds (7th Edition, 1998) of the American Ornithologists' Union (A.O.U). The A.O.U. Checklist arranges species according to their presumed natural and evolutionary relationships and is followed by most ornithologists and birding communities in North America.

Ducks
Mallard
Common Merganser
Harlequin Duck

Quail
White-tailed Ptarmigan
Sooty Grouse
Mountain Quail
California Quail

Herons
Great Blue Heron

Vultures
Turkey Vulture

Hawks, Eagles, and Falcons
Osprey
Northern Harrier
Sharp-shinned Hawk
Cooper's Hawk
Northern Goshawk
Red-shouldered Hawk
Red-tailed Hawk
Golden Eagle
Bald Eagle
American Kestrel
Peregrine Falcon
Prairie Falcon

Plovers
Killdeer

Sandpipers
Spotted Sandpiper

Pigeons and Doves
Band-tailed Pigeon
Mourning Dove

Owls
Flammulated Owl
Western Screech-Owl
Great Horned Owl
Northern Pygmy-Owl
Spotted Owl
Great Gray Owl
Long-eared Owl
Northern Saw-whet Owl

Nighthawks
Common Nighthawk
Common Poorwill

Swifts
Black Swift
Vaux's Swift
White-throated Swift

Hummingbirds
Black-chinned Hummingbird
Anna's Hummingbird
Calliope Hummingbird
Rufous Hummingbird

Kingfishers
Belted Kingfisher

Woodpeckers
Acorn Woodpecker
Williamson's Sapsucker
Red-breasted Sapsucker
Nuttall's Woodpecker
Downy Woodpecker
Hairy Woodpecker
White-headed Woodpecker
Black-backed Woodpecker
Northern Flicker
Pileated Woodpecker

Flycatchers
Olive-sided Flycatcher

Western Wood-Pewee
Hammond's Flycatcher
Dusky Flycatcher
Willow Flycatcher
Pacific-sloped Flycatcher
Black Phoebe
Say's Phoebe
Ash-throated Flycatcher
Western Kingbird

Vireos
Cassin's Vireo
Hutton's Vireo
Warbling Vireo

Jays, Crows, and Ravens
Steller's Jay
Western Scrub-Jay
Clark's Nutcracker
Common Raven

Larks
Horned Lark

Swallows
Tree Swallow
Violet-green Swallow
Northern Rough-winged Swallow
Cliff Swallow
Barn Swallow

Chickadees and Titmice
Mountain Chickadee
Chestnut-backed Chickadee
Oak Titmouse

Long-tailed Tits
Bushtit

Nuthatches
Red-breasted Nuthatch
White-breasted Nuthatch
Pygmy Nuthatch

Creepers
Brown Creeper

Wrens
Rock Wren
Canyon Wren
Bewick’s Wren
House Wren
Pacific Wren

Dippers
American Dipper

Kinglets
Golden-crowned Kinglet
Ruby-crowned Kinglet

Gnatcatchers
Blue-gray Gnatcatcher

Thrushes
Western Bluebird
Mountain Bluebird
Townsend’s Solitaire
Swainson’s Thrush
Hermit Thrush
American Robin
Varied Thrush

Babblers
Wrentit

Starlings
European Starling

Pipits
American Pipit

Waxwings and Silky Flycatchers
Cedar Waxwing
Phainopepla

Warblers
Orange-crowned Warbler
Nashville Warbler
Yellow Warbler
Yellow-rumped Warbler
Black-throated Gray Warbler
Townsend’s Warbler

Hermit Warbler
MacGillivray's Warbler
Common Yellowthroat
Wilson's Warbler

Towhees, Sparrows, and Juncos
Green-tailed Towhee
Spotted Towhee
California Towhee
Rufous-crowned Sparrow
Chipping Sparrow
Black-chinned Sparrow
Fox Sparrow
Song Sparrow
Lincoln's Sparrow
White-crowned Sparrow
Golden-crowned Sparrow
Dark-eyed Junco

Tanagers
Western Tanager

Grosbeaks and New World Buntings
Black-headed Grosbeak
Lazuli Bunting

Blackbirds
Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
Brown-headed Cowbird
Bullock's Oriole

Finches
Gray-crowned Rosy-Finch
Pine Grosbeak
Purple Finch
Cassin's Finch
House Finch
Red Crossbill
Pine Siskin
Lesser Goldfinch
Lawrence's Goldfinch
Evening Grosbeak

Acronyms Used in the Accounts

BBS – Breeding Bird Survey
DEPO – Devils Postpile National Monument
MAPS – Monitoring Avian Productivity and Survivorship
NM – National Monument
NP – National Park
SEKI – Sequoia and Kings Canyon National Parks
SIEN – Sierra Nevada Inventory & Monitoring Network (Includes SEKI, YOSE and DEPO)
YOSE – Yosemite National Park

Appendix A: Abstract

To inform and support the Sierra Nevada Network's long-term bird monitoring program and the Sequoia and Kings Canyon Natural Resource Condition Assessment, we assessed distribution, abundance, ecological stressors, and conservation opportunities for 145 bird species that commonly occur in the national parks of the Sierra Nevada Network. The Network includes Devils Postpile National Monument, Sequoia and Kings Canyon National Parks, and Yosemite National Park. For each species, we drew from published and unpublished information to determine migratory, residency, breeding, and conservation status; significance of the parks to the species' range; distribution and habitat associations within the parks; elevational distribution within the parks; and abundance, population trends and demography within the parks (and, to a lesser degree, across the Sierra Nevada region). We also assessed the likely effects on each bird species of five potential ecological stressors:

- Anthropogenic Climate Change
- Altered Fire Regimes
- Habitat Fragmentation or Loss
- Invasive Species and Disease
- Human Use Impacts

W e also identified and discussed management options and conservation opportunities that park managers might consider for safeguarding the species from the identified stressors.

Despite a wealth of information sources about birds in the Sierra Nevada Network parks, a great deal of uncertainty remains about a) the effects that the identified stressors have already had on individual species, b) how the stressors themselves will change in the future, and c) how bird species will respond to those changes. For many species, conclusions rely heavily on expert opinion and speculation, and remain tentative. Additional monitoring and research on ecological stressors and their effects on bird populations in the Sierra Nevada parks are still needed.

Appendix A is a companion document to the summary narrative of this report and provides species accounts for the 145 focal species assessed in the report. The narrative of the report is published separately. The species accounts in this appendix synthesize existing information on each species' status in Sequoia and Kings Canyon National Parks, Yosemite National Park, and Devils Postpile National Monument, discuss possible stressors to park populations, and identify management options. The accounts draw from a variety of data and information sources including on-going monitoring projects, published literature and expert opinion. Detailed explanations of material that is presented in many or all of the species accounts are provided in the Methods section of the Introduction, in the narrative of the main report (p. 3-7 in Steel et al. 2012). Literature cited for Appendix A is included in the Literature Cited section of the main report, which is published as a separate document, as cited below:

Steel, Z. L., M. L. Bond, R. B. Siegel, and P. Pyle. 2012. Avifauna of Sierra Nevada Network parks: Assessing distribution, abundance, stressors, and conservation opportunities for 145 bird species. Natural Resource Report NPS/SIEN/NRR—2012/506. National Park Service, Fort Collins, Colorado.

Acorn Woodpecker – *Melanerpes formicivorus*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Acorn Woodpecker is a fairly common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, but has not been reported from Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Acorn Woodpeckers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Acorn Woodpecker occurs in foothill and montane woodlands from northwestern Oregon, California, the American Southwest, and western Mexico through the highlands of Central America to the northern Andes in Colombia (Koenig et al. 1995). The species is common throughout its range in California (Purcell et al. 2005) and is often the most abundant woodpecker where it occurs (Koenig et al. 1995). Acorn Woodpecker primarily resides at lower elevations and is limited by the distribution limit of oaks, thus the montane Sierra is not of great importance to the species.

Distribution and Habitat Associations
Acorn Woodpecker is strongly associated with oaks and is most commonly found in pine-oak woodlands (Koenig et al. 1995). The species is known for its highly social habits (cooperative breeding) and unique method of storing acorns in specialized trees known as granaries (Koenig et al. 1995). Acorn Woodpeckers were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE but were not observed in DEPO. Detections were concentrated along the lower-elevation stations on the

western edges of the parks. Park inventories show highest associations with Blue Oak forests within SEKI and in Mixed Chaparral, Canyon Live Oak and, curiously, Giant Sequoia in YOSE (Table 2).

Table 2. Number of Acorn Woodpeckers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	23	42	Blue Oak Forest	0.67	0.88 (0.51-1.53)
			Live Oak/California Buckeye	0.09	0.07 (0.02-0.29)
			Canyon Live Oak Forest	0.02	0.02 (0.01-0.07)
Yosemite NP	55	79	Mixed Chaparral	0.20	
			Giant Sequoia	0.16	
			Canyon Live Oak	0.08	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

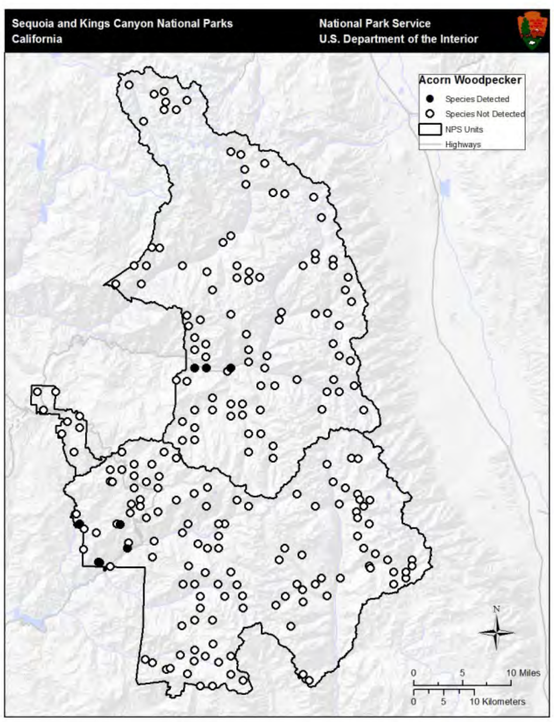

Figure 1. Bird survey transects where Acorn Woodpecker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

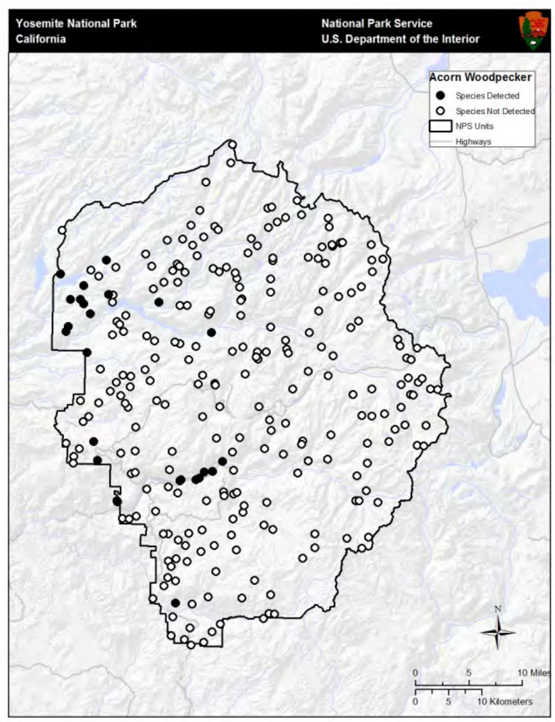

Figure 2. Bird survey transects where Acorn Woodpecker was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Acorn Woodpecker was detected at lower elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Acorn Woodpecker in SEKI was 832 m, with 95% of observations occurring between 495 and 1724 m. In YOSE, the mean elevation of observations was 1474 m with 95% of observations falling between 1200 and 1862 m (Siegel et al. 2011).

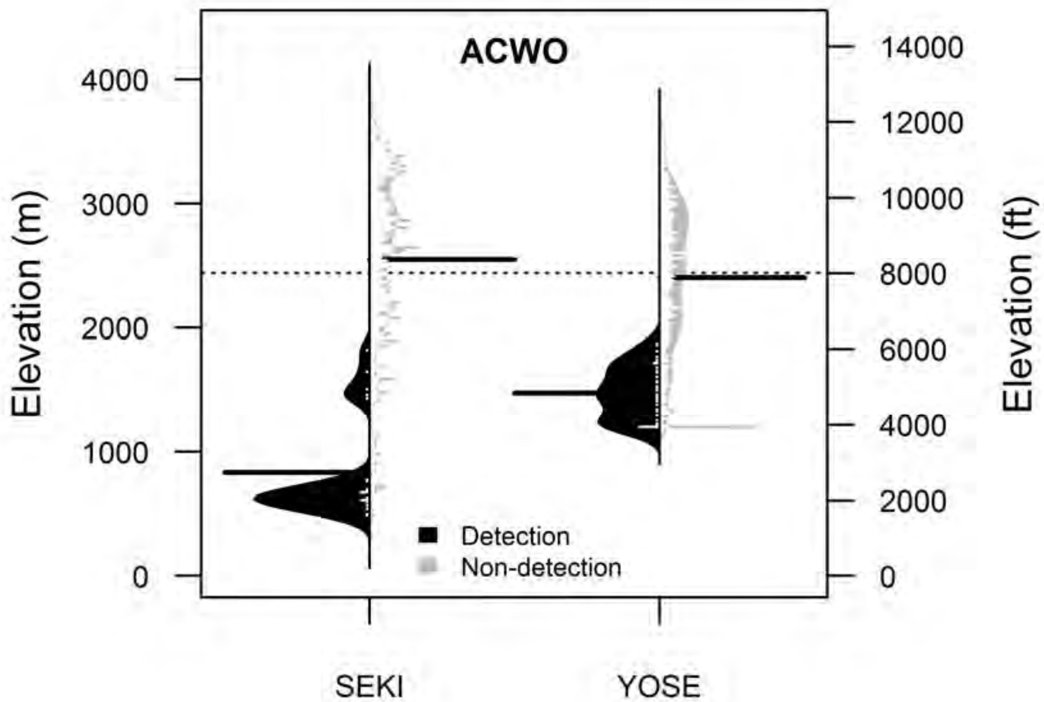

Figure 3. Elevational distributions of sites where Acorn Woodpecker (ACWO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Acorn Woodpeckers are abundant in both the Sierra Region (BCR 15) and in California as a whole (Table 3). They were detected in relatively high numbers on individual BBS routes at YOSE and SEKI, especially at Sequoia NP. No significant population trends were observed, although a non-significant, small negative trend was reported for the Sequoia route (Table 3).

Table 3. Relative abundance and trends for Acorn Woodpecker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	122	10.90	+0.4	0.37
	1980-2007			+0.5	0.22
Sierra Nevada (BCR 15)	1966-2007	15	9.72	+1.3	0.26
	1980-2007			+1.7	0.14
Route 14117 – Sequoia NP	1972-2005	1	21.69	-3.6	0.36
Route 14132 – Kings Canyon NP	1974-2005	1	1.75	+1.8	0.88
Route 14156 – Yosemite NP	1974-2007	1	8.00	-1.9	0.51

Too few Acorn Woodpeckers (<0.03) were captured in mist nets at the SIEN MAPS stations; data on productivity and survival within the parks are not available. However, results from other study sites in coastal California documented that large proportions of a population will emigrate from an area during years of poor acorn supply, particularly in woodlands with a lower diversity of oak species (Koenig et al. 1995). Moreover, population densities increased and variability decreased with increasing abundance and diversity of oak species (Koenig and Haydock 1999).

Stressors

Acorn Woodpeckers are relatively common and abundant throughout their range. Poor regeneration of oaks in California, potentially due to cattle grazing and altered fire regimes, could have a significant effect on Acorn Woodpeckers in the future, but there is no indication of major population declines. Climate change may increase the extent of the woodpeckers' oak woodland habitat in the SIEN parks. Loss or degradation of habitat and disease do not appear to be major concerns for Acorn Woodpeckers within the SIEN parks.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Acorn Woodpecker has significantly shifted in latitude over the past 40 years, but only about 5 miles south (Audubon 2009). Modeled distribution shifts of Acorn Woodpecker range predict a greater future probability of occurrence in the Sierra Nevada foothills – particularly in the northern foothills – as well as a range expansion in the northern Central Valley and northwestern California. A greater probability of occurrence is predicted in the lower-elevation foothills and drainages of YOSE and SEKI and around DEPO. The most important variables influencing current and projected distribution were annual mean temperature and precipitation (Maxent distribution model), and vegetation and precipitation of the driest quarter (Maxent and GAM distribution model) (Stralberg and Jongsomjit 2008).

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contribute to sensitivity and/or adaptability of the species. In addition to evaluating sensitivity, vulnerability assessments also incorporate climate change predictions, providing modeled, spatially explicit estimates of vulnerability. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Acorn Woodpecker received a sensitivity score of 45.92 (UW 2010), suggesting moderate sensitivity to threats stemming from climate change. Certainty of results was listed as 40.00 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Acorn Woodpecker's sensitivity to climate change was its high degree of dependence on oaks (UW 2010). A similar assessment of vulnerability of Acorn Woodpecker in the Willamette Valley of Oregon gave Acorn Woodpecker a vulnerability score of 4 (a score of 5 representing least vulnerable), indicating low vulnerability to climate change at least within this region (Steel et al. 2010).

Acorn Woodpeckers currently breed in oak woodlands at lower elevations along the western slope of the Sierra Nevada and may colonize higher elevations if oak woodlands expand uphill with climate warming. If climate change causes the species' range to shift upslope as is generally expected, there is likely to be adequate oak woodlands habitats in SEKI and YOSE. Moreover, this species has the ability to nest twice per year, in spring and in August when a second acorn crop matures (Koenig and Stahl 2007). Because second nesting takes place when summer temperatures are relatively high and these fledglings survive and recruit into the population at numbers comparable to spring fledglings, global warming may increase the frequency of late nesting in the future and may enhance lifetime reproductive success of Acorn Woodpeckers. However, changes in oak phenology resulting from climate change may also adversely affect Acorn Woodpeckers.

Altered Fire Regimes: Fire, set by lightning or Native Americans, historically has been an important component of oak woodlands in California. The decimation of the Native American population and the introduction of livestock and associated non-native annual grasses by European settlers altered fire regimes of this habitat type (Purcell and Stephens 2005). European settlers burned extensively to convert shrublands and woodlands to grasslands for livestock. Oak recruitment increased in some areas coincident with European settlement due to fire, but many areas of Blue Oak woodlands were entirely cleared and permanently converted to annual grassland (Purcell and Stephens 2005).

Although Blue Oak seedlings may be killed by frequent fire, seedlings and saplings are capable of resprouting after fire, and fire increases acorn and leaf production by reducing competition with understory vegetation, which in turn improves habitat for Acorn Woodpeckers (Purcell and Stephens 2005). Mixed Chaparral habitats are also well-adapted to fire; some shrub species resprout after fire while others regenerate from seed banks (Riggan et al. 1994), but with overly frequent fire can type-convert to annual grasslands. Acorn Woodpeckers were associated with Blue Oak woodlands in SEKI and Mixed Chaparral in YOSE, and thus are likely to benefit from moderately frequent fire in these parks.

Habitat Fragmentation or Loss: The majority of oak woodlands in California are privately owned and receive little management or regulatory protection. Historically, foothill oak woodlands have been extensively grazed, and between 1945 and 1985 approximately 480,000 hectares of oaks were cleared to enhance forage production (Aigner et al. 1998). More recently, urban development has become the dominant reason for loss of oak woodlands. Acorn Woodpecker adapts fairly well to the presence of humans if not persecuted and readily uses human-made structures such as utility poles and buildings for roost and storage locations (Koenig et al. 1995). However, some natural habitat is required for the species to persist in an area. Extensive clearing of oak woodlands for urban development is a major threat to Acorn Woodpeckers in lower-elevation foothill habitats, but does not impact the species in the SIEN parks.

Invasive Species and Disease: Acorn Woodpeckers might be adversely impacted by non-native European Starlings. However, cooperative breeding may allow Acorn Woodpeckers to defend against starlings better than other non-communal cavity nesters (Siegel and DeSante 1999), and there is no evidence of declines after starling invasion (Koenig 2003). Disease in Acorn Woodpeckers has not been studied, and the potential importance of diseases and epidemics in this highly social species is unexplored (Koenig et al. 1995).

Human Use Impacts: Fuelwood and timber harvesting can adversely impact Acorn Woodpeckers by eliminating food sources, nest trees, and granaries. Studies of the effects of low-impact, small-scale harvesting indicate these activities do not significantly reduce abundance of Acorn Woodpeckers as long as sufficient oaks, snags, and, especially, granary trees are retained (Aigner et al. 1998, Garrison et al. 2005). Fuelwood and timber harvesting are minimal in SIEN parks, however, and not likely to have any impact on Acorn Woodpecker populations there.

Acorn Woodpeckers were strongly associated with Blue Oak woodlands in SEKI. A major threat to Blue Oak woodlands in California is the lack of regeneration over the past century, due to livestock grazing and associated invasion of non-native annual grasses (Standiford et al. 1997, CPIF 2000, Purcell and Stephens 2005). Loss of Acorn Woodpecker granary trees has been attributed to intensive livestock grazing that suppressed reproduction of young cottonwood trees (Ligon and Stacey 1996). Packstock grazing within the SIEN parks could adversely impact habitat for this species if such grazing were reducing oak recruitment. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, impacts from packstock grazing are likely relatively small and localized.

Oak woodlands in north-central coastal California have been falling victim to Sudden Oak Death (SODS), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SODS was probably introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Acorn Woodpeckers and other oak-dependent species if it reaches those regions of the Sierra Nevada.

Acorn Woodpeckers may be harmed by the occasional legal and illegal shooting of birds to prevent depredation of nut and fruit crops (Koenig et al. 1995). This activity does not pose a threat to the species in SIEN parks. Pesticide use on forest insect outbreaks or drift from the Central Valley could be a risk to Acorn Woodpeckers.

Management Options and Conservation Opportunities

Protection of granary trees and other large, decaying oaks and softwood trees is one of the most important actions park managers can take to benefit Acorn Woodpecker populations in SIEN parks. Potential impact of European Starlings could be quantified and ameliorated. Managers should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SOD, and preventative measures including quarantine of the area could be immediately implemented if SOD is identified. Management guidelines and regulations pertaining to SOD can be found at the California Oak Mortality Task Force website (http://www.suddenoakdeath.org/).

Acorn Woodpeckers have been recommended as a focal species for monitoring oak woodlands due to their abundance, their ability to excavate cavities, and their habit of storing acorns which provides an abundant food source for many wildlife species (Purcell et al. 2005).

American Dipper – *Cinclus mexicanus*

Migratory Status

Resident/short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

American Dipper is a fairly common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and at Devils Postpile National Monument (Table 1).

Table 1. Breeding status and relative abundance of American Dippers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Year-round	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

The American Dipper breeds from western Alaska and Aleutians southward along the Pacific Coast to Monterey County, California and throughout high mountains of the western U.S. (Kingery 1996). The Sierra Nevada represents an extremely important part of the American Dipper's range in California (Siegel and DeSante 1999).

Distribution and Habitat Associations

American Dippers are restricted to fast-moving streams, rivers, and glacial lakes throughout the Sierra, where they nest on rock ledges above flowing water or behind waterfalls (Siegel and DeSante 1999). Dippers were detected at low numbers (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were detected off-survey in DEPO, but these surveys were not designed specifically to detect birds so closely tied to stream channels. The highest abundance was in streams in Live Oak/California Buckeye habitats (Table 2), but stream conditions are what matters to this species, not the surrounding terrestrial habitat.

Table 2. Number of American Dippers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	11	11	Live Oak/California Buckeye	0.09	NA
			Ponderosa Pine/Incense Cedar	0.02	NA
			Higher Elevation Meadow	0.02	NA
Yosemite NP	5	5	Mountain Hemlock	0.01	
			Ponderosa Pine/Mixed Conifer	0.01	
			Red Fir	0.01	
Devils Postpile NM	0	0	Detected off-survey	NA[1]	

[1]NA - Information not available due to insufficient data.

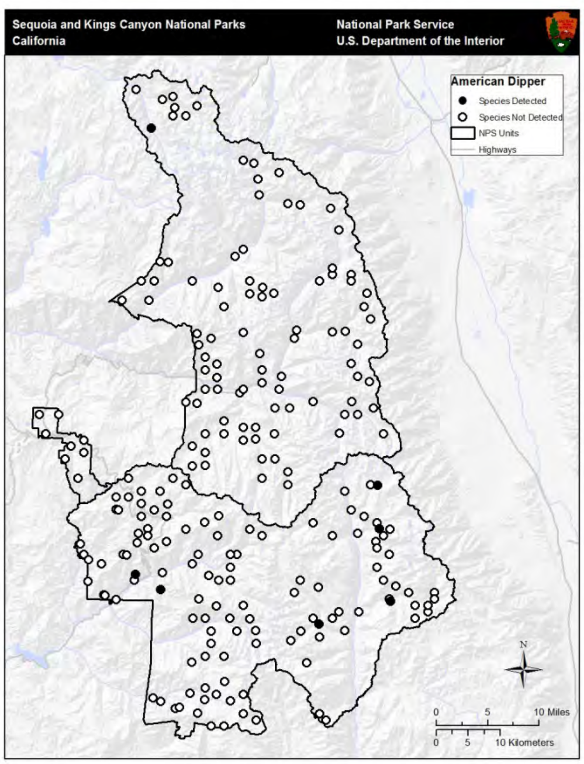

Figure 1. Bird survey transects where American Dipper was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

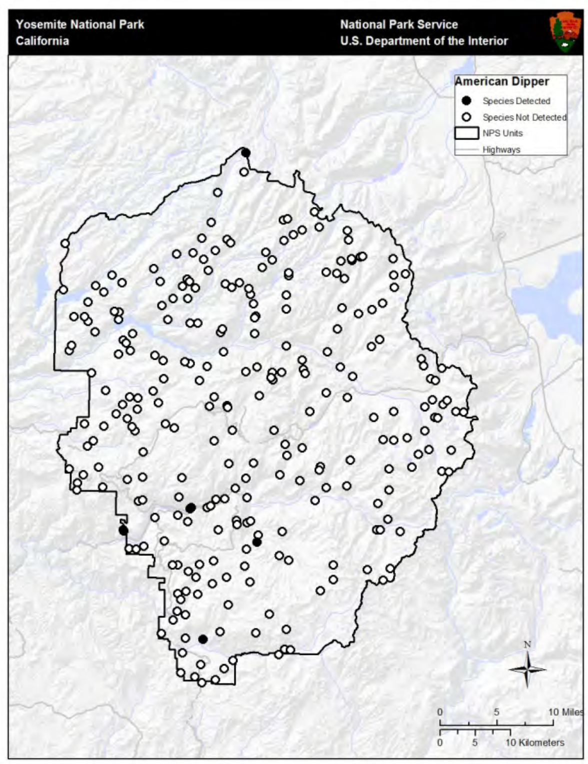

Figure 2. Bird survey transects where American Dipper was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

America Dipper was detected from low to high elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of American Dipper in SEKI was 2501 m, with 95% of observations occurring between 921 and 3343 m. In YOSE, the mean elevation of observations was 1738 m with 95% of observations falling between 1209 and 2828 m (Siegel et al. 2011).

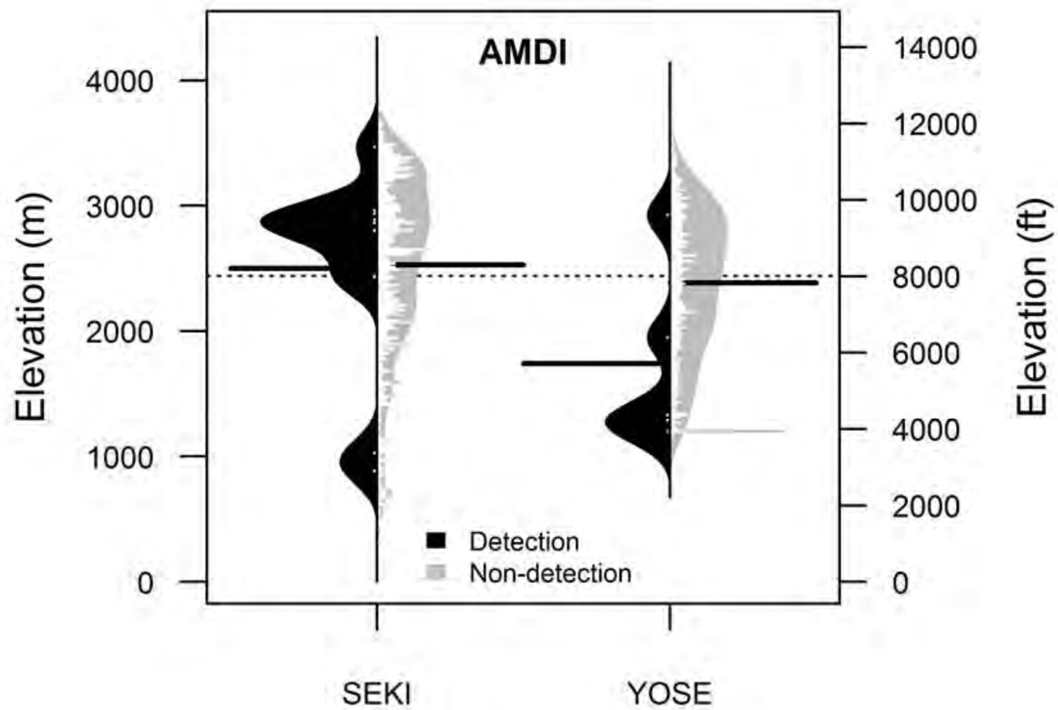

Figure 3. Elevational distributions of sites where American Dipper (AMDI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate American Dippers are not abundant either in the Sierra Region (BCR 15) or in California as a whole, with the exception of the individual route in Kings Canyon NP (Table 3). A significant negative population trend was observed in Yosemite NP from 1974-2007 (Table 3) but the overall detection rate was very low.

Table 3. Relative abundance and trends for American Dipper according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	21	0.16	+0.5	0.80
	1980-2007			+0.3	0.81
Sierra Nevada (BCR 15)	1966-2007	10	0.19	+0.6	0.82
	1980-2007			+2.3	0.40
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	1.45	-3.6	0.56
Route 14156 – Yosemite NP	1974-2007	1	0.27	-26.9	0.00

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Few American Dippers are captured in mist nets at the SIEN MAPS stations; thus data on productivity and survival within the parks are not available.

Stressors

The American Dipper is an aquatic songbird that has been suggested as an indicator species for the health of mountain streams due to its sensitivity to water quality and habitat disturbance (Anderson et al. 2008). In the Sierra, the greatest threat to this species is probably logging operations that cause stream degradation. While counter-intuitive, high-intensity fire may enhance dipper habitat by increasing aquatic food resources. This species may suffer from increased flooding due to climate change.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of American Dipper has significantly shifted northwards by over 37 miles and towards the coast by more than 20 miles over the past 40 years (Audubon 2009). This observed shift provides some evidence that this species may have already responded to climate change and may continue to shift its range within the Sierra in the coming decades. The most detrimental potential effect of climate change on American Dippers is nest failure due to increased flooding.

Altered Fire Regimes: High-intensity fire can cause stream erosion and thus negatively impact stream conditions for American Dippers. However, adverse impacts may be temporary: Malison and Baxter (2010) documented that stream reaches burned by high-intensity fire 5 years previously in an Idaho wilderness area (thus not subjected to post-fire management activities) had significantly greater biomass of zoobenthic insects and emerging adult aquatic insects than unburned and low-intensity burned sites. Minshall (2003) also concluded fire was not detrimental to the maintenance of diverse and productive aquatic ecosystems. High-intensity fire may ultimately enhance food resources for the American Dipper, but further research in the Sierra range is warranted.

Habitat Fragmentation or Loss: Adverse effects of logging and associated road-building on stream ecosystems is well-documented (Beschta et al. 2004, Karr et al. 2004). Clearcut logging increases stream temperatures and alters stream morphology, and spraying of chemicals during forestry operations can pollute streams and disrupt the aquatic food web, which in turn significantly threatens the American Dipper. These issues do not pose substantial threats in the SIEN parks.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the American Dipper.

Human Use Impacts: Pollution into streams may be a significant threat to American Dippers, but unlikely in the higher elevations of SIEN parks. American Dippers may benefit from the construction of new bridges, as this bird utilizes these structures for nesting, but nests on bridges are also vulnerable to vandalism (Kingery 1996). Dams can flood nest sites and wintering habitat, while drawing down dams can result in dry, unsuitable streams. Packstock grazing may alter stream morphology and disrupt the food web, although the impacts of grazing in SIEN parks are likely to be relatively small and localized.

Management Options and Conservation Opportunities

The most important thing park managers can do to protect American Dipper populations in the SIEN parks is to protect riparian areas and streams themselves from overgrazing, siltation, logging, and pollution. This may include vigilant maintenance of culverts and other areas where roads cross streams, and monitoring of packstock grazing. Park managers might also consider installing educational signs on bridges used for nesting by American Dippers.

American Kestrel – *Falco sparverius*

Migratory Status

Resident/Short-distance Migrant (Smallwood and Bird 2002)

Residency and Breeding Status

American Kestrel is uncommon at Devils Postpile (DEPO) National Monument as well as Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks. The species is a regular breeder at SEKI and YOSE and may breed at DEPO as well (Table 1).

Table 1. Breeding status and relative abundance of American Kestrels in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Year-round	Regular Breeder	Uncommon
Yosemite NP	Migrant/Year-round	Regular Breeder	Uncommon
Devils Postpile NM	Migrant/Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

American Kestrel is distributed over much of North America including the entire continental U.S. (Smallwood and Bird 2002). SIEN parks do not comprise a significant portion of the species' range.

Distribution and Habitat Associations

American Kestrels are associated with open, grassy habitats from valley floors to alpine fields (Gaines 1992). American Kestrels were detected in low densities (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE and were observed only anecdotally, off-survey at DEPO. The YOSE park inventory shows highest associations with Montane Chaparral. American Kestrels were not observed frequently enough to infer habitat preferences within YOSE or DEPO (Table 2). Like most other raptors, they are not well sampled by passive point counts designed to detect singing birds.

Table 2. Number of American Kestrels recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	2	3	NA[1]	NA	NA
Yosemite NP	3	3	Montane Chaparral	0.02	
Devils Postpile NM	0	0	Detected off-survey	NA	

[1]NA - Information not available due to insufficient data.

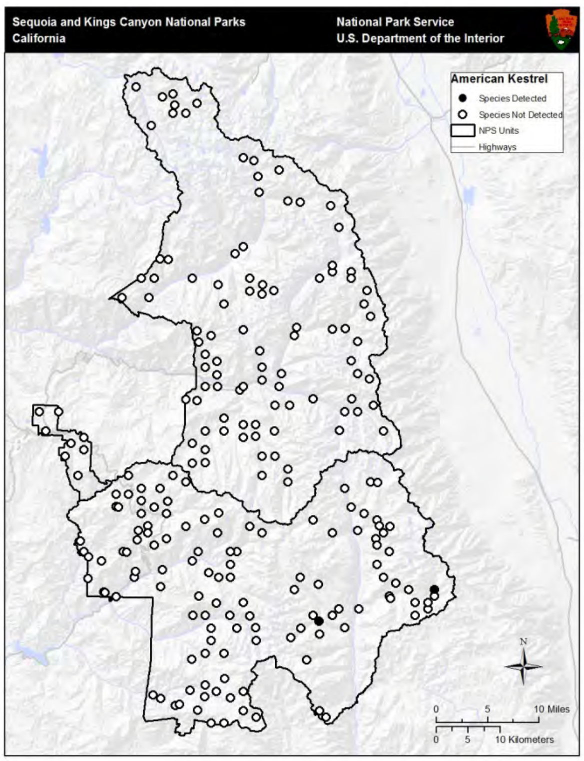

Figure 1. Bird survey transects where American Kestrel was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

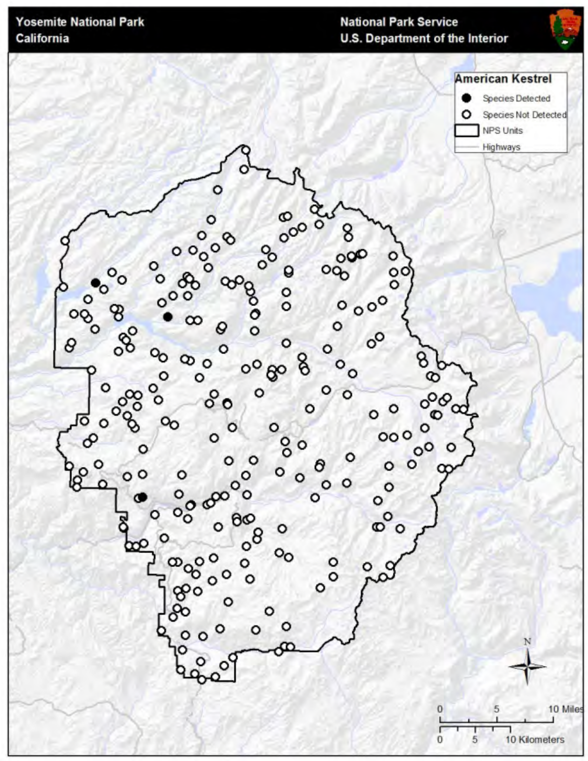

Figure 2. Bird survey transects where American Kestrel was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

American Kestrel was observed only three times each in SEKI and YOSE, with the mean elevation of observations occurring at 2905 and 1790 m, respectively (Figure 3) (Siegel et al. 2011).

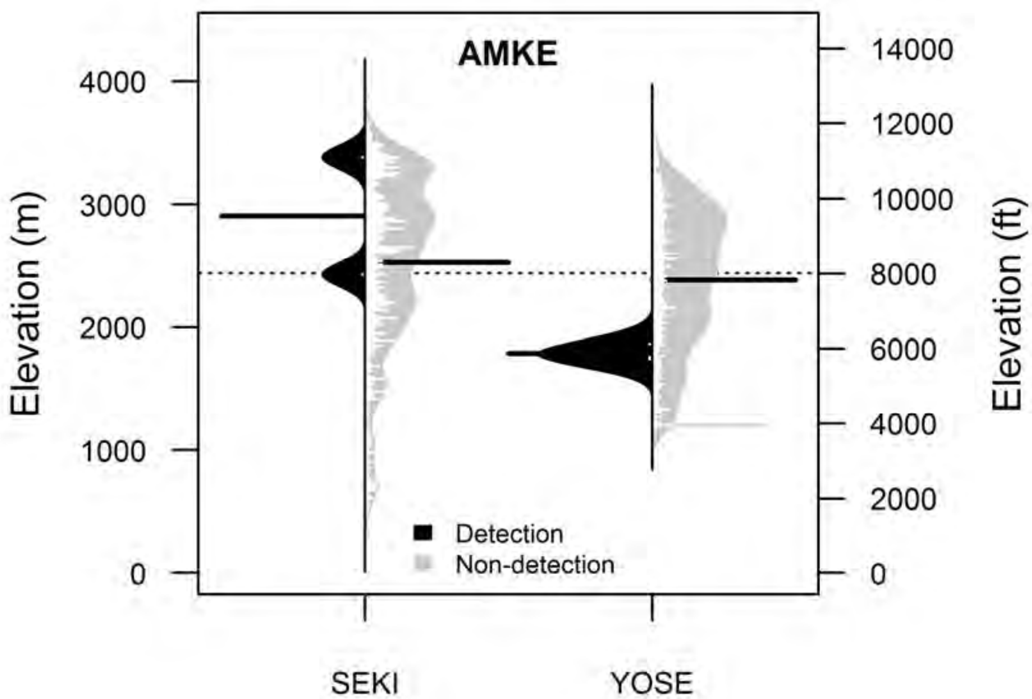

Figure 3. Elevational distributions of sites where American Kestrels (AMKE) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate American Kestrels are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at YOSE and SEKI. A significant negative trend was observed in California over the long term (1966-2007) and appears to have continued during recent decades (1980-2007) (Table 3).

Table 3. Relative abundance and trends for American Kestrel according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	173	1.68	-1.4	0.01
	1980-2007			-1.0	0.12
Sierra Nevada (BCR 15)	1966-2007	18	0.39	+1.6	0.49
	1980-2007			-0.8	0.67
Route 14117 – Sequoia NP	1972-2005	1	0.38	-31.5	0.28
Route 14132 – Kings Canyon NP	1974-2005	1	0.50	-5.4	0.61
Route 14156 – Yosemite NP	1974-2007	1	0.12	+16.6	0.45

American Kestrels are infrequently captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Most troubling for American Kestrels is a slight, but significant California-wide decline over the long-term (Sauer et al. 2008). However, there does not appear to be any single threat that alone explains the decline. The American Kestrel cannot utilize industrial agriculture where marginal vegetation has been removed, but otherwise does well despite human activities and presence and has benefitted from the draining of wetlands and deforestation. Other potential threats include new diseases to California such as West Nile Virus and exposure to contaminants. Climate change appears to be altering the distribution of American Kestrels, but is likely to affect them predominantly through changes in habitat and prey species abundance. Finally, altered fire regimes will impact kestrels locally, but do not appear to threaten the species' abundance or distribution as a whole.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of American Kestrel has significantly shifted 54.5 miles to the north and 105.7 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that American Kestrel has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Due to the ubiquity of American Kestrels across North America it is unlikely that changing temperature and precipitation patterns will directly threaten the species as a whole. However, local populations may experience some changes such as breeding timing. A twenty-year study (1986-2006) of breeding American Kestrels in southwestern Idaho found no significant change in reproductive success or productivity over the period, but observed a tendency of breeding to begin earlier in the season, corresponding with increased winter temperatures (Steenholf and Peterson 2009). SIEN populations may experience local changes as habitat and prey species are altered with a changing climate, but American Kestrel is unlikely to be threatened as much as many other species within the parks.

Altered Fire Regimes: A study in Saskatchewan, Canada (Dawson and Bortolotti 2006) has shown a reduction in nest success of American Kestrels breeding in recently burned areas. However, in the eighth year following the fire, burned areas showed greater kestrel occupancy than unburned forests. These observations indicate that American Kestrels are able to continue using burned habitats (even with some reduced reproductive success) and may prefer forests recovering from fires to mature, unburned forests (Dawson and Bortolotti 2006). Similar studies are not available for California forests, but given the species' use of dead trees for nesting (Smallwood and Bird 2002), it is reasonable that American Kestrel will respond favorably to fires that create nesting habitat in the Sierra Nevada as they did in the boreal forests of Saskatchewan.

Habitat Fragmentation or Loss: Deforestation and wetland drainage may provide additional foraging habitat for American Kestrel. However, such conversions often remove suitable nest-cavities, making habitats unsuitable for breeding (Smallwood and Bird 2002). American Kestrels can be found perching on fence posts and hedgerows of agricultural fields. However, where the practice of 'clean farming' (which eliminates all vegetation along field margins) occurs, the species cannot find sufficient breeding and foraging habitat (Smallwood and Bird 2002).

Invasive Species and Disease: In a recent study evaluating the risk of California birds to West Nile Virus, American Kestrel received a combined risk score of 2.0 (with a score of 4 indicating the greatest risk), suggesting the species is at moderate to low risk from the disease (Wheeler et al 2009). A single documented case of a dead kestrel testing positive for WNV in 2009 in California (CDPH 2010) further suggests that American Kestrels are at least minimally susceptible to the disease. Additionally researchers in Saskatchewan**,** Canada showed reduced condition and possibly reduced survivorship of breeding American Kestrels infected with hematozoan parasites (Dawson and Bortolotti 2000). If West Nile Virus becomes prevalent in SIEN parks, the disease will pose some threat to American Kestrels. Other ailments such as blood parasites likely negatively affect individual condition and reproductive success, but are of less concern for populations of the species.

Human Use Impacts: Although previously more problematic for American Kestrels, shooting of individuals still occurs, but apparently now has minimal impacts on kestrel populations (Smallwood and Bird 2002). This is not likely to pose a threat to SIEN populations where hunting of any kind is prohibited.

When exposed to organochlorine pesticides such as DDT and other pollutants, American Kestrels experience egg-shell thinning, lowered fertility, and embryonic abnormalities. However, such effects do not appear to affect American Kestrels greatly across their range (Smallwood and Bird 2002).

American Kestrels are extremely tolerant of human disturbances and often breed in nest boxes attached to barns or other buildings (Smallwood and Bird 2002).

Management Options and Conservation Opportunities

American Kestrels are easily bred and maintained in captivity, which has allowed them to be used frequently in laboratory studies assessing the impact of contaminants and testing captive breeding techniques (Smallwood and Bird 2002). If deemed necessary in SIEN parks, park managers could consider supplementing nesting sites with nest boxes (NatureServe 2009). Finally, the presence of West Nile Virus within SIEN parks and any mortalities of American Kestrel due to the disease should be monitored and documented.

American Pipit – *Anthus rubescens*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
American Pipit is a locally fairly common summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) National Parks and a locally uncommon summer resident and regular breeder at Yosemite (YOSE) National Park, but is not reported at Devils Postpile National Monument (Table 1).

Table 1. Breeding status and relative abundance of American Pipits in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Migrant	Regular Breeder	Locally Fairly Common
Yosemite NP	Summer	Regular Breeder	Locally Uncommon
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S2 – Imperiled (High risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
American Pipit breeds in arctic and alpine regions of North America, including isolated breeding populations on mountain tops above treeline (Verbeek and Hendricks 1994). This species has nested in the central and southern Sierra and southern California only since the early 1970s (Verbeek and Hendricks 1994, Siegel and DeSante 1999). The subspecies (*A. r. alticola*) in the Sierra is the same as that which breeds in the Great Basin and central Rocky Mountains (Siegel and DeSante 1999). This recent breeding expansion southward is important to the distribution and population of *alticola*. The vast majority of the breeding range of this species in California is in the Sierra, thus the mountain range is critical (Siegel and DeSante 1999).

Distribution and Habitat Associations
American Pipits in the Sierra Nevada nest in moist alpine meadows in the vicinity of lakes or tarns (Siegel and DeSante 1999). On the wintering grounds, the species is found in coastal beaches and marshes and stubble fields, and recently plowed fields in spring, with a preference

for mud flats and river courses (Verbeek and Hendricks 1994). These birds were detected in moderate densities (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE, and were not observed in DEPO. Survey routes with detections occurred in the easternmost high-elevations areas of the parks. Park inventories show strongest associations with high-elevation meadows, and to a lesser extent with sparse vegetation at SEKI, with lower abundances in barren habitats, Whitebark Pine, and alpine meadows in YOSE (Table 2).

Table 2. Number of American Pipits recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	37	68	Higher Elevation Meadow Higher Elevation/Sparse Veg.	0.57 0.29	1.21 (0.63-2.34) 0.80 (0.39-1.63)
Yosemite NP	16	22	Barren Whitebark Pine Subalpine/Alpine Meadow	0.06 0.06 0.04	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

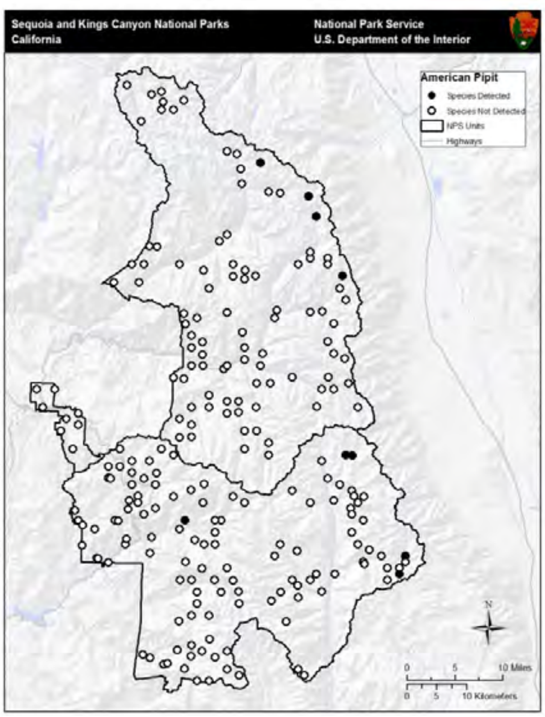

Figure 1. Bird survey transects where American Pipit was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

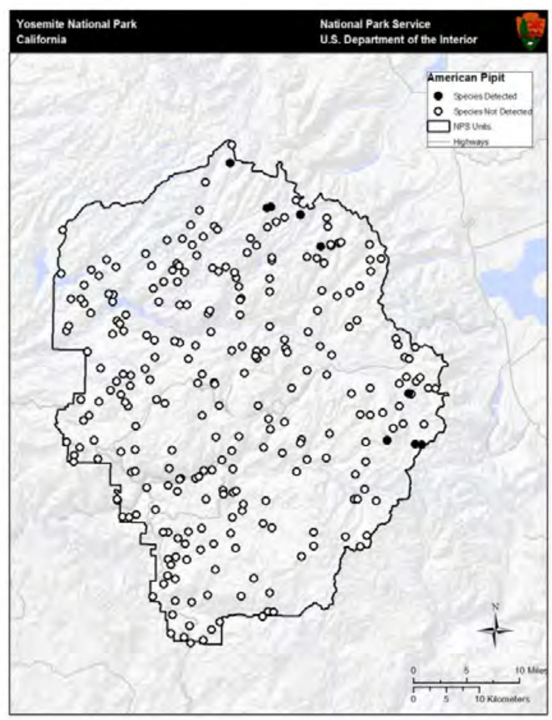

Figure 2. Bird survey transects where American Pipit was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

American Pipit was detected at high elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of American Pipit in SEKI was 3456 m, with 95% of observations occurring between 3156 and 3651 m. In YOSE, the mean elevation of observations was 3322 m with 95% of observations falling between 3003 and 3625 m (Siegel et al. 2011).

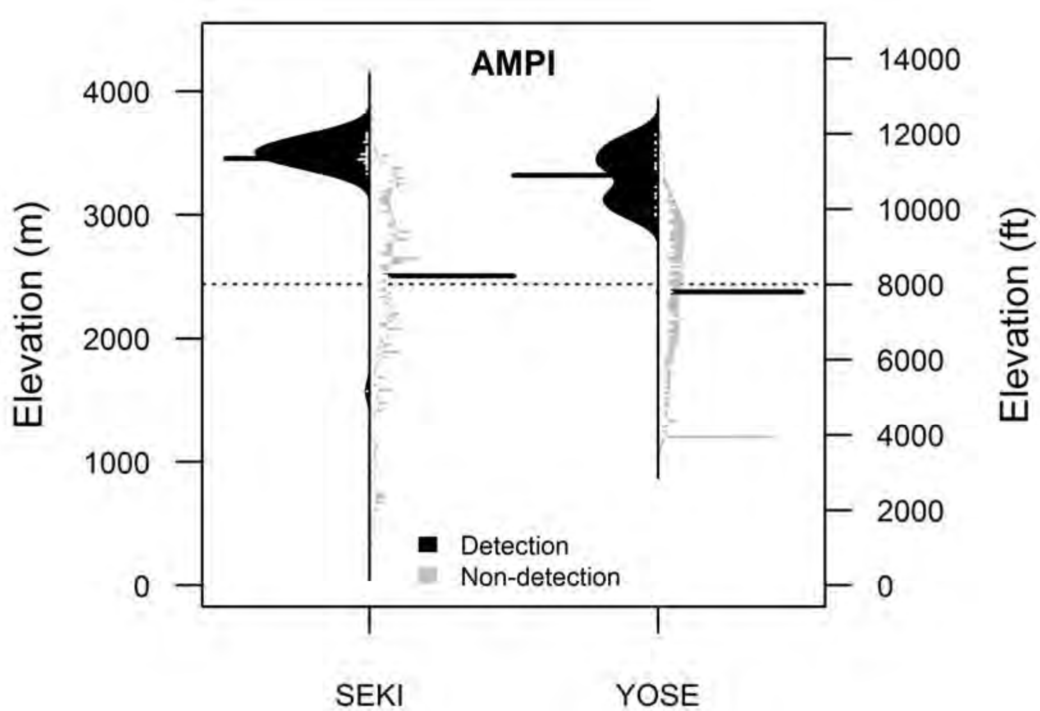

Figure 3. Elevational distributions of sites where American Pipit (AMPI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) survey routes provide very poor coverage of high-elevation habitats. No American Pipits were detected on any BBS routes in California, thus abundance and population trend data are not available. Similarly, SIEN MAPS stations are not located in high-elevation habitats, and no pipits were captured in mist nets. Thus, no productivity or survival estimates are available for this species in SIEN parks.

Christmas Bird Counts of American Pipits from nine U.S. states suggest substantial declines in all regions from 1962-1993 (Verbeek and Hendricks 1994). Further analysis is required to determine whether these declines are biologically significant. Siegel and DeSante (1999) noted from anecdotal observations in the Hall Natural Area in the eastern Sierra that smaller numbers of pipits were detected during drought years than wetter years.

Stressors

American Pipit breeds at high altitudes in alpine meadows and on the arctic tundra. Thus, the species is probably fairly buffered from extensive habitat loss and fragmentation from urban development or habitat alteration by fire. Climate change is likely to affect American Pipits, but potential impacts are unknown; some research suggests this species may benefit from reduced snowpack, but the pipit may be adversely impacted by competition from other bird species moving upslope or from changes in vegetation. Perhaps the greatest threat to the American Pipit in SIEN parks is damage to high-elevation meadows from packstock grazing and recreation.

Climate Change: Alpine habitats are among the most vulnerable to the effects of climate change. Lesica and McCune (2004) found that alpine vegetation in Glacier National Park moved toward the dry end of a moisture gradient from 1989-2002, and several arctic-alpine indicator plant species declined in abundance while none increased. From 40-50% of high-alpine habitats could be invaded by non-alpine vegetation by 2050 due to climate change (Franco et al. 2006, Hayhoe et al. 2004), although effects on American Pipits of invading vegetation into breeding grounds are unknown. Some researchers have suggested that warmer temperatures disrupt migratory patterns, reproduction, and food availability for birds utilizing alpine habitats. American Pipits may be limited to the alpine range because of the lack of competition and/or dependence on alpine vegetation. Both of these factors could change in the long term as the pipit experiences more competition from other bird species moving upslope and/or their preferred vegetation type will be replaced by lower-elevation vegetation. However, Hendricks (2003) found that in years of earlier snowmelt, more potential American Pipit nest sites were exposed, resulting in increased mean clutch sizes. Reduced snowpack also may allow pipits to winter farther north than historically (Verbeek and Hendricks 1994). Further monitoring of the effects of climate change on American Pipits is warranted, as this is one of only a handful of ground-inhabiting songbirds that breed at high altitudes in alpine meadows and on the arctic tundra (Verbeek and Hendricks 1994)

Altered Fire Regimes: Fires do not typically affect the high-alpine breeding habitats of the American Pipit in the SIEN parks or elsewhere in its range. Similarly, the mud flats, coastal marshes, river courses, and plowed fields used during winter are not significantly impacted by fires.

Habitat Fragmentation or Loss: Habitat fragmentation and loss probably do not pose a threat to American Pipits in the SIEN parks or elsewhere in the species' range, aside from potentially minor impacts of development or farmland reversion to forests on wintering grounds.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the American Pipit in SIEN parks.

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for American Pipits, at least locally where grazing is permitted, because packstock can damage meadow habitats. Due to pipits' restriction to particularly high-elevation areas, however, adverse impacts to American Pipits from packstock grazing are likely relatively small and localized in SIEN parks, and may even be negligible. Recreation impacts also can degrade alpine breeding habitats, although effects on breeding pipits are unknown (Verbeek and Hendricks 1994).

Management Options and Conservation Opportunities

The most beneficial management action for American Pipits in the SIEN parks is to minimize the impacts of recreation and packstock grazing on high-elevation alpine meadows. The American Pipit's response to a changing climate should be closely monitored, although research may be hindered by the lack of surveys due to the remoteness of the breeding grounds; the MAPS and BBS programs do not monitor this species in the Sierra, and virtually no information on population trends or demographics in this region exist.

American Robin – *Turdus migratorius*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
American Robin is a common summer and year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and a common summer resident and regular breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of American Robins in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Common
Yosemite NP	Summer/Year-round	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The American Robin is the largest, most abundant, and most widespread North American thrush, breeding over most of Canada, the U.S., and much of Mexico (Sallabanks and James 1999). American Robins are common and widespread in the Sierra which represents an important part of their range in California, and a relatively important part of the range of the subspecies *propinquus*, which is limited to western North America (Siegel and DeSante 1999).

Distribution and Habitat Associations
American Robins is common in forest, woodland, and gardens, and breeds where lawns and other short-grass areas are interspersed with shrubs and trees such as residential areas, towns, farmyards, and parks as well as in riparian areas and in early-successional post-fire and post-harvest forests (Hutto 1995, Sallabanks and James 1999). In the Sierra, the American Robin is found in moist tree-margined meadows, pastures, or lawns at most elevations; and in most forest types, as long a source of mud is available for nest building, and berry crops are available for wintering (Siegel and DeSante 1999). American Robins were detected at high numbers along survey transects (Figures 1 and 2) during avian inventory surveys at all SIEN parks (Table 2). The strongest habitat associations were with riparian and meadow habitats as well as White

Alder in YOSE (Table 2), but American Robins were found in 24 of 26 habitat types at SEKI and 25 of 29 at YOSE, indicating this species is a widespread generalist.

Table 2. Number of American Robins recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	313	399	Undifferentiated Riparian	0.64	0.87 (0.35-2.16)
			Lower Elevation Meadow	0.45	0.60 (0.31-1.16)
			Mid Elevation Meadow	0.37	0.30 (0.15-0.59)
			Red Fir/White Fir Forest	0.35	0.30 (0.14-0.67)
			Aspen Forest	0.35	0.29 (0.11-0.74)
Yosemite NP	449	628	White Alder	0.64	
			Montane Meadow	0.46	
			Subalpine/Alpine Meadow	0.37	
			Black Oak	0.33	
			Ponderosa Pine/Mixed Conifer	0.25	
Devils Postpile NM	7	8	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

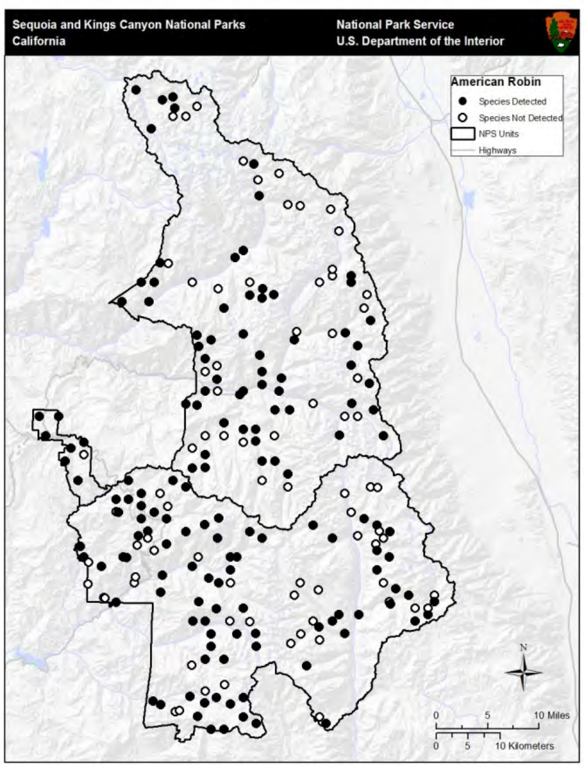

Figure 1. Bird survey transects where American Robin was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

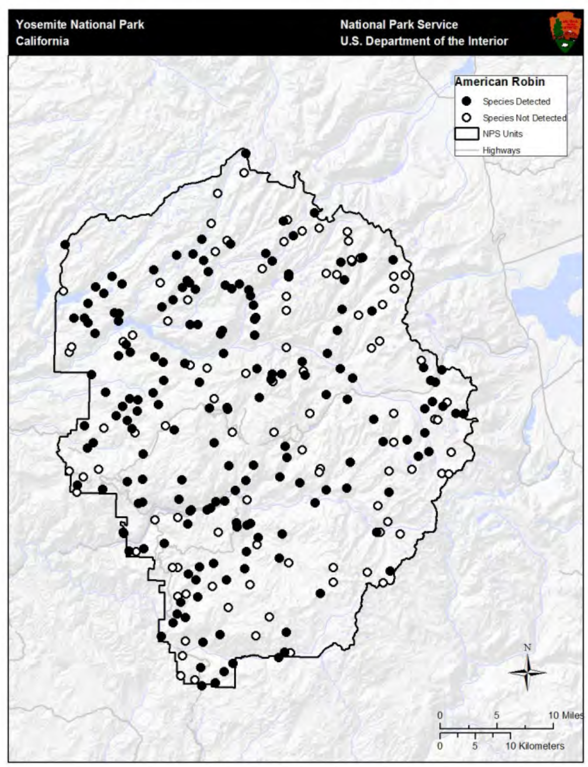

Figure 2. Bird survey transects where American Robin was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

American Robin was detected from low to high elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 2382 m, with 95% of observations occurring between 1064 and 3348 m. In YOSE, the mean elevation of observations was 2154 m with 95% of observations falling between 1200 and 3083 m (Siegel et al. 2011).

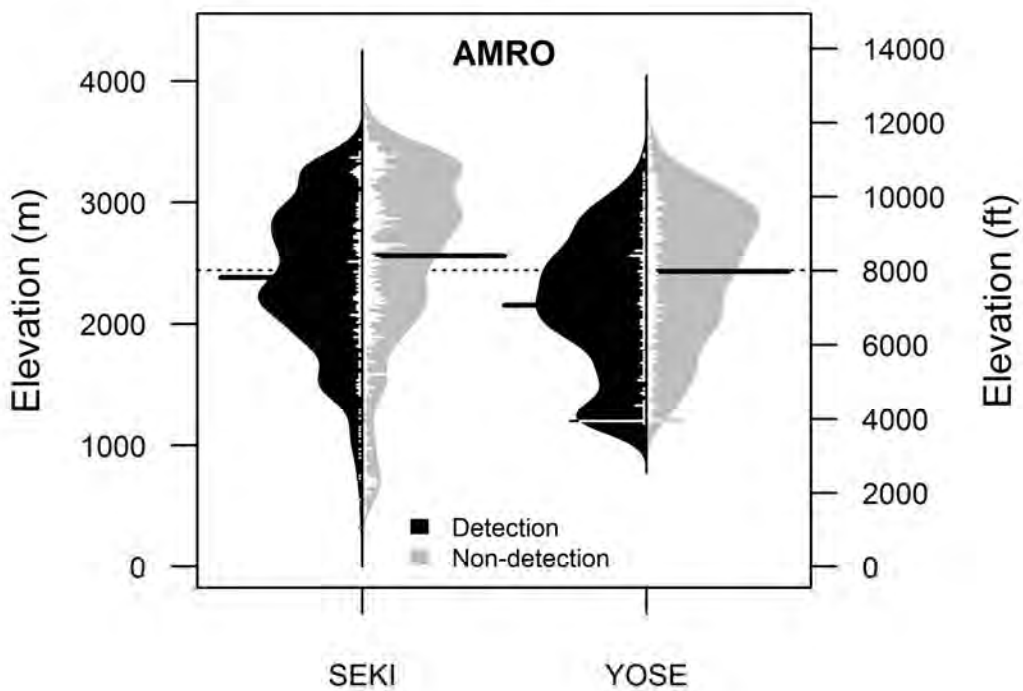

Figure 2. Elevational distributions of sites where American Robin (AMRO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) survey data indicate American Robins are very abundant in California, and twice as abundant along routes in the Sierra Nevada Region (BCR15) than in California as a whole (Table 3). Small but significant negative population trends were documented during the past half-century in the Sierra Nevada from 1966-2007 and 1980-2007, with larger decreases in Yosemite NP from 1974-2007, although a non-significant annual increase was observed along the Kings Canyon NP route from 1974-2007 (Table 3).

Table 3. Relative abundance and trends for American Robin according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	186	14.29	-0.6	0.10
	1980-2007			-0.9	0.05
Sierra Nevada (BCR 15)	1966-2007	35	29.68	-1.6	0.00
	1980-2007			-1.5	0.05
Route 14117 – Sequoia NP	1972-2005	1	22.50	+4.3	0.66
Route 14132 – Kings Canyon NP	1974-2005	1	21.05	+3.2	0.07
Route 14156 – Yosemite NP	1974-2007	1	27.85	-6.2	0.00

Contrary to BBS results, mark-recapture data from SIEN MAPS stations suggest significant population and reproductive increases at the Yosemite NP. Non-significant declines were observed at MAPS stations in Kings Canyon NP and Devils Postpile NM (Table 4).

Table 4. Population trends, productivity, trends, and survival estimates of American Robin at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	6.5	-9.24	0.14	-4.23	0.585 (0.076)
Yosemite NP	1993-2009	4.9	+4.13**	0.20	+2.74**	0.592 (0.045)
Devils Postpile NM	2002-2006	19.0	-23.08	0.20	NA[2]	0.912 (0.227)

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Considering the widespread distribution and high abundance of American Robins in the Sierra, it is troubling that the species is declining throughout the mountain range (Table 3). However, populations are increasing at Yosemite NP MAPS stations (Table 4), perhaps suggesting that this park represents important protected habitat. The American Robin requires moist habitats such as riparian zones and meadows within open forests for foraging and nest-building, and is somewhat associated with these types in the SIEN parks (Table 2). These birds may have declined over the past 30 years in the Sierra Nevada due to drought conditions, and may be threatened by future drying due to climate change. An increase in fire may benefit American Robins. The species is also susceptible to brood parasitism from Brown-headed Cowbirds, West Nile virus, and exposure to chemical pesticides used on lawns.

Climate Change: An analysis of Christmas Bird Count (CBC) data indicates the center of abundance of American Robin has shifted significantly northward by 206 miles and inland by 137 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). The assertion that American Robin is already showing responses to climate change is corroborated by recent findings that the species has adjusted its median arrival date during migration in response to temperature (MacMynowski and Root 2007). These observed shifts provide evidence that American Robins have already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

American Robin is associated with tree-margined meadows and riparian zones and moist forest conditions (Siegel and DeSante 1999) and is already shifting its center of abundance northwards and inland in tandem with climate change. If the species expands upslope in the Sierra Nevada as generally expected, there is substantial moist meadow-forest edge at higher altitudes for continued occupation in SIEN parks. However, if climate change results in drier conditions in its preferred breeding and foraging habitats, this species may suffer.

Altered Fire Regimes: Fire likely enhances habitat for American Robins, but research results are somewhat equivocal. The species was detected in early and mid-successional burned plots in the Rocky Mountains in 100% of studies examined by Hutto (1995). American Robin pairs were significantly denser in burned than unburned plots in the eastern Sierra (Bock and Lynch 1978) and continued to increase over 25 years post-fire (Rafael et al. 1987). American Robin densities were highly variable pre-fire but declined significantly post-fire in unburned forests and in increased significantly in high-intensity burned patches in New Mexico (Kotliar et al. 2007). American Robins were significantly more abundant in post-fire areas than green forests in the northern Sierra (Burnett et al. 2010), however the species preferred unburned forests in the southern Sierra (Siegel and Wilkerson 2005). No differences in densities of robins were detected among logged and unlogged burned forests in Oregon, although they were positively correlated with snag densities (Cahall and Hayes 2009).

Research results on the impacts of fire on American Robins are somewhat inconclusive, but the majority of studies suggest positive impacts. Fire is known to enhance berry-producing shrubs (Kay 2000), so fire likely enhances food resources for American Robins, as fruits comprise an important part of their diet. An increase in frequency and intensity of fire in the SIEN parks may benefit this species.

Habitat Fragmentation or Loss: American Robins respond favorably to the irrigated lawns and gardens around human habitations (Siegel and DeSante 1999) thus the species is not substantially harmed by light to moderate residential development. In forests, American Robins are associated with more open canopies. They do not appear to be sensitive to habitat degradation due to timber harvesting; detections increased significantly in thinned compared to untreated stands in Douglas-fir forests in Oregon (Hayes et al. 2003) and detections were common on early and mid-successional clearcuts (Hutto 1995). Thinning and clearcutting are widespread in the Sierra Nevada, but largely absent from the SIEN parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. American Robins are susceptible to brood parasitism by Brown-headed Cowbirds.

A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). The virus has caused mortality in many native birds. In 2009, West Nile Virus caused at least 6 American Robin deaths in California (CDPU 2010).

Human Use Impacts: Extensive grazing that causes stream channelization and drying of meadows can adversely affect American Robins (Siegel and DeSante 1999). Packstock grazing within the parks might threaten American Robins because it can attract Brown-headed Cowbirds and alter riparian and meadow habitats. As compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Because American Robins congregate on suburban lawns, these birds are vulnerable to pesticide poisoning due to chemicals such as DDT, Azodrin, carbofuran, hydrogen sulphide, furadan, famphur, nemacur, cyanide, chlorpyrifos, dursban, fenthion, chlordane, and carbamate and organophosphate pesticides (Sallabanks and James 1999). Robins are also killed by vehicles and collisions with windows (Sallabanks and James 1999).

Management Options and Conservation Opportunities

American Robin is perhaps the most widespread and abundant of bird species in the Sierra, but appears to be experiencing troubling declines. The most important things park managers can do to protect American Robin populations in the parks are to maintain relatively open forest and moist meadow habitats and to carefully manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE should be updated. Use of chemical pesticides on park lawns should be avoided or minimized.

If climate change leads to substantial meadow desiccation and reproductive success declines, restoration of meadow hydrology could benefit breeding American Robins. Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites would likely benefit American Robins and other meadow-associated bird species.

MAPS station operation and other means of monitoring American Robin populations in the parks should continue in order to determine whether population increases continue in Yosemite NP and resolve whether declines are occurring in Kings Canyon NP and Devils Postpile NM, and if so, to determine their causes.

Anna's Hummingbird – *Calypte anna*

Migratory Status

Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Anna's Hummingbird is a common breeder in Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks. The species is a fairly common possible breeder in Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Anna's Hummingbirds in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Common
Yosemite NP	Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Possible Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Anna's Hummingbird is generally limited to the Pacific Slope of western North America. Breeding populations in the montane Sierra Nevada are rare, but individuals disperse upslope as flowers disappear from lower elevations (Siegel and DeSante 1999). Given the species' greater association with lowland areas, the Sierra Nevada and SIEN parks are of minor importance to the species, especially during the winter and breeding seasons.

Distribution and Habitat Associations

Anna's Hummingbird's native habitats are dry slopes, broken chaparral, scattered trees, and open woodland (Gaines 1992). Anna's Hummingbirds were detected in moderate densities (Table 2) along a number of survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE and were observed only once during the avian inventory at DEPO. Park inventories show highest associations with Blue Oak Woodland and Ponderosa Pine forests within SEKI and YOSE respectively (Table 2). Estimated densities are not available from surveys; the birds' attraction to flagging used for marking survey points invalidated density estimation using distance sampling.

Table 2. Number of Anna's Hummingbirds recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	36	43	Blue Oak Woodland	0.40	NA
			Mixed Chaparral	0.28	NA
			Interior Live Oak	0.14	NA
Yosemite NP	68	84	Ponderosa Pine	0.40	
			Mixed Chaparral	0.20	
			Foothill Pine	0.18	
			Canyon Live Oak	0.17	
Devils Postpile NM	1	1	NA[1]	NA	

[1]NA - Information not available due to insufficient data. Habitat densities at Sequoia and Kings Canyon not available due to atypical behavior of this species (see Siegel and Wilkerson 2005).

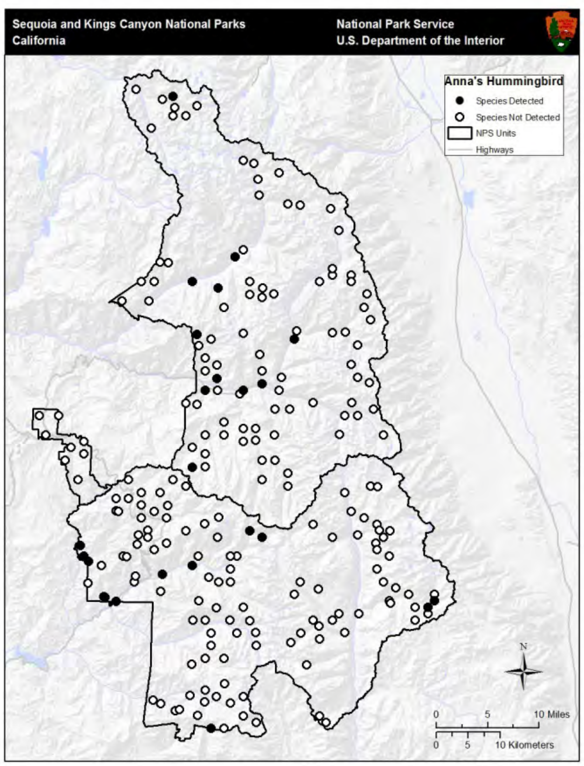

Figure 1. Bird survey transects where Anna's Hummingbird was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

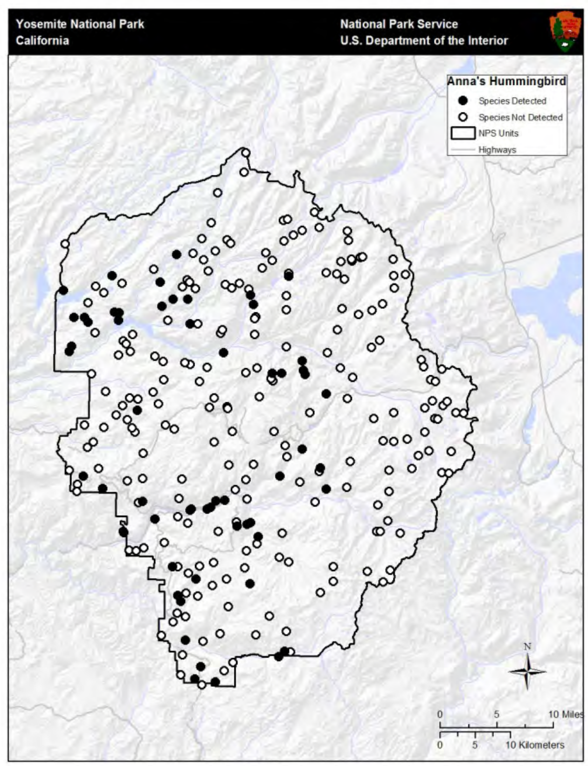

Figure 2. Bird survey transects where Anna's Hummingbird was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Anna's Hummingbird was observed within the lower to middle-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Anna's Hummingbird in SEKI was 1709 m, with 95% of observations occurring between 478 and 3395 m. At YOSE, the mean elevation of observations was 1952 m with 95% of observations falling between 1200 and 2970 m (Siegel et al. 2011).

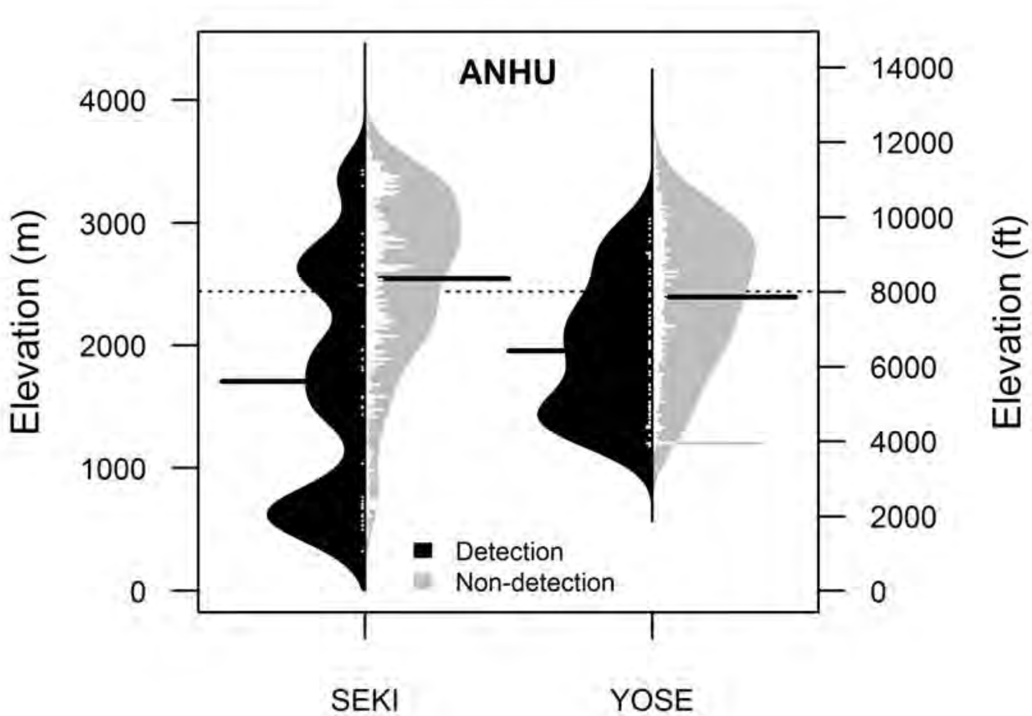

Figure 3. Elevational distributions of sites where Anna's Hummingbirds (ANHU) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Anna's Hummingbirds are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low to moderate numbers on individual BBS routes at YOSE and SEKI. Significant positive trends were observed in the short-term across California and both the short and long-terms in the Sierra Nevada Region (BCR 15). A dramatic positive trend was also observed during 1974-2005 along the Kings Canyon NP route (Table 3), although sample sizes along that route remain quite small.

Table 3. Relative abundance and trends for Anna's Hummingbird according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	139	1.59	+1.1	0.09
	1980-2007			+1.7	0.00
Sierra Nevada (BCR 15)	1966-2007	21	0.71	+9.7	0.00
	1980-2007			+7.4	0.00
Route 14117 – Sequoia NP	1972-2005	1	2.56	-23.8	0.09
Route 14132 – Kings Canyon NP	1974-2005	1	0.85	+30.5	0.01
Route 14156 – Yosemite NP	1974-2007	1	0.81	-8.8	0.15

Anna’s Hummingbirds are captured in low numbers at MAPS banding stations in SEKI and YOSE, but are not banded. For this reason demographic and survivorship data are not available from MAPS stations.

Stressors

Anna’s Hummingbird appears to be healthy across California and where they occur in the Sierra Nevada with populations likely increasing across its range (Russell 1996, Sauer et al. 2008). Such increases can be attributed to the introduction of new food sources in the form of artificial bird feeders and non-native flowering plants. There appear to be no major current threats to the species and evidence suggests that the species has not yet responded to recent climate change by shifting its range, although unstudied effects are plausible.

Climate Change: An analysis of shifts between the historical range of Anna’s Hummingbird (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species did not responded to either temperature or precipitation changes by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count data suggests that the center of abundance of Anna’s Hummingbird has not shifted latitudinally over the past 40 years throughout its range. These data show a 20.9 mile shift away from the coast, which could be associated with movement toward cooler areas as the climate warms, but without a corresponding northward shift evidence of climate-driven range shifts is not strong (Audubon 2009). This observed shift provides evidence that Anna’s Hummingbird is not responding to climate change as strongly as other bird species.

Altered Fire Regimes: Although fires can impact Anna’s Hummingbird populations locally through temporary loss of habitat, they do not appear to be a major concern for the species and may benefit hummingbirds where burned areas increase the abundance of early-seral flowering plants.

Habitat Fragmentation or Loss: Anna’s Hummingbird is tolerant of human presence and land-use change (Russell 1996). In fact human-altered habitat often benefits the species where additional flowering plant species are introduced (see below).

Invasive Species and Disease: The introduction of non-native plants, especially tree tobacco and eucalyptus have provided Anna's Hummingbird with additional food sources when native flowers cease to bloom (Russell 1996). The presence of such food sources in lowland areas of southern California may delay or prevent the dispersal of individuals to higher elevations in the late summer and fall (Russell 1996). Although such introductions likely benefit the species as a whole, a reduced need to search for higher-elevation flowers late in the season may have led to a reduction in the number of Anna's Hummingbirds in the SIEN parks.

Anna's Hummingbird is not among the species often discussed as carriers of West Nile Virus (WNV). However, a single documented case of a dead Anna's Hummingbird testing positive for WNV in 2009 in California (CDPH 2010) suggests that the species is at least minimally susceptible to the disease.

Human Use Impacts: Like other hummingbird species, the introduction of artificial feeders provides resources when flowers are unavailable, possibly elevating populations above natural levels especially in urban and suburban areas (Russell 1996). Even if feeders are not placed with the SIEN parks, elevated populations elsewhere may supplement park populations.

Management Options and Conservation Opportunities

The lack of major threats to Anna's Hummingbird suggests that management of the species is unnecessary at this time. If declines in local populations are observed, artificial feeders can be implemented to supplement natural food sources, although this does not appear to be necessary in SIEN parks or elsewhere in California.

Ash-throated Flycatcher – *Myiarchus cinerascens*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Ash-throated Flycatcher is a locally common breeder in low-elevation portions of Sequoia and Kings Canyon (SEKI) National Parks and a locally uncommon breeder at the lower elevations in Yosemite (YOSE) National Park. The species has not been reported at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Ash-throated Flycatchers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Locally Common
Yosemite NP	Summer	Regular Breeder	Locally Uncommon
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Ash-throated Flycatcher is distributed throughout the North American southwest, including much of California and lower elevations of the Sierra Nevada (Cardiff and Dittmann 2002). Because the species primarily resides in the foothills, the montane Sierra is not of great importance to the species (Siegel and DeSante 1999).

Distribution and Habitat Associations

Ash-throated Flycatchers are found most often within chaparral-covered slopes or open pine-oak forests in the foothills, but also can be found in moist riparian habitat (Gaines 1992). Ash-throated Flycatchers were detected most often in Blue Oak Forests in SEKI, but were also found sporadically at YOSE during avian inventories (Table 2, Figures 1 and 2). The species was not detected during inventory surveys at DEPO (Table 2).

Table 2. Number of Ash-throated Flycatchers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	43	53	Blue Oak Forest	0.94	0.59 (0.22-1.53)
			Mixed Chaparral	0.31	0.35 (0.21-0.58)
			Live Oak/California Buckeye	0.28	0.19 (0.06-0.56)
Yosemite NP	4	4	NA[1]	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

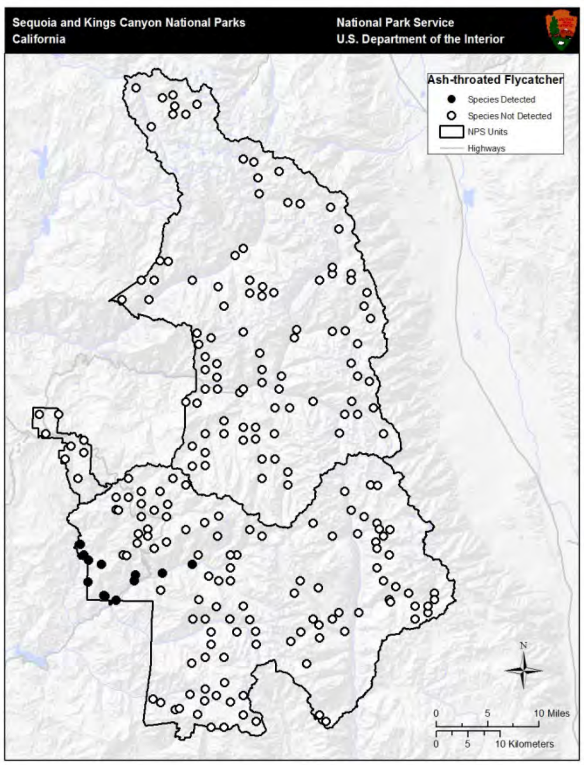

Figure 1. Bird survey transects where Ash-throated Flycatcher was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

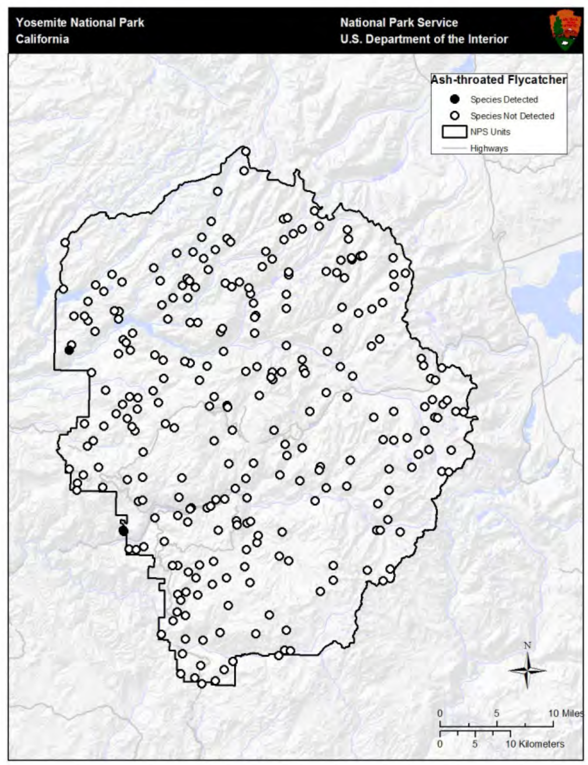

Figure 2. Bird survey transects where Ash-throated Flycatcher was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution
Ash-throated Flycatchers were observed within the lower-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations at SEKI was 780 m and 1386 m at YOSE (Siegel et al. 2011).

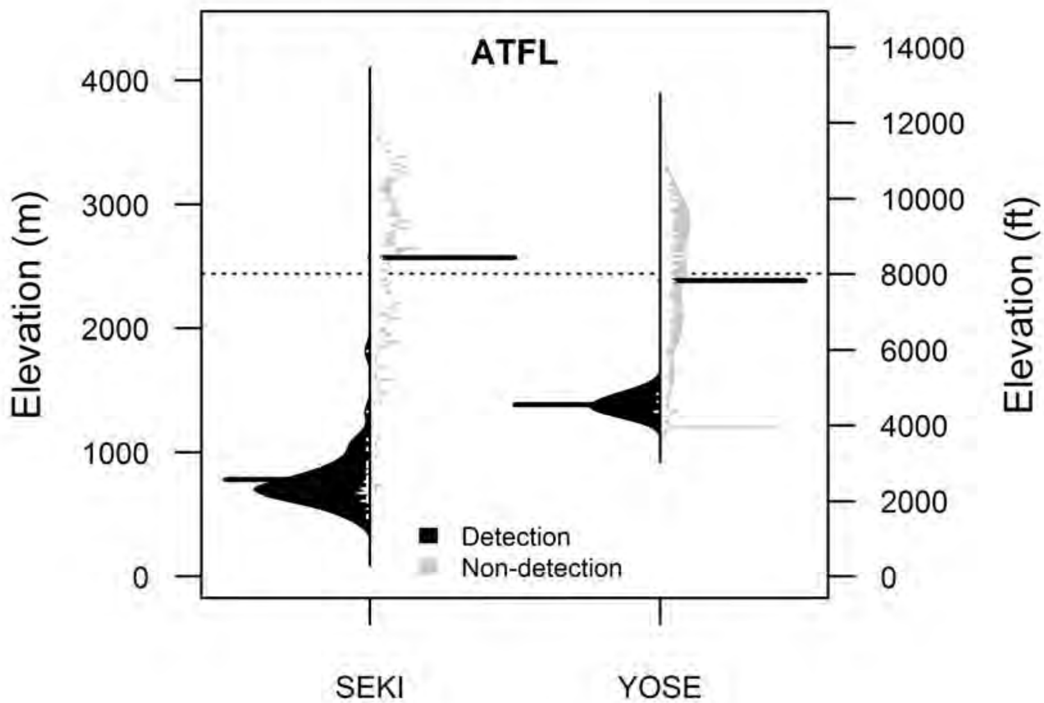

Figure 3. Elevational distributions of sites where Ash-throated Flycatchers (ATFL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Ash-throated Flycatchers are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in moderate to high numbers on individual BBS routes at YOSE and SEKI, most often along the Sequoia and Kings Canyon routes that extend into the foothills below the National Parks. A significant positive trend was observed on the Kings Canyon route during 1974-2007 (Table 3).

Table 3. Relative abundance and trends for Ash-throated Flycatcher according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	165	6.91	+0.0	0.96
	1980-2007			-0.5	0.38
Sierra Nevada (BCR 15)	1966-2007	13	3.77	+4.6	0.23
	1980-2007			+1.7	0.71
Route 14117 – Sequoia NP	1972-2005	1	13.31	+8.3	0.32
Route 14132 – Kings Canyon NP	1974-2005	1	9.65	+7.0	0.04
Route 14156 – Yosemite NP	1974-2007	1	1.42	+2.5	0.61

Although Ash-throated Flycatchers are sometimes caught at MAPS banding stations, they were not captured frequently enough at SIEN stations to make inferences about population trends and demographics.

Stressors

Loss of breeding and wintering habitat outside of SIEN parks appears to be the greatest threat to Ash-throated Flycatcher, although this has not led to declines in the species across its range. Minor and local threats to this flycatcher species include competition with European Starlings, habitat alteration by grazing or suburban landscaping with exotic plants, and heavy pesticide use; none of these are concerns within SEIN parks. Fire does not appear to be detrimental to the Ash-throated Flycatcher and climate change may even be beneficial to California populations of the species.

Climate Change: An analysis of shifts between the historical range of Ash-throated Flycatcher (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature and precipitation changes by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Ash-throated Flycatcher has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Modeled distribution shifts of Ash-throated Flycatcher predict increased occurrence of the species across California. The most prominent increases in occurrence are expected in the lower elevation areas of the state with little change in the southern Sierra Nevada. The most important variables influencing current and projected distribution were vegetation (in both models used), annual precipitation (Maxent distribution model) and mean diurnal range[1] (GAM distribution model) (Stralberg and Jongsomjit 2008).

Ash-throated Flycatchers are found breeding in the lower-elevations of SIEN parks (Figure 3). If, contrary to model predictions, climate change causes the species' range to shift upward as is generally expected for many species, there is much higher-altitude habitat for new colonization within Sequoia and Kings Canyon as well as Yosemite. Furthermore, SIEN parks are positioned in the middle to northern part of the species' range, suggesting any range shifts would not result in loss of the species from the parks. Ash-throated Flycatcher appears likely to fare better than many species as California's climate changes in the coming decades.

Altered Fire Regimes: Ash-throated Flycatchers have been found to utilize post-fire habitat, provided appropriate nesting sites remain (Smith et al. 2007). Given that post-fire snag removal does not occur to any large extent within SIEN parks, periodic fires are not likely to pose a major threat to the Ash-throated Flycatcher.

Habitat Fragmentation or Loss: Loss of oak woodland and pinyon-juniper breeding habitat is detrimental to the Ash-throated Flycatcher (Siegel and DeSante 1999) and clearing of habitat for agriculture, urbanization, suburbanization, and flood-control projects has likely led to reductions and even extirpations of some local populations (Cardiff and Dittmann 2002). Habitat loss is not a concern within SIEN parks, but could affect park populations indirectly, especially if tropical wintering habitat is destroyed or degraded (Siegel and DeSante 1999).

Invasive Species and Disease: European Starlings compete with Ash-throated Flycatchers for nest cavities. However, the flycatchers may be able to evict and dominate starlings when starling densities are low (Siegel and DeSante 1999) as they are in SIEN parks. Where native vegetation has largely been replaced with exotic plants, particularly in suburban areas, densities of Ash-throated Flycatchers have decreased (Cardiff and Dittmann 2002). Because extensive landscaping with exotic plants does not occur in SIEN parks this is not a major concern for park populations.

Human Use Impacts: Loss of prey species from heavy pesticide use is a potential, but likely unrealized concern outside of SIEN parks. Pesticide use on the Ash-throated Flycatcher's wintering grounds may be a more serious concern, though solid data are lacking (Siegel and DeSante 1999). Ash-throated Flycatchers are relatively tolerant of disturbance at nesting sites and population declines may have been offset by artificial nest sites in some areas (Cardiff and Dittmann 2002). Livestock grazing appears to be somewhat detrimental to the Ash-throated Flycatcher (Cardiff and Dittmann 2002), but the limited pack-stock grazing within SEIN parks is unlikely to cause a problem for park populations.

Management Options and Conservation Opportunities

Ash-throated Flycatcher nesting sites have been supplemented by artificial nest boxes in some areas to increase densities of the species (Cardiff and Dittmann 2002). However, the species appears healthy across California (Table 3) making special management within SIEN parks unnecessary.

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[1] The mean diurnal range is a measure of the average temperature change within each month (Stralberg and Jongsomjit 2008).

Bald Eagle – *Haliaeetus leucocephalus*

Migratory Status
Migration varies (Buehler 2000)

Residency and Breeding Status
Bald Eagle is a rare visitor to Devils Postpile (DEPO) National Monument and Sequoia and Kings Canyon (SEKI) National Parks, and is an uncommon, but occasional breeder in Yosemite (YOSE) National Park (Table 1).

Table 1. Breeding status and relative abundance of Bald Eagles in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Year-round	Non-Breeder	Rare
Yosemite NP	Migrant/Year-round	Occasional Breeder	Uncommon
Devils Postpile NM	Migrant/Summer	Non-Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S2 – Imperiled (High risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Bird of Conservation Concern (delisted 8-8-07)

Range Significance
Bald Eagles breed throughout Canada and in most U.S. states (with the exception of Hawaii, Rhode Island, and Vermont), but primarily in Alaska, Southeastern U.S. and the Pacific Northwest down to Northern California (Buehler 2000). Because SIEN parks fall outside of their primary breeding range, the parks are not a significant part of the Bald Eagle range.

Distribution and Habitat Associations
Bald Eagles are observed most often hunting over water bodies and wetlands, but can be seen migrating over any type of habitat (Gaines 1992). During park inventories Bald Eagle was observed only once in YOSE (Figure 1) and was not detected in SEKI or DEPO (Table 2). Bald Eagles were not observed frequently enough to infer habitat preferences within the SIEN parks.

Table 2. Number of Bald Eagles recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Not detected	NA	NA
Yosemite NP	1	1	NA[1]	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

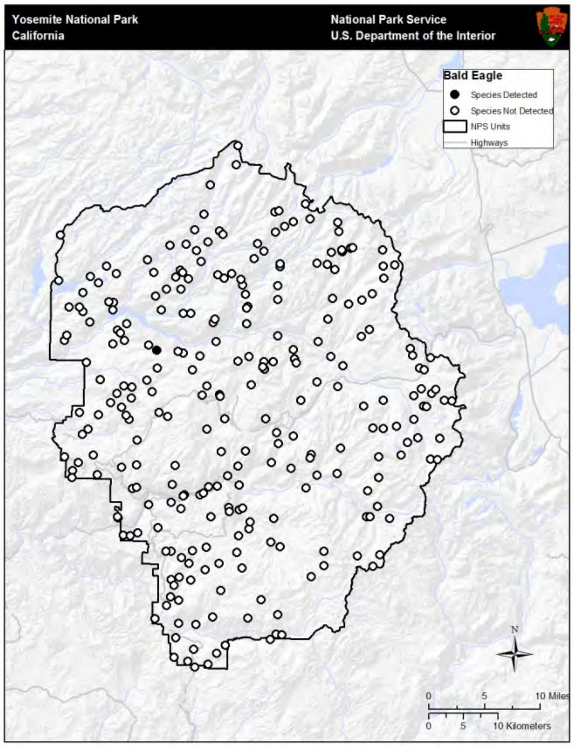

Figure 1. Bird survey transects where Bald Eagle was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Bald Eagle was observed once in the middle elevations (2338 m) of YOSE during the avian inventory project (Figure 2) (Siegel et al. 2011).

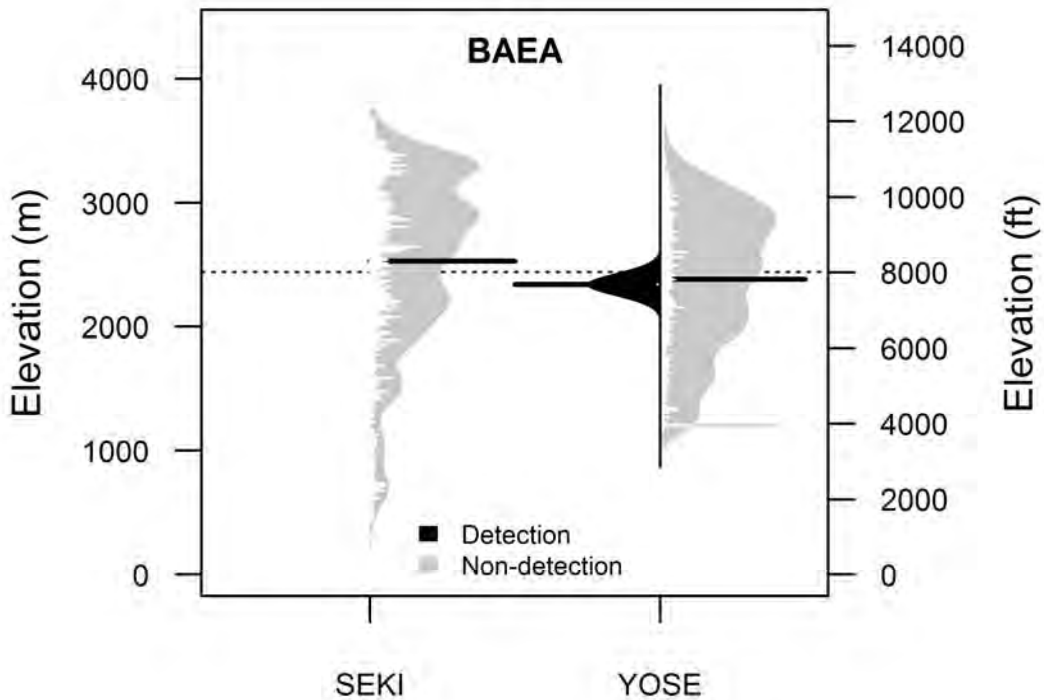

Figure 2. Elevational distributions of sites where Bald Eagles (BAEA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Bald Eagles are observed rarely in the Sierra Region (BCR 15) and in California as a whole. They were not detected on individual BBS routes at YOSE and SEKI. A significant positive trend was observed in California both in the short and long-term (Table 3), but the low observed abundance makes the reliability of these results questionable.

Table 3. Relative abundance and trends for Bald Eagle according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007[1]	16	0.05	+14.2	0.00
	1980-2007[1]			+12.1	0.00
Sierra Nevada (BCR 15)	1966-2007[1]	4	0.02	+15.6	0.17
	1980-2007[1]			+16.8	0.14
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Bald Eagles are not captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Despite great improvements over the past 40 years, contaminants such as pesticides, oil, and lead remain one of the greatest threats to Bald Eagles across their range. Also of concern is the loss of breeding and foraging habitat, mortality due to interactions with vehicles and human infrastructure, and human disturbance at nesting sites. Of these threats only nest disturbance is relevant within SIEN parks, although other factors likely affect SIEN birds when they move beyond park boundaries. Of less concern are diseases affecting Bald Eagles, shooting and trapping by humans, the effects of climate change, and reduced habitat suitability due to selective logging and fire suppression.

Climate Change: The occurrence of Bald Eagles across many climate zones suggests that their persistence is more tightly linked to the availability of habitat and prey species than to temperature and precipitation patterns. Therefore, Bald Eagles are not likely to be affected directly by climate change. However, local abundance and distribution of the species may shift if the abundance and migratory timing of prey species such as salmon shifts with the changing climate.

Altered Fire Regimes: Selective logging and long-term fire suppression in mixed-conifer forests can lead to alterations in forest composition and structure such that sites can become less suited for roosting by Bald Eagles (e.g. Bear Valley National Wildlife Refuge in southern Oregon; Dellasala et al. 1998). However, without timber harvest or a large population of Bald Eagles within SIEN, similar losses of adequate roosting sites are not likely to be a concern within the parks.

Habitat Fragmentation or Loss: Human development, especially of coastal and aquatic areas (Buehler 2000) as well as timber and ore extraction (NatureServe 2009) can lead to loss of foraging and breeding habitat for Bald Eagles. Loss of eagle habitat within SIEN parks is not a concern, but park populations can be detrimentally affected by development beyond park boundaries.

Invasive Species and Disease: The presence of exotic macrophytes (e.g. *Hydrilla verticillata*) and an associated toxic cyanobacteria in Southeastern U.S. reservoirs has been linked to infections of avian vacuolar myelinopathy which can be fatal to Bald Eagles and waterfowl (Williams et al. 2007). However, a similar phenomenon does not appear to be occurring in California or the SIEN parks. Other diseases known to cause morbidity and mortality among Bald Eagles include avian mycobacteriosis (Hoenerhoff et al. 2004), the parasite *Toxoplasma gondii* (Szabo et al. 2004) and avian influenza (Fuller et al. 2010). However, cases of infection are not widespread and not a great concern for SIEN Bald Eagles.

Human Use Impacts: Shooting and trapping of Bald Eagles by Native Americans, European settlers and ranchers are the greatest threats to the species historically. Since the 1970s such killings have been reduced largely due to public education and greater law enforcement coupled with the Endangered Species Act, but human persecution continues to some degree (Buehler 2000).

Bald Eagles are highly susceptible to contaminants such as those resulting from the application of pesticides and oil spills. Bald Eagles can be affected either through direct contact with a toxin or through secondary poisoning by eating contaminated prey. Studies suggest that DDE, a metabolite of the pesticide DDT, caused declines in reproductive success and population size due to eggshell thinning prior to its ban in the U.S. in 1972. Since the cessation of DDT use, reproductive success improved across the species' range (Buehler 2000). However, other contaminants such as PCBs, Dieldrin and Cyclodiene (organochlorine) pesticides continue to threaten Bald Eagles through mortality and reproductive failure (Buehler 2000). Additionally, lead poisoning, primarily from consumption of hunter-shot prey continues to cause some morbidity and mortality among Bald Eagles (Buehler 2000).

Interactions with vehicles and human infrastructure are major threats to Bald Eagles as the species is susceptible to collisions with vehicles (while scavenging road kill) and power lines as well as to electrocution from power lines (Buehler 2000). Disturbance at nesting sites has varying effects on nesting pairs, but may reduce reproductive success among some populations (USFWS 2007).

With the possible exception of human disturbance at nesting sites, persecution by humans, contamination by pesticides and other toxins, and deaths from interactions with vehicles and infrastructure are not major threats within SIEN parks. However, due to the wide-ranging nature of Bald Eagles such threats are likely to affect eagles that utilize SIEN as well as more human-dominated areas.

Management Options and Conservation Opportunities

First protected under the Bald Eagle Protection Act in 1940, and later the Endangered Species Act of 1973, Bald Eagles have provided an example of successful conservation as steps toward their preservation have led to greatly recovered populations throughout the U.S. The Bald Eagle was down-listed from endangered to threatened in 1995 (Buehler 2000) and finally delisted in 2007 (USFWS 2008).

Because the Bald Eagle occurs and breeds rarely within SIEN parks and because most threats to the species occur outside of park boundaries, there is little park managers can and need to do to preserve park populations. However, where breeding does occur, human activities surrounding nest sites should be limited to reduce chances of nest failures (NatureServe 2009). If needed, further guidelines for the protection of foraging and nesting sites of the Bald Eagle are available (i.e., National Bald Eagle Management Guidelines, USFWS 2007).

Band-tailed Pigeon – *Patagioenas fasciata*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Band-tailed Pigeon is a common summer resident and breeder at Yosemite (YOSE), Sequoia and Kings Canyon (SEKI) national parks, but is absent from Devils Postpile National Monument (DEPO) (Table 1).

Table 1. Breeding status and relative abundance of Band-tailed Pigeons in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Primarily Summer	Regular Breeder	Fairly Common
Yosemite NP	Primarily Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G4 – Apparently Secure (Uncommon, but not rare)
- National Status: N4 – Apparently Secure (Uncommon, but not rare)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The species is limited to the southwestern U.S., and the Pacific Slope of North America with the subspecies *monilis* confined to the pacific slope only. Sierra Nevada populations, including birds in the SIEN parks, are relatively important for the overall range of the species and especially the *monilis* subspecies (Siegel and DeSante 1999).

Distribution and Habitat Associations
Band-tailed Pigeons prefer oak woodlands, sometimes intermixed with conifers, for breeding and feeding grounds (Gaines 1992). Band-tailed Pigeons were detected in low densities (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory projects in SEKI and YOSE and were not observed in DEPO. Park inventories show highest associations with Giant Sequoia and Canyon Live Oak forests within SEKI and YOSE respectively (Table 2). However, when adjusted for detectability, densities of Band-tailed Pigeons in SEKI were uniformly low for the three habitat types where they were detected most often. The limited number of observations likely reflects the species' preference for oaks, which are scarce in the conifer-dominated forests of the parks.

Table 2. Number of Band-tailed Pigeons recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	10	10	Giant Sequoia Forest	0.02	0.01 (0.00-0.05)
			Red Fir/White Fir Forest	0.01	0.01 (0.01-0.04)
			California Black Oak Forest	0.00	0.01 (0.01-0.08)
Yosemite NP	23	43	Canyon Live Oak	0.06	
			Mixed Chaparral	0.04	
			Western Juniper	0.03	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

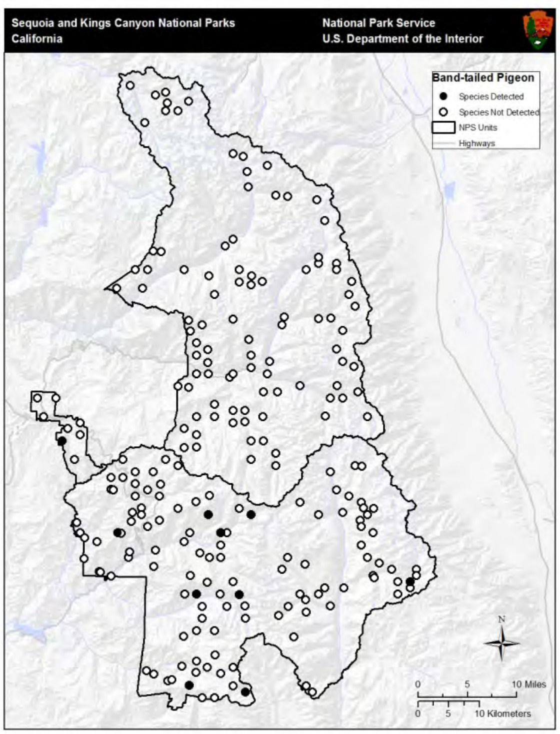

Figure 1. Bird survey transects where Band-tailed Pigeon was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

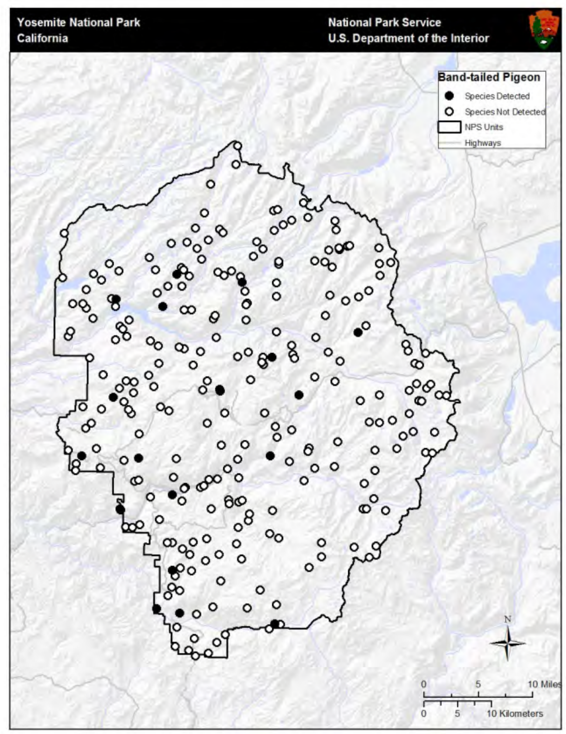

Figure 2. Bird survey transects where Band-tailed Pigeon was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Band-tailed Pigeon was observed within the mid to lower elevations of both SEKI and YOSE during recent avian inventory projects (Figure 3). The mean elevation of observations of Band-tailed Pigeon made in SEKI was 2331 m, with 95% of observations made between 810 and 3209 m. In YOSE, the mean elevation of observations was 2039 m, with 95% of observations falling between 1208 and 2831 m (Siegel et al. 2011).

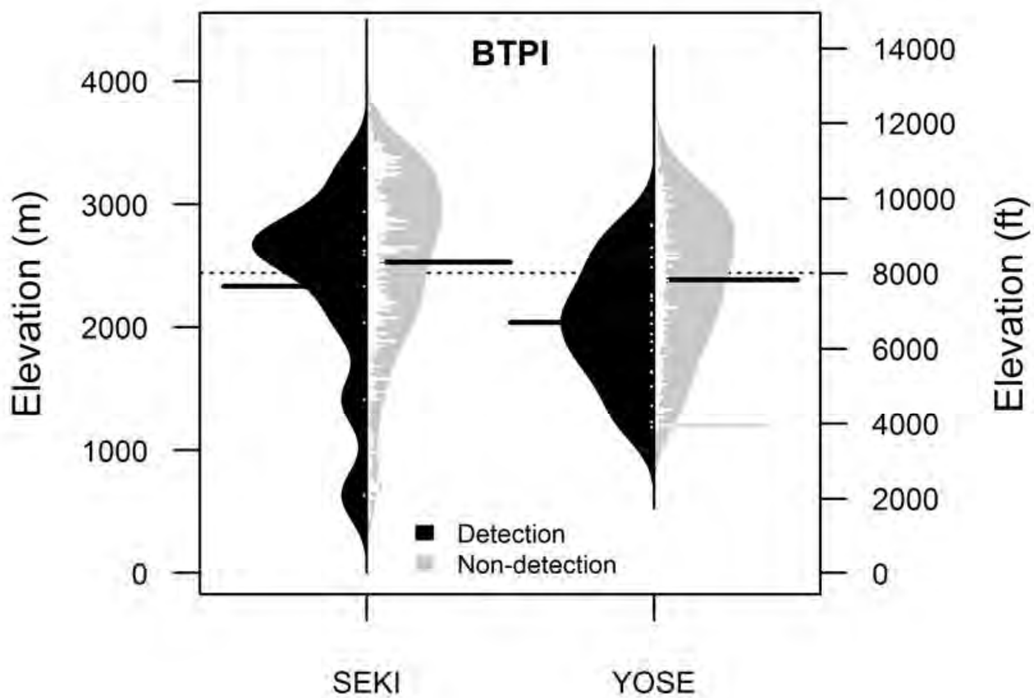

Figure 3. Elevational distributions of sites where Band-tailed Pigeons (BTPI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Band-tailed Pigeons are found in slightly greater abundance in California overall than in the Sierra Region (BCR 15) (Table 3). They were detected in moderate numbers on individual BBS routes at SEKI, but in fewer numbers in YOSE. There are no significant population trends in California or the Sierra range, although there are non-significant declines in the Sierra Nevada and recently (1980-2007) in California as a whole.

Table 3. Relative abundance and trends for Band-tailed Pigeon according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	107	2.22	-0.5	0.74
	1980-2007			-1.1	0.09
Sierra Nevada (BCR 15)	1966-2007	26	2.17	-3.7	0.07
	1980-2007			-4.4	0.16
Route 14117 – Sequoia NP	1972-2005	1	4.69	+39.0	0.20
Route 14132 – Kings Canyon NP	1974-2005	1	2.50	+5.5	0.64
Route 14156 – Yosemite NP	1974-2007	1	1.88	-6.5	0.31

Band-tailed Pigeons are not generally captured at SIEN MAPS stations; no data on productivity and survival are available.

Population and trend data for Band-tailed Pigeon at SEKI and YOSE provide no evidence of declines, but park populations are relatively small. Apparent declines in the species across the state and in the Sierra may be attributed to poor acorn crops which provide the primary food source for Band-tailed Pigeons (Siegel and DeSante 1999). Low densities of the species during park inventories and possible declines across the Sierra and California warrant continued monitoring of Band-tailed Pigeon populations in SIEN parks.

Stressors

Most troubling for Band-tailed Pigeon is an apparent California and Sierra-wide decline in recent years (Sauer et al. 2008). Suggested causes of this decline include years of poor acorn production (Siegel and DeSante 1999). However, hunting of the species may contribute to population declines as well. Predictions of Band-tailed Pigeon's response to climate change are mixed with modeled range shifts showing decreased occurrences, but an assessment of life-history characteristics suggesting low sensitivity to the threat. Thus, climate change has the potential to be a significant threat to the species, but large uncertainties remain. Also of concern are infrequent, but highly damaging local outbreaks of disease within Band-tailed Pigeon populations, as well as potential habitat loss from increased fire frequencies or land conversion outside of SIEN parks.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of Band-tailed Pigeon has significantly shifted 69.5 miles to the north over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts toward higher latitudes suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). This observed shift provide evidence that Band-tailed Pigeon has already responded to climate change and will likely continue to shift its range in the coming decades.

Modeled distribution shifts of Band-tailed Pigeons show decreased distribution of the species across California. The most prominent decreases in occurrence are shown in the Sierra Nevada, with high numbers of Band-tailed Pigeons remaining along the north and central coasts of California. The most important variables influencing current and projected distribution were vegetation (both distribution models), annual precipitation (Maxent distribution model), and mean temperature of the warmest quarter (GAM distribution model) (Stralberg and Jongsomjit 2008).

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Band-tailed Pigeon received a sensitivity score of 23.47 (UW 2010), suggesting low sensitivity to the threat. Certainty of results was listed as 36.25 out of 100 (a score of 100 representing complete certainty).

Unlike many other species, Band-tailed Pigeons may not be able to adapt to climate change by dispersing to higher elevations unless oak populations are able to move rapidly upslope as well. However, if oaks colonize higher elevations within SIEN parks it is possible that Band-tailed Pigeons will occur more widely within the network in the future.

Altered Fire Regimes: Increased fire frequencies within oak woodlands could have negative effects on the species in the future.

Habitat Fragmentation or Loss: Any loss of oak habitat is detrimental to Band-tailed Pigeon. Additionally, degradation of habitat which results in reduced acorn yields can cause individuals to disperse to less preferred habitat in search of food, including converted farmland, especially grain crops (Keppie et al. 2000).

Invasive Species and Disease: The species is known to suffer large local die-offs from infections of *Trichomonas gallinae* (Stromberg et al. 2008), which could have dire consequences in any SIEN park if the disease were to spread to local populations.

Human Use Impacts: Band-tailed Pigeon is a game bird which has experienced large declines from over-harvest in the past. Currently hunting pressure does not appear to be causing serious population declines. However, better data on annual take and population trends are needed (Keppie et al. 2000). Hunting is not permitted within SIEN parks, although hunting pressure in surrounding areas could impact park populations which cross park boundaries.

Oak woodlands in north-central coastal California have been falling victim to sudden oak death syndrome (SODS), a disease caused by a previously unknown species of *Phytopthora,* a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SODS was probably introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Band-tailed Pigeons and other oak-dependent species if it reaches those regions of the Sierra Nevada.

Management Options and Conservation Opportunities

Band-tailed Pigeon is managed as a game species in California and take is limited in the state. However, current funding for assessments of abundance may be inadequate to accurately assess the impact of hunting of Band-tailed Pigeon populations (Keppie et al. 2000). Hunting does not occur within SIEN parks, but low numbers of the species warrant attention to population trends and habitat needs.

Possibly the greatest challenge to managing Band-tailed Pigeon is the lack of effective population monitoring techniques. Standardized point count survey techniques have low detection rates for this species, suggesting that species-specific monitoring is necessary to accurately assess populations and trends (NatureServe 2009).

Likely the best way to conserve Band-tailed Pigeons in SIEN parks is to preserve oak woodland habitat where it currently exists and consider the potential to foster its expansion up-slope with climate warming. Habitat conservation and improved understanding of population trends and needs is essential for active management of this species. The parks should train staff to recognize oak diseases such as SODS, and preventative measures including quarantine of the area could be immediately implemented if SODS is identified.

Barn Swallow – *Hirundo rustica*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Barn Swallow is an uncommon occasional breeder at Sequoia and Kings Canyon National Parks (SEKI) and a fairly common regular breeder at Yosemite National Park (YOSE); the species has not been reported at Devils Postpile (Table 1).

Table 1. Breeding status and relative abundance of Barn Swallows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Summer	Occasional Breeder	Uncommon
Yosemite NP	Migrant/Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Barn Swallow breeds across most of the continental United States, Canada, and northern Mexico (Brown and Brown 1999). The species' extensive range and relative uncommonness in much of the Sierra Nevada make the Sierra not very important to Barn Swallow overall (Siegel and DeSante 1999).

Distribution and Habitat Associations
Barn Swallows in the Sierra Nevada are closely associated with meadows and other wetlands, as well as human settlements – they often attach nests to buildings (Gaines 1992). Barn Swallows were not detected during point counts associated with SIEN park inventories, and were detected only anecdotally at YOSE (Table 2).

Table 2. Number of Barn Swallows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Not detected	NA[1]	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Because of the lack of detections, quantitative elevation data from the SIEN avian inventory projects are not available. Gaines (1992) reports that the species nests in the Yosemite area up to around 1524 m.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Barn Swallows are found in much lower abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes that intersect Sequoia NP and YOSE, but not Kings Canyon NP. No significant population trends were observed in the Sierra Region or California as a whole (Table 3).

Table 3. Relative abundance and trends for Barn Swallow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	127	5.07	-0.5	0.69
	1980-2007			+0.0	0.99
Sierra Nevada (BCR 15)	1966-2007	18	1.56	-1.8	0.41
	1980-2007			-2.7	0.28
Route 14117 – Sequoia NP	1972-2005	1	0.31	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.96	-20.8	0.01

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Barn Swallows are only rarely captured at SIEN MAPS stations; data on productivity and survival for park birds are not available.

Stressors
The Barn Swallow is the most widely distributed and abundant swallow in the world, and is well-studied due to its close association with human habitation (Brown and Brown 1999). The Barn Swallow may have increased in the Sierra in population size and distribution over the past half-century; the species was not recorded in Yosemite NP before 1949, for example (Siegel and DeSante 1999). Its current population trend appears to be stable (Table 3).

The Barn Swallow has benefited greatly by human construction, and the species now nests almost exclusively in buildings, culverts, bridges, and any structure that provides a flat ledge and/or overhang (Brown and Brown 1999). Barn Swallows forage close to the ground over wetlands and other moist areas, so elimination or drying up of these habitats, either directly from development or indirectly from climate change could adversely impact the species. Brown-headed Cowbirds are known to parasitize Barn Swallow nests, and pesticide use may decrease the prey base.

Climate Change: The Barn Swallow is closely associated with human structures near meadows and other wetlands and is found in low-elevation habitats in the Sierra. If climate change causes the swallow's range to shift upward as is generally expected for a number of species, there is much middle- and higher-altitude wetland habitat for new colonization within SEKI and YOSE. However, it is important to note that even if Barn Swallows are able shift their range in response to climate change, populations may suffer if the habitats they depend upon are degraded due to climate warming.

Altered Fire Regimes: Little is known about the effects of fire on Barn Swallows. Some nesting structures may be eliminated if fire destroys buildings, but other structures such as bridges and culverts are probably less vulnerable. Wetland foraging habitats are little affected by fires.

Habitat Fragmentation or Loss: Barn Swallows once built their mud nests in caves and on cliff faces, but now use human structures almost exclusively (Brown and Brown 1999). The Barn Swallow's conversion to artificial sites started long before European settlement of North America, as these birds already were nesting on Native American habitations in the early 1800s. The species now builds its nests in virtually any sort of building, shed, bridge, culvert, or other structure that provides a wall with on overhang and/or flat ledge (Brown and Brown 1999). Thus, nesting habitat for the Barn Swallow is greatly enhanced by construction in SIEN parks. Habitat may be lost when water sources or moist areas for foraging are eliminated, which is not a threat in the parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Barn Swallows are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Overall, human activities have had a strong positive effect on Barn Swallow populations, and the species has adapted well to human-altered habitats throughout its range. The proximity of nests on bridges and culverts to automobile traffic means that adults and juveniles are vulnerable to collisions with vehicles (Brown and Brown 1999).

Packstock grazing in SIEN parks is a potential concern for Barn Swallows because it can attract Brown-headed Cowbirds, but at the same time stables and other structures built for livestock provide nesting substrates. As compared to the greater Sierra Nevada where cattle grazing and related infrastructures are widespread, any impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Pesticide use may pose a risk to Barn Swallows by reducing their prey base (Siegel and DeSante 1999).

Management Options and Conservation Opportunities

Barn Swallow populations can be protected in SIEN parks by preventing disturbance and harassment at nests. Speed limits on roads should be strictly enforced to reduce collisions between Barn Swallows and vehicles. A previous assessment of cowbird pressure in SIEN parks is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Belted Kingfisher – *Megaceryle alcyon*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Belted Kingfisher is a locally common resident and breeder of Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and an uncommon migrant at Devils Postpile (DEPO) National Monument where it likely breeds during the summer months (Table 1).

Table 1. Breeding status and relative abundance of Belted Kingfishers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Common
Yosemite NP	Year-round	Regular Breeder	Locally Common
Devils Postpile NM	Migrant/Summer	Probable Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Belted Kingfishers are distributed over much of North America including the Sierra Nevada and SIEN parks. However, the species is relatively uncommon in the Sierra Nevada making the mountain range and SIEN parks of limited importance to the species' broader range (Siegel and DeSante 1999).

Distribution and Habitat Associations
Belted Kingfishers are found along freshwater lakes and streams (Gaines 1992). Belted Kingfisher was detected infrequently (Table 2) along few survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE and was not observed during inventory point counts in DEPO. Park inventories show highest associations with Ponderosa Pine Woodland and Montane chaparral within SEKI and YOSE respectively (Table 2). Although Belted Kingfisher was recorded at low densities in several upland habitats at SEKI and YOSE, these results are largely artifacts of the study design, which classified habitats according to the dominant vegetation within 50 m of the survey station. Belted Kingfishers likely occurred along waterways within a larger matrix of upland habitats.

Table 2. Number of Belted Kingfishers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	3	3	Ponderosa Pine Woodland	0.08	NA
Yosemite NP	4	4	Montane Chaparral Montane Meadow	0.01 0.01	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

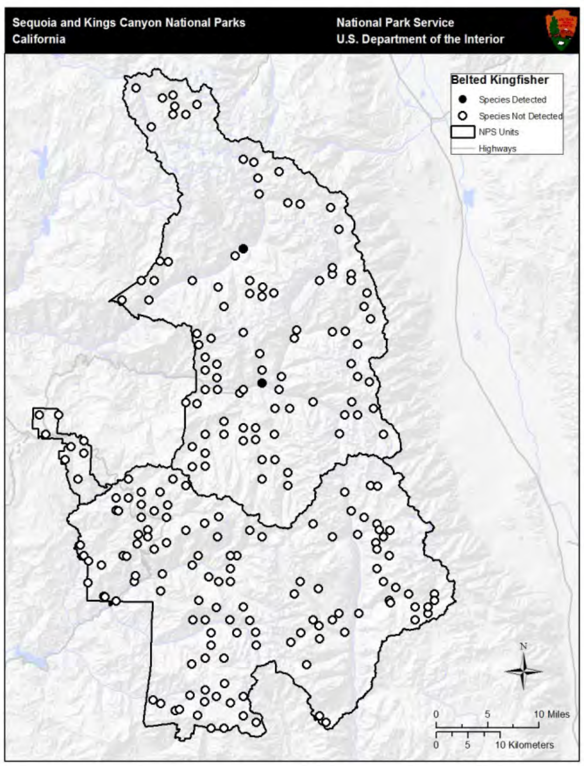

Figure 1. Bird survey transects where Belted Kingfisher was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

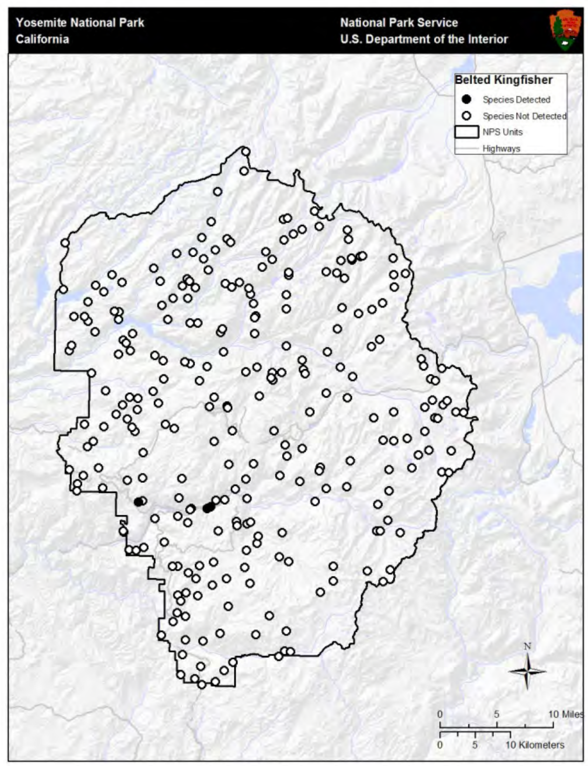

Figure 2. Bird survey transects where Belted Kingfisher was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution
Belted Kingfisher was observed within the lower elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of the four observations at YOSE was 1389 m; the mean elevation of the three observations at SEKI was 1644 m (Siegel et al. 2011).

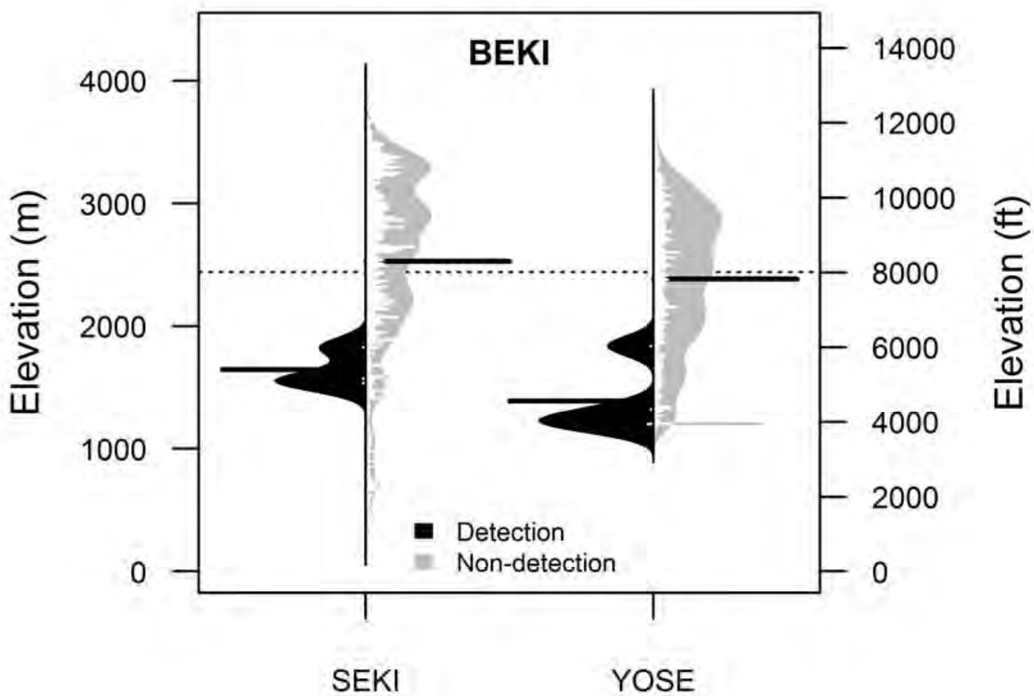

Figure 3. Elevational distributions of sites where Belted Kingfisher (BEKI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data
Breeding Bird Survey (BBS) data indicate Belted Kingfishers are found in low numbers in both the Sierra Region (BCR 15) and in California as a whole, but only along ten BBS routes in the Sierra Nevada. They were also detected in low numbers on individual BBS routes at YOSE and Kings Canyon, but were not detected on the Sequoia NP route. A significant negative trend was observed in the Sierra Region during 1980-2007, along with non-significant negative trends along individual routes at the parks and across California as a whole (Table 3).

Table 3. Relative abundance and trends for Belted Kingfisher according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	68	0.18	-2.0	0.12
	1980-2007			-2.7	0.09
Sierra Nevada (BCR 15)	1966-2007	10	0.13	-12.3	0.02
	1980-2007			-9.2	0.09
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.60	-20.1	0.13
Route 14156 – Yosemite NP	1974-2007	1	0.12	-18.0	0.17

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Belted Kingfishers are infrequently captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Most troubling for Belted Kingfisher is a significant Sierra-wide decline during 1966-2007 (Sauer et al. 2008). The cause of this decline is unclear, but may be attributed to one or a combination of minor threats to Sierran populations. Belted Kingfishers are susceptible to disturbances at nest sites and reproductive success may suffer where riparian areas experience heavy human use and/or livestock grazing. Likewise, reproductive success may suffer somewhat where individuals are exposed to environmental contaminants. Such threats are not major concerns within SIEN parks, but may affect park populations indirectly. Climate change does not appear to be a major threat to the species at large, but observed shifts in the species' center of abundance may lead to decreased kingfisher breeding within SIEN parks in the future. Finally, altered fire regimes, invasive species, or disease have not been shown to pose major threats to the species.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of Belted Kingfisher throughout its range has significantly shifted 98.2 miles to the north and 31.8 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Belted Kingfisher has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Despite the observed shifts, the species' wide distribution across North American, throughout many different climate regions suggests that Belted Kingfishers are not highly sensitive to climatic variation. Any impacts from climate change will likely be indirect and result from changes in habitat structure and function, or prey species abundance. However, if Belted Kingfisher experiences a northward range shift as is generally expected of species living in the northern hemisphere, SIEN parks may begin seeing fewer breeding kingfishers due to the parks' location at the southern edge of the species' current breeding range.

Altered Fire Regimes: Where fires destroy Belted Kingfisher habitat, especially within riparian areas, local populations will be affected temporarily. However, changing fire regimes do not appear to pose a major threat to the species within SIEN parks.

Habitat Fragmentation or Loss: Degradation of riparian areas due to livestock grazing has been shown to significantly decrease the abundance of Belted Kingfishers as compared to ungrazed areas (Popotnik and Giuliano 2000). Due to the minimal amount of grazing within SIEN parks, this is not a major concern within park boundaries.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Belted Kingfisher. However, one untested speculation is that introduced trout may be harming kingfisher populations by eating prey species important for kingfishers (Siegel and DeSante 1999).

Human Use Impacts: Belted Kingfishers elsewhere in their range have experienced some negative effects on reproductive success due to environmental contaminants. However, the species does not appear as susceptible as other fish-eating birds to pollutants such as DDT and PCBs (Kelly et al. 2009). Before the implementation of legal protection, Belted Kingfishers were shot near fish hatcheries and trout streams as they were considered significant predators of desired fish species. However, shooting of Belted Kingfishers is no longer prevalent (Kelly et al. 2009). Neither environmental contaminants nor illegal shooting of individuals is a major threat within SIEN parks, although any exposure to pesticides in the species' wintering grounds in California's Central Valley could be detrimental (Siegel and DeSante 1999). Finally, Belted Kingfishers are sensitive to human disturbance especially during breeding (Kelly et al. 2009).

Management Options and Conservation Opportunities

The maintenance of water quality, cover, and availability of suitable nesting sites appear to be most important for breeding success of the species (Kelly et al. 2009). The maintenance of such habitat characteristics along streams used by Belted Kingfisher is likely the most effective way to protect the species within SIEN parks. Park managers can reduce nest disturbance and aid reproductive success by limiting human activities, especially packstock grazing near nesting sites during the breeding season. Additional, species-specific surveys would be helpful to reveal where Belted Kingfisher breeds within the SIEN parks.

Bewick's Wren – *Thryomanes bewickii*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Bewick's Wren is a fairly common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and an uncommon summer resident and possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Bewick's Wrens in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Bewick's Wren is widely distributed in the western U.S. but restricted to the southern half of the U.S. elsewhere, and is almost extirpated in the East (Siegel and DeSante 1999). The subspecies *drymoecus* occurs on the northern and central portions of the west slope, *correctus* on the southern portion of the west slope and very southern portion of the east slope, *atrestus* on the northern portion of the east slope, and *eremophilus* on the central and southern east slope (Siegel and DeSante 1999). None of these subspecies are centered in the Sierra, so the mountain range is of relatively low importance to the species (Siegel and DeSante 1999).

Distribution and Habitat Associations
Bewick's Wren prefers shrubland and shrubby riparian habitats at lower elevations of the west and east slope of the Sierra (Siegel and DeSante 1999). The species is not attracted to human habitations as much as the House Wren. Bewick's Wren were detected at moderate numbers (Table 2) along transects in SEKI and YOSE (Figures 1 and 2) but not at DEPO during avian inventory surveys. The species was most strongly associated with Mixed Chaparral in SEKI and Foothille Pine in YOSE (Table 2).

Table 2. Number of Bewick's Wrens recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	34	53	Mixed Chaparral	0.51	0.88 (0.60-1.27)
			Live Oak/California Buckeye	0.19	0.15 (0.04-0.59)
			Blue Oak Forest	0.13	0.11 (0.02-0.48)
Yosemite NP	26	31	Foothill Pine	0.27	
			Mixed Chaparral	0.12	
			Recent Burn	0.06	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

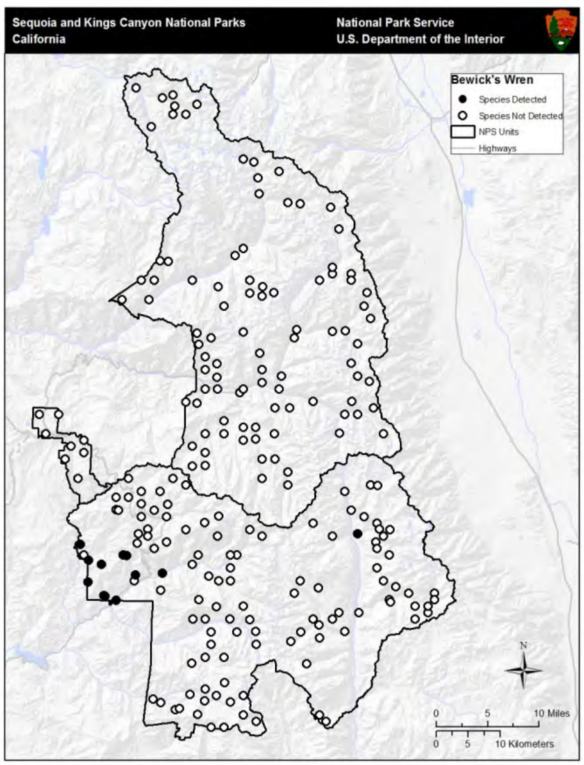

Figure 1. Bird survey transects where Bewick's Wren was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

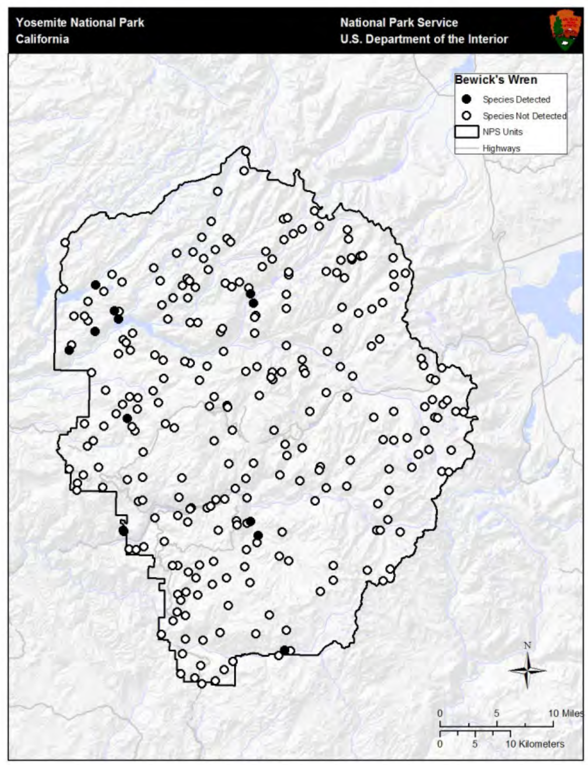

Figure 2. Bird survey transects where Bewick's Wren was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Bewick's Wren was detected at low to mid elevations at SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Bewick's Wren at SEKI was 970 m, with 95% of observations occurring between 590 and 1691 m. In YOSE, the mean elevation of observations was 1648 m with 95% of observations falling between 1235 and 2353 m (Siegel et al. 2011).

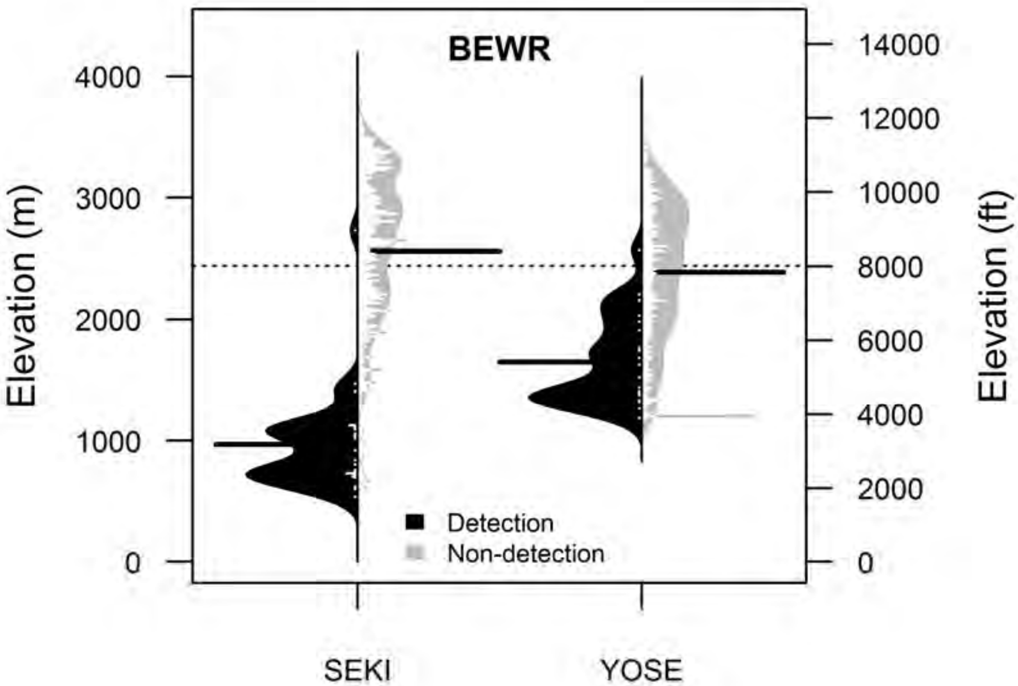

Figure 3. Elevational distributions of sites where Bewick's Wren (BEWR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) indicate Bewick's Wrens are less abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). No statistically significant population trends were observed, but a nearly significant (*P* = 0.07) increasing trend was suggested along the BBS route that intersects Yosemite NP (Table 3).

Table 3. Relative abundance and trends for Bewick's Wren according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	161	4.14	-1.2	0.15
	1980-2007			-0.5	0.79
Sierra Nevada (BCR 15)	1966-2007	23	1.59	+1.8	0.33
	1980-2007			+0.6	0.77
Route 14117 – Sequoia NP	1972-2005	1	6.50	+15.6	0.39
Route 14132 – Kings Canyon NP	1974-2005	1	3.70	+7.8	0.53
Route 14156 – Yosemite NP	1974-2007	1	2.31	+9.7	0.07

Mark-recapture data from Yosemite NP MAPS stations reveal a significant positive reproductive trend and a non-significant positive population trend for Bewick's Wrens (Table 4).

Table 4. Population trends, productivity, trends, and survival estimates of Bewick's Wren at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.0	NA[2]	NA	NA	NA
Yosemite NP	1993-2009	0.3	+6.25	0.76	+10.27*	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

The Bewick's Wren population appears to be stable in the Sierra Nevada based on BBS and MAPS data. Urban and agricultural development in the lower-elevation foothills may threaten local populations. Fire likely benefits this chaparral-dwelling species, thus restoration of natural fire regimes, including increased frequency and extent of high-intensity fire and allowing regeneration of chaparral should enhance habitat. Brown-headed Cowbird parasitism, exacerbated by presence of packstock, may pose a threat to Bewick's Wrens, as do grazing activities that reduce shrub cover required for nesting and foraging.

Climate Change: An analysis of shifts between the historical range of Bewick's Wren (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature changes) by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Bewick's Wren has shifted significantly northward by 55 miles and inland by 29 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be responding to climate change by shifting its range to cooler regions, and will likely continue to shift its range in the coming decades (Audubon 2009). Indeed, modeled distribution shifts of Bewick's Wrens predict an increasing probability of occurrence and range expansion throughout northern California, especially the coast north of San Francisco Bay, and in the higher-elevations of the Sierra Nevada, with range contractions in the southeastern desert regions (Stralberg and Jongsomjit 2008). The GAM distribution model predicts a much greater probability of occurrence in the Central Valley. Vegetation was the most important variable influencing current and projected distribution for both the Maxent and GAM models.

The Bewick's Wren breeds at lower elevations in SIEN parks (Figure 3). If climate change causes the wren's range to move upslope in the Sierra Nevada as is generally expected, the species should persist and thrive in the SIEN parks as long as Mixed Chaparral and other dry, shrubby habitat types expand uphill as well.

Altered Fire Regimes: Bewick's Wren is associated with shrub types such as Mixed Chaparral that are well-adapted to fire; some shrub species resprout after fire while others regenerate from seed banks (Riggan et al. 1994) and the Bewick's Wren was found in recently burned habitats in Yosemite NP (Table 2). The species was detected equally in burned and unburned forests in the southern Sierra (Siegel and Wilkerson 2005). A future increase in extent and frequency of fire that fosters and maintains shrub stands may increase habitat for Bewick's Wrens, at least in the shorter-term, while post-fire management activities that eliminate shrubs that are regenerating after fire would threaten this species. Policies of prescribed natural fire likely benefit this species in SIEN parks.

Habitat Fragmentation or Loss: Loss of shrubland habitats due to urban and agricultural development is a significant risk to Bewick's Wrens in the Sierra foothills (Siegel and DeSante 1999) but not in SIEN parks. As this species occurs primarily at low elevations outside these protected parks, some type of landscape-scale protection of chaparral habitat in the Sierra Nevada is sorely needed.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Bewick's Wrens are vulnerable to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for Bewick's Wrens, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock might damage chaparral habitat suitability by reducing cover. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks (Siegel and DeSante 1999).

Management Options and Conservation Opportunities

Park managers can protect Bewick's Wren populations in the parks by maintaining mixed chaparral habitats, restoring the natural fire cycle (including high-intensity fire where it is a characteristic of the historic fire regime), and carefully managing or potentially eliminating cowbird feeding sites such as stables. A previous assessment of cowbird pressure is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Black Phoebe – *Sayornis nigricans*

Migratory Status
Resident/Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Black Phoebe is a fairly common breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks. The species occurs rarely in Devils Postpile (DEPO) National Monument during migration (Table 1).

Table 1. Breeding status and relative abundance of Black Phoebes in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Migrant	Non-Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Black Phoebe is limited to the southwestern U.S. including much of California, but occurs less often in the Sierra Nevada than in other parts of the state (Siegel and DeSante 1999). Thus, SIEN parks are of less importance to the species than other areas of California, but still comprise a portion of the species' relatively small range within the U.S.

Distribution and Habitat Associations
Black Phoebes are most often found along the margins of streams, lakes, and meadows (Gaines 1992). Black Phoebes were detected in low densities (Table 2) along only a few transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were not observed during the DEPO survey. Park inventories show highest associations with Live Oak/California Buckeye forests and Mixed Chaparral within SEKI and YOSE respectively (Table 2). However, in this case observed habitat associations are likely artifacts of the study design, which classified habitats according to the dominant vegetation within 50 m of the survey station. Black Phoebes often occurred in small patches of riparian vegetation within a larger forest matrix.

Table 2. Number of Black Phoebes recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	4	5	Live Oak/California Buckeye	0.01	NA[1]
Yosemite NP	6	6	Mixed Chaparral Ponderosa Pine/Mixed Conifer	0.04 0.01	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

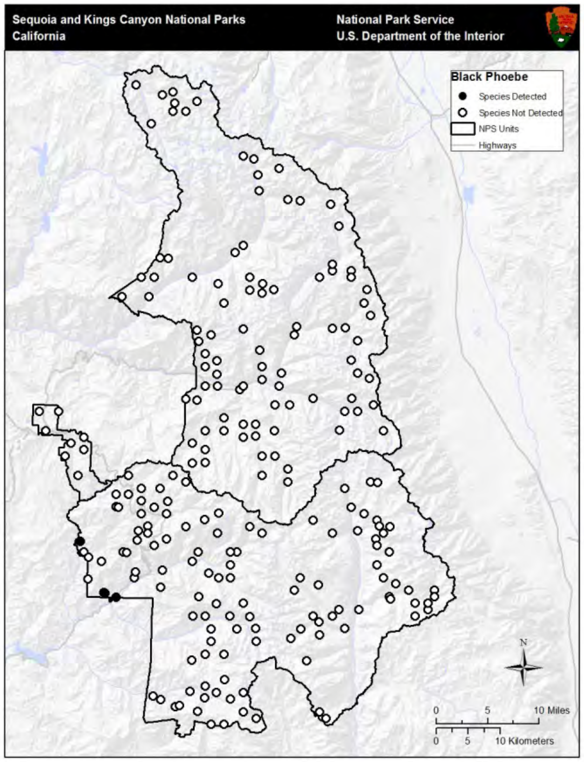

Figure 1. Bird survey transects where Black Phoebe was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

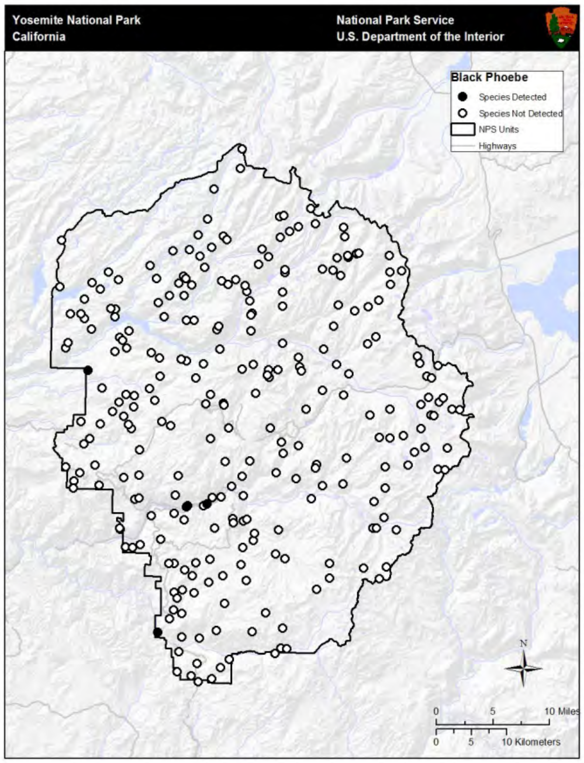

Figure 2. Bird survey transects where Black Phoebe was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Black Phoebe was observed within the lower-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Black Phoebe in SEKI was 562 m and 1295 m at YOSE (Siegel et al. 2011).

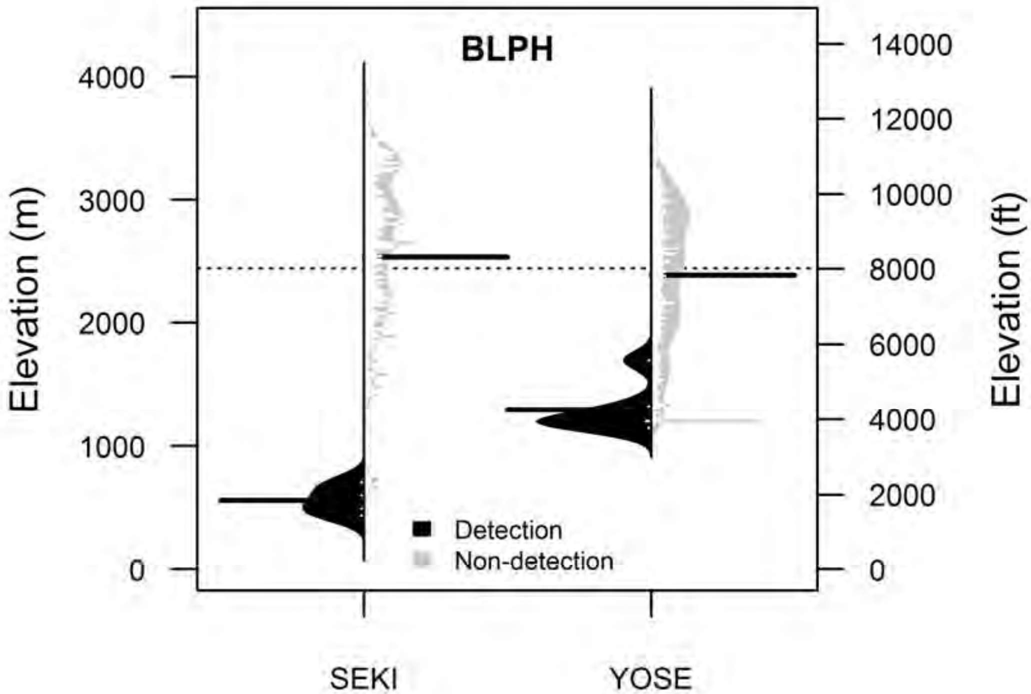

Figure 3. Elevational distributions of sites where Black Phoebes (BLPH) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Black Phoebes are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low to moderate numbers on individual BBS routes at YOSE and SEKI. A significant positive trend was observed across California during 1966-2007; other trends are not statistically significant (Table 3).

Table 3. Relative abundance and trends for Black Phoebe according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	132	1.36	+1.9	0.01
	1980-2007			+1.2	0.25
Sierra Nevada (BCR 15)	1966-2007	14	0.50	+5.9	0.22
	1980-2007			+4.6	0.40
Route 14117 – Sequoia NP	1972-2005	1	2.06	+6.5	0.71
Route 14132 – Kings Canyon NP	1974-2005	1	1.30	-1.6	0.78
Route 14156 – Yosemite NP	1974-2007	1	0.38	+22.6	0.17

MAPS data from YOSE show significantly negative population trends in the meadows where stations are located between 1993 and 2009, possibly due to relatively low adult survival. However, despite this trend, productivity is high and possibly increasing. There are no significant trends at the SEKI MAPS stations, but populations appear to be increasing despite possible declines in productivity. Sufficient data for interpretation are not available from the DEPO MAPS station (Table 4).

Table 4. Population trends, productivity, trends, and survival estimates of Black Phoebe at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.8	+38.57	2.60	-32.14	NA
Yosemite NP	1993-2009	1.1	-7.68**	3.00	+6.08	0.380 (0.149)
Devils Postpile NM	2002-2006	0.0	NA[2]	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

The loss of riparian habitat is the greatest threat to the Black Phoebe. However, where human activities along water bodies are non-destructive, the species shows tolerance of infrastructure and human presence. Black Phoebe does not appear to be responding to climate change at least as much as other species and may in fact occur more often in SIEN parks in the future. Invasive species, disease, and altered fire regimes do not appear to be major threats to phoebes within or beyond SIEN parks.

Climate Change: An analysis of shifts between the historical range of Black Phoebe (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species did not respond to either temperature or precipitation changes by shifting its range to follow its climatic niche (Tingley et al. 2009). An analysis of Christmas Bird Count data suggests that the center of abundance of Black Phoebe has significantly shifted 40.6 miles to the north and 38.4 miles toward the coast over the past 40 years (Audubon 2009). Shifts in these directions have mixed implications because higher latitudes and inland areas generally have cooler winter temperatures than lower latitudes and coastal areas (Audubon 2009). Thus, if Black Phoebe were responding to climate change in a predictable manner by moving toward cooler areas, we would see movements northward and inland. These observations provide evidence that Black Phoebe is not responding to climate change as strongly as other bird species and is likely more dependent on the availability of suitable habitat than climatic conditions. However, if Black Phoebe shifts its range poleward and upward as is generally expected of many species, SIEN parks may see an increase in occurrence of the species in the future as the parks are situated at the northern and upper edges of its current range.

Altered Fire Regimes: Where fires occur in riparian areas, Black Phoebe can suffer from habitat loss at least temporarily. However, this does not appear to be a major concern for this species.

Habitat Fragmentation or Loss: Despite tolerance of human activities, Black Phoebe is highly susceptible to loss of riparian habitat and diversions of water from natural drainages (Wolf 1997). With the exception of some older water diversion projects in YOSE and SEKI these threats are primarily of concern outside of SIEN parks.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Black Phoebe.

Human Use Impacts: Black Phoebe is well adapted to human presence (Wolf 1997; Siegel and DeSante 1999) and has even increased in California along with human development between 1966 and 2007 (Table 3). Pesticide use near human settlements may be a minor threat to the species (Siegel and DeSante 1999), but is not a concern within SIEN parks.

Management Options and Conservation Opportunities

Black Phoebe is not currently a species of management concern (Wolf 1997). However, the maintenance of riparian habitat is likely the most important measure managers can take to preserve the species within SIEN parks. Other conservation actions do not appear necessary at this time.

Black Swift – *Cypseloides niger*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Black Swift is locally uncommon breeder in Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks. The species is rare but occasionally breeds in Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Black Swifts in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Locally Uncommon
Yosemite NP	Summer	Regular Breeder	Locally Uncommon
Devils Postpile NM	Summer	Occasional Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Heath 2005, Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G4 – Apparently Secure (Uncommon, but not rare)
- National Status: N4 – Apparently Secure (Uncommon, but not rare)
- California Status: S2 – Imperiled (High risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Species of Special Concern

Range Significance
Black Swift is generally limited to the Pacific Slope of western North America, but can be found sparingly in the Rocky Mountains as well. Due to its rarity and irregular distribution, breeding locations in the Sierra Nevada (Siegel and DeSante 1999) and SIEN parks are of considerable importance to the species.

Distribution and Habitat Associations
Black Swifts can be seen flying over a wide range of habitats, but nest on sheer, well-shaded cliffs, often behind waterfalls (Gaines 1992). Black Swifts were detected in low densities (Table 2) along few survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE and were not detected at DEPO. The species' strictly aerial foraging habits and ability to fly large distances very quickly prevented inference of habitat associations from inventory data.

Table 2. Number of Black Swifts recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	1	1	NA[1]	NA	NA
Yosemite NP	2	3	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

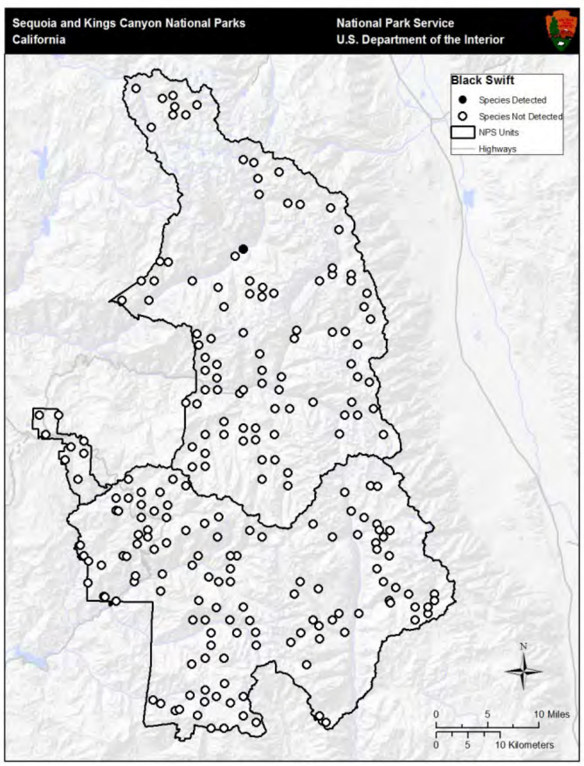

Figure 1. Bird survey transects where Black Swift was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

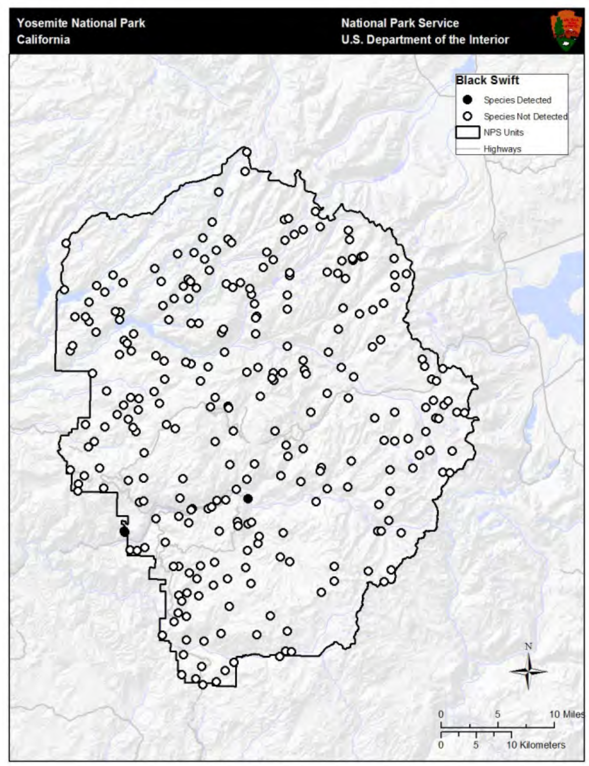

Figure 2. Bird survey transects where Black Swift was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Black Swift was observed at 1915 and 1340 m at SEKI and YOSE respectively during avian inventory surveys (Figure 3).

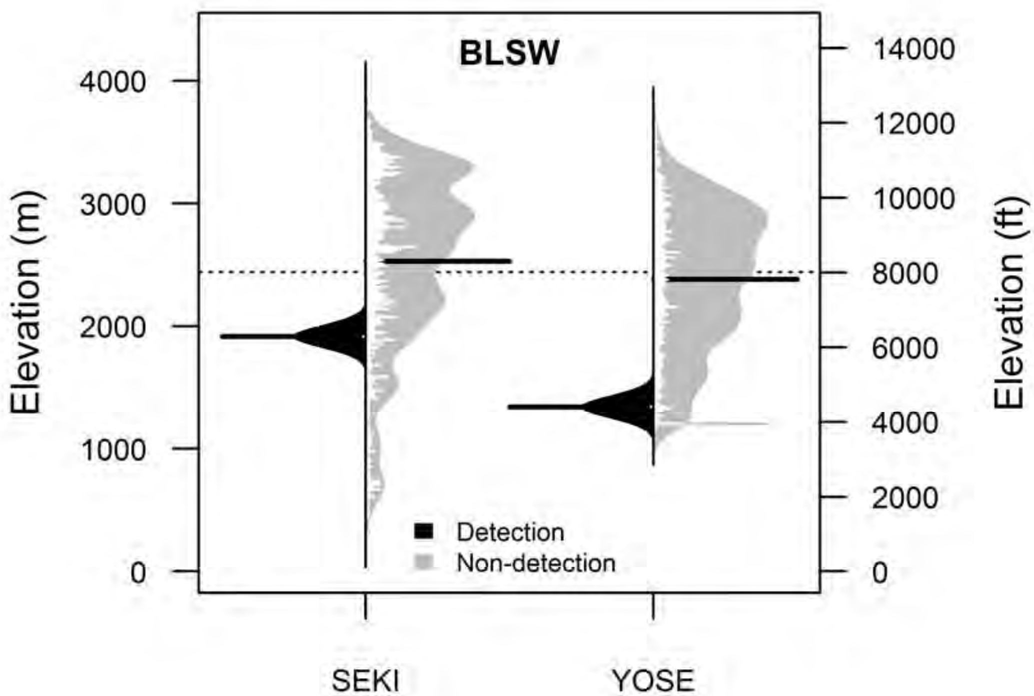

Figure 3. Elevational distributions of sites where Black Swifts (BLSW) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Black Swifts are found only along a handful of survey routes in California and the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at SEKI, but not at YOSE. Significant positive trends were observed across California during 1980-2007 and the Kings Canyon NP transect during 1974-2005 and dramatic, although not statistically significant, positive trends may be occurring in the Sierra Nevada region as well, but small sample sizes make the reliability of these observed trends questionable (Table 3).

Table 3. Relative abundance and trends for Black Swift according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007[1]	5	0.11	+31.2	0.24
	1980-2007[1]			+16.3	0.02
Sierra Nevada (BCR 15)	1966-2007[1]	2	0.08	+55.9	0.13
	1980-2007[1]			+129.9	0.15
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	2.05	+62.7	0.01
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Black Swifts are infrequently captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Likely the greatest threat to the Black Swift in California and the SIEN parks is its demography and the specificity of its nesting and prey needs during the breeding season. The entire California population is estimated at around 200 pairs. Such low numbers coupled with low productivity (1 egg laid per pair each season) and a reliance on swarming winged ants during summer months, makes the species vulnerable to environmental or human caused perturbations (Roberson and Collins 2008). However, threats from fire, habitat fragmentation or loss, invasive species, disease, or human activities do not appear to be substantial. Climate change has the potential to impact individual nesting locations, but the phenomenon's effects on the Black Swift remain largely unknown.

Climate Change: The effects of climate change on the Black Swift are unknown. The use of relatively few localized breeding sites, which vary widely in latitude and elevation within western North America, suggests that the availability of suitable nesting sites is more limiting to Black Swift abundance than climatic tolerance. However, the species' dependence on specific nesting sites such as those behind or beside permanent or semi permanent waterfalls (Roberson and Collins 2008), may make them locally vulnerable to climate change. Climate change is expected to result in a greater proportion of precipitation falling as rain rather than snow in the Sierra Nevada (Hayhoe et al. 2004). Such a shift could lead to greater stream flows earlier in the season and a reduction or absence of flow in some streams that were previously perennial (Null et al. 2010). If such a shift were to occur within a river or stream providing nesting habitat for the Black Swift, such sites could become unsuitable to the species in the future. Likewise, any effects of climate change on Black Swifts prey would impact the swift populations as well.

Altered Fire Regimes: Black Swifts nest on cliff faces that are generally not susceptible to fire. Likewise, their foraging range is large (approximately 24 km in diameter; Roberson and Collins 2008) allowing individuals to avoid any habitat temporarily made unsuitable by fire.

Habitat Fragmentation or Loss: Black Swifts are not likely to be threatened by habitat fragmentation or loss due to the inaccessibility of nesting sites.

Invasive Species and Disease: To our knowledge there is no significant threat to Black Swift from invasive species or disease. However, the species remains understudied, which allows for the possibility of undocumented, but substantial threats.

Human Use Impacts: Few threats from human activities have been documented. There is one record of a nest being destroyed by a thrown rock (Lowther and Collins 2002) and rock climbing near nest sites could pose a threat, but the inaccessibility of nesting sites prevents most interactions with humans (Roberson and Collins 2008). Pesticides could pose an indirect threat where they kill an important ant prey species (Roberson and Collins 2008), although this is not a concern within SIEN parks. Unknown threats in wintering grounds may also contribute to declines in some populations (Roberson and Collins 2008).

Management Options and Conservation Opportunities
Black Swift is limited to very few nesting sites (40-45 sites in California; Roberson and Collins 2008). The persistence of the species within the SIEN parks likely depends on the continued suitability of current sites. Surveys and monitoring of nesting sites within SIEN parks would help better understand the status and trends of the species in these areas. A better understanding of nesting locations within the parks, coupled with modeled stream responses to climate change within SIEN parks may highlight sites vulnerable to changing hydrology in a warmer future. Human activities around nesting sites are likely rare, but if rock climbing occurs around such locations, its restriction during the breeding season would help protect breeding Black Swifts.

Black-backed Woodpecker – *Picoides arcticus*

Migratory Status

Resident (Siegel and DeSante 1999)

Residency and Breeding Status

Black-backed Woodpecker is an uncommon year-round resident of Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and Devils Postpile (DEPO) National Monument (Table 1). The species is a regular (SEKI, YOSE) and occasional (DEPO) breeder at all Sierra Nevada Network (SIEN) parks (Table 1).

Table 1. Breeding status and relative abundance of Black-backed Woodpeckers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Uncommon
Yosemite NP	Year-round	Regular Breeder	Uncommon
Devils Postpile NM	Year-round	Occasional Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N4 – Apparently Secure (Uncommon, but not rare)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Black-backed Woodpecker occurs in boreal forests from south-central Alaska across Canada to Newfoundland and Nova Scotia, and south in the western United States into the northern Rocky Mountains and the Cascade and Sierra Nevada Mountains to east-central California (Dixon and Saab 2000). Occasional irruptions occur in eastern North America, south to Illinois, West Virginia, and Delaware (Dixon and Saab 2000). In California the Black-backed Woodpecker breeds at elevations of 1200-3000 m in the Siskiyou, Warner, Shasta, and Sierra Nevada Mountains. The species may be extirpated from the Shasta-Trinity and Klamath national forests, therefore the Sierra Nevada is extremely important to the Black-backed Woodpecker because it is the majority of the species' range in California (Siegel and DeSante 1999).

Distribution and Habitat Associations

Black-backed Woodpeckers prefer stands of recently fire- or insect-killed trees (Dixon and Saab 2000). Black-backed Woodpeckers were detected in low numbers (Table 2) along a handful of survey transects (Figure 1) during avian inventory projects at YOSE and were not observed in SEKI or DEPO, likely due to the ephemeral nature of the species' preferred habitat (Siegel et al. 2008). Low sample size precluded adjustment for detectability. Park inventories show highest associations with recent burn, Jeffrey Pine, and Whitebark/Lodgepole Pine forest types in YOSE, with highest abundance in recent burn (Table 2).

Table 2. Number of Black-backed Woodpeckers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Low sample sizes preclude absolute density estimates (adjusted for detectability).

Park	**Count Stations with Detections**	**Indiv. Birds Counted**	**Most Densely Occupied Habitats**	**Relative Abundance (detections per station)**	**Density of birds per ha (95% c.i.)**
Sequoia and Kings Canyon NPs	0	0	Not detected	NA[1]	NA
Yosemite NP	12	16	Recent Burn	0.11	
			Jeffrey Pine	0.04	
			Whitebark/Lodgepole Pine	0.02	
Devils Postpile NM	0	0	Detected off-survey	NA	

[1]NA - Information not available due to insufficient data.

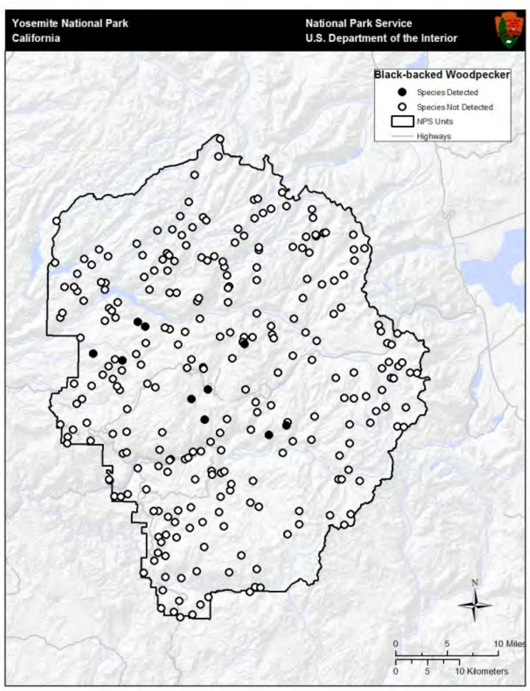

Figure 1. Bird survey transects where Black-backed Woodpecker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at YOSE (Siegel and Wilkerson 2005).

Elevational Distribution

Black-backed Woodpecker was observed at mid-elevations in YOSE during recent avian inventory surveys (Figure 2). The mean elevation of observations was 2323 meters, with 95% of observations occurring between 2004 and 2913 meters (Siegel et al. 2011).

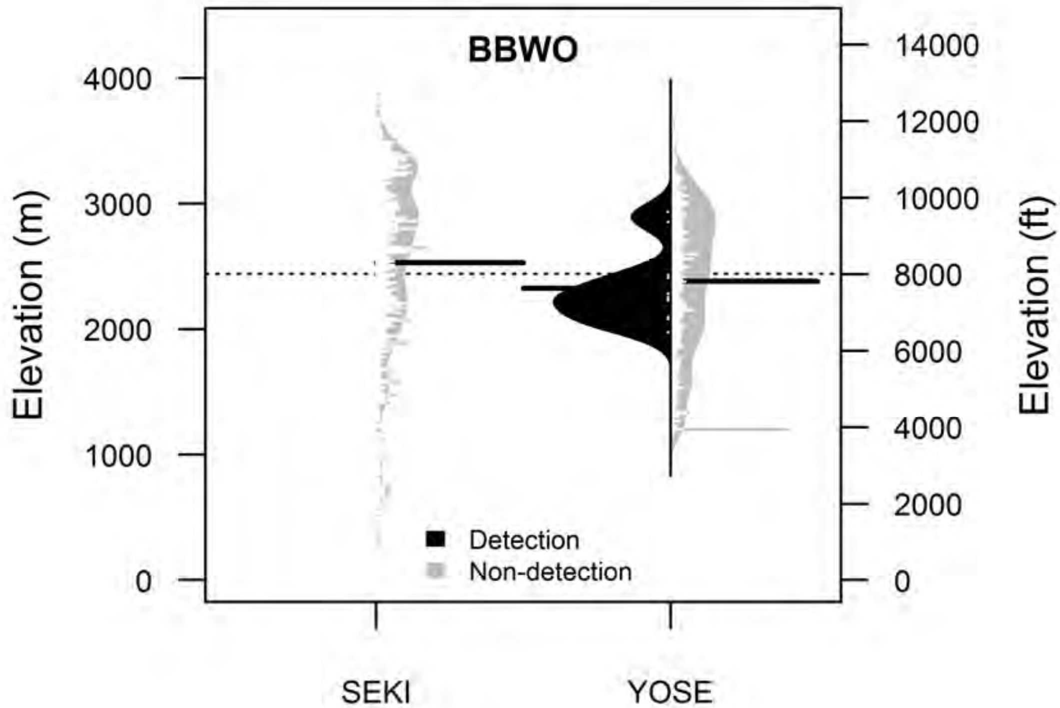

Figure 2. Elevational distributions of sites where Black-backed Woodpeckers (BBWO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate abundance of Black-backed Woodpeckers is low in both the Sierra Region (BCR 15) and in California as a whole (Table 3). They were not detected on individual BBS routes at YOSE and SEKI. Low detection rates are likely due to the ephemeral nature of the species' preferred habitat (Siegel et al. 2008). A non-significant negative trend was observed throughout California (-6.4%) and in the Sierra Region (-9.3%) during 1980-2007, but small sample sizes make the reliability of any apparent trends questionable (Table 3).

Table 3. Relative abundance and trends for Black-backed Woodpecker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007[1]	7	0.06	+0.5	0.92
	1980-2007[1]			-6.4	0.34
Sierra Nevada (BCR 15)	1966-2007[1]	5	0.04	-1.7	0.76
	1980-2007[1]			-8.3	0.27
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Too few Black-backed Woodpeckers (<0.03) were captured in mist nets in the SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The Black-backed Woodpecker is strongly associated with recently burned or insect-infested conifer forests. The species may be declining in the Sierra Nevada and throughout California as a result of fire suppression, post-fire salvage logging, and logging to reduce risk of high-intensity fire. With the exception of some hazard tree removal near roads or campsites, habitat loss and degradation are not substantial threats to Black-backed Woodpeckers within SIEN parks. If climate change results in a future increase in extent and intensity of fires, this woodpecker will prosper. In the meantime, fire treatments in SIEN parks that mimic natural fire regimes – especially higher-intensity fire – will benefit this species.

Lack of commercial logging in the SIEN parks makes these areas especially important for Black-backed Woodpeckers should fire or insect outbreaks occur. However, the ephemeral nature of the species' habitat means managers cannot predict where the highest densities of these birds are likely to occur in future years. The best hope for the Black-backed Woodpecker is to modify post-fire timber harvest practices and regulations on public and private lands throughout California to ensure an adequate supply of burned forest habitat now and in the future.

Invasive species and disease do not appear to be major concerns for Black-backed Woodpeckers in the SIEN parks. Due to apparent declining populations, this species and all possible threats should be monitored closely.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Black-backed Woodpecker has significantly shifted 100 miles north and over 130 miles inland throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009).

Modeled shifts in distribution of Black-backed Woodpecker due to climate change predict range contractions of the species across the Sierra Nevada. The most prominent decreases in occurrence are expected in the northern Sierra. These woodpeckers are most common in the northern Sierra (Saracco et al. 2010), so the predicted range contraction in this region is particularly troubling. The most important variables influencing current and projected distribution were annual mean temperature and precipitation (Maxent and GAM distribution models), as well as vegetation (Maxent distribution model) (Stralberg and Jongsomjit 2008). Black-backed Woodpeckers currently breed between 1200 and 3000 meters in the Sierra Nevada (Gaines 1992), and are more likely to occur at the higher end of their elevational range (Saracco et al. 2010). If the Black-backed Woodpecker shifts its range upslope as a result of climate change, as generally expected, there are likely sufficient areas of coniferous forests available for colonization at higher elevations.

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contribute to sensitivity and/or adaptability of the species. In addition to evaluating sensitivity, vulnerability assessments also incorporate climate change predictions, providing modeled, spatially explicit estimates of vulnerability. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Black-backed Woodpecker received a sensitivity score of 35.71 (UW 2010), suggesting moderate sensitivity to the threat. Certainty of results was listed as 36.25 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Black-backed Woodpecker's sensitivity to climate change was its reliance upon burned forest habitat (UW 2010).

Altered Fire Regimes: Black-backed Woodpecker favors recent, intensely burned forests. The species undoubtedly has suffered from a half-century of fire suppression and widespread post-fire salvage logging (Hutto and Gallo 2006, Hutto 2008). If drier conditions in the Sierra Nevada lead to an increase in the extent and intensity of fire, Black-backed Woodpecker reproductive success and survival are likely to increase, as long as the extent of post-fire salvage logging does not increase concomitantly.

Black-backed Woodpeckers will benefit from the restoration of natural fire regimes within SIEN parks, including patches of intensely burned forests to provide optimal nesting and foraging habitat.

Habitat Fragmentation or Loss: Fire suppression, thinning to reduce risk of high-intensity fire, and especially post-fire salvage logging have eliminated and fragmented Black-backed Woodpecker habitat. Black-backed Woodpecker abundance in forests that were commercially thinned and then burned was lower than in burned forests that were not thinned before fire in the Rocky Mountains (Hutto 2008). Black-backed Woodpecker abundance and reproductive success were adversely impacted by post-fire salvage logging in the Rocky Mountains and Oregon (Dixon and Saab 2000, Hutto and Gallo 2006, Saab et al. 2007, Hutto 2008, Cahall and Hayes 2009). Using passive surveys in several fire areas in the Sierra Nevada, Hanson and North (2008) detected Black-backed Woodpeckers only in high-intensity burned stands that were not salvage-logged. Conversely, using playback methods in a larger sample of fires, Siegel et al. (2008) identified strong associations with the most intensely burned forests but also detected woodpeckers in moderately burned and, rarely, in low-intensity burned stands and occasionally in partially salvage-logged areas. Accurate counts are difficult to obtain because passive surveys may miss birds while playback methods may draw birds from surrounding habitats or double-count the same birds.

Fire-management activities involving logging and fire suppression have likely resulted in population declines of Black-backed Woodpeckers throughout California (Siegel and DeSante 1999) but are not likely to pose major threats to the species within SIEN parks, aside from localized hazard tree removal. The large size and relatively unfragmented nature of these parks make them potentially important habitat for the persistence of the species.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Black-Backed Woodpecker.

Human Use Impacts: Black-backed Woodpeckers are relatively tolerant of people and are thus not likely impacted by human presence in SIEN parks. These woodpeckers are specialized to forage upon larvae of wood-boring beetles and, to a lesser degree, bark beetles. Pesticide use on surrounding forests in response to beetle outbreaks, as well as pesticide drift from the Central Valley may harm the woodpecker by reducing the abundance of prey.

Management Options and Conservation Opportunities
The most important things park managers can do to protect Black-backed Woodpecker populations in the parks are to allow patches of intensely burned forests to occur. High-intensity burns benefit not only Black-backed Woodpeckers but a host of other fire-dependent birds. The parks might also consider an education program to the public about the value of high-intensity fire (where it is a part of the historic fire regime) to many wildlife species.

Little is known about Black-backed Woodpecker abundance in unburned forests. Targeted surveys for this species throughout SIEN parks could provide much-needed information about the ecology of this species in the absence of fire. The parks should also continue to monitor the species in burned forests.

Black-chinned Hummingbird – *Archilochus alexandri*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Black-chinned Hummingbird is an uncommon breeder at Sequoia and Kings Canyon (SEKI) National Parks and is a rare possible breeder at Yosemite (YOSE) National Park. The species has not been reported at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Black-chinned Hummingbirds in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Uncommon
Yosemite NP	Migrant/Summer	Possible Breeder	Rare
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Black-chinned Hummingbird is distributed across much of the western U.S. However, the species is found most often in the valleys and foothills of California and rarely in the Sierra Nevada above the foothill zone (Siegel and DeSante 1999). Because of Black-chinned Hummingbird's relatively wide distribution and rarity within the Sierra Nevada, the SIEN parks have little significance to the species.

Distribution and Habitat Associations

Black-chinned Hummingbirds are most often found among hardwoods along riparian areas or at feeders within meadows or gardens (Gaines 1992). The species was not observed during inventory surveys at any of the SIEN parks, but was observed anecdotally off-survey at SEKI.

Table 2. Number of Black-chinned Hummingbirds recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA[1]	NA
Yosemite NP	0	0	Not detected	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Data on elevational distribution of the Black-chinned Hummingbird are not available from park surveys, but the species is restricted to the lower-elevation western margins of SEKI, and to a lesser degree, YOSE.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Black-chinned Hummingbirds are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at YOSE and Kings Canyon NP, but were not observed along the Sequoia NP route. No significant population trends were observed along any of the routes or regions relevant to the SIEN parks (Table 3).

Table 3. Relative abundance and trends for Black-chinned Hummingbird according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	46	0.14	+2.2	0.59
	1980-2007			-3.0	0.53
Sierra Nevada (BCR 15)	1966-2007[1]	4	0.07	+9.6	0.42
	1980-2007[1]			+18.6	0.40
Route 14117 – Sequoia NP	1972-2005	1	0.13	+41.2	0.48
Route 14132 – Kings Canyon NP	1974-2005	1	0.15	+4.5	0.72
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA[1]	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Black-chinned Hummingbirds are not typically captured at SIEN MAPS stations. Additionally hummingbirds are not banded at these stations; data on productivity and survival within the parks are not available.

Stressors

Populations of the Black-chinned Hummingbird appear to be healthy across the western United States and in California. Any loss of riparian habitat would be most harmful to hummingbird populations and may have reduced Sierran populations in the past. Potential minor threats include fire management in riparian areas and increased competition with Anna's Hummingbird. However, the introduction of non-native flowering plants and artificial bird feeders have allowed for an increase in hummingbird populations in urban and suburban areas. The effects of climate change on Black-chinned Hummingbird are unknown, but could lead to a shift of hummingbird populations into SIEN parks. Disease does not appear to be a major concern for the Black-chinned Hummingbird.

Climate Change: The effects of climate change on the Black-chinned Hummingbird are largely unknown. However, if the species responds to climate change by shifting its range northward and upward, as is generally expected of most species, the SIEN parks may begin to see an increase in Black-chinned Hummingbird occurrences as the species currently occupies elevations lower than those found within the parks, with the except of the western edge of SEKI.

Altered Fire Regimes: Smith et al. (2009) found that fuel reduction efforts reduce nest-site availability leading to altered nest-site selection. Although they found no immediate effects on nest survival, Smith et al. (2009) suggests that the thinning of forest understory can lead to selection of nesting sites more exposed to predation risk and lower Black-chinned Hummingbird nest survival. It is likely that any increase in natural fires within riparian areas would have similar impacts.

Habitat Fragmentation or Loss: Loss of riparian habitat in the Sierra Nevada may have contributed to losses of the Black-chinned Hummingbird in the region since the early twentieth century (Siegel and DeSante 1999).

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Black-chinned Hummingbird. The introduction of non-native plants has benefitted the species by providing additional food sources in urban and suburban areas (Baltosser and Russell 2000).

Human Use Impacts: In addition to the introduction of exotic flowering plants, hummingbird feeders supplement native food sources, allowing populations of Black-chinned Hummingbirds and other hummingbird species to expand. Such increases in abundance are especially prominent in urban and suburban areas (Baltosser and Russell 2000). The concurrent increase in competing hummingbird species such as the larger Anna's Hummingbird may have some impact on the Black-chinned Hummingbird (Siegel and DeSante 1999), but such interactions have not been studied (Baltosser and Russell 2000).

Management Options and Conservation Opportunities

Management of Black-chinned Hummingbirds is largely unnecessary throughout the United States. However, the maintenance of lower-elevation riparian habitat is critical to the small populations that utilize the SIEN parks. Hummingbird feeders can be used where there is a need to encourage the expansion of populations, although such measures are not required for the maintenance of the species or Californian populations.

Black-chinned Sparrow – *Spizella atrogularis*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Black-chinned Sparrow is a locally rare and irregular summer resident and possible breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Black-chinned Sparrows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Possible Breeder	Locally Rare/Irregular
Yosemite NP	Summer	Possible Breeder	Locally Rare/Irregular
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds may occasionally occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Black-chinned Sparrow breeds in shrublands throughout the southwestern U.S. and south-central Mexico (Tenney 1997). In California, this species breeds locally in the inner Coast Ranges, the mountains of southern California, and the western slopes of Sierra Nevada from Kern to Tehama counties (Tenney 1997). The species is rare in the Sierra, which does not constitute a major portion of the its overall range; however the mountain range is very important to the subspecies *S. a. cana* which is found in central and southern portions of the west slope and extreme southern end of the Sierra (Siegel and DeSante 1999).

Distribution and Habitat Associations
On the west slope of the Sierra Nevada, Black-chinned Sparrow is associated with arid slopes comprised of dense chaparral, often burned patches after vegetation has recovered (Tenney 1997, Siegel and DeSante 1999). Black-chinned Sparrows were rarely detected (Table 2) along survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE, and were not detected at DEPO. All detections were in chaparral types (Table 2).

Table 2. Number of Black-chinned Sparrows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	3	5	Mixed Chaparral	0.11	NA[1]
Yosemite NP	2	2	Montane Chaparral Mixed Chaparral	0.04 0.03	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

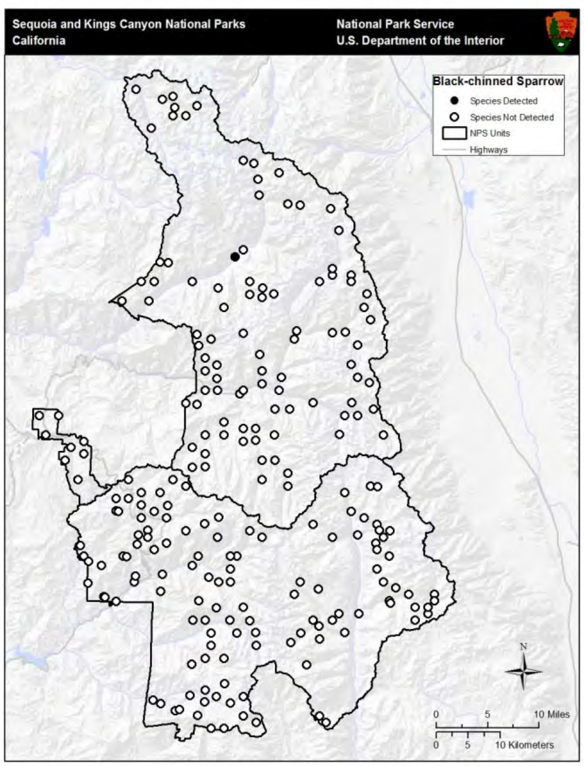

Figure 1. Bird survey transects where Black-chinned Sparrow was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

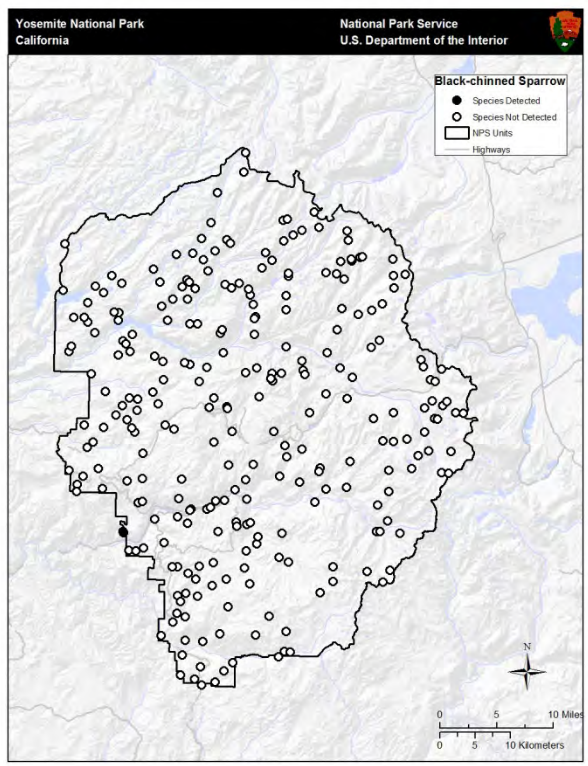

Figure 2. Bird survey transects where Black-chinned Sparrow was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

The few Black-chinned Sparrow detections during avian inventory surveys at SEKI and YOSE were from lower elevations (Figure 3). The mean elevation of observations of Black-chinned Sparrow in SEKI was 1892 m, with 95% of observations occurring between 1826 and 1959 m. In YOSE, the mean elevation of observations was 1359 m with 95% of observations falling between 1321 and 1397 m (Siegel et al. 2011).

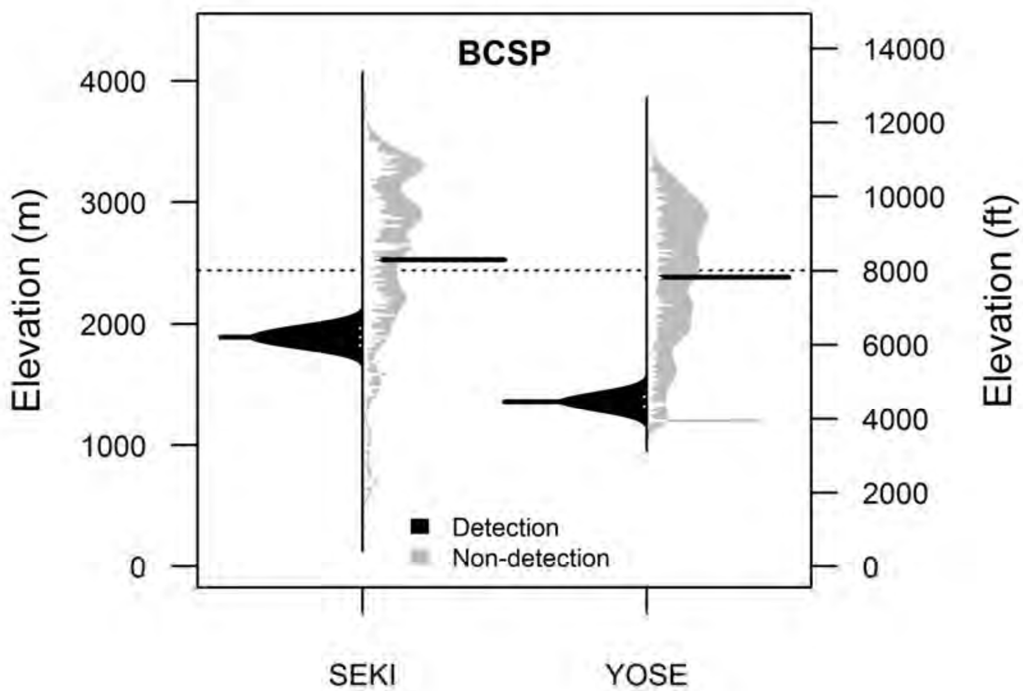

Figure 3. Elevational distributions of sites where Black-chinned Sparrow (BCSP) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) indicate Black-chinned Sparrows are less abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were rarely detected in the Sierra, and abundances were greater along the Kings Canyon route than in Sequoia or Yosemite National Parks. BBS data reveal a significant declining population trend for this species in California from 1966-2007 (Table 3).

Table 3. Relative abundance and trends for Black-chinned Sparrow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	35	2.02	-6.9	0.02
	1980-2007			-4.6	0.39
Sierra Nevada (BCR 15)	1966-2007[1]	2	0.01	-1.3	0.33
	1980-2007[1]			NA[1]	NA
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.15	-1.8	0.90
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Black-chinned Sparrows were not captured in mist nets at SIEN MAPS stations. Thus, no productivity or survival estimates are available for this species in SIEN parks.

Stressors

The Black-chinned Sparrow is considered to be at moderate risk of extinction or elimination in California. Indeed, BBS data indicate that the species declined significantly in the state over the past 40 years (Table 3). Overall distribution of Black-chinned Sparrow in California is somewhat patchy due to its specific chaparral habitat requirements, habitat fragmentation, and the dynamic nature of chaparral in response to fire, which may render population trends somewhat difficult to interpret (Siegel and DeSante 1999).

Fire suppression and elimination of regenerating shrubs after fire in favor of conifers are perhaps the greatest threats to the Black-chinned Sparrow in the Sierra Nevada. The restoration of natural fire regimes and maintenance of post-fire chaparral should benefit this species. Chaparral habitats inhabited by Black-chinned Sparrows in California are also adversely affected by agricultural conversion, livestock grazing, and urbanization.

Climate Change: Few data are available regarding response of Black-chinned Sparrow to climate change. If climate change causes the Black-chinned Sparrow's breeding range to shift upslope as is generally expected, there is higher-elevation habitat for new colonization within the SIEN parks, as long as natural fire cycles are restored. In fact, due to the species' affinity for arid shrublands (Tenney 1997, Siegel and DeSante 1999), any expansion of chaparral as a result of climate warming might allow this species to expand its breeding range.

Altered Fire Regimes: Periodic fires may be required for suitable chaparral habitat. Tenney (1997) noted numerous observation reports of Black-chinned Sparrows utilizing post-fire chaparral habitats. Chaparral habitats are well-adapted to fire; some shrub species resprout after fire while others regenerate from seed banks (Riggan et al. 1994) however overly frequent fire can also type-convert to annual grasslands comprised of invasive grass species. A future increase in extent and frequency of high-intensity fire will increase habitat for this species, as long as overly frequent fire does not type-convert shrublands. Conversely, fire suppression and post-fire activities that eliminate shrubs regenerating post-fire in favor of conifers may threaten the Black-chinned Sparrow in the Sierra Nevada.

Habitat Fragmentation or Loss: Population declines of Black-chinned Sparrows in southern California indicate that urban development into foothill chaparral habitat is a significant threat to this species. Development is not a major problem within SIEN parks, but could be a threat to birds that dwell at or near the parks' lower-elevation boundaries.

Invasive Species and Disease: To our knowledge, there are no significant threats to the Black-chinned Sparrow from invasive species or disease.

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for this species, at least locally where grazing is permitted, because it can alter chaparral breeding habitats (Tenney 1997). However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Management Options and Conservation Opportunities

Management recommendations for Black-chinned Sparrows in SIEN parks include restoring natural fire frequencies and intensities to maintain a semi-open structure in chaparral and controlling grazing where appropriate.

Black-headed Grosbeak – *Pheucticus melanocephalus*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Black-headed Grosbeak is a common summer resident and regular breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, and an uncommon regular breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Black-headed Grosbeaks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Common
Yosemite NP	Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Black-headed Grosbeak is relatively abundant in a diversity of habitats from southern Canada south through Mexico, and as far east as central North Dakota, central Kansas, central Nebraska, extreme western Oklahoma, eastern New Mexico, and southwestern Texas (Ortega and Hill 2010). The Sierra Nevada does not comprise a particularly important part of the species' range in California or as a whole (Siegel and DeSante 1999).

Distribution and Habitat Associations
Black-headed Grosbeak occurs in habitats containing large shrubs and broad-leaved trees such as oaks, alders, cottonwoods, or aspens (Siegel and DeSante 1999). The birds are found in both dry and moist habitats and in open and dense forests, but apparently avoid the interior of dense, old forest perhaps due to the lack of a deciduous element (Siegel and DeSante 1999). Regardless of habitat type, a well-developed understory combined with large trees appears to be a key habitat component (Orgeta and Hill 2010). Black-headed Grosbeaks were detected in high numbers (Table 2) along survey transects in YOSE and SEKI (Figures 1 and 2) but not DEPO during avian inventory surveys. Detections were in a wide variety of oak associations, as well as in White Alder and Douglas-fir and Mixed Conifer forests (Table 2).

Table 2. Number of Black-headed Grosbeaks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	149	212	Live Oak/California Buckeye	0.90	0.81 (0.48-1.36)
			California Black Oak Forest	0.62	1.01 (0.70-1.45)
			Canyon Live Oak Forest	0.62	0.80 (0.55-1.15)
Yosemite NP	230	291	Interior Live Oak	2.55	
			White Alder	0.64	
			Douglas-fir/Mixed Conifer	0.40	
			Canyon Live Oak	0.39	
			Black Oak	0.36	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

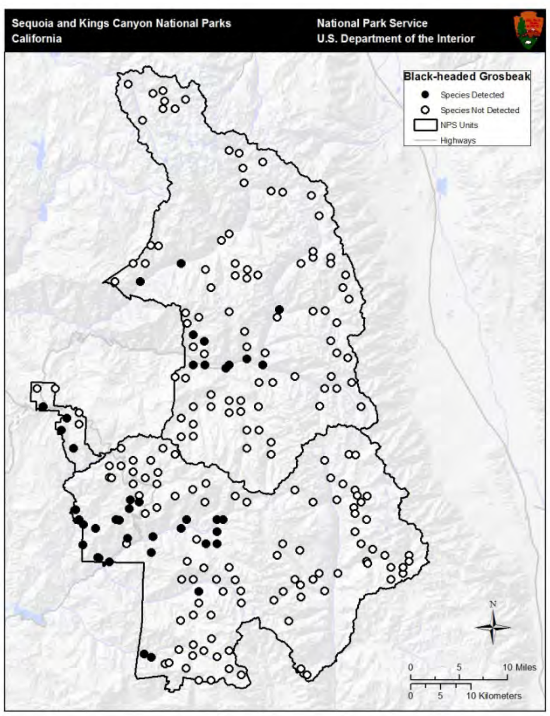

Figure 1. Bird survey transects where Black-headed Grosbeak was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

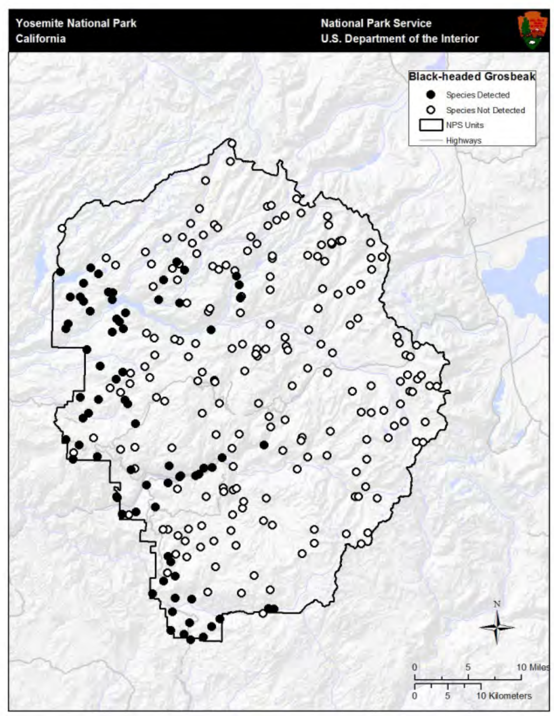

Figure 2. Bird survey transects where Black-headed Grosbeak was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Black-headed Grosbeak was detected at low- to mid-elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 1301 m, with 95% of observations occurring between 595 and 2032 m. In YOSE, the mean elevation of observations was 1598 m with 95% of observations falling between 1200 and 2268 m (Siegel et al. 2011).

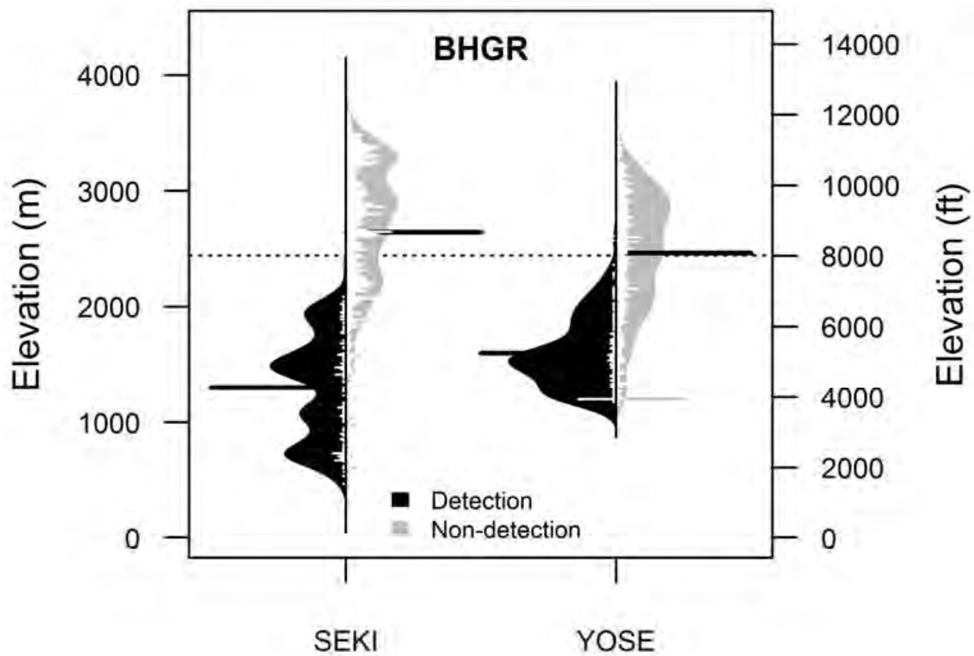

Figure 2. Elevational distributions of sites where Black-headed Grosbeak (BHGR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) survey data indicate Black-headed Grosbeaks are abundant in the Sierra Region (BCR15) and in California as a whole, and very abundant in the SIEN parks (Table 3). No significant population trends were evident along any of the survey routes.

Table 3. Relative abundance and trends for Black-headed Grosbeak according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	174	8.01	+0.2	0.79
	1980-2007			+0.4	0.26
Sierra Nevada (BCR 15)	1966-2007	34	13.91	+2.2	0.23
	1980-2007			+1.3	0.29
Route 14117 – Sequoia NP	1972-2005	1	14.06	+5.1	0.64
Route 14132 – Kings Canyon NP	1974-2005	1	20.35	+4.9	0.29
Route 14156 – Yosemite NP	1974-2007	1	21.65	-1.9	0.37

Mark-recapture data from SIEN MAPS stations document a significant decreasing population trend, but a large increasing reproductive trend, for Black-headed Grosbeak in Yosemite National Park from 1993-2009 (Table 4). Reproductive trend is the ratio of hatch-year birds to adults in the catch, so this apparent contradiction could reflect high reproductive success but poor recruitment into the adult population.

Table 4. Population trends, productivity, trends, and survival estimates of Black-headed Grosbeak at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	4.5	-4.96	0.18	-2.81	0.312 (0.157)
Yosemite NP	1993-2009	6.4	-4.88**	0.72	+10.89*	0.661 (0.051)
Devils Postpile NM	2002-2006	0.0	NA[2]	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Despite the abundance of Black-headed Grosbeaks and the diversity of habitats they occupy, this species is surprisingly understudied (Ortega and Hill 2010). Populations of Black-headed Grosbeak show no significant trends throughout California (Table 3) but have declined significantly at MAPS stations in Yosemite NP in recent years (Table 4). Outside the park, the grosbeak is likely threatened by loss of habitat due to urban development and livestock grazing, and may be adversely impacted by clearcutting practices, but is also quite tolerant of lower-density human habitation (Ortega and Hill 2010). Black-headed Grosbeak exhibits a mixed response to forest fire: perhaps some level of low-to moderate-intensity burning might benefit the species, particularly in the longer-term after vegetation has re-grown. Black-headed Grosbeak is probably able to adapt well to climate change due to the wide variety of habitats in which it occurs.

Climate Change: An analysis of shifts between the historical range of Black-headed Grosbeak (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). The Black-headed Grosbeak apparently has already responded to climate change and will likely continue to shift within the Sierra in the coming decades. Modeled distribution shifts of Black-headed Grosbeak predict a greater probability of occurrence throughout its range in California as well as range expansion upslope in the Sierra Nevada (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation, annual mean temperature (Maxent distribution model), and vegetation and isothermality (GAM distribution model).

Black-headed Grosbeaks were found in oak associations and conifer forests at low- to mid-elevations in SIEN parks. The species is already shifting its range in the Sierra Nevada concomitant with rising temperatures. If climate change causes the grosbeak's range to move upslope in the Sierra Nevada as is generally expected, there is plenty of habitat for the species to colonize because of the wide diversity of different forest types it occupies.

Altered Fire Regimes: Studies document mixed effects of fire on Black-headed Grosbeaks. Peak densities of Black-headed Grosbeaks in New Mexico were found in low- and moderate-intensity burned patches (Kotliar et al. 2007), but the species declined at burned sites after fire in Montana (Smucker et al. 2005). Black-headed Grosbeak was a strong indicator of older (e.g., 15-year) burned forests in Oregon (Fontaine et al. 2009). The species was frequently detected in both early successional and mid-successional burned forests in the Rocky Mountains (Hutto 1995). Black-headed Grosbeaks were more abundant in unburned than burned forests in the northern and southern Sierra Nevada (Siegel and Wilkerson 2005, PRBO 2010).

Black-headed Grosbeaks are associated with woodlands and forests that contain a deciduous element and are not often found in dense, old forests (Siegel and DeSante 1999). Thus, this bird may benefit from some degree of low- or moderate-intensity fire that over the long-term opens up forests and maintains the deciduous component of the understory. Black-headed Grosbeaks may not respond positively to high-intensity burns in the short-term but may occupy these sites much later after recovery of the understory vegetation under remnant large, live trees.

Habitat Fragmentation or Loss: Human alteration of landscapes has often enhanced habitat conditions for Black-headed Grosbeaks, such as irrigating arid regions and planting orchards and suburban and rural trees and shrubs, especially berry-producing shrubs (Ortega and Hill 2010). Conversely, however, much habitat for this species has been lost to urbanization. The majority of oak woodlands in California are privately owned and receive little management or regulatory protection. Black-headed Grosbeaks adapt well to the presence of humans, but appear to have a tolerance threshold for habitat alteration (Ortega and Hill 2010). Extensive clearing of oak woodlands and forests for urban development is likely a major threat to Black-headed Grosbeaks, but does not impact the species in the SIEN parks.

Timber harvest practices that eliminate or degrade forest habitat beyond some threshold also may pose a threat to Black-headed Grosbeaks (Siegel and DeSante 1999). The species was detected in mid- but not early-successional logged forests in the Rocky Mountains (Hutto 1995). Some opening of dense forests may benefit Black-headed Grosbeaks (Ortega and Hill 2010) but research is needed on the threshold tolerance of this species to various levels of logging. This activity does not pose a significant threat to Black-headed Grosbeaks in the SIEN parks due to the lack of commercial logging.

Invasive Species and Disease: Black-headed Grosbeak nests are parasitized by Brown-headed Cowbirds, but at a very low frequency (Ortega and Hill 2010). A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see species account for Brown-headed Cowbird in this report).

Human Use Impacts: One study found nearly all Black-headed Grosbeak nest failures in central New Mexico were due to nest predation, largely by Steller's and Scrub Jays (Ortega and Hill 2010). High levels of nest predation may be due to the fact that male Black-headed Grosbeaks sing from the nest (Siegel and DeSante 1999). Human activities that increase abundance of corvids, such as leaving uncontained food and garbage at camp and picnic sites in SIEN parks, may increase predation of Black-headed Grosbeak nests.

Packstock grazing within the SIEN parks is a potential risk to Black-headed Grosbeaks, at least locally where grazing is permitted, because grazing attracts Brown-headed Cowbirds and degrades oak woodland habitats. In the Sacramento Valley of California, Gardali and Nur (2006) reported the lowest adult survival of Black-headed Grosbeaks was at a heavily grazed site, postulating that grazing reduced shrubby vegetation needed by the birds for cover. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Oak woodlands in north-central coastal California have been falling victim to sudden oak death syndrome (SODS), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SODS probably was introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Black-headed Grosbeak and other oak-associated species if it reaches those regions of the Sierra Nevada.

Management Options and Conservation Opportunities

Park managers can protect Black-headed Grosbeak populations by pursuing ecosystem management that maintains the deciduous component in woodland and forest habitats and by containing food waste at camp and picnic sites to control the numbers of potential nest predators (Ortega and Hill 2010). Managers also should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SODS, and preventative measures including quarantine of the area could be immediately implemented if SODS is identified.

MAPS station operation and other means of monitoring Black-headed Grosbeak populations in the parks, especially Yosemite, should continue to resolve whether population declines are indeed occurring, and if so, to determine their causes.

Black-throated Gray Warbler – *Dendroica nigrescens*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Black-throated Gray Warbler is a locally fairly common summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) National Parks and a locally common summer resident and regular breeder at Yosemite (YOSE) National Park, but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Black-throated Gray Warblers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Locally Fairly Common
Yosemite NP	Summer	Regular Breeder	Locally Common
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Black-throated Gray Warbler breeds west of the Rocky Mountains from northern Mexico to British Columbia, and winters mostly in Mexico (Guzy and Lowther 1997). While the species is common in suitable habitat in the Sierra, the mountain range is less important for the overall population than most other montane warblers that occupy it (Siegel and DeSante 1999).

Distribution and Habitat Associations
Black-throated Gray Warblers inhabit open coniferous or mixed coniferous-deciduous woodland with shrubby undergrowth, Piñon-Juniper and pine-oak associations, and oak scrub (Guzy and Lowther 1997). On the west slope of the Sierra, the species prefers dry, sunny slopes and open forest or woodland including Canyon Live Oak, Black Oak, Ponderosa Pine, and less commonly Douglas-fir (in the north) and mixed conifers, with a montane chaparral understory (Siegel and DeSante 1999, CALPIF 2002). Black-throated Gray Warblers were detected in moderate- to high numbers in mostly in oak and pine-oak associations (Table 2), along survey transects at SEKI and YOSE (Figure 1 and Figure 2) during avian inventory surveys at SIEN parks. This warbler

was not detected at DEPO. After accounting for detection probability, greatest densities were in Canyon Live Oak Forest in SEKI, and highest abundance at YOSE was in Interior Live Oak.

Table 2. Number of Black-throated Gray Warblers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	46	61	Canyon Live Oak Forest	0.34	0.42 (0.25-0.72)
			Ponderosa Pine Woodland	0.24	0.18 (0.04-0.72)
			Live Oak/California Buckeye	0.19	0.21 (0.08-0.57)
Yosemite NP	126	177	Interior Live Oak	2.55	
			Canyon Live Oak	0.53	
			Douglas-fir/Mixed Conifer	0.28	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

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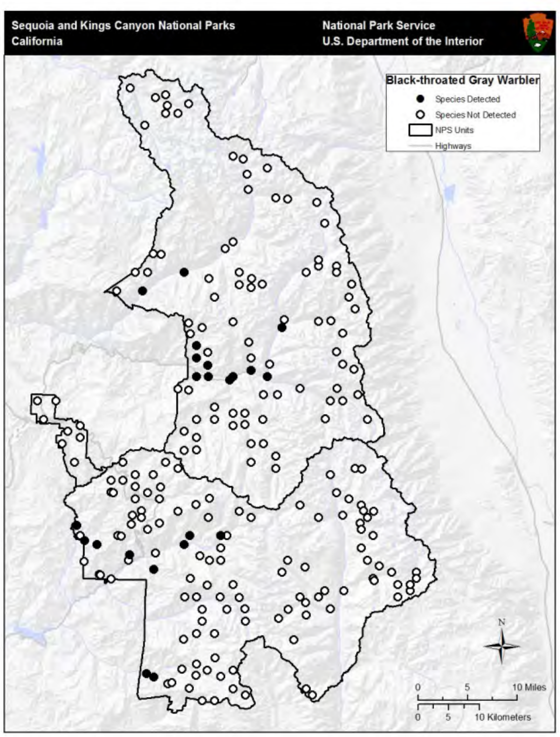

Figure 1. Bird survey transects where Black-throated Gray Warbler was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

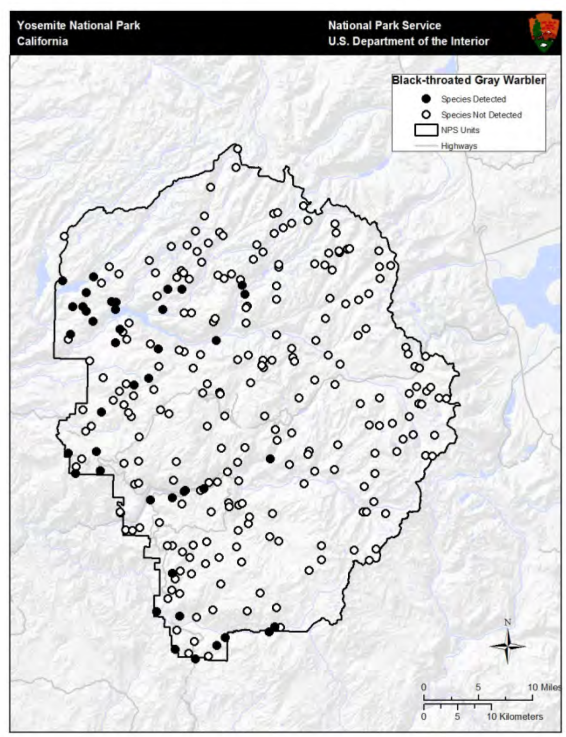

Figure 2. Bird survey transects where Black-throated Gray Warbler was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Black-throated Gray Warbler was observed within the lower to middle-elevations of SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Black-throated Gray Warbler in SEKI was 1426 m, with 95% of observations occurring between 708 and 2201 m. At YOSE, the mean elevation of observations was 1679 m with 95% of observations falling between 1223 and 2221 m (Siegel et al. 2011).

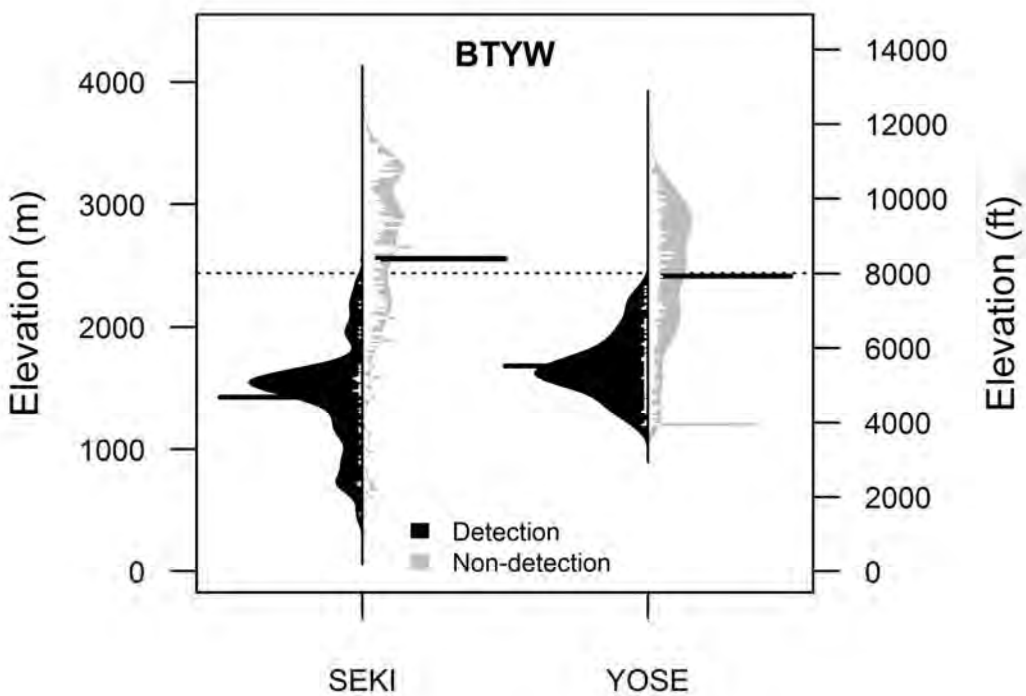

Figure 3. Elevational distributions of sites where Black-throated Gray Warblers (BTYW) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Black-throated Gray Warblers are found in slightly greater abundance in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were detected in high numbers on individual BBS routes at SEKI and especially at YOSE. A significant positive population trend was observed at Yosemite NP, and a nearly significant positive trend was suggested for Kings Canyon NP, from 1974-2007.

Table 3. Relative abundance and trends for Black-throated Gray Warbler according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	86	3.83	+0.5	0.63
	1980-2007			-0.2	0.84
Sierra Nevada (BCR 15)	1966-2007	24	4.11	+1.2	0.33
	1980-2007			-1.8	0.56
Route 14117 – Sequoia NP	1972-2005	1	3.00	+23.5	0.43
Route 14132 – Kings Canyon NP	1974-2005	1	3.05	+11.6	0.10
Route 14156 – Yosemite NP	1974-2007	1	20.23	+3.7	0.02

Black-throated Gray Warblers are captured in relatively low numbers at SIEN MAPS stations, and mark-recapture data reveal no significant population or reproductive trends for Black-throated Gray Warblers (Table 4). Non-significant positive population trends and negative reproductive trends were observed for King Canyon NP.

Table 4. Population trends, productivity, trends, and survival estimates of Black-throated Gray Warbler at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.4	+10.59	0.23	-15.00	NA
Yosemite NP	1993-2009	0.1	NA[2]	6.11	NA	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Black-throated Gray Warbler occurs in canyon oak woodlands and dry, open forests with low economic value to humans, thus human activity probably has had little effect on its overall population in the Sierra. Loss of habitat to urban development at the lower elevation 'stronghold' of its range potentially threatens this species, as do forest thinning practices and parasitism by Brown-headed Cowbirds. However, Black-throated Gray Warbler populations appear to be thriving in the Sierra Nevada (Table 3). The species is potentially resilient to effects of climate change and may expand its range under warmer, drier conditions. Conversely, an increase in extent and frequency of high-intensity fire may adversely impact Black-throated Gray Warblers in the short-term as they are more abundant in unburned, mature forests than burned sites in fire-affected landscapes.

Climate Change: An analysis of shifts between the historical range of Black-throated Gray Warbler (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to both temperature and precipitation changes by shifting its range to follow its climatic niche (Tingley et al. 2009). This result suggests that the species has already responded to climate change, and will likely continue to shift its range in the coming decades. Modeled distribution shifts of Black-throated Gray Warblers predict a greater probability of occurrence in Sierra Nevada and throughout their California range, including in the SIEN parks (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation, annual precipitation (Maxent distribution model), and temperature seasonality (GAM distribution model).

Black-throated Gray Warblers prefer dry oak and pine forests with an understory of montane chaparral. If this species moves upslope in response to a warming climate, as is generally expected, there is likely to be an abundance of its dry-forest habitat available for colonization in the SIEN parks and throughout the Sierra, suggesting that this warbler may be more adaptable to climate change than many other montane warblers.

Altered Fire Regimes: Habitat for Black-throated Gray Warblers is characterized by open conifer forests interspersed with shrubs or forest edges, or shrubby undergrowth below oak and conifer trees (CALPIF 2002). This habitat suggests that high-intensity fire would enhance conditions for the species, but empirical research indicates fire may reduce habitat suitability, at least temporarily. While found in burned forest, the Black-throated Gray Warbler was significantly more abundant in unburned forests in the southern Sierra Nevada (Siegel and Wilkerson 2005). Similarly, the species was a significant indicator of mature forests in burned landscapes in Oregon (Fontaine et al. 2009). A future increase in extent and frequency of high-intensity fires within dry, open pine and oak forests in the SIEN parks may adversely impact this species, although further research on the long-term impact of fire on habitat is warranted.

Habitat Fragmentation or Loss: The Black-throated Gray Warbler prefers habitats that tend to be of little economic value or are unprofitable to convert to other uses, and together with the widespread occurrence of the warbler, it has been suggested that human activity has had little effect on its overall population (Guzy and Lowther 1997). However, the species is sensitive to habitat degradation due to timber harvesting; detections decreased significantly in thinned compared to untreated stands in Douglas-fir forests in Oregon (Hayes et al. 2003). Thinning is widespread in the Sierra Nevada, but less so in the SIEN parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Black-throated Gray Warblers are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Thus habitat degradation due to packstock grazing within the parks is a potential concern for the Black-throated Gray Warbler, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can alter oak woodland habitats by spreading invasive grasses (Standiford et al. 1997, CPIF 2000, Purcell and Stephens 2005). However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Management Options and Conservation Opportunities

The Black-throated Gray Warbler apparently is thriving in SIEN parks, especially Yosemite. As with most warblers, the species is vulnerable to Brown-headed Cowbird parasitism, so perhaps the most important action park manages can take to protect Black-throated Gray Warbler populations in the parks is to carefully manage or consider eliminating cowbird feeding sites (Heath 2008) such as stables. Guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004). Managing for a mosaic of burn intensities may benefit this species in the long-term, as it is associated with unburned forest but requires a shrubby understory that is typically maintained by fire.

Blue-gray Gnatcatcher – *Polioptila caerulea*

Migratory Status

Short-distance/Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Blue-gray Gnatcatcher is an uncommon summer and year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and a rare summer resident and possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Blue-gray Gnatcatchers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Uncommon
Yosemite NP	Summer	Regular Breeder	Uncommon
Devils Postpile NM	Summer	Possible Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Blue-gray Gnatcatchers occur in the southwestern U.S., most of the eastern half of the U.S., and all of Mexico (although only as a wintering bird on the Pacific coast of mainland Mexico (Ellison 1992). The bird's breeding range expanded northward during the 20th century, especially in eastern North America (Ellison 1992). In the Sierra the subspecies *amoenissima* is uncommon, thus the mountain range is relatively unimportant for this species (Siegel and DeSante 1999).

Distribution and Habitat Associations

Blue-gray Gnatcatchers are found in a wide variety of wooded habitats but seem to prefer moist areas with broad-leaved trees (Ellison 1992). In the Sierra, Blue-gray Gnatcatchers prefer open woodlands with an open, shrubby understory. On the west slope of the Sierra the species is found most often in oak-woodlands but also in Gray, Knobcone, and Ponderosa Pines, while on the east slope these birds prefer Pinyon Pines, Junipers, and Mountain Mahogany (Siegel and DeSante 1999). Blue-gray Gnatcatchers were detected in moderately low numbers (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were not observed during the inventory at DEPO. Park inventories show highest associations with Blue Oak Forest (perhaps the one park habitat where the species is quite common) within SEKI and Foothill Pine and Mixed Chaparral in YOSE (Table 2).

Table 2. Number of Blue-gray Gnatcatchers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	17	17	Blue Oak Forest	0.40	0.79 (0.31-1.97)
			Mixed Chaparral	0.11	0.12 (0.04-0.32)
			Live Oak/California Buckeye	0.09	0.18 (0.05-0.73)
Yosemite NP	26	31	Foothill Pine	0.36	
			Mixed Chaparral	0.24	
			Canyon Live Oak	0.08	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

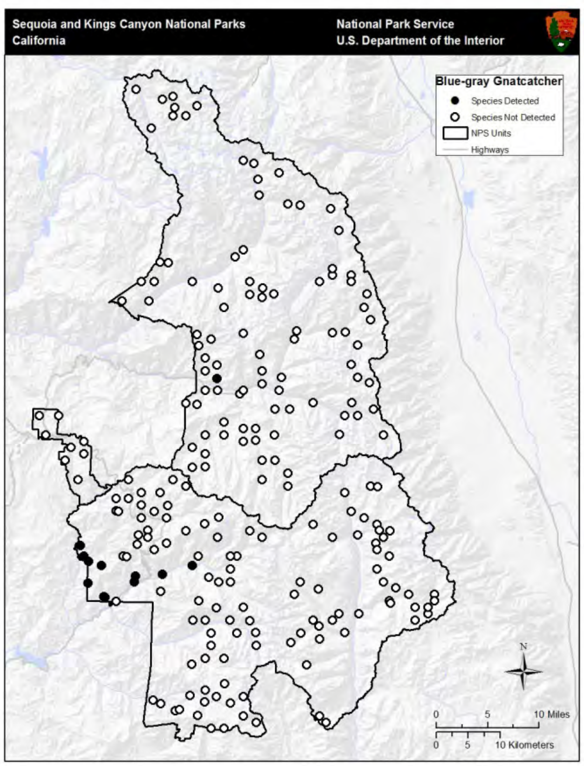

Figure 1. Bird survey transects where Blue-gray Gnatcatcher was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

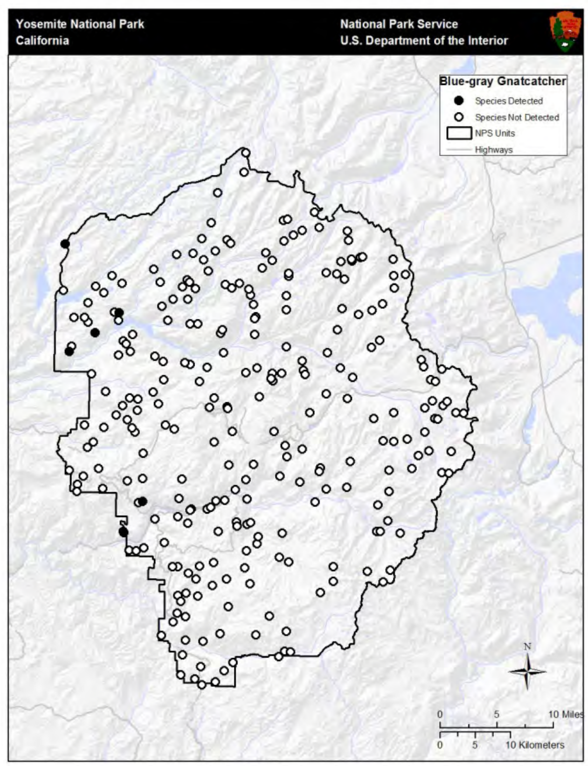

Figure 2. Bird survey transects where Blue-gray Gnatcatcher was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Blue-gray Gnatcatcher was detected at low to middle elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Blue-gray Gnatcatcher in SEKI was 895 m, with 95% of observations occurring between 573 and 1808 m. In YOSE, the mean elevation of observations was 1534 m with 95% of observations falling between 1280 and 2040 m (Siegel et al. 2011).

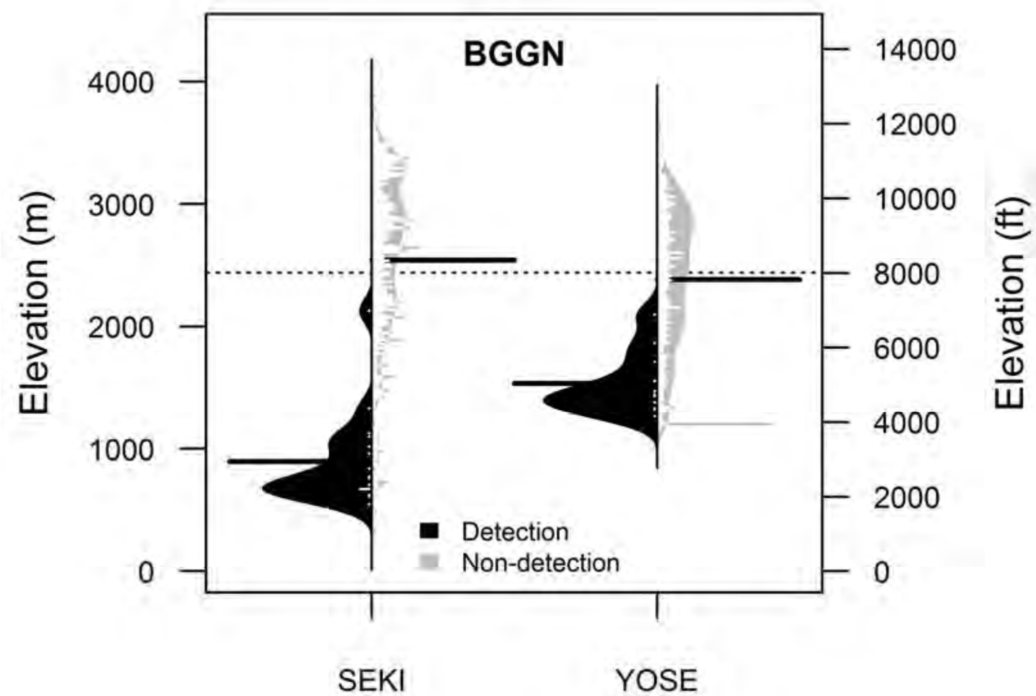

Figure 2. Elevational distributions of sites where Blue-gray Gnatcatcher (BGGN) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Blue-gray Gnatcatchers are similarly abundant in the Sierra Region (BCR 15) and California as a whole. They were detected in higher numbers on individual BBS routes in SIEN parks than in the Sierra Nevada region, especially at Sequoia and Kings Canyon NPs. Nearly significant positive high annual population trends were observed in Sequoia and Kings Canyon (Table 3).

Table 3. Relative abundance and trends for Blue-gray Gnatcatcher according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	80	0.59	+0.1	0.89
	1980-2007			-0.5	0.65
Sierra Nevada (BCR 15)	1966-2007[1]	10	0.54	-0.6	0.94
	1980-2007[1]			+2.5	0.57
Route 14117 – Sequoia NP	1972-2005	1	1.94	+57.4	0.07
Route 14132 – Kings Canyon NP	1974-2005	1	2.35	+16.3	0.05
Route 14156 – Yosemite NP	1974-2007	1	0.69	+1.1	0.91

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Blue-gray Gnatcatchers are not captured in mist nets at SIEN MAPS stations, thus data on productivity and survival in the parks are not available.

Stressors

The most widespread member of its genus, the Blue-gray Gnatcatcher expanded northwards and increased in population over the 20th century (Ellison 1992). In the Sierra this bird is generally uncommon but appears to be thriving in the low-elevation portions of SIEN parks, particularly SEKI (Table 3). The species may expand upslope in the Sierra in response to climate change. Restoration of natural fire cycles, including high-intensity fire in conifer forests and moderate-frequency fire in oak woodlands, should benefit Blue-gray Gnatcatchers. Loss of habitat to urbanization likely poses a threat to the species. Packstock grazing and the Brown-headed Cowbirds it attracts may threaten gnatcatchers in the parks and throughout the Sierra.

Climate Change: An analysis of Christmas Bird Count (CBC) data found that the center of abundance of Blue-gray Gnatcatcher throughout its North American range has not changed significantly over the past 40 years (Audubon 2009). Modeled distribution shifts of Blue-gray Gnatcatcher range predict a much greater probability of occurrence throughout all the mountains of California – including the Sierra foothills – as well as a range expansion in northwestern California (Stralberg and Jongsomjit 2008). A greater probability of occurrence is predicted in the lower-elevation foothills and drainages of YOSE and SEKI and around DEPO, driven primarily by vegetation and precipitation changes (Stralberg and Jongsomjit 2008).

Blue-gray Gnatcatchers are associated with Blue Oak forests, Foothill Pine forests, and Mixed Chaparral at low to middle elevations of the SIEN parks, and may colonize higher elevations if these habitat types expand uphill or are readily available at higher elevations. If climate change causes the species' range to shift upslope as is generally expected, there is likely to be adequate oak woodland, shrubland, and open conifer forest habitat in SEKI and YOSE for the species to colonize. This may be an example of a species to substantially benefit from a warming climate.

Altered Fire Regimes: Fire, set by lightning or Native Americans, historically has been an important component of oak woodlands in California. The decimation of the Native American population and the introduction of livestock and associated non-native annual grasses by European settlers altered fire regimes of this habitat type (Purcell and Stephens 2005). European settlers burned extensively to convert shrublands and woodlands to grasslands for livestock. Oak recruitment increased in some areas coincident with European settlement due to fire, but many areas of Blue Oak woodlands were entirely cleared and permanently converted to annual grassland (Purcell and Stephens 2005).

Although Blue Oak seedlings may be killed by frequent fire, seedlings and saplings are capable of resprouting after fire, and fire increases acorn and leaf production by reducing competition with understory vegetation, which in turn improves habitat for Blue-gray Gnatcatchers (Purcell and Stephens 2005). This species prefers open forests and woodlands with a shrubby overstory, however, so overly frequent fire would reduce the shrub layer. Thus, the Blue-gray Gnatcatcher is likely to benefit from moderately frequent fire in oak woodlands in SIEN parks (Purcell et al. 2005).

While few data are available on fire effects to Blue-gray Gnatcatchers in conifer forests, the species was detected only in a 9-year old burned site in Mixed Conifer and true fir forests in the northern Sierra (Burnett et al. 2010). High-intensity fire may temporarily reduce habitat suitability for this shrub-nesting species, but burned sites may represent highly suitable habitat once the shrub layer recovers. The association of Blue-gray Gnatcatchers with open forests and shrubby understories, as well as in Mixed Chaparral types suggests that a future increase in extent and frequency of high-intensity fire in SIEN parks may benefit this species. Conversely, policies of fire suppression and shrub elimination may adversely impact these gnatcatchers.

Habitat Fragmentation or Loss: The majority of oak woodlands in California are privately owned and receive little management or regulatory protection. More recently, urban development has become the dominant reason for loss of oak woodlands. Extensive clearing of oak woodlands for urban development is likely a major threat to Blue-gray Gnatcatchers in lower-elevation foothill habitats (Siegel and DeSante 1999), but does not impact the species in the SIEN parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Blue-gray Gnatcatchers are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see species account for Brown-headed Cowbird in this report).

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for Blue-gray Gnatcatchers, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage shrubs and degrade oak woodland habitats. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Oak woodlands in north-central coastal California have been falling victim to Sudden Oak Death (SOD), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SOD probably was introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Blue-gray Gnatcatchers if it reaches those regions of the Sierra Nevada.

Management Options and Conservation Opportunities

Pursuing ecosystem management that protects the shrubby understory in lower-elevation forests is one of the most important actions managers can take to benefit Blue-gray Gnatcatcher populations in SIEN parks. Managers can also carefully manage or consider eliminating Brown-headed Cowbird feeding sites (Heath 2008) such as stables. Guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004). Managers should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SOD, and preventative measures including quarantine of the area could be immediately implemented if SOD is identified. Management guidelines and regulations pertaining to SOD can be found at the California Oak Mortality Task Force website (http://www.suddenoakdeath.org/).

Brewer's Blackbird – *Euphagus cyanocephalus*

Migratory Status

Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Brewer's Blackbird is a locally common summer or year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and a fairly common summer resident and regular breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Brewer's Blackbirds in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Locally Common
Yosemite NP	Summer/Year-round	Regular Breeder	Locally Common
Devils Postpile NM	Summer	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

The Brewer's Blackbird historically occurred throughout western North America but over the past century expanded eastward and northward (Martin 2002). The Sierra Nevada does not comprise an important part of the Brewer's Blackbird's range either in California or throughout North America (Siegel and DeSante 1999).

Distribution and Habitat Associations

Brewer's Blackbirds are strongly associated with human habitats. In the Sierra Nevada, nesting typically occurs around meadows, ponds, lakes, streams, or areas of human habitation. The birds forage over meadows and meadow edges, riparian vegetation, and along the margins of lakes and streams (Siegel and DeSante 1999). During avian inventory projects, Brewer's Blackbirds were detected in moderate numbers (Table 2) along survey transects in SEKI (Figure 1) and in higher numbers (Table 2) along survey transects in YOSE (Figure 2), and moderate numbers at DEPO. Observations at YOSE often were clustered along streams (Figure 2). Park inventories show highest associations with montane meadows at YOSE, in addition to Black Oak, and meadows, with a small number of observations recorded in Red Fir/White Fir forest (Table 2).

Table 2. Number of Brewer's Blackbirds recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	13	19	Lower Elevation Meadow	0.06	0.65 (0.21-2.02)
			Red Fir/White Fir Forest	0.02	0.10 (0.02-0.40)
Yosemite NP	52	190	Montane Meadow	0.70	
			Black Oak	0.39	
			Subalpine/Alpine Meadow	0.23	
Devils Postpile NM	3	5	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

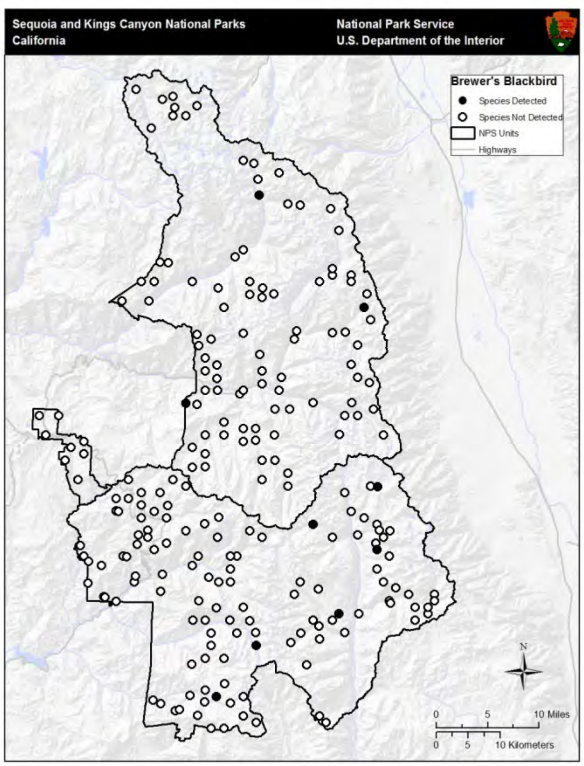

Figure 1. Bird survey transects where Brewer's Blackbird was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

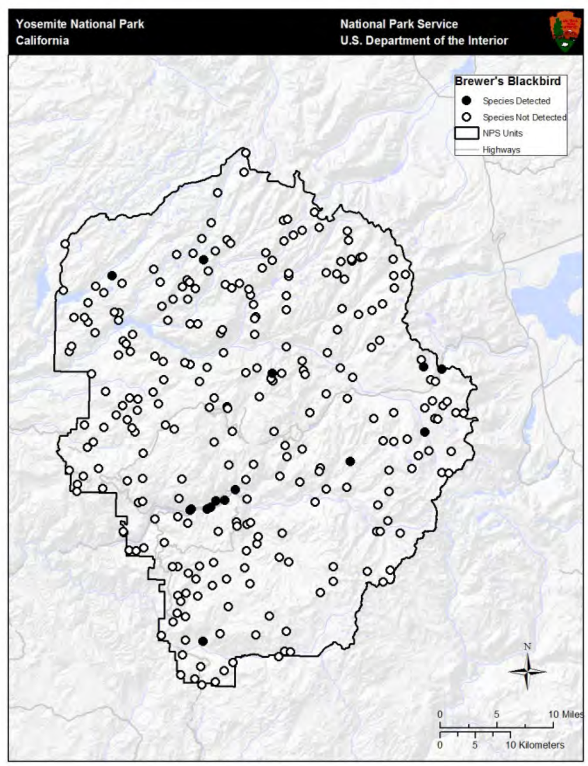

Figure 2. Bird survey transects where Brewer's Blackbird was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Brewer's Blackbird was detected at mid to high elevations in SEKI and at mid elevations at YOSE during recent avian inventory surveys (Figure 3). The mean elevation of observations for Brewer's Blackbird at SEKI was 2854 m, with 95% of observations occurring between 2385 and 3535 m. In YOSE, the mean elevation of observations was 1880 m with 95% of observations falling between 1200 and 2998 m (Siegel et al. 2011).

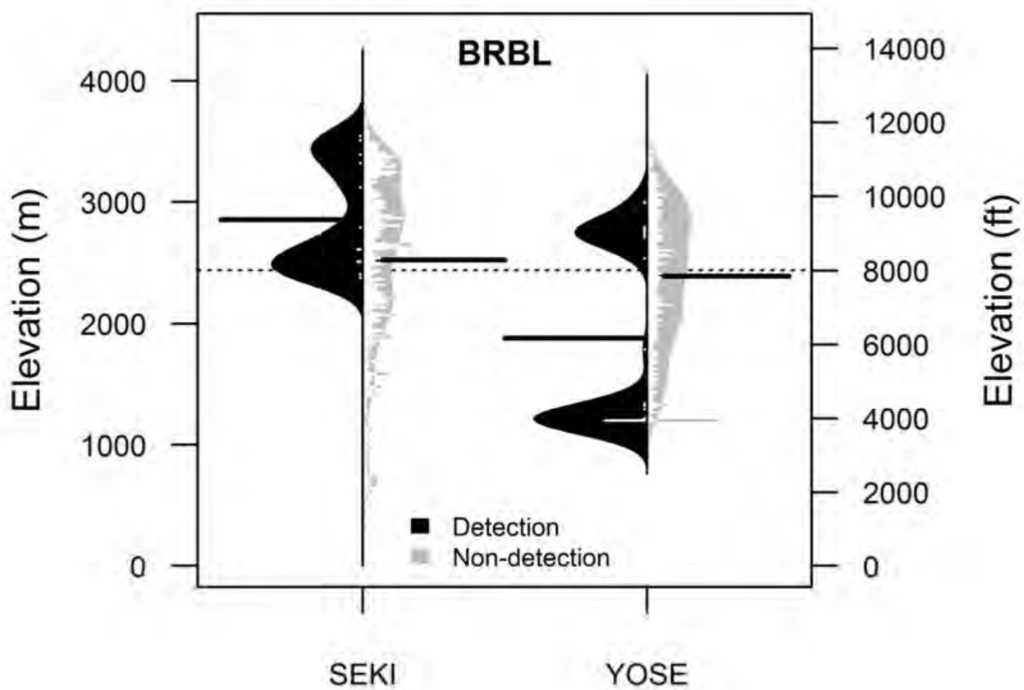

Figure 2. Elevational distributions of sites where Brewer's Blackbird (BRBL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) survey data indicate Brewer's Blackbirds were very abundant in both the Sierra Region (BCR 15) and in California as a whole, including the SIEN parks (Table 3). Brewer's Blackbirds experienced small but significant population declines in California from 1966-2007 and 1980-2007. The species also declined significantly along the route in Yosemite National Park by nearly 15% per year from 1974-2007. Non-significant population increases were recorded along the routes in both Sequoia and Kings Canyon National Park.

Table 3. Relative abundance and trends for Brewer's Blackbird according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	191	47.78	-1.9	0.00
	1980-2007			-2.1	0.00
Sierra Nevada (BCR 15)	1966-2007	31	14.91	-0.9	0.32
	1980-2007			-0.9	0.37
Route 14117 – Sequoia NP	1972-2005	1	11.88	+13.1	0.23
Route 14132 – Kings Canyon NP	1974-2005	1	6.45	+3.2	0.54
Route 14156 – Yosemite NP	1974-2007	1	4.77	-14.7	0.03

Contrary to results from BBS data, SIEN parks MAPS data indicate Brewer's Blackbird populations increased significantly by more than 10% annually at MAPS stations in Yosemite National Park from 1993-2009 (Table 4).

Table 4. Population trends, productivity, trends, and survival estimates of Brewer's Blackbird at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.2	NA[2]	0.00	NA	NA
Yosemite NP	1993-2009	1.0	+10.20***	0.11	NA	NA
Devils Postpile NM	2002-2006	2.7	NA	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

While native to California, Brewer's Blackbird has expanded in the Sierra Nevada over the past century. This species increased in Yosemite Valley from six pairs in 1920 to hundreds in 1940, and the population now probably numbers in the thousands (Siegel and DeSante 1999). MAPS data indicate continued population increases in Yosemite from 1993-2009 (Table 4). The expansion of this species in the Sierra Nevada has been a result of increased human activity and the ability of Brewer's Blackbirds to adapt to human habitation.

Brewer's Blackbirds in the Sierra Nevada may be threatened by future drying of wet meadow habitats due to climate change. The species is also susceptible to brood parasitism from Brown-headed Cowbirds, and is vulnerable to West Nile Virus.

Climate Change: An analysis of Christmas Bird Count (CBC) data indicates the center of abundance of Brewer's Blackbird has shifted significantly northwards by nearly 14 miles and towards the coast by nearly 15 miles throughout its North American range over the past 40 years, concomitant with increases in temperature (Audubon 2009). Similarly, an analysis of shifts between the historical range of Brewer's Blackbird (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation change (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). These observed shifts provide evidence that the Brewer's Blackbird has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

The Brewer's Blackbird has been shifting its range and center of abundance. This species occupies a broad variety of habitat types, especially human-altered areas throughout California, suggesting it is relatively resilient to climate change. Typically considered a lower-elevation species, the Brewer's Blackbird was detected in montane meadows at surprisingly high elevations in SIEN parks (Figure 3). If climate change causes the species' range to move upslope in the Sierra Nevada as is generally expected, there is likely to be sufficient meadow habitats at higher elevations. However, populations of blackbirds may suffer in the SIEN parks if meadow habitats are degraded due to climate warming. For example, if climate change results in drier meadows for a longer portion of the breeding season, which in turn reduces insect prey, Brewer's Blackbird may be adversely impacted. Another potential risk of climate change is more precipitation falling as rain rather than snow, which may cause flooding that causes nest failures of this ground-nesting bird.

Altered Fire Regimes: Brewer's Blackbird was only detected in unburned forests during surveys in burned landscapes in the northern Sierra Nevada (Burnett et al. 2010). Conversely, in the southern Sierra Nevada, Brewer's Blackbird preferred recently burned forests (Siegel and Wilkerson 2005). Thus, research results on the impacts of fire on Brewer's Blackbirds in the Sierra Nevada are equivocal. The effects of an increase in frequency and intensity of fire in the SIEN parks on this species remain unknown.

Habitat Fragmentation or Loss: Human alteration of habitats such as campgrounds and other developments in SIEN parks is likely to benefit Brewer's Blackbirds, who forage readily in these areas.

Invasive Species and Disease: West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). The virus has caused mortality in many native birds. In 2009, West Nile Virus caused at least 12 Brewer's Blackbird deaths in California (CDPU 2010).

Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas, which are often located in meadow habitats favored by Brewer's Blackbirds. Brewer's Blackbirds are highly susceptible to brood parasitism by Brown-headed Cowbirds; one study in Colorado and Wyoming found 19.4% of Brewer's Blackbird nests were parasitized. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: The Code of Federal Regulations specifies Brewer's Blackbird as one of approximately a dozen species that can be killed in absence of a Federal permit when birds are in the act or about to commit crop depredation (Martin 2002). Further, the Brewer's Blackbird's mixed-flock association with serious pest species (Red-winged Blackbirds, grackles, Brown-headed Cowbirds, and European Starlings) subjects this blackbird to inadvertent shooting, poisoning, hazing, netting, trapping, and other pest-control practices directed toward marauding target pests (Martin 2002). Brewer's Blackbirds also are associated with agricultural operations, rendering them susceptible to poisoning by agrochemicals (Martin 2002). These activities are not threats in SIEN parks.

Packstock grazing within the SIEN parks is a potential risk to Brewer's Blackbirds, at least locally where grazing is permitted, because it can attract Brown-headed Cowbirds and because packstock can damage meadow habitats. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized. Moreover, comparisons between ungrazed riparian habitats and riparian zones subjected to livestock grazing found no effect of grazing on Brewer's Blackbird occupancy (Martin 2002).

Management Options and Conservation Opportunities

The most important things park managers can do to protect Brewer's Blackbird populations are to maintain montane meadow habitats and to manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE should be updated.

If climate change leads to substantial meadow desiccation and declines in reproductive success, restoration of meadow hydrology could benefit breeding Brewer's Blackbirds. Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites, perhaps along with active restoration of riparian deciduous vegetations, would likely benefit Brewer's Blackbirds and other meadow-dwelling bird species.

Brown Creeper – *Certhia americana*

Migratory Status
Resident/short-distant migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Brown Creeper is a common year-round resident and breeder in Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks as well as Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Brown Creepers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Common
Devils Postpile NM	Year-round	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Brown Creeper breeds across much of Canada and the mountains of western U.S. including the Sierra Nevada, but occurs in much of the eastern U.S. only during winter. However, the subspecies *zelotes* is only found in California, primarily at higher elevations. SIEN parks are more important for populations of *zelotes* than for the species as a whole (Siegel and DeSante 1999).

Distribution and Habitat Associations
Brown Creepers prefer dense conifer stands, but are often also found in deciduous forests in the Sierra Nevada (Gaines 1992). The species was detected frequently (Table 2) along numerous transects (Figures 1 and 2) during avian inventory projects in the SIEN parks. The high number of observations reflects the species' rather wide habitat preferences and broad elevational range. Characteristic of Brown Creepers, the species was found in a variety of coniferous forest types within SEKI and YOSE. Park inventories show highest associations with Giant Sequoia and recently burned forests within SEKI and YOSE respectively. However, it should be noted that although relative abundance in Undifferentiated Post-fire habitats in SEKI was relatively low

(0.21 detections per station), when adjusted for detectability the estimated density was relatively high (0.44 birds per ha) (Siegel and Wilkerson 2005a).

Table 2. Number of Brown Creepers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	223	237	Giant Sequoia Forest	0.47	0.58 (0.38-0.88)
			Western White Pine Woodland	0.32	0.37 (0.16-0.85)
			Red Fir Forest	0.28	0.34 (0.22-0.53)
			Ponderosa Pine Woodland	0.24	0.28 (0.07-1.11)
Yosemite NP	342	407	Recent Burn	0.39	
			Red Fir	0.34	
			White Fir	0.33	
			Western White Pine	0.29	
Devils Postpile NM	9	10	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

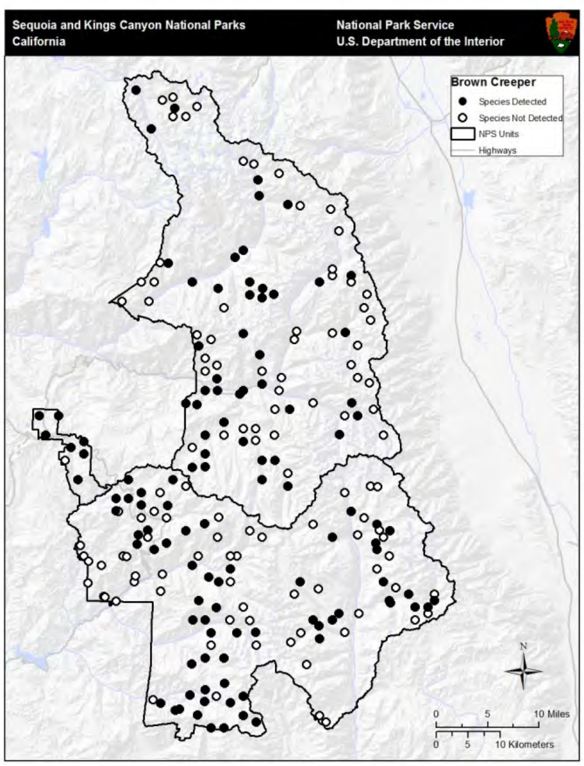

Figure 1. Bird survey transects where Brown Creeper was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

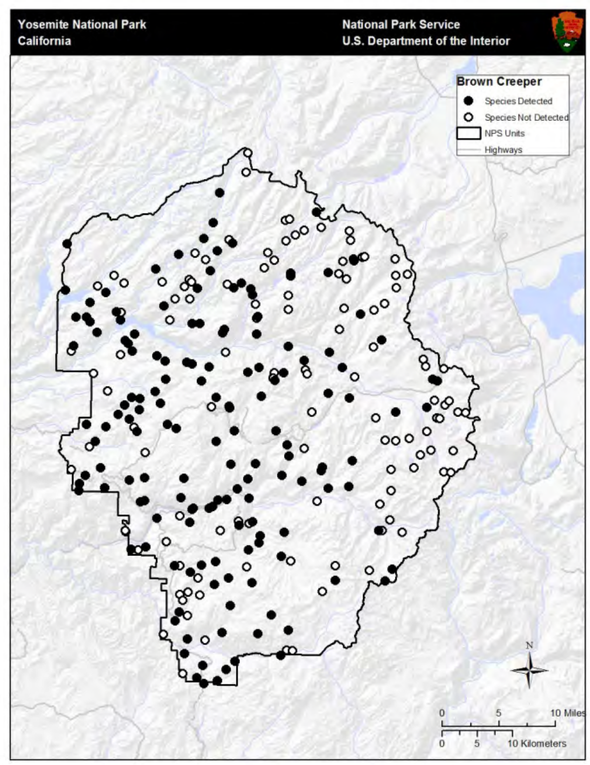

Figure 2. Bird survey transects where Brown Creeper was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Brown Creeper was observed across broad elevation gradients at SEKI and YOSE during recent avian inventory projects (Figure 3). The mean elevation of observations of Brown Creeper made in SEKI was 2472 m, with 95% of observations made between 1476 and 3296 m. In YOSE, the mean elevation of observations was 2159 m with 95% of observations falling between 1208 and 2939 m (Siegel et al. 2011).

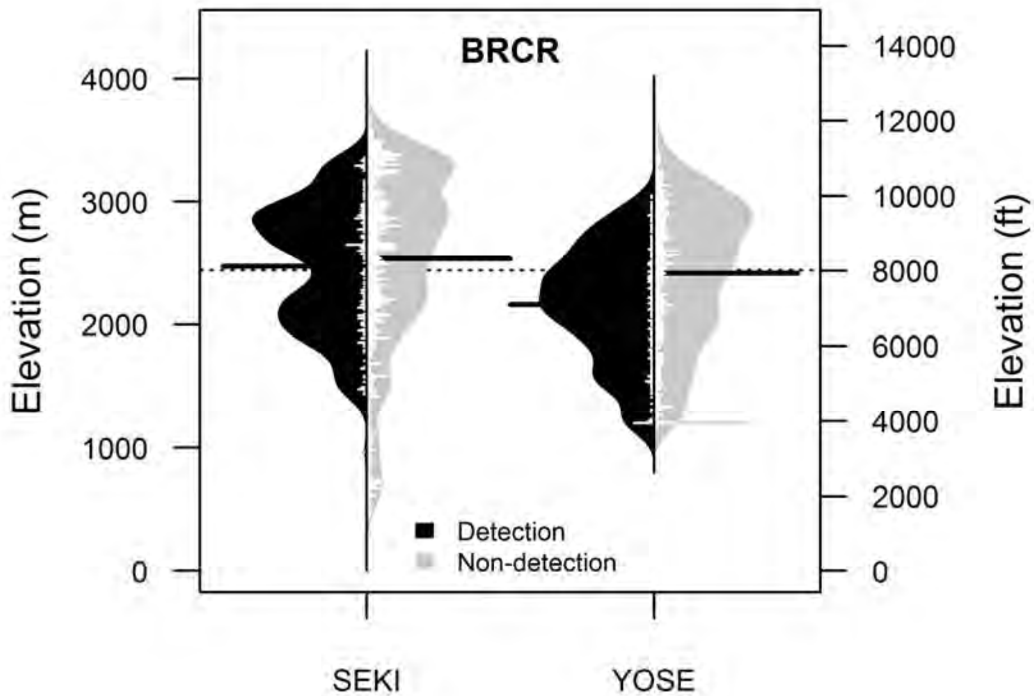

Figure 3. Elevational distributions of sites where Brown Creepers (BRCR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Brown Creepers are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were detected in relatively high numbers on individual BBS routes at YOSE and Sequoia NP, but in low numbers on the BBS route in Kings Canyon NP. A significant and worsening negative trend is evident in California as a whole, but observed declines are not statistically significant in the Sierra.

Table 3. Relative abundance and trends for Brown Creeper according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	102	2.22	-1.9	0.06
	1980-2007			-2.7	0.00
Sierra Nevada (BCR 15)	1966-2007	35	4.02	-2.1	0.21
	1980-2007			-0.8	0.41
Route 14117 – Sequoia NP	1972-2005	1	2.13	+5.8	0.68
Route 14132 – Kings Canyon NP	1974-2005	1	0.95	+16.2	0.11
Route 14156 – Yosemite NP	1974-2007	1	6.77	-2.0	0.56

MAPS data from Kings Canyon and YOSE NPs show stable populations at banding stations. Reproductive indices from both parks are relatively high with slightly greater productivity suggested in YOSE.

Table 4. Population trends, productivity, trends, and survival estimates of Brown Creepers at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	3.5	+6.47	1.26	-9.79	0.402 (0.190)
Yosemite NP	1993-2009	2.7	+2.90	2.01	-0.01	0.304 (0.073)
Devils Postpile NM	2002-2006	0.3	NA[2]	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Trend and demographic data for Brown Creeper show declines across the state, but stable populations in the Sierra including SEKI and YOSE. Likewise productivity appears to be stable in Kings Canyon NP and YOSE. High relative abundance and adult survival rates indicate a particularly healthy population of Brown Creepers within YOSE. Data on the species in DEPO is limited and further monitoring will be necessary to better evaluate current condition and ongoing trends.

Stressors

The greatest stressor to Brown Creeper across the Sierra Nevada is the loss or reduction in size of mature forests stands as well as a reduction in stand diversity. Due to the absence of commercial timber harvest, this is not a major concern within SIEN parks. However, forest management and timber harvest adjacent to SIEN parks could affect Brown Creeper populations that cross park boundaries.

Brown Creeper appears to have already responded to climate change and occurrence of Brown Creeper through much of California is predicted to decrease due to the threat. However, high altitude forests such as those found in SIEN parks may act as climate refugia and perhaps even host increased numbers of Brown Creepers in the future. Increased fire frequency due to climate change may benefit the species by providing favorable nesting and foraging habitat, provided that late-seral forest stands with large trees remain common throughout the parks. Finally, human use impacts (other than timber harvest), invasive species, and disease do not appear to be major threats to the species.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of Brown Creeper has significantly shifted 103.8 miles to the north and 25.3 miles away from the coast over the past 40 years throughout its North American range, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Brown Creeper has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Modeled distribution shifts of Brown Creeper predict decreasing occurrence of the species in lower altitudes across California (Stralberg and Jongsomjit 2008). The most prominent decreases in occurrence are expected along the north coast, while Brown Creeper is expected to increase in density in the southern Sierra where high-altitude habitat is available. The most important variables influencing current and projected distribution were vegetation, annual precipitation (Maxent distribution model), and precipitation seasonality (GAM distribution model) (Stralberg and Jongsomjit 2008). Brown Creepers currently breed between 1208 and 3296 m in SEKI and YOSE (Figure 3). Climate change is likely to result in range contraction in the lower elevations and an increase in use of high-elevation forests.

MAPS data from Kings Canyon suggest that during La Niña years (characterized by mild winters and early springs) Brown Creeper is one of several species that tend to exhibit reduced capture rates of young birds and/or depressed productivity rates (Siegel et al. 2009). La Niña conditions are expected to become more frequent in the coming years (Siegel et al. 2009) which may therefore reduce adult populations over time.

Additionally, one study (Mills 2004) from elsewhere in Brown Creeper's range indicates the species has already adjusted its annual life-cycle phenology in response to climate change, with increasingly delayed fall migration evident over a 25-year span (1975-2000). Observations such as these, though not directly relevant to SIEN populations, indicate that Brown Creepers are already responding to climate warming.

Due to the presence of high-elevation forests, SIEN parks may act as important refugia for Brown Creeper in a warmer future. However, if the species were to persist only in high-elevation 'islands' within the southern Sierra Nevada, isolation of these populations from the greater range of the Brown Creeper could lead to a loss of genetic diversity.

Altered Fire Regimes: Brown Creepers utilize snags and downed logs such as those present in post-fire habitats. In fact, the species was found most often in recently burned forest within

YOSE (Table 2). Therefore, an increase in fire frequency would likely benefit Brown Creeper by creating more high-quality habitat, as long as fire intervals remain long enough to allow the development of late-seral forest stands with large trees.

Habitat Fragmentation or Loss: Much of the Brown Creeper's preferred late-seral forest habitat within California has been reduced due to timber harvest (CalPIF 2002). This habitat loss is of concern for the Sierra-wide population, but does not directly impact populations within SIEN parks.

Invasive Species and Disease: To our knowledge there is no significant threat to Brown Creeper from either invasive species or disease.

Human Use Impacts: Brown Creepers commonly collide with human structures where they exist (Heijl et al. 2002), but at most this could have a minor effect on localized populations within SIEN parks.

Management Options and Conservation Opportunities

The best way to conserve Brown Creeper populations is to protect late-successional forests, especially in the higher elevations in and around the SIEN parks. Coordination with land managers of forests adjacent to the SIEN parks, in order to maintain large diameter trees, snags and a diverse tree structure (CALPIF 2002), would benefit Brown Creeper and other species that utilize late-successional forests in the parks. Fire management practices that limit the removal of snags and downed woody debris during treatments would also benefit Brown Creeper.

MAPS station operation and other means of monitoring Brown Creeper populations in the parks should continue to assess how Brown Creeper responds to changing environmental conditions.

Brown-headed Cowbird – *Molothrus ater*

Migratory Status

Short-distance migrant/Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Brown-headed Cowbird is a locally fairly common summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and probable breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Brown-headed Cowbirds in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Probable Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Originally found in short-grass plains, the Brown-headed Cowbird is now distributed throughout all of the U.S. and a substantial portion of Canada and Mexico (Lowther 1993). Northerly populations migrate south in the winter. The Sierra Nevada does not constitute a major portion of the range of the species, but due to the potentially serious impact of cowbirds on populations of smaller open-cup nesting landbirds, this species should be closely monitored in the SIEN parks (Siegel and DeSante 1999).

Distribution and Habitat Associations

In the Sierra Nevada, Brown-headed Cowbirds prefer montane meadows, montane riparian habitat, and the presence of grazing animals in pastureland and around stables for foraging (Siegel and DeSante 1999). They also forage extensively around areas of high human use, such as residential areas with bird feeders, campgrounds, picnic areas, and lawns. Brown-headed Cowbirds are obligate brood parasites that lay their eggs in the nests of smaller cup-nesting species, which then typically raise the cowbird chicks at the expense of their own (Lowther 1993). Cowbirds were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects in SEKI and YOSE and only off-survey at DEPO. Park inventories show highest associations with Blue Oak forest, but the birds were also detected in other oak types, Mixed Chaparral, Ponderosa Pine and Mixed Conifer forests, and montane meadows (Table 2).

Table 2. Number of Brown-headed Cowbirds recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	26	29	Blue Oak Forest	0.34	0.49 (0.24-1.01)
			Live Oak/California Buckeye	0.19	0.15 (0.06-0.39)
			Mixed Chaparral	0.08	0.07 (0.03-0.18)
			Ponderosa Pine Woodland	0.08	0.06 (0.01-0.39)
			Canyon Live Oak Forest	0.06	0.06 (0.03-0.17)
Yosemite NP	12	12	Montane Meadow	0.04	
			Ponderosa Pine/Mixed Conifer	0.02	
			White Fir/Mixed Conifer	0.01	
Devils Postpile NM	0	0	Detected off-survey	NA[1]	

[1]NA - Information not available due to insufficient data.

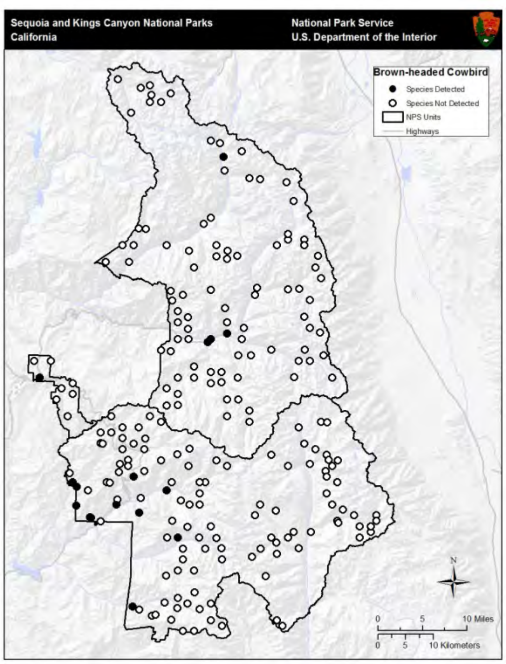

Figure 1. Bird survey transects where Brown-headed Cowbird was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

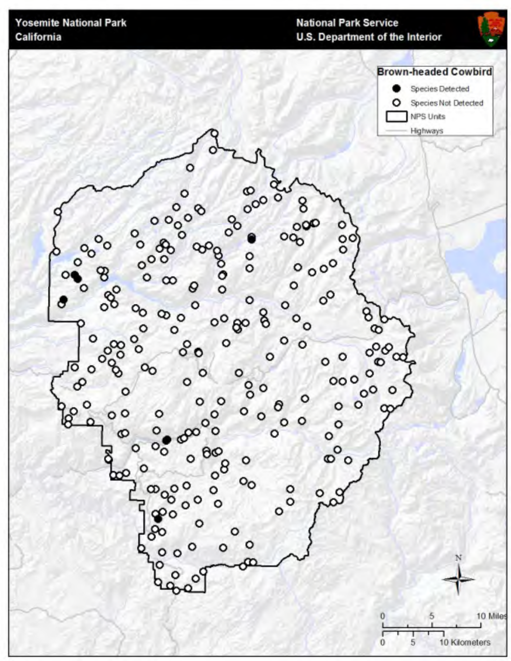

Figure 2. Bird survey transects where Brown-headed Cowbird was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Brown-headed Cowbird was detected at low- to mid-elevations in SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations for this species at SEKI was 1143 m, with 95% of observations occurring between 530 and 2243 m. In YOSE, the mean elevation of observations was 1536 m with 95% of observations falling between 1200 and 2245 m (Siegel et al. 2011).

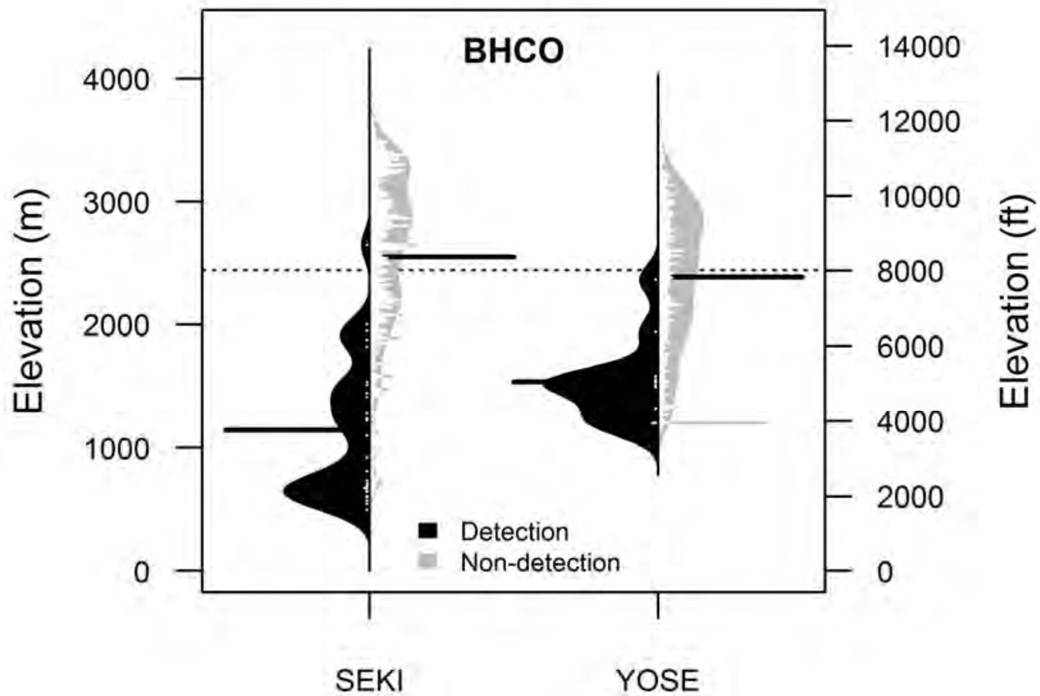

Figure 2. Elevational distributions of sites where Brown-headed Cowbird (BHCO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) survey data indicated Brown-headed Cowbirds were relatively abundant in both the Sierra Region (BCR 15) and in California as a whole (Table 3). The only significant population trends observed were 3.0% and 3.1% declines in the Sierra from 1966-2007 and 1980-2007, respectively. Non-significant population increases were recorded along routes in all three SIEN parks, especially Sequoia NP.

Table 3. Relative abundance and trends for Brown-headed Cowbird according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	204	5.81	-0.3	0.67
	1980-2007			-0.5	0.68
Sierra Nevada (BCR 15)	1966-2007	32	4.15	-3.0	0.00
	1980-2007			-3.1	0.00
Route 14117 – Sequoia NP	1972-2005	1	2.31	+12.3	0.51
Route 14132 – Kings Canyon NP	1974-2005	1	2.40	+7.9	0.28
Route 14156 – Yosemite NP	1974-2007	1	2.58	+0.2	0.98

Brown-headed Cowbirds were not captured in sufficient numbers at SIEN MAPS stations to estimate population trends (Table 4).

Table 4. Population trends, productivity, trends, and survival estimates of Brown-headed Cowbird at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.5	NA[2]	0.13	NA	NA
Yosemite NP	1993-2009	0.2	NA	0.05	NA	NA
Devils Postpile NM	2002-2006	1.5	NA	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Brown-headed Cowbirds once were restricted to short-grass prairies, where they followed herds of bison and fed on the insects stirred up by their movement – earning them the nickname of ‘buffalo birds’ (Lowther 1993). The cowbird expanded their range in the wake of European settlers who logged forests and created suitable cowbird habitat with agricultural and suburban development across North America. Brown-headed Cowbird was not recorded in California prior to 1930, but by the 1960s it was numerous throughout the west slope of the Sierra up to 3000 meters, as well as the east slope (Rothstein et al. 1980, Siegel and DeSante 1999). The species is an obligate brood parasite, laying its eggs in the nests of many different species. Cowbird expansion has exposed new, naïve bird species to brood parasitism, causing significant adverse impacts to the host populations. Female cowbirds wander widely, overlap their breeding ranges, and may lay 40 eggs per season (Lowther 1993).

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the Brown-headed Cowbird’s center of abundance has shifted significantly southwards and towards the coast throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). These observed shifts in abundance suggest that the cowbird may have already responded to climate change, but these changes could also be in response to other factors such as location of developments and livestock grazing.

The Brown-headed Cowbird has successfully invaded most human-altered habitats at lower elevations of the Sierra Nevada. The species was detected in a wide variety of habitat types in the SIEN parks, including oak woodlands, chaparral, pine forests, and mixed-conifer forests (Table 2). If woodland edge habitats expand in the SIEN parks as a result of climate change, this species is likely to benefit substantially, particularly if the extent of packstock presence in the parks continues.

Altered Fire Regimes: Results from research on the impacts of fire on Brown-headed Cowbirds are equivocal. Brown-headed Cowbirds were detected in burned and unburned forests in the eastern Sierra (Bock and Lynch 1970), but only bred in burned forests, albeit in low numbers (Rafael et al. 1987). Conversely, cowbirds were only detected in unburned forests in burned landscapes in the southern Sierra (Siegel and Wilkerson 2005). In the Rocky Mountains, the species was found in equal numbers before and after fire in both burned and unburned areas, but increased in response to moderate-intensity fire and decreased in low-intensity and unburned forests (Smucker et al. 2005). The effects of an increase in frequency and intensity of fire in the SIEN parks on this species remain unknown. Possibly numbers of Brown-headed Cowbirds are more strongly related to factors other than fire, such as proximity to human-based sources of food (Verner and Ritter 1983).

Habitat Fragmentation or Loss: Brown-headed Cowbirds exhibit preference for breeding in wood-field ecotones rather than in extensive woods, field, or prairie areas (Lowther 1993). Cowbird parasitism is strongly associated with habitat disturbance such as logging, development, roads, and trails (Verner and Ritter 1983, Airola 1986, Chace et al. 2002). Verner and Ritter (1983) found cowbirds in the Sierra National Forest strongly preferred meadow edges for breeding, using clearcuts and other logged forest to some extent and unlogged forests rarely or never. Due to increased forest fragmentation, naïve interior-forest species are increasingly exposed to extensive parasitism (Hosoi and Rothstein 2000, Siegel and DeSante 2003). The unfragmented nature of much of the forest in SIEN parks may prevent Brown-headed Cowbird colonization and protect susceptible host species.

Invasive Species and Disease: The Brown-headed Cowbird is an invasive species in California. Although native to North America, the species has expanded its range following extensive habitat alteration by European settlers. As of 1988, Brown-headed Cowbirds have been recorded as successfully parasitizing 144 of 220 species in whose nests its eggs have been observed (Ehrlich et al. 1988). Cowbirds will travel long distances from human-enhanced feeding grounds into surrounding forests to parasitize host nests (Goguen and Mathews 2001, Chace et al. 2002). Forest host species are more susceptible than non-forest species. Desertion of parasitized nests is an evolutionary adaptation to parasitism, and non-forest species that evolved with cowbird parasitism desert their nests significantly more often than naïve forest species (Hosoi and Rothstein 2000). Larger species that build larger nests are more likely to reject eggs, another evolutionary adaptation to parasitism (Peer and Sealy 2004). Parasitism can take a substantial toll on host parents. Not only do some host parents often fail to raise their own young, but cowbird nestlings in parasitized nests impose a substantial energy demand on smaller host parents that could reduce their future survival or fecundity (Kilpatrick 2001). In one study in the northern Sierra Nevada, productivity of susceptible species was reduced by 20.6 and 6.6% in highly and moderately disturbed areas, respectively, with riparian habitat-dependent hosts most likely to decline due to cowbird parasitism (Airola 1986). Nest parasitism may be severe enough to threaten continued survival in the Sierra of some species (Rothstein et al. 1980).

Within national parks, cowbirds are sometimes found and can be particularly problematic near campgrounds, horse stables, and trails. Cowbird occurrence and parasitism rates within SIEN parks were relatively rare in one study (Halterman et al. 1999). For example, from 1995-1996 in SEKI, 2.8% and 2% of passerine nests monitored were parasitized by cowbirds. However, this study is now 15 years old and an updated assessment is warranted, especially given that cowbird numbers appear to have (non-significantly) increased in YOSE and SEKI (Table 3).

Human Use Impacts: Livestock and packstock grazing is a strong indicator of the presence of foraging and breeding Brown-headed Cowbirds. Abundance of cowbirds in the Sierra National Forest declined rapidly with increasing distance from meadows close to food sources provided by humans, such as at pack horse stations (Verner and Ritter 1983). In New Mexico, Brown-headed Cowbird foraging was strongly associated with the presence of active livestock grazing, with 98% of feeding observations occurring with livestock; and female cowbirds greatly increased their commuting distances when cattle were rotated to farther feeding pastures (Goguen and Mathews 2001). Habitat degradation due to packstock grazing within the SIEN parks is a potential concern for numerous vulnerable host species. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized. Nonetheless this impact should be closely monitored.

Management Options and Conservation Opportunities
Known species susceptible to Brown-headed Cowbird brood parasitism in the SIEN parks include (but are not limited to) the following:

Olive-sided flycatcher, Western Wood-pewee, Hammond's Flycatcher, Dusky Flycatcher, Willow Flycatcher, Pacific-slope Flycatcher, Western Kingbird, Cassin's Vireo, Hutton's Vireo, Warbling Vireo, Steller's Jay, Horned Lark, Tree Swallow, Northern Rough-winged Swallow, Barn Swallow, Mountain Chickadee, Chestnut-backed Chickadee, Bushtit, Pygmy Nuthatch, Brown Creeper, Canyon Wren, Bewick's Wren, House Wren, Winter (Pacific) Wren, Golden-crowned Kinglet, Blue-gray Gnatcatcher, Western Bluebird, Mountain Bluebird, Townsend's Solitaire, Hermit Thrush, American Robin, European Starling, Nashville Warbler, Yellow Warbler, Yellow-rumped warbler, Black-throated Gray, Hermit Warbler, MacGillivray's Warbler, Common Yellowthroat, Wilson's Warbler, Green-tailed Towhee, Chipping Sparrow, Fox Sparrow, Song Sparrow, Lincoln's Sparrow, White-crowned Sparrow, Dark-eyed Junco, Western Tanager, Black-headed Grosbeak, Lazuli Bunting, Red-winged Blackbird, Brewer's Blackbird, Bullock's Oriole, Purple Finch, Cassin's Finch, House Finch, Lesser Goldfinch (Robertson and Norman 1976, Gaines 1974, Lavers 1974, Verner and Ritter 1983, Airola 1986, Harris 1991, Goguen and Mathews 2001, Kilpatrick 2002). Spotted sandpiper and Killdeer nests were unsuccessfully parasitized (Ehrlich et al. 1988)

Flycatchers, vireos, and warblers are especially susceptible to Brown-headed Cowbird parasitism (Gaines 1974) as are riparian-dependent species (Airola 1986). Warbling Vireo seems particularly vulnerable, suffering up to 80% parasitism in some areas (Rothstein et al. 1980, Ward and Smith 2000).

An updated assessment of the 15-year old study of Brown-headed Cowbird occurrence and parasitism in Sequoia and Kings Canyon national parks is warranted to guide managers towards cowbird ‘hotspots.’ If problem areas are identified, risk of Brown-headed Cowbird parasitism might be reduced by locating cowbird-attracting developments in SIEN parks away from habitats that are richest in host species, to force cowbirds that are attracted to foods in developed areas to disperse farther to find hosts, thereby diluting parasitism over a larger area (Airola 1986). Concerted cowbird trapping and removal may be necessary to maintain host species in diverse habitats in or adjacent to disturbed areas. Although not germane to management within the parks, the strong association between cowbird foraging and the distribution of active livestock grazing suggests that manipulating grazing patterns may prove effective in managing cowbird populations (Goguen and Mathews 2001).

Bullock's Oriole – *Icterus bullockii*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Bullock's Oriole is a locally fairly common summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, but was not recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of Bullock's Orioles in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Locally Fairly Common
Yosemite NP	Summer	Regular Breeder	Locally Fairly Common
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Bullock's Oriole breeds from southernmost British Columbia throughout the western United States as far east as Montana and the western parts of North and South Dakota, Nebraska, Kansas, Oklahoma (the panhandle) and Texas (Rising and Williams 1999). This species is of limited occurrence in the Sierra Nevada which is not an important part of its range (Siegel and DeSante 1999).

Distribution and Habitat Associations

Bullock's Orioles in the Sierra Nevada prefer oak woodlands and riparian habitats, especially cottonwoods and sycamores, and also occur infrequently in Ponderosa Pine if an oak component is present (Siegel and DeSante 1999). Bullock's Orioles were detected at very low numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventories in SEKI and YOSE but not at DEPO. Three birds were observed in Blue Oak woodland in SEKI and 3 in Montane Meadow in YOSE (Table 2).

Table 2. Number of Bullock's Orioles recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	3	3	Blue Oak Woodland	0.07	NA
Yosemite NP	3	3	Montane Meadow	0.01	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

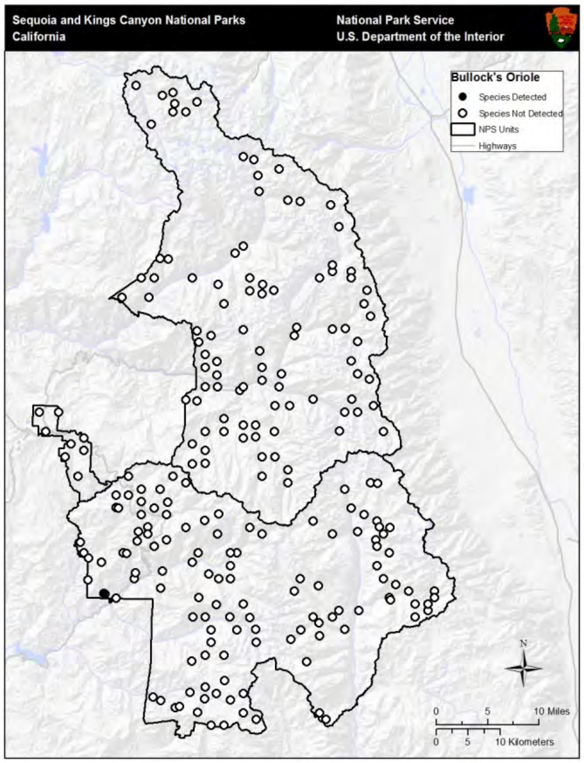

Figure 1. Bird survey transects where Bullock's Oriole was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

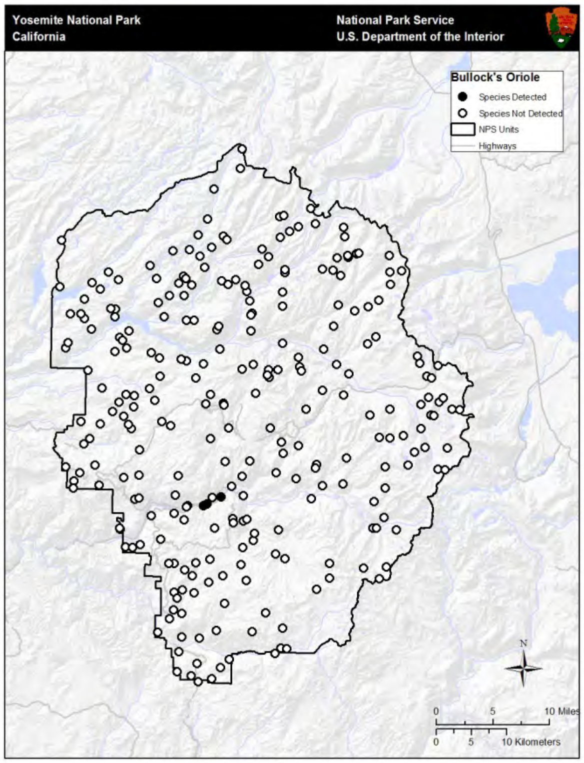

Figure 2. Bird survey transects where Bullock's Oriole was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Bullock's Oriole was detected at low elevations in SEKI and YOSE during recent avian inventory surveys (Figure 3). The mean elevation of observations for this species at SEKI was 638 m, with all 3 observations occurring between 611 and 669 m. In YOSE, all three observations occurred in Yosemite Valley at 1200 m (Siegel et al. 2011).

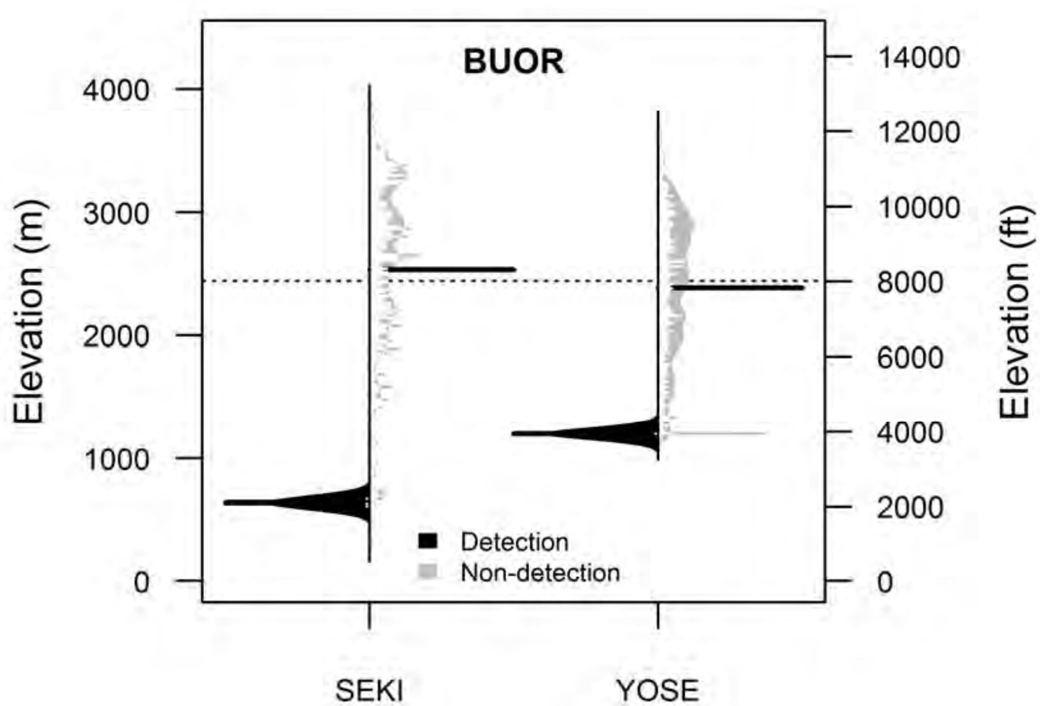

Figure 3. Elevational distributions of sites where Bullock's Oriole (BUOR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) survey data indicate Bullock's Orioles are less abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). No significant population trends were observed in SIEN parks, but Bullock's Orioles declined significantly throughout California from 1966-2007 and 1980 to 2007. Non-significant population increases were recorded along routes in all three SIEN parks.

Table 3. Relative abundance and trends for Bullock's Oriole according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). See Methods for an explanation of calculations. Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	171	4.40	-2.0	0.00
	1980-2007			-2.1	0.00
Sierra Nevada (BCR 15)	1966-2007	18	2.71	-2.2	0.07
	1980-2007			-2.6	0.17
Route 14117 – Sequoia NP	1972-2005	1	5.19	+6.7	0.41
Route 14132 – Kings Canyon NP	1974-2005	1	2.10	+9.0	0.18
Route 14156 – Yosemite NP	1974-2007	1	1.04	+7.8	0.23

Sufficient captures were available from SIEN MAPS mist nets only to estimate population trends for Yosemite NP (Table 4). Contrary to BBS data from YOSE (Table 3), a non-significant negative trend was observed from 1993-2009.

Table 4. Population trends, productivity, trends, and survival estimates of Bullock's Oriole at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.1	NA[2]	0.00	NA	NA
Yosemite NP	1993-2009	0.5	-3.24	0.18	NA	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Bullock's Oriole declined slightly but significantly throughout California over the past 40 years according to BBS survey data (Table 3). Riparian and oak woodlands, especially where trees are large and well spaced or in isolated clumps, are important habitats, while sycamores, cottonwoods, willows, and deciduous oaks are favorite nesting trees (Rising and Williams 1999). Thus, loss of riparian habitat is a major risk for the Bullock's Oriole, although this impact may be mitigated by its tendency to use deciduous shade trees and windbreaks around human habitations (Siegel and DeSante 1999). Loss and degradation of riparian habitat are not substantial threats within SIEN parks, apart from potential localized impacts of packstock grazing. Packstock grazing also may be indirectly impacting the Bullock's Oriole by increasing the numbers of Brown-headed Cowbirds which parasitize oriole nests.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Bullock's Oriole has shifted significantly northward by 21 miles and coastward by 8 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Similarly, an analysis of shifts between the historical range of Bullock's Oriole (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species' responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). These observed shifts provide evidence that the Bullock's Oriole has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Bullock's Oriole is found at low elevations, most commonly within foothill habitats in Sequoia NP and along the Merced River in Yosemite Valley (Figure 3). The species is already shifting its range northwards in response to climate change. If climate change also causes the species' range to move upslope in the Sierra Nevada as is generally expected, there is likely to be sufficient amounts of oak and riparian habitats in SIEN parks for them to colonize, particularly if these habitat types expand uphill as well. However, changes in hydrology due to climate change that result in alteration or loss of riparian vegetation, particularly arborescent vegetation, could adversely impact the species.

Altered Fire Regimes: In SIEN parks, habitat for Bullock's Orioles includes lower-elevation riparian and oak woodlands. The role of fire in riparian zone dynamics is complex and not well-understood (Dwire and Kauffman 2003). Fire naturally would have been less frequent in some riparian zones due to moist conditions and firebreaks provided by the streams, but with human impacts, floodplain forest fires have probably increased (Dwire and Kauffman 2003, Rood et al. 2007). Riparian vegetation is well-adapted to disturbance and rapidly recovers after fire (Dwire and Kauffman 2003). Most cottonwood and willow species sprout from stems and produce root suckers, and in fact riparian cottonwoods are dependent upon occasional physical disturbance for population rejuvenation (Rood et al. 2007). However, post-fire recovery of riparian vegetation can be hindered by invasive species in some areas (e.g., saltcedar or Arundo). Fire in riparian zones may adversely impact Bullock's Oriole in the short-term by eliminating potential nesting sites, but may be important for long-term habitat and population maintenance.

Blue Oak woodlands also comprise important Bullock's Oriole habitat in SIEN parks. Although Blue Oak seedlings may be killed by frequent fire, seedlings and saplings are capable of resprouting after fire, and fire increases acorn and leaf production by reducing competition with understory vegetation, which in turn improves habitat for Bullock's Orioles (Purcell and Stephens 2005). This species was associated with Blue Oak woodlands in SEKI, and thus is likely to benefit in the long-term from moderately frequent fire in these areas of the SIEN parks.

Habitat Fragmentation or Loss: The majority of oak woodlands in California are privately owned and receive little management or regulatory protection. Historically, foothill oak woodlands have been extensively grazed, and between 1945 and 1985 approximately 480,000 hectares of oaks were cleared to enhance forage production (Aigner et al. 1998). More recently, urban development has become the dominant reason for loss of oak woodlands. However, loss of oak woodlands may be mitigated by the tendency of Bullock's Orioles to use deciduous shade trees and windbreaks around human habitations (Siegel and DeSante 1999). Some natural habitat is required for the species to persist in an area, so extensive clearing of oak woodlands for urban development may be a threat to Bullock's Oriole in lower-elevation foothill habitats. The Bullock's Oriole also is vulnerable to loss of riparian vegetation (Siegel and DeSante 1999) but this is not likely to pose a major threat to the species within SIEN parks due to the lack of urban development and agriculture (although some localized impacts from packstock grazing may occur).

Invasive Species and Disease: The invasive Brown-headed Cowbird is a nest parasite that has been implicated in declines of many native bird species. One study in Washington documented 12 of 90 Bullock's Oriole nests parasitized by cowbirds (Rising and Williams 1999). Impacts of Brown-headed Cowbirds in SIEN parks should be examined and mitigated.

Human Use Impacts: Bullock's Orioles were detected only in Blue Oak woodlands in SEKI (albeit in low numbers). A major threat to Blue Oak woodlands in California is the lack of regeneration over the past century, due to livestock grazing and associated invasion of non-native annual grasses (Standiford et al. 1997, CPIF 2000, Purcell and Stephens 2005). Packstock grazing within the SIEN parks could adversely impact habitat for this species if such grazing were reducing oak recruitment. Packstock grazing within the parks could also threaten Bullock's Orioles because it can attract Brown-headed Cowbirds and alter riparian and meadow habitats. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Oak woodlands in north-central coastal California have been falling victim to Sudden Oak Death (SOD), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SOD was probably introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Bullock's Orioles and other oak-dependent species if it reaches those regions of the Sierra Nevada.

Management Options and Conservation Opportunities

Park managers can benefit Bullock's Oriole and other vulnerable birds by managing or eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SIEN parks indicates that a cowbird trapping program is not warranted (Halterman et al. 1999). However, this assessment is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Managers also should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SOD, and preventative measures including quarantine of the area could be immediately implemented if SOD is identified. Management guidelines and regulations pertaining to SOD can be found at the California Oak Mortality Task Force website (http://www.suddenoakdeath.org/).

Bushtit– *Psaltriparus minimus*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Bushtit is locally fairly common at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, but has not been reported at Devils Postpile National Monument (DEPO). It is a regular breeder at YOSE and SEKI (Table 1).

Table 1. Breeding status and relative abundance of Bushtits in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Fairly Common
Yosemite NP	Year-round	Regular Breeder	Locally Fairly Common
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Bushtit is patchily distributed across western North America, from southern British Columbia to southern Mexico. The subspecies *californicu*s subspecies is restricted to portions of interior California (including the west slope of the Sierra Nevada) and the extreme south of Oregon (Sloane 2001), making the Sierra Nevada and the SIEN parks very important to the subspecies (Siegel and DeSante 1999).

Distribution and Habitat Associations
Bushtits on the Sierra's west slope nest on chaparral-covered slopes with scattered oaks or pines, in oak savannah and open oak woodlands, and in riparian thickets (Gaines 1992). Bushtits were detected in moderate densities (Table 2) along low-elevation survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were not observed during the DEPO survey. Park inventories show highest associations with Blue Oak Forest and Mixed Chaparral within SEKI, and with Ponderosa Pine and Mixed Chaparral within YOSE respectively (Table 2).

Table 2. Number of Bushtits recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	7	13	Blue Oak Forest	0.34	0.60 (0.15-2.30)
			Mixed Chaparral	0.17	0.18 (0.05-0.58)
			Live Oak/California Buckeye	0.05	0.08 (0.01-0.47)
Yosemite NP	4	12	Ponderosa Pine	0.13	
			Mixed Chaparral	0.12	
			Canyon Live Oak	0.03	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

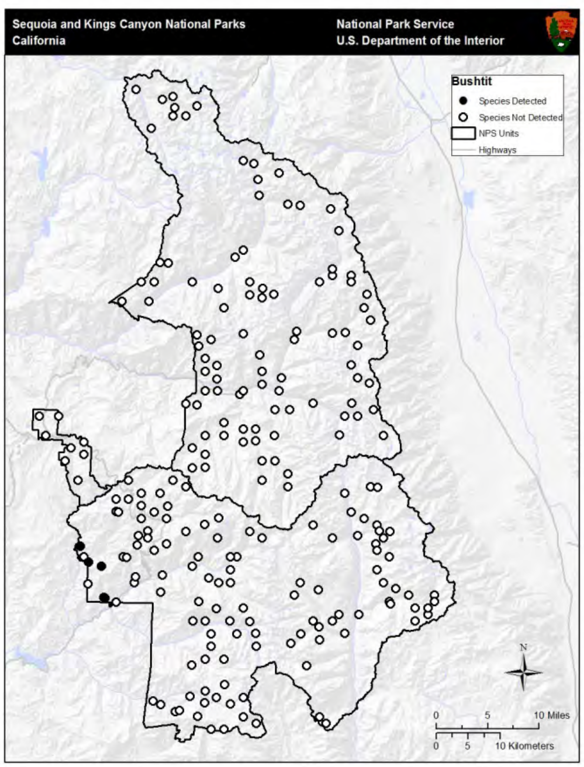

Figure 1. Bird survey transects where Bushtit was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

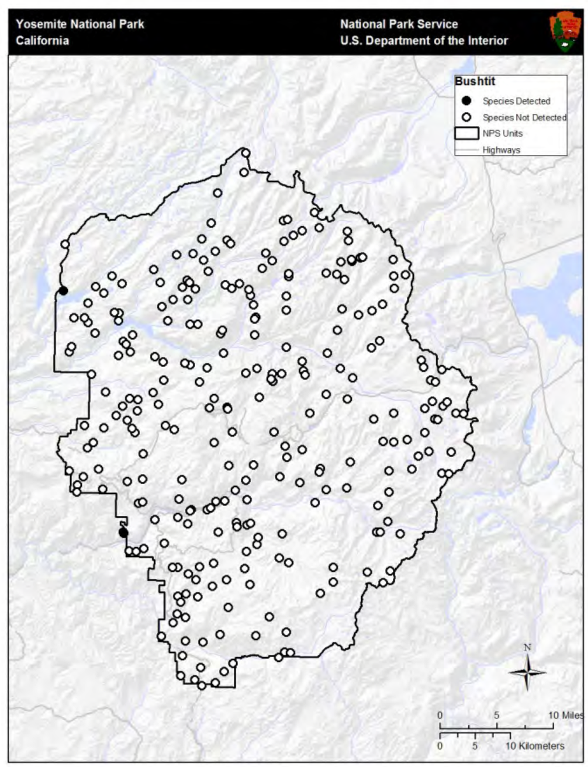

Figure 2. Bird survey transects where Bushtit was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Bushtit was observed within low-elevation areas of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Bushtit in SEKI was 689 m, with 95% of observations occurring between 491 and 974 m. At YOSE, the mean elevation of observations was 1376 m with 95% of observations falling between 1214 and 1550 m (Siegel et al. 2011).

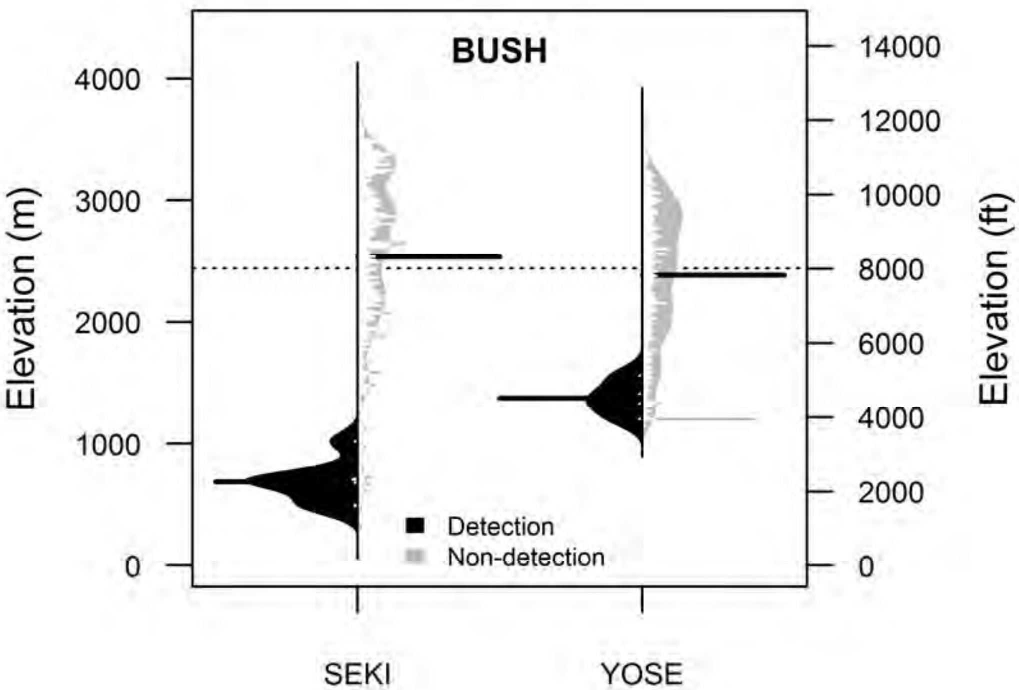

Figure 3. Elevational distributions of sites where Bushtit (BUSH) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Bushtits are detected less often in the Sierra Region (BCR 15) than in California as a whole. They were detected in high numbers on the BBS routes that intersects Sequoia NP and in lower numbers on the route Kings Canyon NP and YOSE. A significant negative trend was observed in California as a whole during 1980-2007, with nearly significant declines evident in California during 1966-2007 and non-significant declines in the Sierra region during both the short- and long-term periods (Table 3).

Table 3. Relative abundance and trends for Bushtit according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). See Methods for an explanation of calculations. Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	145	4.67	-1.9	0.14
	1980-2007			-2.9	0.03
Sierra Nevada (BCR 15)	1966-2007	21	2.55	-2.4	0.26
	1980-2007			-3.5	0.20
Route 14117 – Sequoia NP	1972-2005	1	9.13	-11.0	0.45
Route 14132 – Kings Canyon NP	1974-2005	1	2.70	-16.0	0.14
Route 14156 – Yosemite NP	1974-2007	1	2.19	+5.9	0.50

Bushtits are only infrequently captured SIEN MAPS stations, and no significant trends are evident (Table 4).

Table 4. Population trends, productivity, trends, and survival estimates of Bushtit at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.3	NA[2]	0.20	NA	NA
Yosemite NP	1993-2009	1.1	+8.13	1.97	-1.28	0.512 (0.173)
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Local population increases of Bushtits in California in the early 20th century have been attributed to the clearing of dense forests and planting of smaller trees and shrubs, while recent population declines over the past 30 years (Table 3) may be the result of fragmentation and loss of open oak woodlands and shrublands (Sloane 2001). Oak woodlands and chaparral in California are under threat from various human activities, including clearing for agriculture, rangeland, and urbanization. Bushtits are likely to benefit from predicted climate changes that increase the extent of dry, open oak woodland and chaparral habitats in the Sierra Nevada. A restoration of moderately frequent fires in oak woodlands and chaparral and allowing regeneration of shrubs also will likely benefit this species.

Climate Change: Sloane (2001) noted that the Bushtit's range is slowly expanding north and west, but a recent assessment of Christmas Bird Count (CBC) data indicates that the center of abundance of wintering Bushtits moved significantly southwards by 31 miles over the past 40 years (Audubon 2009). An analysis of shifts between the historical range of Bushtit (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). Thus, the Bushtit is likely already responding to climate change and may continue to do so in the future. The species currently breeds in dry oak and chaparral habitats at low elevations in the Sierra. These habitats are predicted to expand upslope (Stralberg and Jongsomjit 2008), thus the Bushtit is likely to colonize higher elevations and benefit overall from a warmer, drier climate.

Altered Fire Regimes: The Bushtit may be adapted to fire in oak and chaparral vegetation once dense shrubs have re-grown. The species was most abundant in a 50-year old burn in the southern Sierra (Siegel and Wilkerson 2005), and, although uncommon overall, was detected most frequently in an older burn in Oregon (Fontaine et al. 1999). Bushtits were most strongly associated with Blue Oak habitat in SEKI, with additional detections in Mixed Chaparral and Live Oak (Table 2). Although Blue Oak seedlings may be killed by frequent fire, seedlings and saplings are capable of resprouting after fire, and fire increases acorn and leaf production by reducing competition with understory vegetation (Purcell and Stephens 2005). Mixed Chaparral habitats are also well-adapted to fire; some shrub species resprout after fire while others regenerate from seed banks (Riggan et al. 1994), but with overly frequent fire can type-convert to annual grasslands. Bushtits are likely to benefit from moderately frequent fire in their preferred habitats in SIEN parks, but only once vegetation has re-grown. Post-fire management activities that eliminate shrubs that are regenerating after fire would threaten this species.

Habitat Fragmentation or Loss: The Bushtit adapts well to suburban and edge habitats (Sloane 2001) but may be adversely impacted by widespread loss of oak woodland and chaparral habitats due to intensive agriculture and urbanization. The majority of oak woodlands in California are privately owned and receive little management or regulatory protection; chaparral habitats also receive little regulatory protection. Urban and agricultural development is undoubtedly eliminating Bushtit habitat outside SIEN parks in lower-elevation foothills of the Sierra, but this is not likely to pose a major threat to the species within the parks. Some type of landscape-scale protection of oak and chaparral habitats in the foothills of the Sierra Nevada is sorely needed.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Bushtits are vulnerable to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within two SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: A major threat to Blue Oak woodlands in California is the lack of regeneration over the past century, due to livestock grazing and associated invasion of non-native annual grasses (Standiford et al. 1997, CPIF 2000, Purcell and Stephens 2005). Packstock grazing within the parks is a potential concern for Bushtits, at least locally where grazing is permitted, because packstock can reduce oak recruitment and because it can attract Brown-headed Cowbirds. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized (Siegel and DeSante 1999).

Oak woodlands in north-central coastal California have been falling victim to Sudden Oak Death (SOD), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SOD probably was introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Bushtits and other species if it reaches those regions of the Sierra Nevada.

Management Options and Conservation Opportunities

Park managers can protect Bushtit populations in SIEN parks by maintaining oak woodlands and chaparral habitats and restoring the natural fire cycle. Managers should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SOD, and preventative measures including quarantine of the area could be immediately implemented if SOD is identified. Management guidelines and regulations pertaining to SOD can be found at the California Oak Mortality Task Force website (http://www.suddenoakdeath.org/). Potential impact of Brown-headed Cowbirds could be quantified and ameliorated.

California Quail – *Callipepla californica*

Migratory Status

Resident (Calkins et al. 1999)

Residency and Breeding Status

California Quail is a locally common year-round resident at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, but has not been recorded in recent surveys of Devils Postpile (DEPO) National Monument (Table 1).

Table 1. Breeding status and relative abundance of California Quail in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Common
Yosemite NP	Year-round	Regular Breeder	Locally Common
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

California Quail is native to Baja California, California, western Nevada, and southern Oregon. The species has been introduced widely in other parts of the western U.S. as well. California Quail is present in the Sierra Nevada, but is more abundant in other parts of the state (Calkins et al. 1999). California is important for the species' native range, but except for low-elevation portions of SEKI, the SIEN parks are less vital to the species than other parts of the state where they are more abundant.

Distribution and Habitat Associations

California Quail shows preference for rolling hills, oak savannah, and open scrub (Gaines 1992). California Quail were detected in fairly high densities (Table 2), but along a few survey transects (Figure 1) during avian inventory projects at SEKI and were not observed during surveys in YOSE or DEPO. However, the species was detected anecdotally in YOSE away from survey transects during the same period. The SEKI park inventory shows highest associations with Blue Oak forest (Table 2). The limited number of observations reflects the species' preference for lower elevation habitats, which are only extensive within the SIEN at SEKI.

Table 2. Number of California Quail recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	21	28	Blue Oak Forest	0.40	0.60 (0.29-1.25)
			Mixed Chaparral	0.06	0.07 (0.02-0.23)
Yosemite NP	0	0	Detected off-survey	NA[1]	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

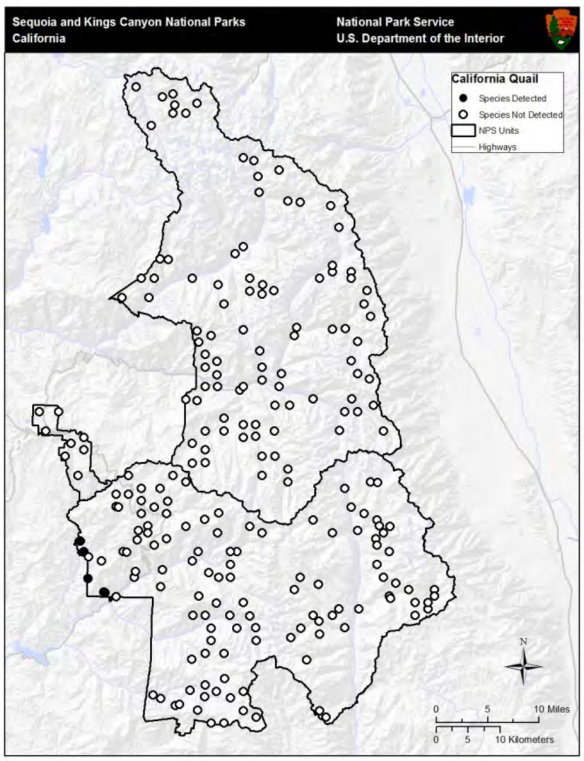

Figure 1. Bird survey transects where California Quail was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

California Quail was observed only within the lower elevations of SEKI during recent avian inventory projects (Figure 2). The mean elevation of observations of California Quail during the avian inventory at SEKI was 708 m, with 95% of observations occurring between 525 and 901 m. (Siegel et al. 2011).

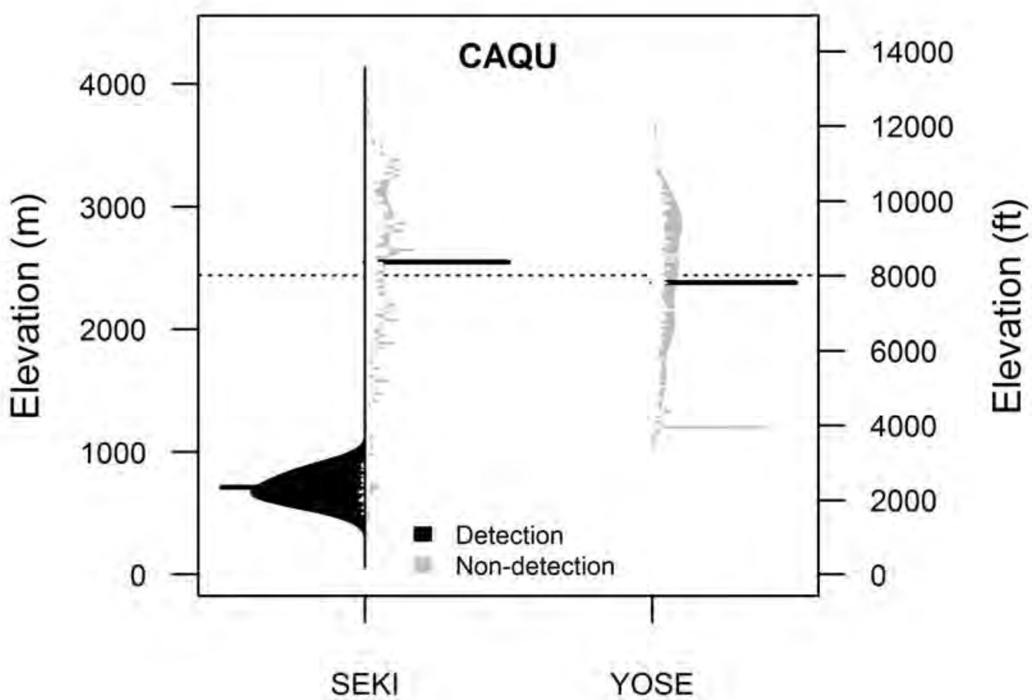

Figure 2. Elevational distributions of sites where California Quail (CAQU) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate California Quail are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in fairly high numbers on individual BBS routes at SEKI, but in low numbers on the YOSE route. A significant positive trend was observed throughout California both in the short and long-term, with a large positive trend (but based on very low detection rates) along the YOSE route during 1974-2007 (Table 3).

Table 3. Relative abundance and trends for California Quail according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). See Methods for an explanation of calculations. Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	170	8.76	+1.1	0.03
	1980-2007			+1.1	0.04
Sierra Nevada (BCR 15)	1966-2007	17	4.02	+3.3	0.48
	1980-2007			+2.3	0.48
Route 14117 – Sequoia NP	1972-2005	1	8.19	-0.6	0.95
Route 14132 – Kings Canyon NP	1974-2005	1	3.60	-7.1	0.20
Route 14156 – Yosemite NP	1974-2007	1	0.35	+30.4	0.08

California Quail are generally not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

California Quail populations appear healthy across California despite significant hunting pressure and loss of native habitat. Within SIEN parks, the greatest potential threat to California Quail is loss of habitat from high-intensity fires. Climate change is predicted to impact California Quail greatly at lower elevations, but may result in an expansion of the species higher into the Sierra and SIEN parks (see below). Finally, quail collisions with cars may result in mortalities locally and there is some concern that non-native ants may increase nest predation pressure, although further study is needed.

Climate Change: An analysis of shifts between the historical range of California Quail (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count data suggests that the center of abundance of California Quail has significantly shifted 117.7 miles to the north and 29.4 miles away from the coast over the past 40 years in its North American range, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that California Quail has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Modeled distribution shifts of California Quail predict reduced occurrences of the species across California. The most prominent declines are expected in California's Central Valley. Occurrences in the Sierra are predicted to remain stable and possibly increase. The most important variables influencing current and projected distribution were vegetation, annual precipitation (Maxent distribution model), and annual mean temperature (GAM distribution model) (Stralberg and Jongsomjit 2008). California Quail currently occur only in the lower elevations of SEKI (Figure 2) due to their preference for lowlands and open habitat (Gaines 1992). If climate change leads to a replacement of wooded habitats with oak savannah and chaparral, California Quail's range could expand further into SIEN parks in the future.

Altered Fire Regimes: California Quail benefit from regular small fires, which promote growth of annual plants in burned areas. However, intense fires can reduce suitable habitat for the species and indirectly lead to declines (Calkins et al. 1999). If future fire regimes lead to more high-intensity fires in California Quail habitat, the amount of suitable habitat could decrease, leading to subsequent population declines.

Habitat Fragmentation or Loss: Complete conversion of native habitat or farmland to urban development has led to decreases in local quail populations (Calkins et al. 1999). However, California Quail benefits from small, marginal farms where field crops mix with grazing lands and un-converted habitat to provide supplementary food, but maintain sufficient cover. Although large-scale farms may provide some additional food for the species, the lack of natural vegetation for cover and heavy use of herbicides, insecticides, and rodenticides is detrimental to California Quail (Calkins et al. 1999). Without any land-conversion to agriculture and little intensive development, the SIEN parks neither provide supplementary food nor degrade habitat by removing vegetation or spraying toxins.

Invasive Species and Disease: The invasive Argentine ant, *Linepithema humile* has been shown to be a more significant nest predator for birds such as California Quail than native ant species (Suarez et al. 2005). However, the ant's impact on California Quail in particular remains unclear. Likewise, the presence and prevalence of *L. humile* within the SIEN parks remains unknown. Aside from this potential threat, invasive species and disease do not appear to be major concerns for California Quail.

Human Use Impacts: In the late nineteenth and early twentieth century, heavy, uncontrolled hunting and trapping lead to population declines of California Quail. Under current management, regulated hunting does not appear to cause long-term population depression in California and across the western U.S. (Calkins et al. 1999). Additionally, the prohibition of hunting within SIEN parks and California Quail's sedentary nature prevents hunting from being a threat to park populations. Lastly, California Quail are killed by colliding with cars and fences (Calkins et al. 1999). This could be a minor threat locally within SIEN parks along roadways and developed areas.

Management Options and Conservation Opportunities

California Quail is managed as a game species across its range. California generally has the largest annual harvest of any state, but this does not appear to cause declines in the species generally (Calkins et al. 1999). While habitat degradation and loss within the SIEN parks is not a concern for California Quail, existing habitat can be maintained through fire management that reduces the occurrence of high-intensity fires by methods such as fuel removal or controlled burns. If an increase in quail populations is desired, the installation of wildlife 'guzzlers' to provide an accessible water source through dry periods has been used across California (Calkins et al. 1999) and could be considered for SIEN parks if habitat deterioration becomes a more significant threat in the future. Artificial roosting structures could also be considered to promote breeding success of the species within the parks (NatureServe 2009).

California Towhee – *Melozone crissalis*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
California Towhee is a locally common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) National Parks and a locally fairly common year-round resident and regular breeder at Yosemite (YOSE) National Park, but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 4. Breeding status and relative abundance of California Towhees in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Common
Yosemite NP	Year-round	Regular Breeder	Locally Fairly Common
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G4/G5 – Apparently Secure (Uncommon, but not rare)
- National Status: N4/N5 – Apparently Secure (Uncommon, but not rare)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Federally Threatened for Inyo California Towhee (*Melozone crissalis eremophilus*)
- CA Department of Fish and Game Status: State Endangered for Inyo California Towhee (*Melozone crissalis eremophilus)*

Range Significance
The California Towhee occurs from south-central Oregon through California to the southern tip of Baja California (Kunzmann et al. 2002). California Towhees are more common in other parts of California than in the Sierra, so these mountains are not important in the species' overall range, but are important for the range of the two subspecies (*kernensis* and *carolae*) occurring within the Sierra (Siegel and DeSante 1999).

Distribution and Habitat Associations
California Towhee has been described as primarily a chaparral species (and secondarily riparian), favoring edges where dense vegetation provides nesting and cover interspersed with openings for foraging (Kunzmann et al. 2002). In the Sierra Nevada, California Towhees prefer low-elevation open woodland, broken chaparral, or shrubby riparian habitats where shrubland edges on grassland or meadows, and are also attracted to human habitation (Siegel and DeSante 1999). California Towhees were detected in moderate numbers at SEKI, but only 1 individual

was detected at YOSE and none at DEPO (Table 2), along survey transects during avian inventory surveys in SIEN parks (Figures 1 and 2). The species was found in Live Oak/California Buckeye, Mixed Chaparral, and Blue Oak forest at SEKI and in Foothill Pine at YOSE (Table 2).

Table 5. Number of California Towhees recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	29	30	Live Oak/California Buckeye	0.24	0.45 (0.20-1.45)
			Mixed Chaparral	0.14	0.20 (0.09-0.24)
			Blue Oak Forest	0.13	0.45 (0.19-1.09)
Yosemite NP	1	1	Foothill Pine	0.07	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

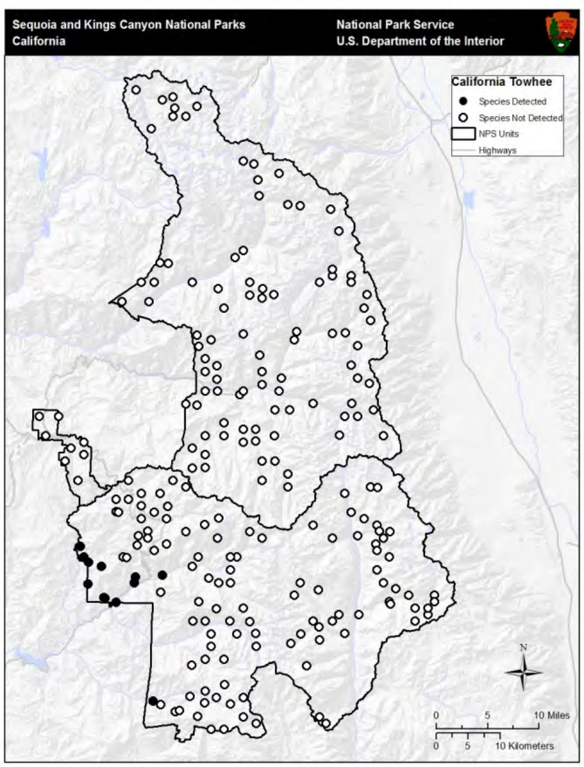

Figure 2. Bird survey transects where California Towhee was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

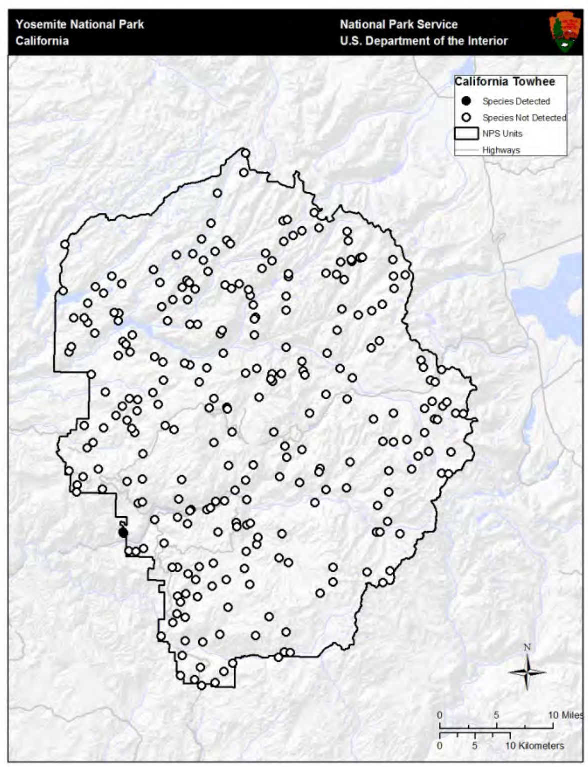

Figure 3. Bird survey transects where California Towhee was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

California Towhee was detected at low elevations in SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of California Towhee at SEKI was 755 m, with 95% of observations occurring between 471 and 1246 m. Only one California Towhee was detected in YOSE at 1267 m (Siegel et al. 2011).

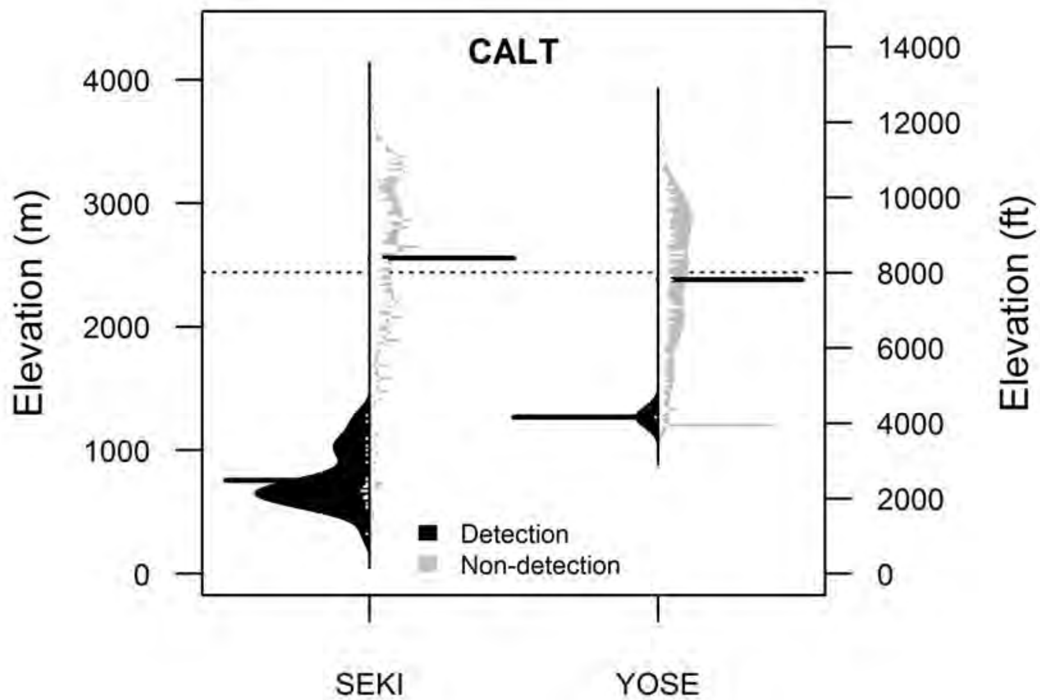

Figure 3. Elevational distributions of sites where California Towhee (CALT) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) indicate California Towhee are more abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). The species was especially abundant along the BBS route in Sequoia and Kings Canyon national parks. No statistically significant population trends were observed (Table 3).

Table 6. Relative abundance and trends for California Towhee according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	123	7.49	-0.3	0.54
	1980-2007			-0.6	0.24
Sierra Nevada (BCR 15)	1966-2007	13	3.81	+1.7	0.56
	1980-2007			+1.5	0.59
Route 14117 – Sequoia NP	1972-2005	1	10.63	+11.7	0.15
Route 14132 – Kings Canyon NP	1974-2005	1	14.90	+0.1	0.96
Route 14156 – Yosemite NP	1974-2007	1	0.19	-11.4	0.37

California Towhees were not captured in mist nets at SIEN MAPS stations, thus data on productivity and survival at the parks are not available.

Stressors

One of the most common and best known of California birds, the California Towhee occupies rugged, remote back-country habitats as well as shrubby vegetation of densely populated urban and suburban areas (Kunzmann et al. 2002). Populations appear to be stable in California (Table 3) but a range-wide assessment of BBS data documented small but significant declines of the "Brown Towhee" (Canyon and California Towhee) over the past 40 years (Audubon 2009). Fire suppression and livestock grazing may adversely impact this species, but it appears to be relatively resilient to residential development. Habitat loss, invasive species, and disease do no appear to threaten California Towhees in the Sierra Nevada, other than the locally imperiled Inyo California Towhee subspecies which may be impacted by Brown-headed Cowbirds and loss of riparian vegetation.

Climate Change: An analysis of shifts between the historical range of California Towhee (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of "Brown Towhee" has shifted significantly northward by 15 miles and coastward by 21 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). These shifts suggest the species may have already responded to climate change and will likely continue to shift its range in the coming decades (Audubon 2009). Modeled distribution shifts of California Towhee predict small range contractions in the northern and southern Central Valley and middle and southern Sierra Nevada, but an increased probability of occurrence along the coast (Stralberg and Jongsomjit 2008). A lower probability of occurrence is predicted for SIEN parks. The most important variables influencing current and projected distribution were vegetation, annual precipitation (Maxent distribution model), and distance to stream (GAM distribution model).

In SIEN parks, the California Towhee was found only at low elevations (Figure 3). If climate change causes the towhee's range to move upslope in the Sierra Nevada as is generally expected, the species should persist and thrive in the SIEN parks as long as a patchy mosaic of shrubland-grassland habitats expand uphill as well, but it is also possible the species' range will shift northward and out of SIEN parks (Stralberg and Jongsomjit 2008).

Altered Fire Regimes: Historically, European settlers burned extensively to convert shrublands and woodlands to grasslands for livestock. This loss of chaparral likely adversely impacted nesting habitat for California Towhees. Conversely, fire suppression also probably has a negative impact on California Towhees because the species prefers open woodland habitat and shrub-grassland edges. Mixed Chaparral habitats are well-adapted to fire; some shrub species resprout after fire while others regenerate from seed banks (Riggan et al. 1994). Thus, a future increase in extent and frequency of fire in SIEN parks that creates patches of shrubs interspersed with grassy openings, and that maintains open woodlands will increase habitat for California Towhees.

Habitat Fragmentation or Loss: Common in suburban landscapes, the California Towhee is apparently tolerant of the loss of natural habitat to development because it is able to utilize exotic vegetation across most of its range (Kunzmann et al. 2002). Thus habitat fragmentation or loss from urbanization is not a significant threat to the species in the Sierra Nevada, and even less so in SIEN parks.

As noted in *Altered Fire Regimes* above, range managers historically removed chaparral by controlled burning and reseeding with non-native annual grasses to increase forage for domestic livestock; in 1950 alone, ranchers in 30 California counties cleared about 97,000 acres of chaparral (Lawrence 1966). These practices likely impacted Sierran foothill habitat for California Towhees historically, but do not currently threaten the species in the SIEN parks.

Invasive Species and Disease: To our knowledge, invasive species and disease are not significant threats to the California Towhee in SIEN parks.

Human Use Impacts: Research has documented lower abundance of California Towhees on grazed versus ungrazed plots, but one study found higher reproductive success in grazed areas (Kunzmann et al. 2002). Further research is warranted on the impacts of grazing on this species. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing in SIEN parks are likely relatively small and localized (Siegel and DeSante 1999).

California Towhees are often killed by automobiles because they are attracted to roadside vegetation (Kunzmann et al. 2002).

Management Options and Conservation Opportunities

California Towhee populations appear to be stable in SIEN parks. Management actions to conserve California Towhee in the parks include restoring the natural fire cycle (including high-intensity fire where appropriate and consistent with historic fire regimes) and enforcing speed limits to minimize vehicle strikes.

Calliope Hummingbird – *Stellula calliope*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Calliope Hummingbird is fairly a fairly common breeding species at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and Devils Postpile National Monument (DEPO) (Table 1).

Table 7. Breeding status and relative abundance of Calliope Hummingbirds in SIEN national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Bird Species of Conservation Concern
- CA Department of Fish and Game Status: Not listed

Range Significance
Calliope Hummingbird's breeding range is largely limited to the interior mountains of western North America from central British Columbia to the Sierra Nevada in California and Sierra San Pedro Martir in Baja California (Calder and Calder 1994). With some localized exceptions (e.g., San Pedro Martir) Calliope Hummingbird's breeding range extends only as far south as the southern Sierra Nevada, making the SIEN parks an important part of the range's southern extent.

Distribution and Habitat Associations
Calliope Hummingbirds are the only hummingbird to breed in the higher mountains, making their nests in both moist thickets and dry chaparral (Gaines 1992). Calliope Hummingbirds were detected in moderate densities (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE and were detected only anecdotally off survey at DEPO. Park inventories show highest associations with Lower Elevation/Sparse Vegetation and Western White Pine forests within SEKI and YOSE respectively (Table 2). Estimated densities are not available from surveys; the birds' attraction to flagging used for marking survey points invalidated density estimation using distance sampling.

Table 8. Number of Calliope Hummingbirds recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	14	14	Lower Elevation/Sparse Veg.	0.21	NA
			Western Juniper Woodland	0.15	NA
Yosemite NP	12	15	Western White Pine	0.21	
			Mixed Chaparral	0.08	
			Jeffrey Pine	0.05	
Devils Postpile NM	0	0	Detected off-survey	NA[1]	

[1]NA - Information not available due to insufficient data. Habitat densities at Sequoia and Kings Canyon not available due to atypical behavior of this species (see Siegel and Wilkerson 2005).

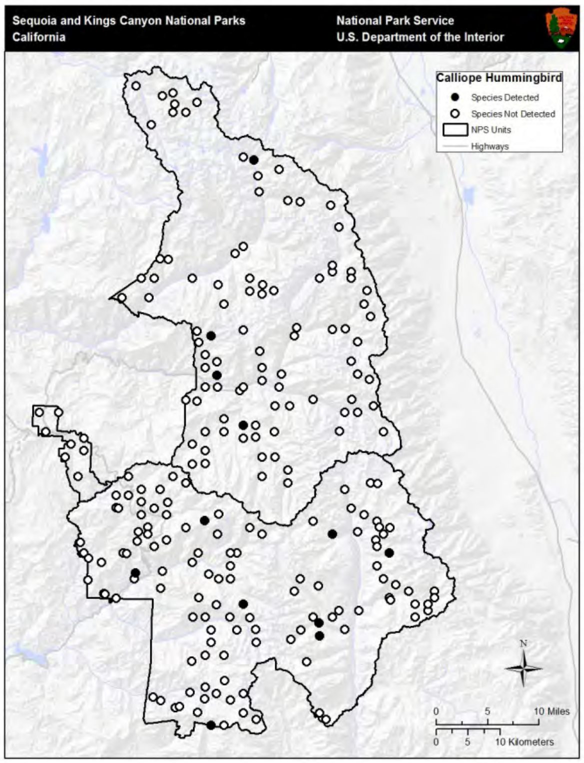

Figure 4. Bird survey transects where Calliope Hummingbird was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

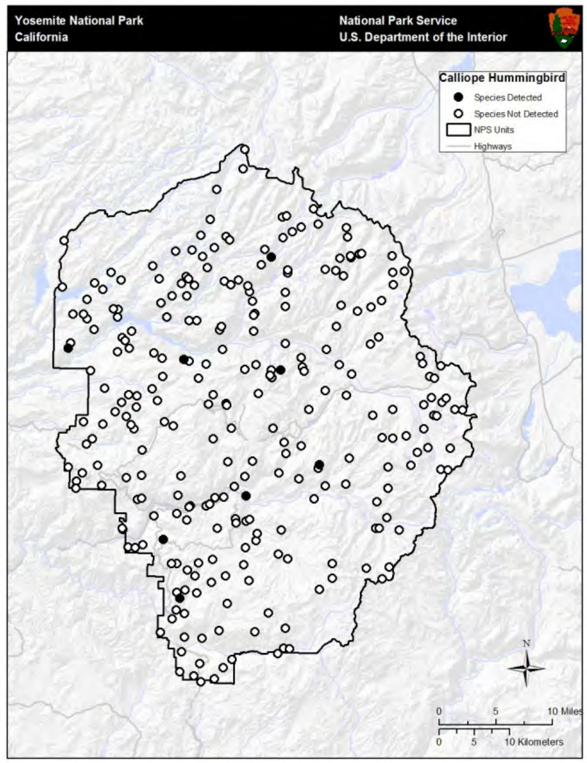

Figure 5. Bird survey transects where Calliope Hummingbird was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Calliope Hummingbird was observed within the middle-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Calliope Hummingbird in SEKI was 2568 m, with 95% of observations occurring between 1239 and 3168 m. At YOSE, the mean elevation of observations was 2159 m with 95% of observations falling between 1631 and 2909 m (Siegel et al. 2011).

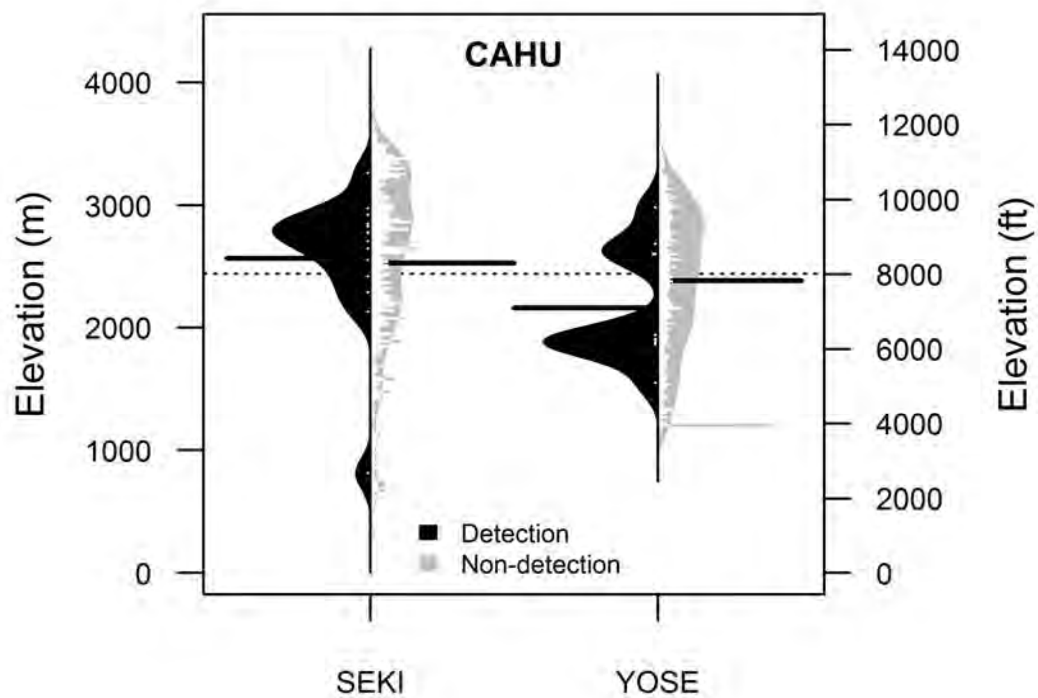

Figure 3. Elevational distributions of sites where Calliope Hummingbird (CAHU) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Calliope Hummingbirds are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at YOSE and Sequoia National Parks, but not along the Kings Canyon route. No significant trends were observed along any routes or regions relevant to the SIEN parks (Table 3).

Table 9. Relative abundance and trends for Calliope Hummingbird according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	28	0.15	-0.5	0.89
	1980-2007			-0.2	0.95
Sierra Nevada (BCR 15)	1966-2007	13	0.23	-4.4	0.18
	1980-2007			-5.2	0.13
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.08	-4.1	0.80

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Calliope Hummingbirds are captured in low numbers at MAPS banding stations in SEKI and YOSE, but are not banded. For this reason demographic and survivorship data are not available from MAPS stations.

Stressors

Calliope Hummingbird populations appear healthy across California and the Sierra Nevada (Table 3) with no major threats to the species. Outside of the SIEN parks, Calliope Hummingbirds have likely benefited from the maintenance of artificial feeders and creation of habitat through timber harvest operations. Although largely unstudied, frequent fires may also create habitat for hummingbirds within and beyond SIEN parks. Conversely, the onset of climate change poses a potentially major threat to Calliope Hummingbird populations, particularly in the SIEN parks. Finally, the impact of invasive species and disease on Calliope Hummingbird is largely unknown, but given stable populations, does not appear to be a major concern.

Climate Change: An analysis of shifts between the historical range of Calliope Hummingbird (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Calliope Hummingbird has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Calliope Hummingbirds are found breeding up to approximately 3000 meters in SEKI (Figure 3). Furthermore, the SIEN parks (particularly SEKI) are located near the southern extent of the species' breeding range. If climate change causes the species' range to shift northward and upward as is generally expected, the southern Sierra and SIEN parks could see a reduction of breeding Calliope Hummingbirds in the future. However, given the relatively large amount of high-elevation habitat within SIEN parks (particularly SEKI), the parks may act as refugia for the hummingbird as populations are reduced or lost from lower-elevation areas in the Sierra.

Altered Fire Regimes: The effects of fire on Calliope Hummingbird are not well understood. However, the creation of early seral habitat by natural or prescribed burns may benefit the species, as may timber harvest operations (see below).

Habitat Fragmentation or Loss: Timber harvest operations that create openings in mature forests benefit Calliope Hummingbirds in the short-term by allowing greater abundance of early-seral flowers. Long-term effects of timber harvest are unknown (Calder and Calder 1994). However, without timber harvest operations within SIEN parks, park populations would only be indirectly affected by forest fragmentation elsewhere in the Sierra.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Calliope Hummingbird.

Human Use Impacts: Like other hummingbird species, the introduction of artificial feeders provides resources when flowers are unavailable, possibly elevating populations above natural levels (Calder and Calder 1994). Even if feeders are not placed with the SIEN parks, elevated populations elsewhere may supplement park populations.

Management Options and Conservation Opportunities

Calliope Hummingbird is not a heavily managed species. Specific management recommendations are lacking and apparently are not urgently needed (Calder and Calder 1994), especially given the species' apparent stability across California and the Sierra Nevada (Table 3). However, given Calliope Hummingbird's apparent vulnerability to climate change, monitoring programs should continue to assess the species' response to shifting conditions within SIEN parks. If populations decline in future years, the use of prescribed burns to maintain early seral habitat or the implementation of hummingbird feeders to supplement future food sources could be considered.

Canyon Wren – *Catherpes mexicanus*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Canyon Wren is a fairly common breeder at Yosemite National Park (YOSE), an uncommon breeder at Sequoia and Kings Canyon (SEKI) National Parks, and has not been reported at Devils Postpile National Monument (Table 1).

Table 10. Breeding status and relative abundance of Canyon Wrens in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Uncommon
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Canyon Wren is widely distributed in appropriate habitat across the western United States, southern British Columbia, and most of Mexico (Jones and Deni 1995). The Sierra Nevada is a relatively important component of the range of the *conspersus* subspecies (Siegel and DeSante 1995).

Distribution and Habitat Associations
Canyon Wrens inhabit steep, rocky stream canyons and rock outcroppings, slides, and boulder-strewn hillsides, generally avoiding forested areas (Gaines 1992). Canyon Wrens were detected in low densities (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE and were not observed in DEPO. Park inventories show highest associations with Mixed Chaparral at SEKI and with Foothill Pine and Canyon Live Oak at YOSE (Table 2), where the species appears to be most abundant along the walls of Yosemite Valley.

Table 11. Number of Canyon Wrens recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004).

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	6	6	Mixed Chaparral	0.03	NA[1]
Yosemite NP	22	23	Foothill Pine	0.09	
			Canyon Live Oak	0.08	
			Douglas fir/Mixed Conifer	0.04	
			Mixed Chaparral	0.04	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

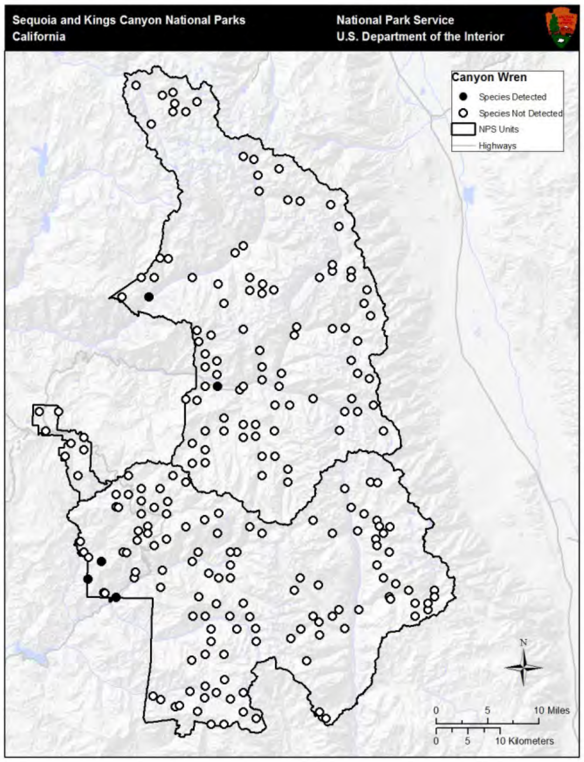

Figure 6. Bird survey transects where Canyon Wren was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

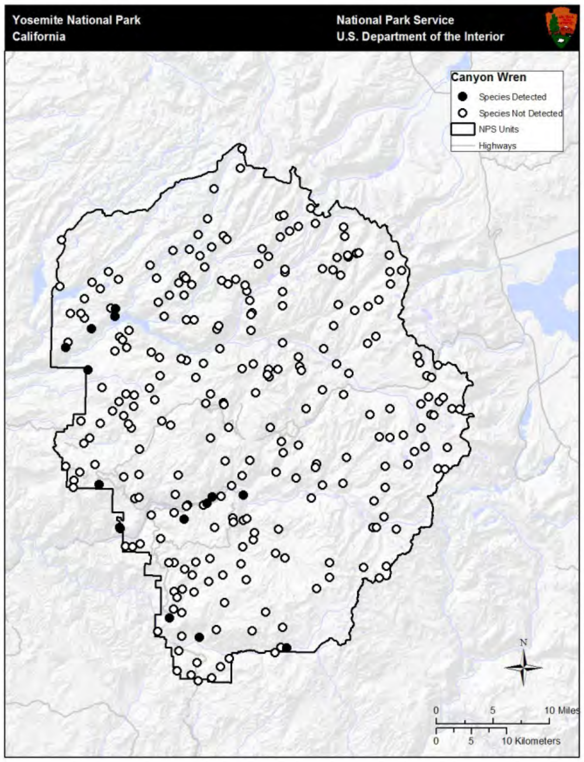

Figure 7. Bird survey transects where Canyon Wren was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Canyon Wren was detected at low elevations at SEKI and from low to middle elevations at YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 990 m, with 95% of observations occurring between 530 and 1435 m. In YOSE, the mean elevation of observations was 1497 m with 95% of observations falling between 1200 and 2094 m (Siegel et al. 2011).

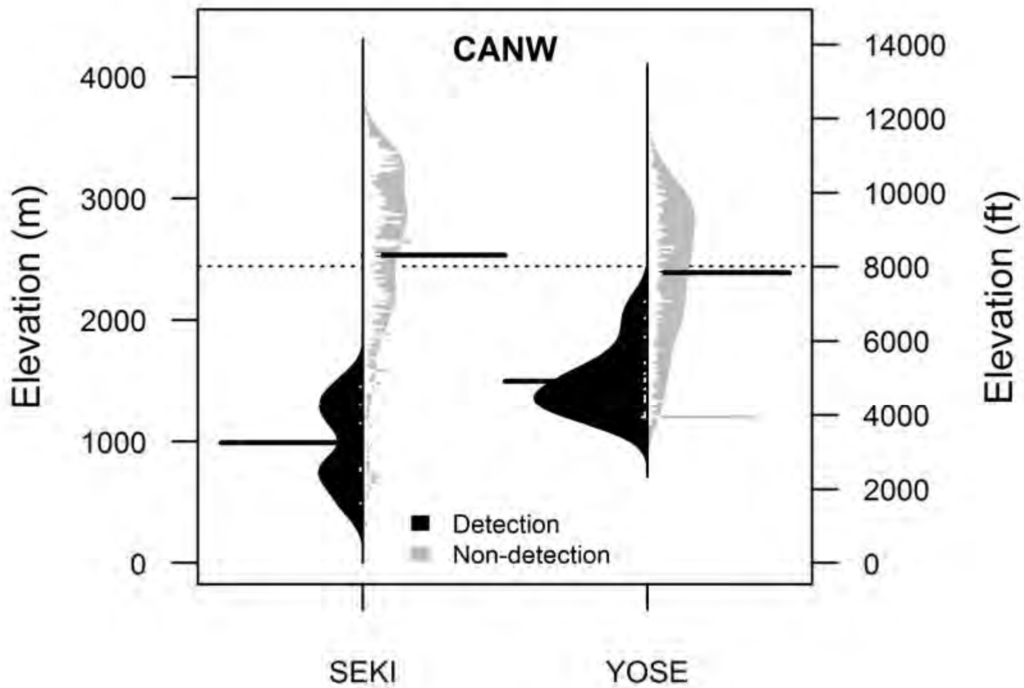

Figure 2. Elevational distributions of sites where Canyon Wrens (CANW) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Canyon Wrens are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were detected in much greater numbers on individual BBS routes in the SIEN parks than in the Sierra Region, with particularly high abundances in SEKI. No significant population trends were observed, but a nearly significant ($P = 0.08$) negative trend was indicated throughout California during 1980-2007.

Table 12. Relative abundance and trends for Canyon Wren according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	49	0.18	-1.6	0.63
	1980-2007			-5.3	0.08
Sierra Nevada (BCR 15)	1966-2007	7	0.38	+0.1	0.98
	1980-2007			-1.5	0.76
Route 14117 – Sequoia NP	1972-2005	1	4.63	+25.2	0.15
Route 14132 – Kings Canyon NP	1974-2005	1	3.90	-7.6	0.13
Route 14156 – Yosemite NP	1974-2007	1	1.42	+6.4	0.22

Canyon Wrens are not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The Canyon Wren is relatively restricted to rocky cliffs or outcrops, thus is more protected from human impacts than many other species. Nonetheless, populations may have declined in California over the past 30 years (Table 3). The Canyon Wren is more tied to water sources than the Rock Wren, and may be adversely impacted by a drying climate. Recreational rock climbers may disturb nesting Canyon Wrens, including in SIEN parks, and the species is also susceptible to Brown-headed Cowbird brood parasitism. Canyon Wrens should fare well with the restoration of natural fire regimes and may be resilient to climate change as long as water sources remain available in steep rocky canyons.

Climate Change: An analysis of shifts between the historical range of Canyon Wren (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature changes) by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Canyon Wren has shifted significantly northward by 94 miles and inland by more than 55 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Movement in both these directions suggest the species may be responding to climate change by shifting its range to cooler regions, and will likely continue to shift its range in the coming decades (Audubon 2009).

Canyon Wren currently at relatively low elevations in the SIEN parks, and may colonize higher elevations with climate warming. If so, there is likely to be sufficient rocky canyons, outcroppings, and hillsides for nesting at these higher elevations.

Altered Fire Regimes: Canyon Wren was detected only in recently burned areas in post-fire forests in the northern (Burnett et al. 2010) and the southern Sierra Nevada (Siegel and Wilkerson 2005). These results indicate potential preference for burned areas, or at least resilience to fire. Restoration of the natural fire cycle is therefore likely to benefit this species in SIEN parks.

Habitat Fragmentation or Loss: Canyon Wren prefers steep canyon walls and boulder fields in steep rocky canyons, and as such is not vulnerable to habitat fragmentation or loss from human activities as are many other bird species.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Canyon Wrens are vulnerable to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within two SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Packstock grazing within the parks is a potential concern for Canyon Wrens, at least locally where grazing is permitted, because it can attract Brown-headed Cowbirds. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Disturbance by climbers may potentially threaten Canyon Wrens in SIEN parks and throughout their range (Siegel and DeSante 1999).

Management Options and Conservation Opportunities
The only obvious thing park managers could do to protect Canyon Wren populations in the parks would be to prevent disturbance to nesting birds from recreational rock climbing, perhaps through educational efforts aimed at rock climbers.

Cassin's Finch – *Carpodacus cassinii*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Cassin's Finch is a common breeder in all Sierra Nevada Network (SIEN) parks (Table 1).

Table 13. Breeding status and relative abundance of Cassin's Finches in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Primarily Summer	Regular Breeder	Common
Yosemite NP	Primarily Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Bird of conservation concern
- CA Department of Fish and Game Status: Not listed

Range Significance
Cassin's Finch occurs over much of western North America, but is generally limited to the higher mountains, at least in the U.S. The Sierra Nevada is very important to Cassin's Finch's range where it is very common (Siegel and DeSante 1999).

Distribution and Habitat Associations
Cassin's Finch is a mountain finch often found in forests that border open areas such as meadows, water bodies, and shrub-covered slopes (Gaines 1992). Cassin's Finches were detected in high densities (Table 2) along many survey transects (Figures 1 and 2) during avian inventory projects in SIEN parks. Park inventories show highest associations with Foxtail Pine and Mountain Hemlock forests within SEKI and YOSE respectively (Table 2). When adjusted for detectability, densities of Cassin's Finch in SEKI appeared highest around the edges of Mid-elevation Meadows.

Table 14. Number of Cassin's Finches recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	239	309	Foxtail Pine	0.39	0.31 (0.14-0.66)
			Mid-elevation Meadow	0.32	0.39 (0.19-0.82)
			Western White Pine Woodland	0.25	0.22 (0.08-0.57)
			Lower Elevation Meadow	0.23	0.29 (0.09-0.88)
Yosemite NP	483	812	Mountain Hemlock	0.49	
			Lodgepole Pine	0.38	
			Western White Pine	0.37	
Devils Postpile NM	7	8	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

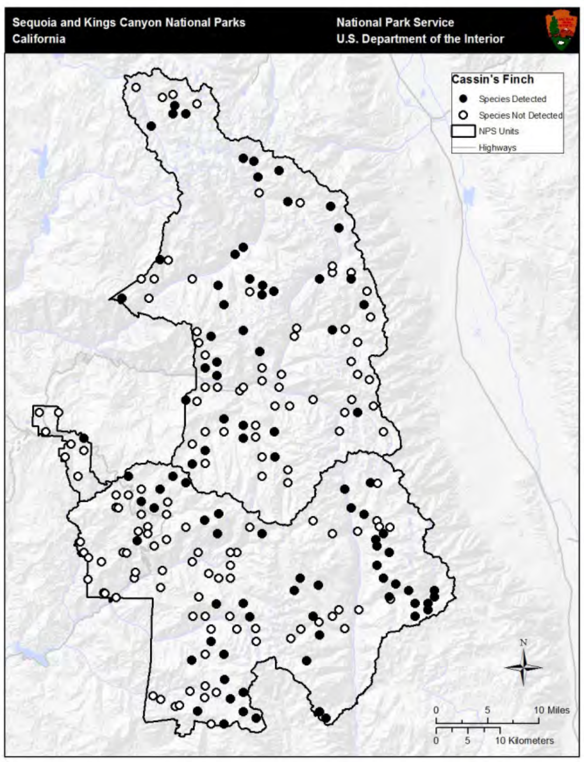

Figure 8. Bird survey transects where Cassin's Finch was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

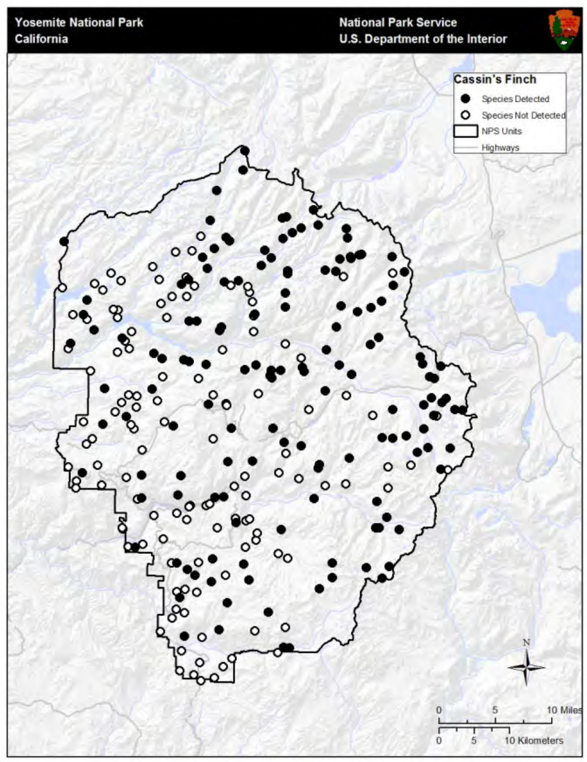

Figure 9. Bird survey transects where Cassin's Finch was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Cassin's Finch was observed throughout high-elevation areas of SEKI and YOSE during avian inventory projects (Figure 3). The mean elevation of observations of Cassin's Finch at SEKI was 2910 m, with 95% of observations made between 1883 and 3431 m. In YOSE, the mean elevation of observations was 2727 m with 95% of observations falling between 1606 and 3234 m (Siegel et al. 2011).

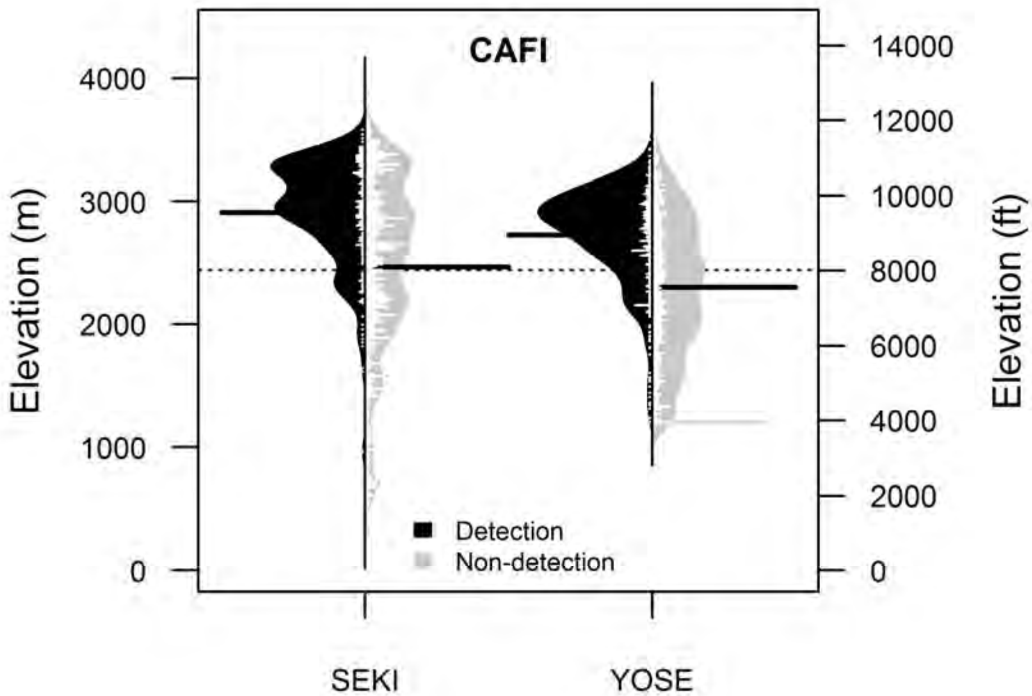

Figure 3. Elevational distributions of sites where Cassin's Finch (CAFI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Cassin's Finches occur in greater abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at YOSE and Kings Canyon NPs and not at all along the Sequoia NP route. However, there is a dramatic and significant positive trend (but based on low detection rates) along the route passing through YOSE. A significant negative trend was observed in the Sierra Region in both the short (1980-2007) and long-term (1966-2007) (Table 3).

Table 15. Relative abundance and trends for Cassin's Finch according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	60	2.65	-0.5	0.87
	1980-2007			-1.7	0.45
Sierra Nevada (BCR 15)	1966-2007	26	4.10	-3.2	0.01
	1980-2007			-3.6	0.00
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.25	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	1.81	+29.8	0.01

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

MAPS data show that Cassin's Finch are rarely captured in Kings Canyon NP and are captured in moderate numbers at YOSE and DEPO banding stations. A significant positive productivity trend and high adult survival indicate healthy populations where MAPS stations are located in YOSE. Reproductive indices of 0.00 at Kings Canyon and DEPO reflect low capture rates of juveniles rather than a lack of breeding success (Table 4).

Table 16. Population trends, productivity, trends, and survival estimates of Cassin's Finches at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.4	NA[2]	0.00	NA	NA
Yosemite NP	1993-2009	3.2	-3.68	0.21	+11.75**	0.824 (0.200)
Devils Postpile NM	2002-2006	4.0	NA	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Most troubling for Cassin's Finch is a significant Sierra-wide decline in recent years (Sauer et al. 2008). Due to the species' preference for high-elevation habitats, there is a high potential for range contraction in response to climate change. In fact, warming in the Sierra may be a contributing factor to current declines.

Loss or degradation of habitat, invasive species, and disease do not appear to be major concerns for Cassin's Finch within the SIEN parks. An increase in natural fire, the use of fire treatments that mimic natural fire regimes, and inadvertent supplemental feeding at stables for packstock may benefit this species.

Climate Change: An analysis of shifts between the historical range of Cassin's Finch (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Cassin's Finch has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Modeled distribution shifts of Cassin's Finch predict decreased distribution of the species across its Sierra Nevada range. Losses are predicted especially in lower-elevation areas with future occurrences potentially limited to the highest parts of the range. The most important variables influencing current and projected distribution were precipitation seasonality and vegetation (both Maxent and GAM distribution models) (Stralberg and Jongsomjit 2008). However, in contrast to modeled changes, it has been suggested that Cassin's Finch may benefit from increased xeric conditions at least as it pertains to competition with its congener, the Purple Finch (Siegel and DeSante 1999).

Cassin's Finch currently breeds between 1606 and 3431 m in SIEN parks (Figure 3). With limited additional high-elevation habitat to colonize, Cassin's Finches will have few opportunities to adapt to climate change by shifting their range up-slope if needed and may see range contraction. In a warmer future, high-elevation areas of the Sierra (such as areas found within SEKI and YOSE) may be the only places Cassin's Finch is able to persist.

Altered Fire Regimes: A restoration study in the East Cascades of Washington state showed a favorable response of Cassin's Finch to treatments that used forest thinning and prescribed burning to mimic pre-settlement conditions in Ponderosa Pine forest that historically experienced frequent fire (Gaines et al. 2007). These results suggest that fire treatments, which create forest structure similar to historic conditions, could benefit Cassin's Finch. How the species will respond to increased fire intensity in the Sierra Nevada remains unclear, although preliminary data indicate Cassin's Finches are among the more common residents of recently burned forest stands throughout the Sierra (Burnett et al. 2010, Siegel et al. 2010).

Habitat Fragmentation or Loss: Cassin's Finch utilizes Lodgepole Pines nearly to treeline and often forages in montane meadows from forest edges (Gaines 1992). Any loss of forest habitat and to some extent degradation of meadows would be detrimental to this species. However, this is not likely to be a great concern within SIEN parks.

Invasive Species and Disease: Neither invasive species nor disease appear to pose a major threat to Cassin's Finch.

Human Use Impacts: Cassin's Finch is known to forage for grain alongside Brown-headed Cowbirds at stables and pack stations (Gaines 1992). The existence of supplemental food sources such as stables may be beneficial to Cassin's Finch within the SIEN parks.

Management Options and Conservation Opportunities

The use of fire treatments and restoration projects, which promote forest conditions similar to what occurred prior to fire suppression, is likely to benefit populations of Cassin's Finch within the SIEN parks. The maintenance of quality habitat for the species is especially important in high-elevation areas of the parks where Cassin’s Finches may persist despite potential range contraction in the lower elevations due to climate change. Although the removal or restriction of stables for packstock would benefit a number of other bird species, their existence in SIEN provides Cassin’s Finch with supplemental food sources.

MAPS station operation and any other opportunities to survey Cassin’s Finch populations in the parks should continue, to assess how the species is responding to climate change and any other threats.

Cassin's Vireo – *Vireo cassinii*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Cassin's Vireo is a fairly common breeder at Sequoia and Kings Canyon (SEKI) National Parks, a common breeder at Yosemite (YOSE) National Park, and an uncommon possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 17. Breeding status and relative abundance of Cassin's Vireos in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N3N/N5B – Vulnerable (Non-breeders)/Secure (Breeders)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Cassin's Vireo's breeding range is limited to the extreme western regions of the U.S. and British Columbia, Canada and extends somewhat into the northern Rocky Mountains and Montana (Goguen and Curson 2002). The Sierra Nevada populations of Cassin's Vireo are fairly large making the Sierra (Siegel and DeSante 1999) and SIEN parks an important part of the species' breeding range.

Distribution and Habitat Associations
Cassin's Vireos are found most often in dry, open forests of oaks and conifers, but also occur along streams and at higher elevations among sequoias and Red Fir (Gaines 1992). Cassin's Vireos were detected in low to moderate densities (Table 2) along many transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were not observed during the DEPO survey. Park inventories show highest associations with undifferentiated riparian habitat and Interior Live Oak forests within SEKI and YOSE respectively (Table 2).

Table 18. Number of Cassin's Vireos recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	52	57	Undifferentiated Riparian	0.25	0.20 (0.05-0.79)
			Canyon Live Oak Forest	0.16	0.14 (0.07-0.28)
			California Black Oak Forest	0.12	0.15 (0.05-0.41)
Yosemite NP	212	257	Interior Live Oak	1.27	
			Jeffrey Pine/Red Fir	0.70	
			Ponderosa Pine/Mixed Conifer	0.30	
			White Fir	0.26	
			Ponderosa Pine	0.20	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

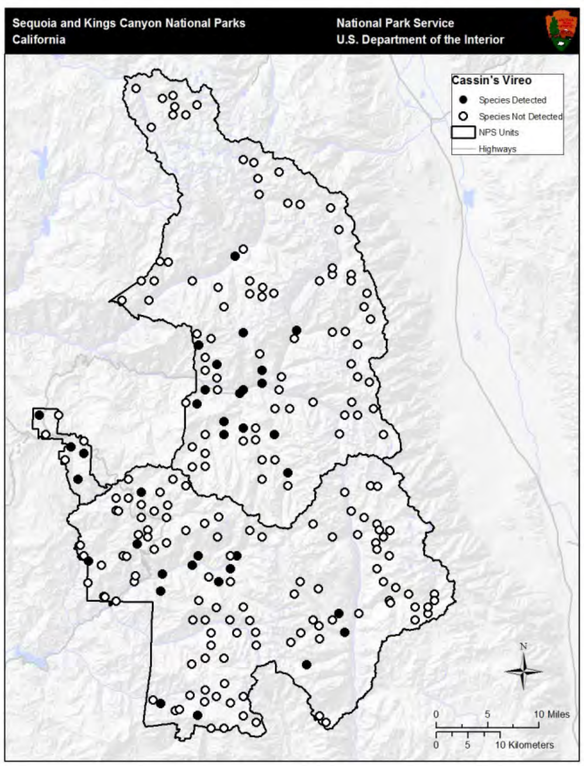

Figure 10. Bird survey transects where Cassin's Vireo was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

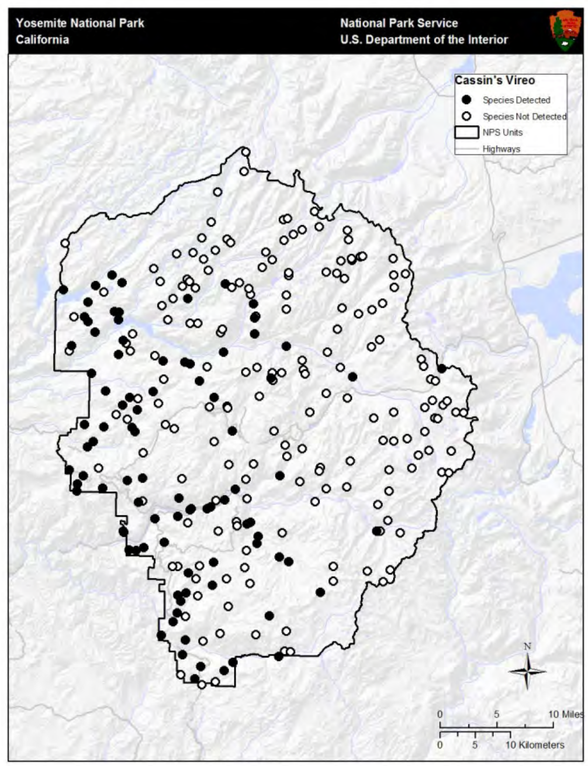

Figure 11. Bird survey transects where Cassin's Vireo was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Cassin's Vireo was observed within the lower to middle-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Cassin's Vireo in SEKI was 1883 m, with 95% of observations occurring between 732 and 3029 m. At YOSE, the mean elevation of observations was 1750 m with 95% of observations falling between 1200 and 2592 m (Siegel et al. 2011).

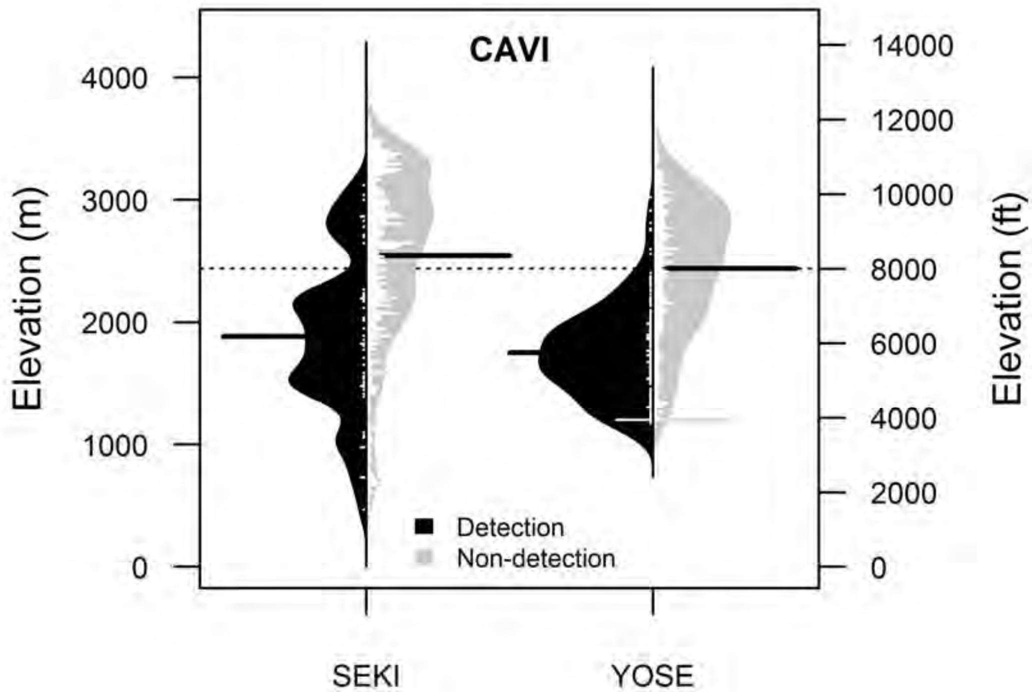

Figure 3. Elevational distributions of sites where Cassin's Vireos (CAVI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Cassin's Vireos are detected more often in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at SEKI and high numbers at YOSE. Significant positive trends were observed across California during 1980-2007, and in the Sierra Nevada in the short and long-term (Table 3).

Table 19. Relative abundance and trends for Cassin's Vireo according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). See Methods for an explanation of calculations. Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	107	3.24	+1.2	0.13
	1980-2007			+1.2	0.04
Sierra Nevada (BCR 15)	1966-2007	32	4.98	+4.6	0.04
	1980-2007			+3.0	0.07
Route 14117 – Sequoia NP	1972-2005	1	0.38	-28.6	0.31
Route 14132 – Kings Canyon NP	1974-2005	1	0.95	+11.8	0.19
Route 14156 – Yosemite NP	1974-2007	1	12.81	-1.2	0.53

MAPS data from Kings Canyon and Yosemite NPs do not show any significant population or reproductive trends. The lack of apparent trends at park MAPS stations implies that populations are stable at banding sites, but note that capture rates (and therefore statistical power) are fairly low (Table 4).

Table 20. Population trends, productivity, trends, and survival estimates of Cassin's Vireo at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	2.1	+3.08	0.18	NA	NA
Yosemite NP	1993-2009	2.3	-1.71	0.64	-3.17	0.459 (0.110)
Devils Postpile NM	2002-2006	0.6	NA[2]	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Loss of habitat from forest clear-cuts on breeding and wintering grounds and nest parasitism by Brown-headed Cowbirds appear to be the greatest threats to Cassin's Vireo. However, within the SIEN parks timber harvest does not occur and cowbirds are less abundant than elsewhere where agriculture and livestock create supplemental food sources. Fires appear to be detrimental to Cassin's Vireo at least in the short term and human use impacts that result in exposure to pesticides and nest disturbance may have some negative impacts as well. The species appears to be responding to climate change by shifting its breeding range, but it seems unlikely continued response to climate change would lead to a loss of Cassin's Vireo from the SIEN parks.

Climate Change: An analysis of shifts between the historical range of Cassin's Vireo (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature and precipitation changes by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Cassin's Vireo has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Cassin's Vireos are found breeding in the lower to middle elevations of SEKI and YOSE (Figure 3). If climate change causes the species' range to shift upward as is generally expected of many species, there is much higher-altitude habitat available for new colonization within Sequoia and Kings Canyon as well as Yosemite. Furthermore, given its association with a fairly wide range of habitat types, Cassin's Vireo is not dependent upon the ability of specific vegetation types to adapt to climate change as well.

Altered Fire Regimes: A study of avian communities in post-fire and unburned forests in the northern Sierra Nevada showed that Cassin's Vireo was significantly more abundant within unburned forests (Burnett et al. 2010), suggesting fires are detrimental to the species at least in the short-term.

Habitat Fragmentation or Loss: Cassin's Vireo is vulnerable to habitat loss from extensive timber harvest (Siegel and DeSante 1999). However, forestry practices that thin rather than clearcut trees appear to have a neutral to positive impact on the species (Goguen and Curson 2002). Timber harvest is not a concern within SIEN parks where commercial timber extraction is prohibited, but loss of habitat outside of SIEN parks could affect park populations indirectly. Likewise, tropical deforestation on Cassin's Vireo's wintering grounds (Goguen and Curson 2002) may impact SIEN populations indirectly.

Invasive Species and Disease: Although native to North America, Brown-headed Cowbirds have expanded their range since European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Cassin's Vireo are susceptible to brood parasitism by Brown-headed Cowbirds (Siegel and DeSante 1999), but cowbird occurrence and parasitism rates within two SIEN parks has been found to be rare (Halterman et al. 1999). For example, during a 1995-96 study at SEKI, only 2-3% of passerine nests monitored were parasitized by cowbirds and of the four Cassin's Vireo nests monitored none were parasitized (Halterman and Laymon 2000). An updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Cassin's Vireo is probably exposed to pesticides and other toxins outside of SIEN parks, but direct effects appear minimal (Goguen and Curson 2002). Pesticide use during Cassin's Vireo's breeding season may indirectly harm the species by reducing food availability (Goguen and Curson 2002), although this is not a problem within SIEN parks. The species shows some sensitivity to disturbance during pairing and nest building and tolerance later in the nesting cycle, although observations of response to disturbance are largely anecdotal (Goguen and Curson 2002).

Management Options and Conservation Opportunities

Positive population trends across the state and Sierra Nevada indicated that direct management of Cassin's Vireo is currently unwarranted. However, many of the apparent threats to the species such as loss or degradation of wintering habitat are poorly understood and should be better assessed (Goguen and Curson 2002). A previous assessment of cowbird pressure in SEKI and

YOSE indicates that a cowbird trapping program is not warranted (Halterman et al. 1999). However, this assessment should be updated; if future studies show an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Cedar Waxwing – *Bombycilla cedrorum*

Migratory Status
Neotropical migrant (Witmer et al. 1997)

Residency and Breeding Status
Cedar Waxwing is an uncommon or rare migrant/winter resident at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and at Devils Postpile (DEPO) National Monument (Table 1).

Table 21. Breeding status and relative abundance of Cedar Waxwings in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Winter	Non-Breeder	Uncommon
Yosemite NP	Migrant/Winter	Non-Breeder	Uncommon
Devils Postpile NM	Migrant/Winter	Non-Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Cedar Waxwing breeds across Canada and the northern half of the U.S. and winters in the southern half of the U.S. (including most of California), Mexico, and Latin America (Witmer et al. 1997). Cedar Waxwings migrate through or winter in the Sierra in substantial numbers (Siegel and DeSante 1999) but these mountains do not constitute a significant portion of the species' overall wintering range (Witmer et al. 1997).

Distribution and Habitat Associations
Cedar Waxwings nests in open deciduous, coniferous, and mixed woodlands and old field habitats with numerous shrubs and small trees, riparian areas, farms, orchards, conifer plantations, and suburban gardens; they migrate through and winter in open-forest areas with fruit-bearing shrubs or trees (Witmer et al. 1997). Only one Cedar Waxwing was detected during avian inventory surveys at SIEN parks, in Jeffrey Pine habitat at Yosemite NP (Table 2).

Table 22. Number of Cedar Waxwings recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-census	NA[1]	NA
Yosemite NP	1	1	Jeffrey Pine	0.01	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

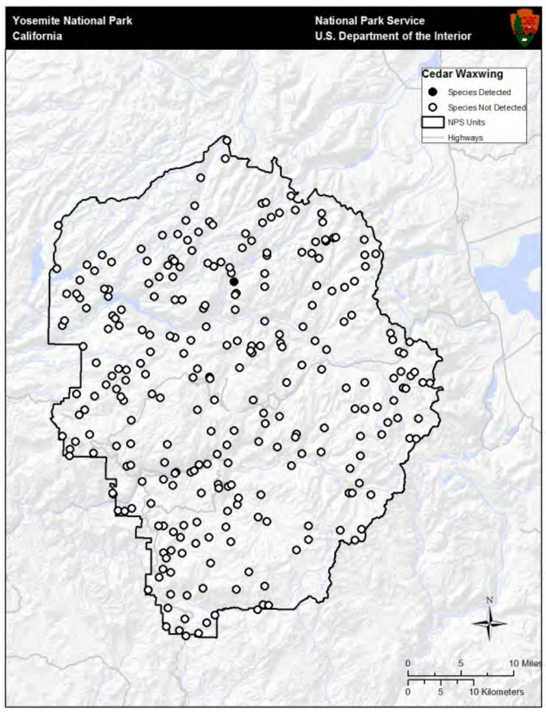

Figure 1. Bird survey transects where Cedar Waxwing was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution
Only one Cedar Waxwing was detected during avian surveys in the SIEN parks, at 2152 m in YOSE (Figure 2; Siegel et al. 2011).

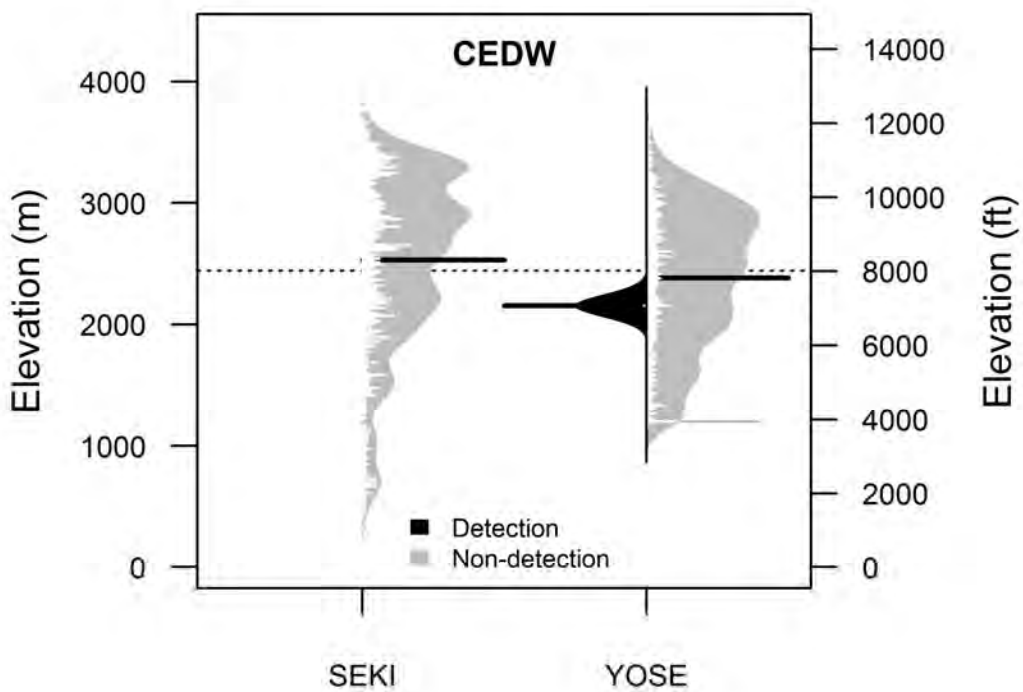

Figure 2. Elevational distributions of sites where Cedar Waxwing (CEDW) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data
The Breeding Bird Survey (BBS) detected Cedar Waxings at very low abundances in California (Table 3) because the species breeds only in the extreme northwest of California. BBS data from the breeding range indicate that populations increased throughout North America from 1965 to 1989 (Witmer 1997).

Table 23. Relative abundance and trends for Cedar Waxwing according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	15	0.40	+2.1	0.36
	1980-2007			-2.8	0.40
Sierra Nevada (BCR 15)	1966-2007	NA[1]	NA	NA	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Cedar Waxwings were not detected at SIEN MAPS stations, but these surveys are designed for breeding species and this bird only winters or migrates through the Sierra. Christmas Bird Count data reveal a significant annual population increase of 2.4% over the past 40 years throughout the species' range (Audubon 2009).

Stressors

Cedar Waxwings are rare or uncommon migrating or wintering birds in SIEN parks (Table 1), but populations have increased recently over much of North America, and the species may be expanding into new regions (Witmer 1997). Increases in range and numbers may be correlated with the creation of edge habitats that enhance fruiting trees and shrubs, especially as farmlands regenerate to forests, as well as the planting of fruiting trees and shrubs in rural and urban areas (Witmer 1997). Cedar Waxwings are not significantly threatened by habitat fragmentation as they commonly nest in farms, orchards, conifer plantations, old-field habitats, open woodlands, and suburban gardens. Potential impacts of climate change likely are associated with changes in seasonal or regional abundance of fruit crops.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of Cedar Waxwing has shifted significantly northward by nearly 190 miles and 163 miles inland throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving towards cooler regions as the climate warms (Audubon 2009). However, Cedar Waxwings are nomadic and irregular in winter due to their reliance on patterns of fruit abundance (Witmer 1997); it is more likely that the species will respond to seasonal and regional changes in fruit crops rather than temperature or precipitation changes resulting from climate change.

Altered Fire Regimes: An increase in extent and frequency of fire of all intensities that create edge habitat that enhances fruiting shrubs and trees (historically cedar berries dominated winter diets) is likely to benefit this species.

Habitat Fragmentation or Loss: Cedar Waxwings commonly nest in farms, orchards, conifer plantations, old-field habitats, open woodlands, and suburban gardens, and utilize these habitats on their wintering grounds as well; this species has adapted well to human alteration of habitats (Witmer 1997). Cedar Waxwings were reported most often in mid-successional clearcuts, with some detections in early successional burned sites, in studies examined by Hutto (1995) in the Rocky Mountains. Thus habitat fragmentation or loss from urbanization is not a significant threat to this species in the Sierra Nevada or SIEN parks; to the contrary, human alteration of the landscape has increased Cedar Waxwing populations.

Invasive Species and Disease: West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). The virus has caused mortality in many native birds. In 2009, West Nile Virus caused at least one Cedar Waxwing death in California (CDPU 2010).

Human Use Impacts: Cedar Waxwings are vulnerable to collisions with windows, television towers, and other objects; flocks also are decimated when individuals feeding on fruits near roadways are struck by vehicles (Witmer et al. 1997).

Management Options and Conservation Opportunities

The most important management action benefiting overwintering Cedar Waxwings in the parks is enforcing speed limits to minimize vehicle strikes, especially where fruiting trees or shrubs occur close to road edges.

Chestnut-backed Chickadee – *Poecile rufescens*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Chestnut-backed Chickadee is a locally uncommon breeder at Yosemite National Park (YOSE) but is not regularly encountered at Sequoia and Kings Canyon National Parks (SEKI) or Devils Postpile National Monument (Table 1).

Table 24. Breeding status and relative abundance of Chestnut-backed Chickadees in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Not recorded[2]		
Yosemite NP	Year-round	Regular Breeder	Locally Uncommon
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

[2]The species has been reported in very low numbers along the Breeding Bird Survey route that intersects Sequoia NP (see below), but not definitively within the park boundaries.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Chestnut-backed Chickadee is distributed over most of the Pacific slope from Alaska south through central California, as well as portions of the interior Pacific Northwest and southwestern Canada (Dahlsten et al. 2002). The west slope of the Sierra was only recently colonized by the species, and it occurs there patchily and in low numbers, so SIEN parks and the Sierra Nevada overall are of little importance to the species (Siegel and DeSante 1999).

Distribution and Habitat Associations
Chestnut-backed Chickadees in the Sierra Nevada occupy lower-elevation conifer forests, particularly stands with a large component of Douglas-fir (Gaines 1992). These birds were detected in small numbers (Table 2) at YOSE only (Figure 1) during avian inventory projects at SEKI, YOSE, and DEPO.

Table 25. Number of Chestnut-backed Chickadees recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Not detected	NA[1]	NA
Yosemite NP	5	8	NA	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

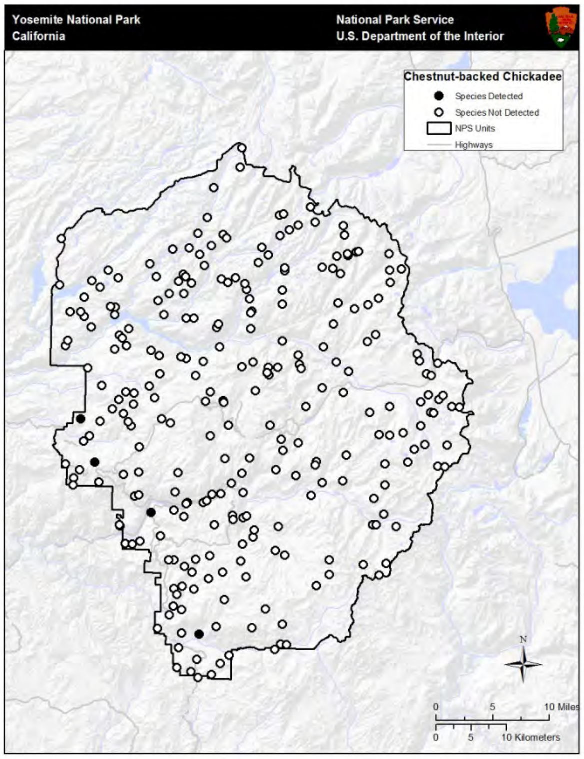

Figure 1. Bird survey transects where Chestnut-backed Chickadee was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Chestnut-backed Chickadee was observed within low-elevation areas of YOSE during avian inventory surveys (Figure 2). The mean elevation of observations of Chestnut-backed Chickadee at YOSE was 1501 m, with 95% of observations occurring between 1307 and 1696 m; the species was not detected at SEKI (Siegel et al. 2011).

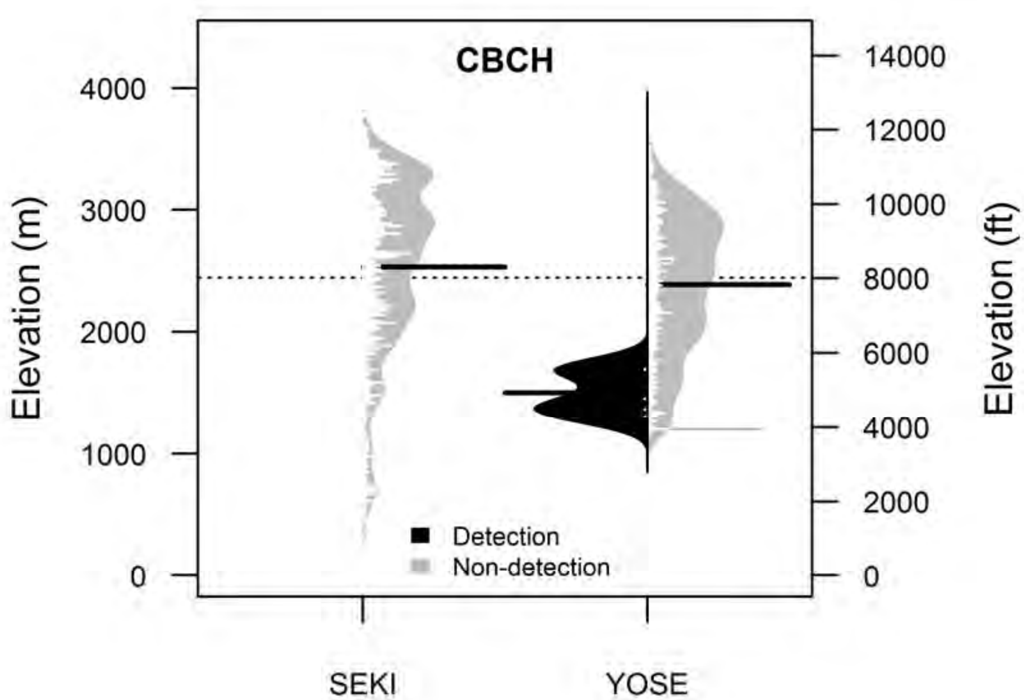

Figure 2. Elevational distributions of sites where Chestnut-backed Chickadees (CBCH) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Chestnut-backed Chickadees are found in much lower abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in very low numbers on individual BBS routes that intersect YOSE and Sequoia NP (though not definitively within park boundaries), but not on the route that intersects Kings Canyon NP. A significant negative trend was observed in California as a whole during both 1966-2007 and 1980-2007 (Table 3).

Table 26. Relative abundance and trends for Chestnut-backed Chickadee according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	55	3.35	-2.5	0.00
	1980-2007			-2.9	0.00
Sierra Nevada (BCR 15)	1966-2007[1]	6	0.19	-5.6	0.50
	1980-2007[1]			-3.2	0.71
Route 14117 – Sequoia NP	1972-2005	1	0.50	0.0	1.00
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	0.04	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Chestnut-backed Chickadees are not regularly captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Dahlsten et al. (2002) noted that the Chestnut-backed Chickadee has expanded its geographic range during the past 50 years by colonizing Douglas-fir forests in the central Sierra Nevada and suburban areas in the eastern San Francisco Bay Area. However, Breeding Bird Survey data indicate that the Chestnut-backed Chickadee has experienced significant population declines throughout California over the past 40 years (Table 3). Thus, while the chickadee's range has expanded, its overall numbers have declined. Population expansions may have occurred after historical logging of pines and fire suppression, which favored the growth of Douglas-fir, and recent declines may be due to logging of firs and possibly a drying climatic trend. Increased high-intensity fire and a warming climate may detrimentally affect the Chestnut-backed Chickadee in Yosemite NP and the Sierra Nevada in general.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of wintering Chestnut-backed Chickadee has significantly shifted more than 123 miles northward over the past 40 years, corresponding with increases in temperature (Audubon 2009). This observed shift provides evidence that this species has already responded to climate change and may shift its range within the Sierra in the coming decades. In the Sierra, Chestnut-backed Chickadees currently breeds in lower-elevation Douglas-fir forests, and expanded into the Yosemite area in the latter half of the 20th century. Several vegetation models predict a much lower extent of Douglas-fir and Montane Hardwood-Conifer types in the Sierra in the face of climate change (Stralberg and Jongsomjit 2008) which will adversely impact the Chestnut-backed Chickadee.

Altered Fire Regimes: The Chestnut-backed Chickadee is strongly associated with Douglas-fir forests in the Sierra Nevada. Long-term fire suppression that favored shade-tolerant species such as Douglas-fir may have increased habitat for the chickadee, allowing it to colonize southwards to Yosemite NP (Dahlsten et al. 2002) The species was a significant indicator of mature forests in burned landscapes in southwestern Oregon (Fontaine et al. 2009), but was detected in the Moonlight Fire area in the northern Sierra (Burnett et al. 2010), indicating that Chestnut-backed Chickadees can persist in burned landscapes as long as enough green forest persists in the matrix. An increase in frequency and extent of high-intensity fire in Douglas-fir forests in Yosemite NP will probably adversely impact Chestnut-backed Chickadees depending on the extent of the burn.

Habitat Fragmentation or Loss: Chestnut-backed Chickadee nests exclusively in cavities, either creating its own holes in rotten snags, or using cavities excavated by other species, and forages on arthropods on live Douglas-fir and other conifer trees (Dahlsten et al. 2002). As such, large-scale clearcuts that eliminate foraging habitat and logging practices that remove suitable nesting trees pose a substantial threat to the species, although this is not a threat in SIEN parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Chestnut-backed Chickadees are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Packstock grazing within Yosemite NP is a potential concern for Chestnut-backed Chickadees, at least locally where grazing is permitted, because it can attract Brown-headed Cowbirds. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Management Options and Conservation Opportunities

Chestnut-backed Chickadees will benefit from the maintenance of lower-elevation Douglas-fir forests in Yosemite NP. Low- and moderate-intensity surface fires in this forest type may help reduce the extent of high-intensity fire and protect chickadee habitat. Park managers can also manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Chipping Sparrow – *Spizella passerina*

Migratory Status
Short-distance/Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Chipping Sparrow is a fairly common summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and a possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 27. Breeding status and relative abundance of Chipping Sparrows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3/S4 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Chipping Sparrow breeds across most of Canada and the U.S. with the exception of California's Central Valley and coastal slopes south of Los Angeles, areas west of the Cascades in the Pacific Northwest, and most of northwestern Texas, the eastern half of Colorado, and central and western portions of Kansas and Oklahoma (Middleton 1998). The subspecies *S. p arizonae* historically was common in the Sierra Nevada, which is an important part of its range (Siegel and DeSante 1999).

Distribution and Habitat Associations
The Chipping Sparrow occupies open woodlands, the borders of natural forest openings, edges of rivers and lakes, and shrubby, weedy fields (Middleton 1998). In the Sierra Nevada, Chipping Sparrow favors the edges of dry montane meadows and open woodland and forest with little or no shrub cover (Siegel and DeSante 1999). When dispersing upslope these sparrows prefer the drier parts of montane riparian and meadow habitats (Siegel and DeSante 1999). Chipping Sparrows were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE. After accounting for detection probability,

park inventories show highest associations with Ponderosa Pine, Blue Oak, and Western Juniper within SEKI; the species was most abundant in recent burn in YOSE (Table 2).

Table 28. Number of Chipping Sparrows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	56	62	Ponderosa Pine Woodland	0.16	0.22 (0.04-1.31)
			Blue Oak Forest	0.07	0.19 (0.05-0.69)
			Western Juniper Woodland	0.07	0.16 (0.04-0.61)
			Western White Pine Woodland	0.06	0.09 (0.02-0.51)
			Red Fir Forest	0.06	0.09 (0.04-0.19)
Yosemite NP	54	66	Recent Burn	0.17	
			Montane Meadow	0.10	
			Ponderosa Pine	0.07	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

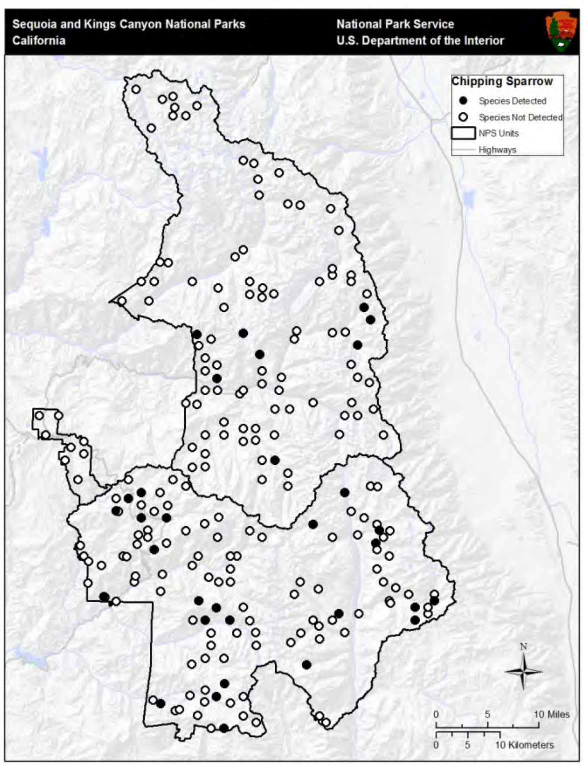

Figure 12. Bird survey transects where Chipping Sparrow was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

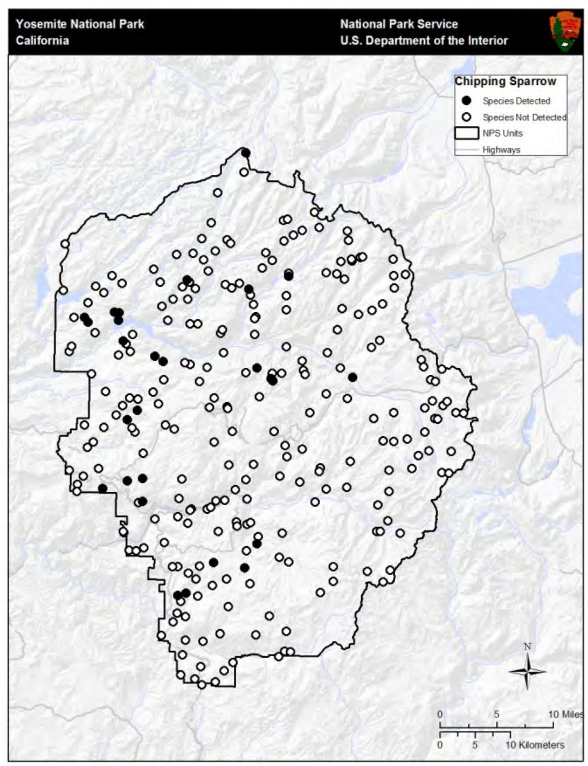

Figure 13. Bird survey transects where Chipping Sparrow was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Chipping Sparrow was detected at low- to high-elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Chipping Sparrow in SEKI was 2659 m, with 95% of observations occurring between 955 and 3341 m. In YOSE, the mean elevation of observations was 2191 m with 95% of observations falling between 1537 and 2927 m (Siegel et al. 2011).

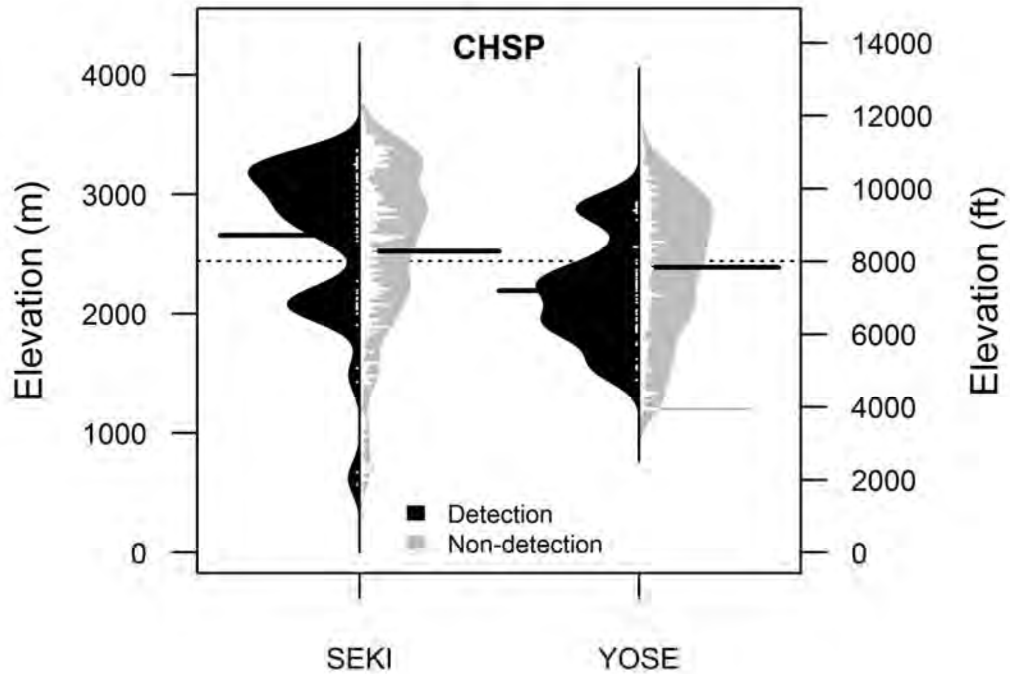

Figure 3. Elevational distributions of sites where Chipping Sparrow (CHSP) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) indicate Chipping Sparrows are more abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were detected in high numbers on individual BBS routes at YOSE, but were substantially less abundant in SEKI. BBS data reveal significant negative population trends in California and the Sierra Nevada, and a nearly significant negative trend along the Yosemite NP route (Table 3). A non-significant large population increase (but involving very small numbers of birds) was reported along the route in Sequoia National Park.

Table 29. Relative abundance and trends for Chipping Sparrow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	130	4.49	-3.5	0.00
	1980-2007			-2.5	0.00
Sierra Nevada (BCR 15)	1966-2007	35	9.07	-3.5	0.00
	1980-2007			-2.8	0.01
Route 14117 – Sequoia NP	1972-2005	1	0.69	+38.2	0.36
Route 14132 – Kings Canyon NP	1974-2005	1	0.45	+4.7	0.69
Route 14156 – Yosemite NP	1974-2007	1	7.23	-5.9	0.06

Similar to BBS trend data, SIEN MAPS station mark-recapture data reveal a highly significant annual negative population trend for Chipping Sparrows at Yosemite NP from 1993-2009 (Table 4).

Table 30. Population trends, productivity, trends, and survival estimates of Chipping Sparrow at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.0	NA[2]	NA	NA	NA
Yosemite NP	1993-2009	4.0	-12.32***	0.32	+1.68	0.440 (0.053)
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Middleton (1998) suggested that the Chipping Sparrow's preference for breeding in shrubby, coniferous habitats bordering open grassy spaces has allowed this adaptable species to benefit from human alteration of natural areas. Park-like landscaping and gardens, agricultural settings, and open forests created by logging can constitute suitable habitat and provide abundant food sources, and the Chipping Sparrow is apparently more common and abundant around suburban and rural residences, orchards, and farms, than in undisturbed habitats (Middleton 1998). Despite this, the Chipping Sparrow has been declining significantly in California and the Sierra Nevada, particularly in Yosemite NP (Tables 3 and 4). In the SIEN parks, the Chipping Sparrow is associated with Ponderosa Pine, Blue Oak, and Pinyon-Juniper open woodland habitats, all of which have been adversely impacted by urbanization, fire suppression and logging, intensive livestock grazing, and agricultural conversion. Brown-headed Cowbird nest parasitism and competition with House Sparrows and House Finches are also potential threats to Chipping Sparrows (Middleton 1998).

The fact that the Chipping Sparrow is a relatively adaptable generalist may reduce the impacts of alteration of any one habitat, and may render the species less vulnerable to climate change. Protection of open woodlands habitats and restoration of natural fire regimes, especially low- and moderate-intensity fire that maintains open forest conditions and enhances grass production, will benefit this species.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Chipping Sparrows has significantly shifted more than 11 miles north and more than 18 miles toward the coast throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). This shift in center of abundance provides some evidence that the species may have already responded to climate change and will likely continue to shift its range in the coming decades, although the observed shifts are small (Audubon 2009). Modeled future distribution shifts of Chipping Sparrows predict an overall decrease in distribution throughout much of California, particularly in northern California and the lower slopes of the Sierra Nevada (including the SIEN parks) (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were distance to stream and vegetation (Maxent and GAM distribution models) as well as precipitation seasonality (GAM).

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. In addition to evaluating sensitivity, vulnerability assessments also incorporate climate change predictions, providing modeled, spatially explicit estimates of vulnerability. An assessment of vulnerability of Chipping Sparrow in the Willamette Valley, Oregon gave this species a vulnerability score of 5 (a score of 5 representing least vulnerable), indicating low vulnerability to climate change at least within this region (Steel et al. 2010).

The Chipping Sparrow occurs regularly from low to high elevations in SIEN parks (Figure 3). The studies described above suggest that the state of knowledge regarding impacts of climate change on Chipping Sparrows is tenuous. Predicted range shifts suggest substantial range contractions in California, while vulnerability assessments suggest low sensitivity. The Chipping Sparrow's proclivity for drier montane woodlands, forests, and meadows imply that this species may be adaptable to a warming climate. If climate change causes the sparrow's range to move upslope in the Sierra Nevada as is generally expected, the species should persist and possibly thrive in the SIEN parks as long as open, dry, grassy forests, woodlands, and meadow habitats are available.

Altered Fire Regimes: Research suggests a positive response to fire by Chipping Sparrows, although certain habitat conditions such as presence of trees and grass may be important. Studies examined by Hutto (1995) documented Chipping Sparrows using early- and mid-successional clearcuts and burned sites as well as a variety of open forest types. In Montana, Chipping Sparrows increased significantly after moderate-intensity fire (Smucker et al. 2005) while in New Mexico the species decreased slightly in abundance as fire intensity increased, with peak densities in low-intensity burns (Kotliar et al. 2007). In the eastern and northern Sierra, Chipping Sparrows were substantially more abundant on burned than unburned plots (Bock and Lynch

1978, Rafael et al. 1987, Burnett et al. 2010) but were equally abundant in burned and unburned sites in the southern Sierra (Siegel and Wilkerson 2005). A future increase in extent and frequency of high-intensity fire may increase habitat suitability for this species but perhaps only if certain post-fire habitat conditions are met. Conversely, fire suppression that results in dense, closed forests may be a significant threat to the Chipping Sparrow in the Sierra Nevada.

Habitat Fragmentation or Loss: Forestry practices that result in open forests with a grassy understory apparently increase (Gaines et al. 2007) or do not significantly affect (Cahall and Hayes 2009) abundance of Chipping Sparrow.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Forest-clearing and habitat fragmentation may have increased the Chipping Sparrow's exposure to cowbird parasitism. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Introduction of exotic bird species such as House Sparrows by humans may have adversely impacted Chipping Sparrows through increased competition for resources, and introduction of domestic cats added a new source of nestling and adult mortality (Middleton 1998), though neither factor is likely a substantial threat in SIEN parks.

Human Use Impacts: Packstock grazing within the parks is a potential concern for Chipping Sparrow, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because grazing contributes to invasion of invasive grasses and other plants, which adversely affect habitat integrity for Chipping Sparrow. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks (Siegel and DeSante 1999).

Chipping Sparrows are susceptible to mortality following collisions with TV towers during fall and spring migrations (Middleton 1998).

Management Options and Conservation Opportunities

Park managers can protect Chipping Sparrow populations in the parks by maintaining and restoring open pine, oak-pine, and juniper habitat types and managing for a healthy native grass understory, and by carefully managing or potentially eliminating cowbird feeding sites such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicated that a cowbird trapping program was not warranted (Halterman et al. 1999). However, this assessment is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

MAPS station operation and any other opportunities to monitor Chipping Sparrow populations in the parks should continue, to assess how the species is responding to climate change and other threats.

Clark's Nutcracker – *Nucifraga columbiana*

Migratory Status

Resident/Short-distance Migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Clark's Nutcracker is a common breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, and a fairly common possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 31. Breeding status and relative abundance of Clark's Nutcrackers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Common
Devils Postpile NM	Year-round	Possible Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Clark's Nutcracker inhabits the high montane regions of the western United States (excluding Alaska) and Canada, preferring coniferous forest dominated by one or more species of large-seeded pines (Tomback 1998). Clark's Nutcrackers are very common in the Sierra; the Sierra and SIEN parks represent an important part of their overall range and an extremely important part of their range in California (Siegel and DeSante 1999).

Distribution and Habitat Associations

On the Sierra's west slope, Clark's Nutcrackers prefer high-elevation forests, particularly stands dominated by Whitebark or Lodgepole Pine (Gaines 1992). Clark's Nutcrackers were detected in moderate densities (Table 2) along numerous survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and at three survey stations during the DEPO survey. Park inventories show highest associations with Whitebark Pine in both SEKI and YOSE, followed by other high-elevation forest types (Table 2).

Table 32. Number of Clark's Nutcrackers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	239	346	Whitebark Pine Woodland	0.38	0.23 (0.15-0.37)
			Western White Pine Woodland	0.32	0.20 (0.09-0.44)
			Western Juniper Woodland	0.15	0.05 (0.02-0.14)
			Foxtail Pine	0.11	0.15 (0.09-0.25)
			Mid Elevation Meadow	0.11	0.08 (0.03-0.17)
Yosemite NP	291	454	Whitebark Pine/Lodgepole Pine	0.42	
			Western White Pine	0.19	
			Mountain Hemlock	0.17	
			Western Juniper	0.10	
			Barren	0.10	
Devils Postpile NM	3	3	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

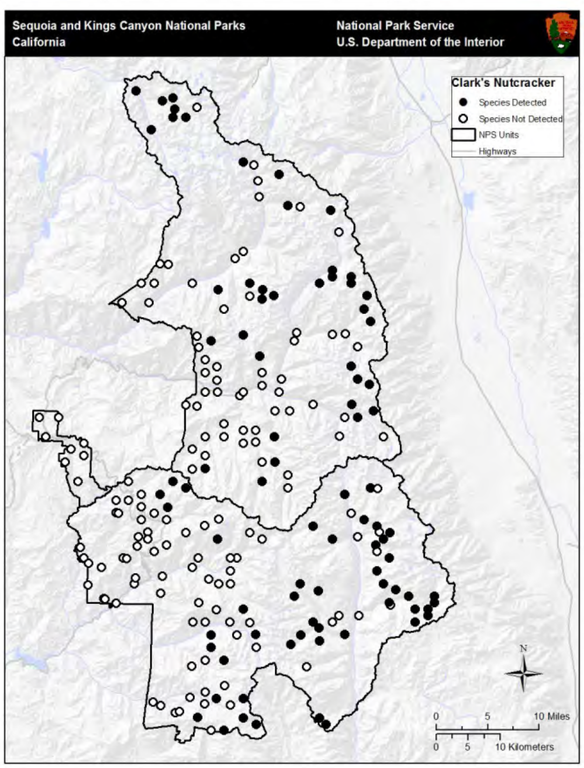

Figure 14. Bird survey transects where Clark's Nutcracker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

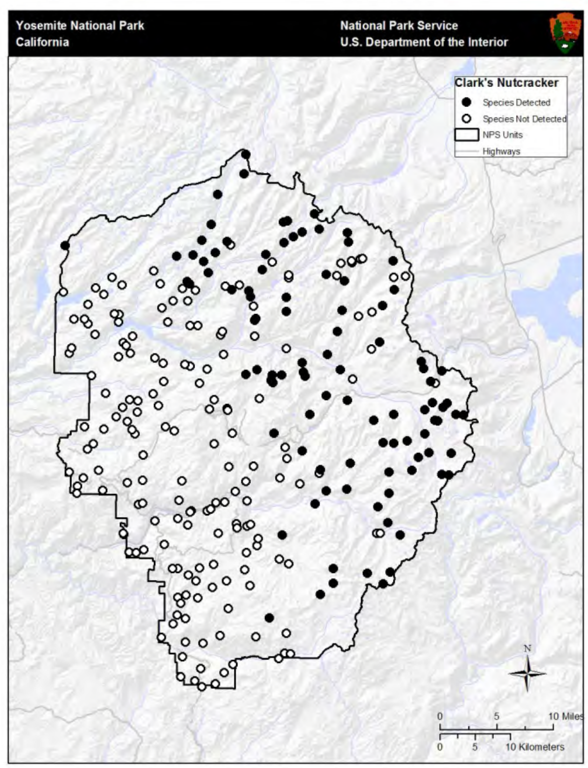

Figure 15. Bird survey transects where Clark's Nutcracker (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Clark's Nutcracker was observed within the middle to high-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Clark's Nutcracker in SEKI was 3123 m, with 95% of observations occurring between 2439 m and 3491 m. At YOSE, the mean elevation of observations was 2951 m with 95% of observations falling between 2359 and 3446 m (Siegel et al. 2011).

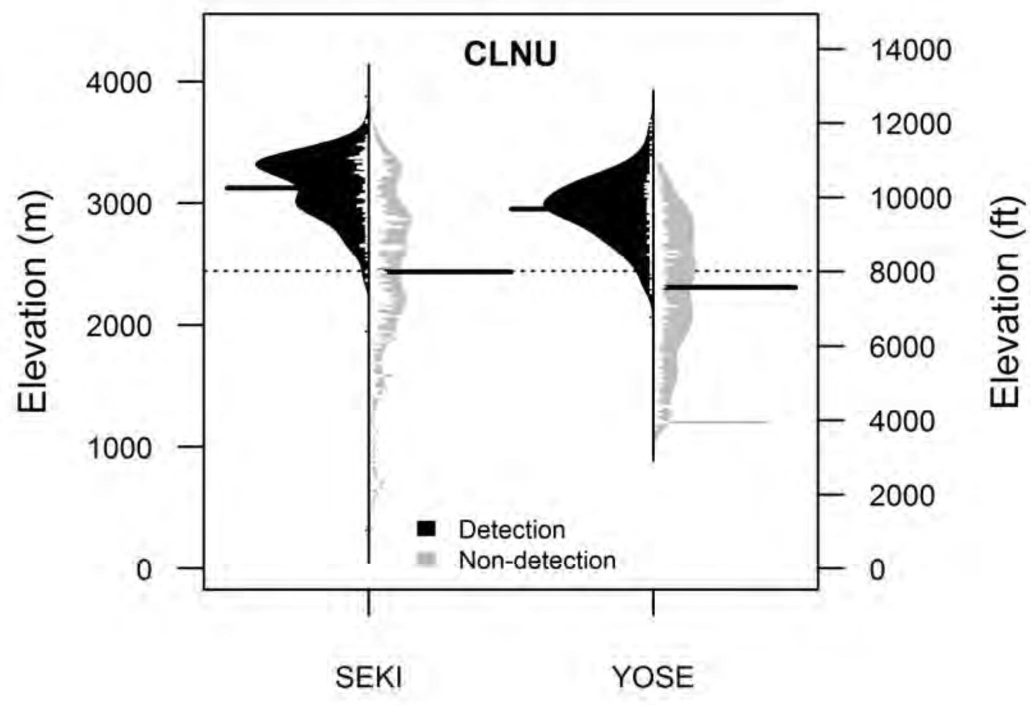

Figure 3. Elevational distributions of sites where Clark's Nutcrackers (CLNU) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Clark's Nutcrackers are detected somewhat more often in the Sierra Region (BCR 15) than in California as a whole. They were not detected on any of the three BBS routes that intersect YOSE and SEKI, likely because these routes collectively sample very little higher-elevation habitat. No significantly trends were observed in California as a whole or the Sierra Region during 1966-2007 or 1980-2007 (Table 3).

Table 33. Relative abundance and trends for Clark's Nutcracker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	33	1.08	+4.3	0.29
	1980-2007			0.0	0.99
Sierra Nevada (BCR 15)	1966-2007[1]	13	1.47	+3.3	0.60
	1980-2007[1]			-0.8	0.76
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Clark's Nutcrackers are not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Clark's Nutcracker is abundant within the Sierra Nevada and SIEN parks, but potentially major threats to the species exist. The spread of White Pine Blister Rust into SIEN parks would threaten nutcracker habitat and the species is particularly vulnerable to climate change due to its dependence on high-elevation habitats. Fire suppression in some areas has been shown to reduce Whitebark Pine abundance, although Clark's Nutcracker may be averse to fire treatments at least in the short-term. Human fragmentation and development in Clark's Nutcracker habitat is minimal and the species may in fact benefit from human activities where they provide additional sources of food.

Climate Change: An analysis of shifts between the historical range of Clark's Nutcracker (1911-1929 survey) and its current range (2003-2008 resurvey) showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count data suggests that the center of abundance of Clark's Nutcracker has significantly shifted 123.6 miles to the North and 44.9 miles toward the coast across its North American range over the past 40 years (Audubon 2009). Shifts to the north suggest the species may be adapting to climate change by moving toward cooler areas. However, the corresponding shift toward coastal areas, which are generally warmer during the winter season, suggests the opposite (Audubon 2009).

Modeled distribution shifts of Clark's Nutcracker predict range contractions across the Sierra Nevada with only the highest elevations showing persistent occurrence into the future (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were precipitation seasonality (Maxent distribution model), mean temperature (GAM distribution model) and distance from stream (both distribution models) (Stralberg and Jongsomjit 2008).

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Clark's Nutcracker received a sensitivity score of 53.06 (UW 2010), suggesting moderate sensitivity to the threat. Certainty of results was listed as 38.75 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic contributing most to Clark's Nutcracker's sensitivity to climate change was its need for specialized habitat (UW 2010).

Clark's Nutcrackers are found breeding in the higher-elevations of SIEN parks (Figure 3). If climate change causes the species' range to shift upward as is generally expected of many species, there is little unoccupied upslope habitat remaining for new colonization within the SIEN parks.

Altered Fire Regimes: Fire suppression in the Rocky Mountains has caused declines in Whitebark Pine communities and may lead to subsequent declines of Clark's Nutcracker in the region (Tomback 1998). It is not clear whether similar trends are occurring within the Sierra Nevada, but an increase in fire within the range may reverse such a phenomenon if it exists within SIEN parks. However, a modeled response of Clark's Nutcracker to prescribed burns in Washington State indicated the species occurred less often following treatments than in unburned areas, at least in the short-term (Russell et al. 2009).

Habitat Fragmentation or Loss: Fragmentation and development of montane habitat is uncommon, but does not appear detrimental to the Clark's Nutcracker where it does occur (Siegel and DeSante 1999). However, loss of Whitebark Pine or Lodgepole Pine due to increased fire or disease would be detrimental to the species.

Invasive Species and Disease: The introduction of White Pine Blister Rust into the western United States has caused great changes in white pine ecosystems (Tomback 2001, McKinney et al. 2009). Further spread of blister rust within white pine species could lead to declines of Clark's Nutcracker, which rely on their seeds as an important food source (Tomback 1998). While the majority of research on White Pine Blister Rust appears to occur within the Rocky Mountains, any similar outbreak of the disease within the Sierra Nevada would become a significant threat to park populations as well.

Human Use Impacts: Clark's Nutcracker is remarkably tolerant of humans at nest sites and the species is drawn to roadsides and other places of high human activity where additional food can be found (Tomback 1998, Siegel and DeSante 1999).

Management Options and Conservation Opportunities

The most important thing park managers can do to conserve Clark's Nutcracker is to maintain Whitebark Pine and Lodgepole Pine ecosystems. Fire management that promotes Whitebark Pine persistence and regeneration as well as steps designed to reduce the spread of blister rust would be beneficial to Clark's Nutcracker. Management strategies for promoting pine resistance to

blister rust can be found at
http://www.fs.fed.us/rm/highelevationwhitepines/Management/Strategy/blister-rust-manage.htm.

Climate change is another potentially major threat to Clark's Nutcracker. Like other threats that impact the species indirectly, steps to maintain suitable habitat despite changes in temperature and precipitation are likely the best way to protect Clark's Nutcracker. Improved monitoring of high-elevation habitats for Clark's Nutcracker and other high-elevation species would improve our understanding of the impacts of climate change and other threats.
A high-elevation pine monitoring project recently initiated by the Sierra Nevada Network Inventory and Monitoring Program will provide useful information about the status and long-term trends of whitebark pine and foxtail pine populations that provide important Clark's Nutcracker habitat in SIEN parks (McKinney et al. 2012).

Cliff Swallow – *Petrochelidon pyrrhonota*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Cliff Swallow is a locally fairly common breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks and an uncommon possible breeder at Devils Postpile National Monument (DEPO) (Table 1).

Table 34. Breeding status and relative abundance of Cliff Swallows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Locally Fairly Common
Yosemite NP	Summer	Regular Breeder	Locally Fairly Common
Devils Postpile NM	Summer	Probable Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)
-

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Cliff Swallow breeds across much of the U.S., Canada, and Mexico (Brown and Brown 1995). The species' relative rarity in on the west slope of the Sierra, particularly above the foothill zones, indicates the Sierra region and the SIEN parks are not of substantial importance to it (Siegel and DeSante 1999).

Distribution and Habitat Associations
Cliff Swallows are plentiful only near their nesting colonies, which on the west slope of the Sierra Nevada are frequently attached to human structures; otherwise nests are built on cliff faces or rock outcroppings (Gaines 1992). Just a single Cliff Swallow was detected during avian inventory point counts at SEKI and none were detected at YOSE or DEPO, although the crew detected the species anecdotally at DEPO (Table 2).

Table 35. Number of Cliff Swallows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	1	1	NA[1]	NA	NA
Yosemite NP	0	0	NA	NA	
Devils Postpile NM	0	0	Detected off-survey	NA	

[1]NA - Information not available due to insufficient data.

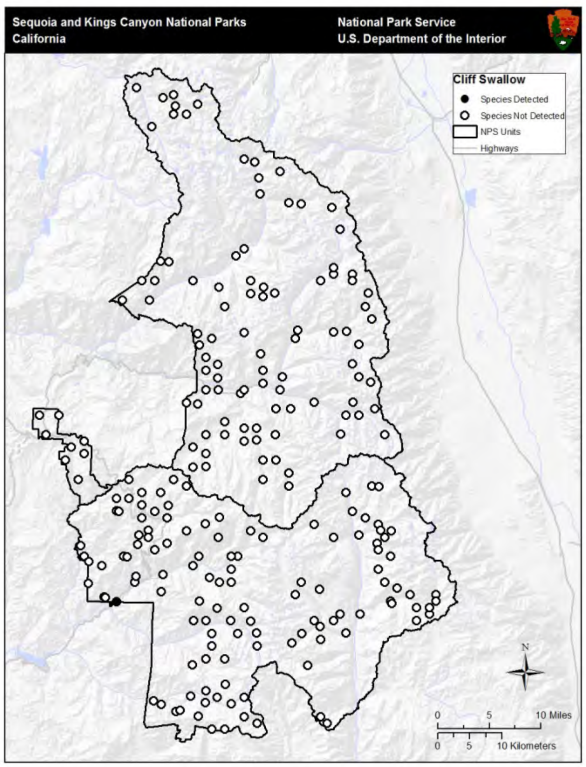

Figure 16. Bird survey transects where Cliff Swallow was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

The single Cliff Swallow detection at SEKI occurred at 497 m. Gaines (1992) suggests the species nests up to around 1524 m in the Yosemite area.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Cliff Swallows are found in lower abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at that intersect Kings Canyon NP and YOSE, but in very high numbers (but not necessarily within park boundaries) along the route that intersects Sequoia NP. No significant population trends were evident from BBS results.

Table 36. Relative abundance and trends for Cliff Swallow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). See Methods for an explanation of calculations. Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	167	63.71	+0.6	0.32
	1980-2007			+0.3	0.77
Sierra Nevada (BCR 15)	1966-2007	23	22.52	-0.2	0.96
	1980-2007			-0.8	0.82
Route 14117 – Sequoia NP	1972-2005	1	55.06	+7.5	0.62
Route 14132 – Kings Canyon NP	1974-2005	1	4.50	-5.3	0.51
Route 14156 – Yosemite NP	1974-2007	1	0.46	-6.8	0.61

Cliff Swallows are generally not at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The Cliff Swallow is one of the most social landbirds in North America, differing from the congeneric Barn Swallow by nesting in much larger colonies (Brown and Brown 1995). Population size and distribution of the Cliff Swallow has increased in the Sierra Nevada over the past half-century due to the species' adaptation to using human-made buildings and bridges, especially concrete bridges, for nesting (Siegel and DeSante 1999). Cliff Swallows forage high in the air over grassy pastures, plowed fields, and other open areas, as well as floodplain forest, above canyons, near towns, and occasionally above open water. Pesticide use may decrease the prey base, but otherwise the species is not substantially threatened by habitat fragmentation or loss, altered fire regimes, or climate change. Its current population trend in the Sierra and throughout California appears to be stable (Table 3).

Climate Change: The Cliff Swallow is found in low-elevation habitats in the Sierra. If climate change causes the swallow's range to shift upward as is generally expected for a number of species, there are middle- and higher-altitude cliffs available for nesting and grassy, open habitat for foraging within the Sierra and SIEN parks.

Altered Fire Regimes: Cliff Swallow nesting habitat on cliff faces and underneath bridges is generally unaffected by fire. Fire in grassy pastures and floodplain forests may enhance populations of some insects such as some grasshoppers, beetles, and flies while potentially reducing other insects such as certain butterflies and moths (Swengel 2001). The Cliff Swallow eats a wide variety of insects, and likely can take advantage of post-fire increases in prey.

Habitat Fragmentation or Loss: Winter habitat for Cliff Swallows consists of grassland and agricultural areas; urban development of these areas may pose a substantial threat to the species. Nesting habitat has been enhanced by construction of bridges, culverts, and buildings which provide alternative nesting sites (Brown and Brown 1995). Habitat fragmentation or loss does not pose a risk to Cliff Swallows in SIEN parks.

Invasive Species and Disease: To our knowledge, the Cliff Swallow faces no major threats of invasive species or disease in the SIEN parks.

Human Use Impacts: Overall, human activities have had a positive effect on Cliff Swallow populations, and the species has adapted well to human-altered habitats throughout its range, especially the building of bridges and the creation of agricultural fields.

The proximity of nests on bridges and culverts to automobile traffic means that adults and juveniles are vulnerable to collisions with vehicles, however (Brown and Brown 1999). Pesticide use also may pose a risk to Cliff Swallows by reducing their prey base (Siegel and DeSante 1999).

Management Options and Conservation Opportunities

Cliff Swallow populations can be protected in SIEN parks by preventing disturbance and harassment at nests during the breeding season. Removal of Cliff Swallow nests after the breeding season can control competing House Sparrows by removing sparrow roosting sites during the winter and preventing them from becoming established in existing nests at a colony site before Cliff Swallows return in the spring; this practice also reduces parasite build-up in the nests (Brown and Brown 1995). Speed limits on roads should be strictly enforced to reduce collisions between Cliff Swallows and vehicles.

Common Merganser – *Mergus merganser*

Migratory Status

Short/Medium-distance migrant (Mallory et al. 1999)

Residency and Breeding Status

Common Merganser is a summer resident at all Sierra Nevada Network (SIEN) parks with varying levels of abundance (Table 1).

Table 37. Breeding status and relative abundance of Common Mergansers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Primarily Summer	Local Breeder	Uncommon
Yosemite NP	Primarily Summer	Local Breeder	Fairly Common
Devils Postpile NM	Primarily Summer	Local Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Common Mergansers winter throughout much of the contiguous U.S., with the exception of the U.S. southeast. Their breeding range extends throughout much of Canada to the north and down to northern California and the southern Sierra Nevada (Mallory et al. 1999). SIEN parks are an important part of the southern edge of the species' breeding range, but are not a substantial portion of the overall range.

Distribution and Habitat Associations

In the mountains, Common Mergansers prefer water bodies bordered by forests (Gaines 1992). Of the SIEN parks, Common Mergansers were detected only in YOSE (Table 2) along three transects (Figure 1) during avian inventory projects. Common Mergansers occur within SEKI and DEPO, but were not observed during inventories. Although Common Merganser was detected in low densities in oak and pine forests in YOSE, these results are largely artifacts of the study design, which classified habitats according to the dominant vegetation within 50 m of the survey stations. Vegetation classifications did not describe habitat features important for waterfowl and Common Merganser likely favors water bodies found within these habitat types.

Table 38. Number of Common Mergansers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA[1]	NA
Yosemite NP	5	11	Canyon Live Oak Lodgepole Pine	0.03 0.01	
Devils Postpile NM	0	0	Detected off-survey	NA	

[1]NA - Information not available due to insufficient data.

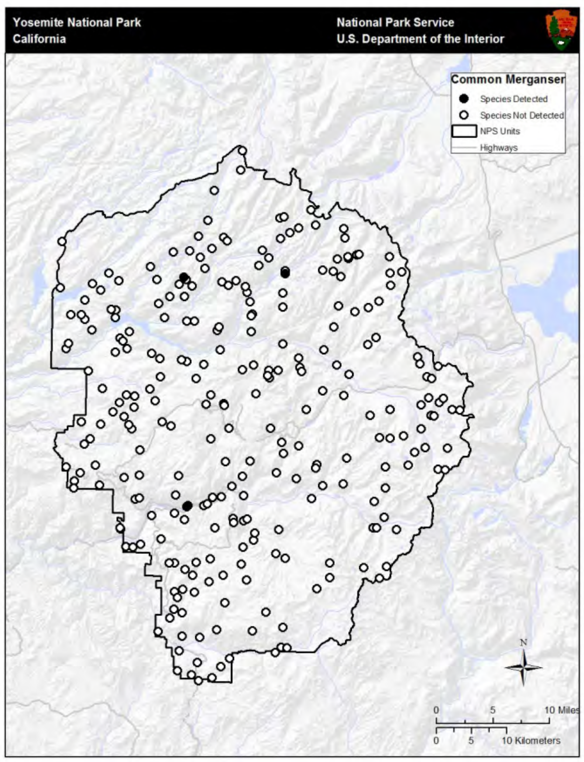

Figure 1. Bird survey transects where Common Merganser was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Common Merganser was observed primarily at mid-elevation in YOSE, but not at all in SEKI during recent avian inventory projects (Figure 2). The mean elevation of observations of Common Merganser in YOSE was 2102 m, with 95% of observations made between 1283 and 2439 m (Siegel et al. 2011).

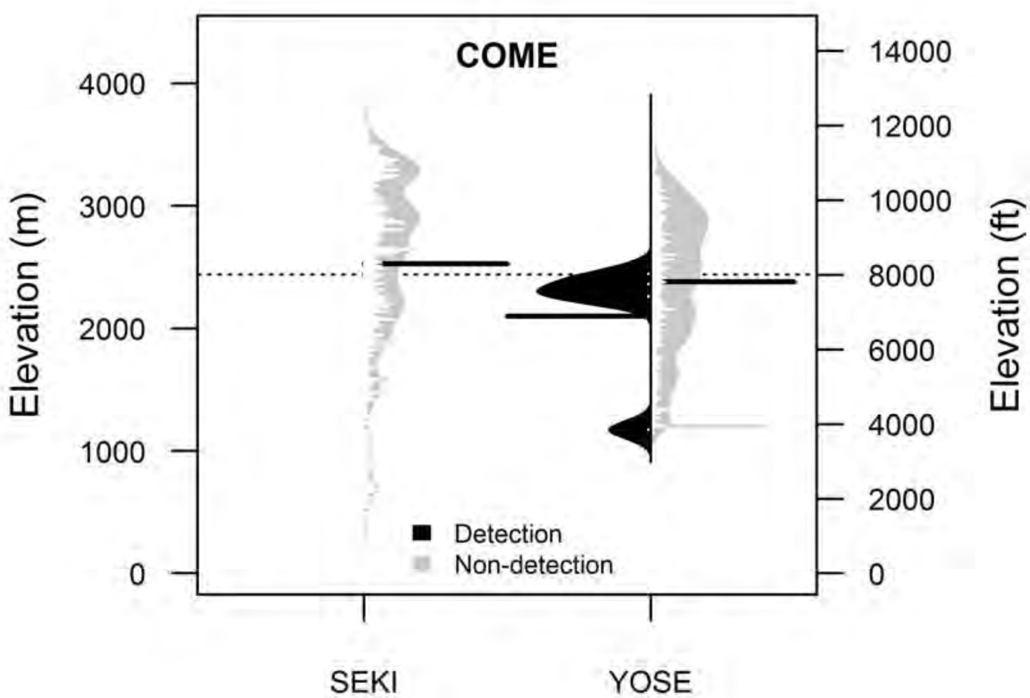

Figure 2. Elevational distributions of sites where Common Mergansers (COME) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Common Mergansers are found in greater abundance in California as a whole than the Sierra Region (BCR 15). Among individual BBS routes at YOSE and SEKI, only the Sequoia NP route shows occurrences of Common Merganser. A significant positive trend was observed across California both in the short and long-term (Table 3).

Table 39. Relative abundance and trends for Common Merganser according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	35	0.34	+6.1	0.01
	1980-2007			+5.8	0.02
Sierra Nevada (BCR 15)	1966-2007[1]	6	0.07	+0.7	0.84
	1980-2007[1]			-1.4	0.62
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Common Mergansers are generally not captured in mist nets intended for passerines, and therefore are not well sampled by the SIEN MAPS stations; data on productivity and survival within SIEN parks are not available.

Stressors

Across its range Common Merganser is most threatened by degradation of habitat from timber harvest and water pollution as well as some hunting pressure. However, within SIEN parks these threats are not a great concern. Likewise, altered fire regimes, invasive species, and disease appear to affect the species only locally. However, the position of SIEN parks at the southern boundary of Common Merganser's breeding range may signal a vulnerability in the context of climate change, as any northward range shift may result in a loss of the species from SEKI or perhaps the other parks as well.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of Common Merganser has significantly shifted 105.6 miles to the north and 37.9 miles toward the coast over the past 40 years throughout its North American range, corresponding with increases in temperature (Audubon 2009). Shifts northward suggests the species is moving toward cooler areas, but a shift toward the coast implies the opposite, as coastal areas are generally characterized by more moderate winter temperatures than those further inland (Audubon 2009). These observed shifts provide mixed evidence as to whether Common Merganser has already responded to climate change.

The SIEN parks are located at the southern and higher end of the species' range, which also has mixed implications. If Common Merganser's breeding range shifts upslope, more individuals may breed within SIEN parks in the future. However, if the species' breeding range contracts along its southern edge as is suggested by Christmas Bird Count data, breeding Common Mergansers may be lost from the southern Sierra in the future. The species should be monitored within and beyond SIEN parks to determine if and how its range is shifting with climate change.

Altered Fire Regimes: Increased fire frequencies could impact Common Mergansers locally and in the short-term through burning of habitat. However, this is not likely a major threat within SIEN parks.

Habitat Fragmentation or Loss: Common Merganser habitat has been degraded in some areas by water contamination and loss of suitable cavity-producing trees used for nesting (Mallory et al. 1999). However, neither water pollution nor loss of nesting trees through timber harvest is a major concern within SIEN parks.

Invasive Species and Disease: Although Common Mergansers may be affected by local disease outbreaks (e.g. DeJong et al. 2001), neither invasive species nor disease appear to be a major threat to the species.

Human Use Impacts: Common Mergansers are not a prized game species. Nevertheless, they experience some hunting pressure (Mallory et al. 1999), although this is not a concern within SIEN parks where hunting is not permitted.

Management Options and Conservation Opportunities

Because Common Mergansers are not a prized game species they have not been managed as heavily as other waterfowl such as Mallard. In some cases Common Mergansers have been used as bioindicators for pollution reduction management plans and populations have been controlled locally for the benefit of young salmonids, which mergansers consume (Mallory et al. 1999).

SIEN parks provide only limited habitat for this species and there is likely little capacity for larger populations than already exist. Maintenance of waterways and surrounding habitats is likely the best way to maintain this species within the parks. Nest boxes could be considered to supplement nesting trees if needed, but there is currently no reason to believe that such efforts are needed.

Common Nighthawk – *Chordeiles minor*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Common Nighthawk is an uncommon probable breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, and an uncommon, apparently non-breeding visitor to Devils Postpile National Monument (Table 1).

Table 40. Breeding status and relative abundance of Common Nighthawks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Probable Breeder	Uncommon
Yosemite NP	Summer	Probable Breeder	Uncommon
Devils Postpile NM	Migrant/Summer	Non-Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not Listed

Range Significance
The Common Nighthawk breeds over much of Canada and virtually all of North America with the exception of coastal and central California and the American Southwest (Poulin et al. 1996). Populations in the Sierra Nevada are small and of very little significance to the species (Siegel and DeSante 1999).

Distribution and Habitat Associations
Common Nighthawk is a ground-nesting aerial insectivore that occupies a variety of open habitat types. Nesting habitat includes coastal sand dunes and beaches, burned or logged forest areas, woodland clearings, prairies and plains, sagebrush and grassland habitat, farm fields, open forests, rock outcrops, and flat gravel rooftops of city buildings (Poulin 1996). In the Sierra Nevada, the species needs open country or large gravelly openings in the forest for nesting, and hunts over water, meadows, sagebrush scrub, or open coniferous forest (Siegel and DeSante 1999). Only one Common Nighthawk was detected (Table 2) along survey transects (Figure 1) at YOSE during diurnal avian inventory projects, and none were detected at SEKI and DEPO. However, the Common Nighthawk is most active at dusk and dawn, so diurnal surveys do not adequately detect this species.

Table 41. Number of Common Nighthawks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA	NA
Yosemite NP	1	1	NA[1]	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

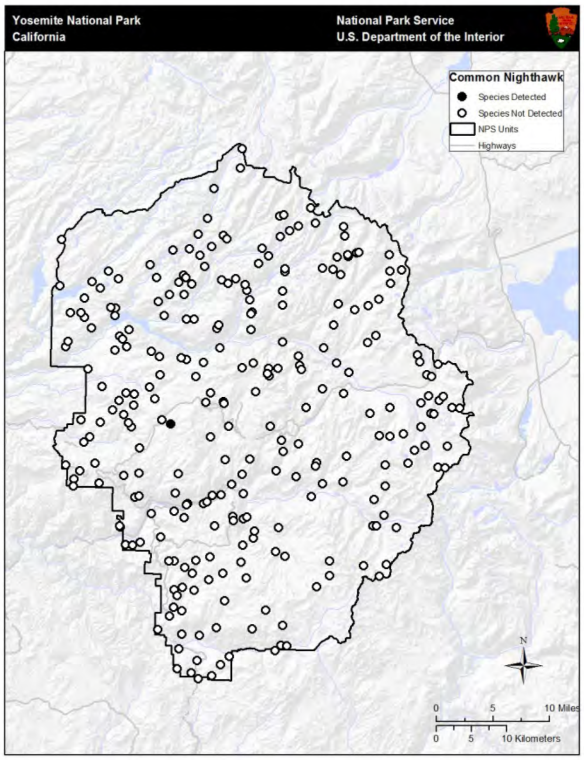

Figure 17. Bird survey transects where Common Nighthawk was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Common Nighthawk breeds from sea level near the coast to elevations of over 3000 m in the Sierra Nevada. The single Common Nighthawk detection during landbird inventory surveys at YOSE (Table 2) was at 2422 m.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Common Nighthawks are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole (Table 3). Nighthawks were detected on the single BBS route in YOSE, where they exhibited a non-significant positive population trend from 1974-2007, but were not detected at SEKI (Table 1). While Poulin et al. (1996) report that the overall population of Common Nighthawks decreased from 1966-1991 and earlier BBS data indicated a decreasing trend in the Sierra Nevada (Siegel and DeSante 1999), recent BBS data documented significant positive population trends in the Sierra Region during 1966-2007 and 1980-2007 (Table 3). No significant trends were detected for California as a whole (Table 3).

Table 42. Relative abundance and trends for Common Nighthawk according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). See Methods for an explanation of calculations.

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	56	0.95	+1.6	0.08
	1980-2007			+1.8	0.22
Sierra Nevada (BCR 15)	1966-2007	19	1.21	+4.9	0.02
	1980-2007			+5.5	0.00
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.73	+17.7	0.23

[1]NA - insufficient data; trend analysis requires at least 14 detections (Sauer et al. 2008).

Common Nighthawks are generally not captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Threats

Common Nighthawks appear to be faring relatively well in the Sierra Nevada, although the birds were not detected frequently during avian inventory or BBS surveys in SIEN parks. As such, little is known about their abundance and breeding habitat in the parks. As ground-nesters, Common Nighthawks are vulnerable to predation from domestic cats and dogs, although this is not likely to threaten the species in SIEN parks. Nighthawks roosting on roads are susceptible to collisions with vehicles. Pesticide drift from the Central Valley may adversely impact this insectivore.

Loss or degradation of habitat, invasive species, and disease do not appear to be major concerns for Common Nighthawk. Burned forests were described as nesting habitat, thus increase in moderate- or high-intensity fire may benefit this species, at least for a short time after fire.

Climate Change: No studies have been published examining impacts of climate change on Common Nighthawks. Nighthawks often forage for insects over water (Siegel and DeSante 1999) and may be adversely impacted if climate change alters meadow hydrology and insect prey abundance.

Altered Fire Regimes: Common Nighthawks nest in open habitat types. Forest patches burned at moderate or high intensity may provide suitable nesting habitat for this species (Poulin et al. 1996). Any positive effect might diminish with time since fire, as Common Nighthawks would likely avoid nesting in dense, re-growing shrubfields.

Habitat Fragmentation or Loss: Common Nighthawks can be found in open, logged forests (Poulin et al. 1996), so timber harvest practices in the Sierra Nevada may potentially benefit the species. However, nighthawks were less abundant in all stages of clearcuts than in unlogged areas in southwestern Ponderosa Pine forests (Block et al. 1997), so this type of harvest probably adversely impacts the species. Research is needed to determine the extent of logging that benefits or harms Common Nighthawks. Habitat fragmentation or loss is not a significant threat to the species within SIEN parks owing to the lack of commercial harvesting.

Invasive Species and Disease: As ground-nesters, Common Nighthawks are vulnerable to native predators as well as introduced cats and dogs, although domestic pets are not a risk in SIEN parks. To our knowledge, there are no major threats of invasive species or disease to the Common Nighthawk in the parks.

Human Use Impacts: Common Nighthawks are aerial insectivores, feeding primarily on moths, mayflies, caddisflies, beetles, ants and wasps, true bugs, and crickets and grasshoppers (Poulin et al. 1996, Todd et al. 1998). Pesticide drift from the Central Valley and forest lands surrounding SIEN parks may negatively impact Common Nighthawk prey species within the SIEN parks (Siegel and DeSante 1999).

Siegel and DeSante (1999) suggest that nest disturbance and trampling of nests by livestock could potentially occur. This is not a significant impact in SIEN parks because packstock are relatively localized.

Management Options and Conservation Opportunities

Common Nighthawk populations in the parks will benefit from strictly enforced speed limits to reduce vehicle collisions. Little is known about abundance and breeding habitats of this species in SIEN parks. Targeted monitoring of Common Nighthawk populations and habitat could be instigated in the parks, because these crepuscular-foraging birds are not easily detected during diurnal avian surveys, and cryptic plumage and reluctance to flush makes them difficult to see on nests during the day (Poulin et al. 1996).

Common Poorwill – *Phalaenoptilus nuttallii*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Common Poorwill is a fairly common regular breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks and was not reported from Devils Postpile National Monument although occasional migrants or dispersers may occur (Table 1).

Table 43. Breeding status and relative abundance of Common Poorwills in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S2 – Imperiled (High risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not Listed

Range Significance
Common Poorwills breed throughout the western U.S. and Mexico and in south-central Canada (Woods et al. 2005). The species is patchily distributed within its range, but is apparently more abundant than once thought (Woods et al. 2005). Common Poorwill is less common in the Sierra Nevada than elsewhere in California, thus the mountain range and SIEN parks are of little significance to the species.

Distribution and Habitat Associations

Common Poorwill is a small, nocturnal, insectivorous bird best known for its ability to enter daily torpor and possibly even to hibernate (Hardy et al. 1998). These birds are found in grassy or shrubby areas in arid or semi-arid regions (Woods et al. 2005), including prairies, rocky knolls and canyons, and shrubby clearings within pine-fir forests (Hardy et al. 1998). On the western slopes of the Sierra Nevada, the Common Poorwill prefers openings within chaparral, oak woodland, or coniferous forest, particularly open mixtures of shrubs and small trees (Siegel and DeSante 1999). Common Poorwills were not detected during avian inventory surveys at any of the SIEN parks, but this is likely due to the low capability of these surveys to detect nocturnal birds.

Elevational Distribution

Common Poorwill is absent from elevations above 3000 m (Woods et al. 2005). Most nesting occurs at elevations from 500-1000 m, though nests have been reported at elevations above 2500 m (Woods et al. 2005).

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Common Poorwills are found in lower abundance in the Sierra Region (BCR 15) than in California as a whole (Table 2). A significant positive trend was observed for Common Poorwills in the Sierra Region during 1966-2007 and 1980-2007 (Table 2), but the very low detection rates make the reliability these apparent trends suspect. The species was essentially undetected on individual BBS routes at YOSE and SEKI. Population trends derived from BBS data for this species should be viewed with caution, as these surveys do not adequately detect this species (Woods et al. 2005). NatureServe ranks the Common Poorwill as imperiled in California.

Table 2. Relative abundance and trends for Common Poorwill according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007[1]	37	0.09	-0.2	0.94
	1980-2007[1]			+3.6	0.31
Sierra Nevada (BCR 15)	1966-2007[1]	6	0.04	+16.9	0.04
	1980-2007[1]			+23.0	0.08
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.04	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Common Poorwills are generally not captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Human activities such as logging and livestock grazing in the Sierra Nevada are not known to threaten Common Poorwills; in fact these activities may enhance habitats for the species, although they are minimal within SIEN parks. Urban development may be adversely impacting Common Poorwills in the Sierra foothills. Vehicle collisions can be significant where relatively high densities of poorwills occur along roads.

Climate change, invasive species, and disease do not appear to be major concerns for Common Poorwill. Fire treatments or prescribed natural fire that allows patches of high-intensity fire is likely to benefit this species.

Climate Change: Along the western slope of the Sierra Nevada, Common Poorwill typically breeds at lower elevations (500-1000 m) although nests have been documented above 2500 m (Woods et al. 2005). Warmer, drier conditions coupled with an increase in fire frequency may lead to an expansion of grasslands into current shrubland and woodland areas. This is likely to improve habitat for Common Poorwills in the Sierra Nevada, and potentially in the SIEN parks.

Altered Fire Regimes: Common Poorwills appear to respond positively to post-fire conditions. Woods et al. (2005) reported that poorwills are "common in areas recovering from forest fires" in British Columbia, although fire intensity was not reported. Bock and Block (2005) also documented Common Poorwills were restricted to burned areas in southwestern Ponderosa Pine forests. If frequency and extent of high-intensity fire increases in the future, Common Poorwill will likely benefit, at least immediately after fire. Dense tree growth from lack of fire likely reduces habitat for this species.

Habitat Fragmentation or Loss: Common Poorwills tend to avoid urban landscapes, and have retreated from some historically rural areas that are now urban (Woods et al. 2005). Habitat loss and fragmentation from urban development likely adversely impacts Common Poorwills in lower-elevation Sierran foothills and grasslands, but this is not likely to pose a major threat to the species within SIEN parks.

Logging may benefit the Common Poorwill (Siegel and DeSante 1999). In Saskatchewan, birds have been found nesting in open areas resulting from small-scale logging, and there is evidence that poorwills decline in these areas following re-growth (Woods et al. 2005).

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Common Poorwill.

Human Use Impacts: Nesting and roosting habitat may potentially be improved by cattle grazing, which keeps grasses short (Woods et al. 2005). Packstock grazing within the parks may enhance habitat for this species, at least locally where grazing is permitted. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, impacts from packstock grazing are likely relatively small and localized.

A decrease in large flying insects due to adverse weather and pesticide use from the Central Valley and surrounding forestland could be a risk to Common Poorwills (Siegel and DeSante 1999). Birds foraging from roads are known to be killed by vehicles, and the fact that Common

Poorwill carcasses are frequently encountered along country roads suggests that collisions with vehicles are frequent where both roads and poorwills are common (Woods et al. 2005).

Management Options and Conservation Opportunities

Common Poorwill populations in the parks will benefit from strictly enforced speed limits to reduce vehicle collisions. Little is known about abundance and breeding habitats of this species in SIEN parks. Targeted monitoring of Common Poorwill populations and habitat could be instigated in the parks, potentially in conjunction with surveys for Common Nighthawks.

Common Raven – *Corvus corax*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Common Raven is a year-round resident and fairly common breeder at Devils Postpile (DEPO) National Monument as well as Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks (Table 1).

Table 44. Breeding status and relative abundance of Common Ravens in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Year-round	Regular Breeder	Fairly Common

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Common Raven is widely distributed across the western United States, most of Canada, portions of the eastern United States, and most of Mexico (Boarman and Heinrich 1999). The broad range of the species suggests that the Sierra Nevada is not of particularly high importance to its greater distribution (Siegel and DeSante 1999).

Distribution and Habitat Associations
In the Sierra Nevada, Common Ravens act as habitat generalists, but are particularly associated with roads (where they forage on roadkill) and human development such as campgrounds, picnic areas, etc. (Gaines 1992). Common Ravens were detected in low densities (Table 2) along a moderate number of survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were not observed during the DEPO survey. Park inventories show rather uniform association with a broad array of habitats, reflecting the species' generalist tendencies (Table 2).

Table 45. Number of Common Ravens recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	65	73	Ponderosa Pine Woodland	0.08	0.02 (0.00-0.12)
			Giant Sequoia Forest	0.07	0.05 (0.02-0.09)
			Red Fir/White Fir Forest	0.05	0.03 (0.01-0.07)
			White Pine/Sugar Pine Forest	0.04	0.03 (0.01-0.06)
			Canyon Live Oak Forest	0.04	0.01 (0.00-0.05)
Yosemite NP	46	56	Giant Sequoia	0.13	
			Douglas fir/Mixed Conifer	0.04	
			Canyon Live Oak	0.03	
Devils Postpile NM	0	0	Detected off-survey	NA[1]	

[1]NA - Information not available due to insufficient data.

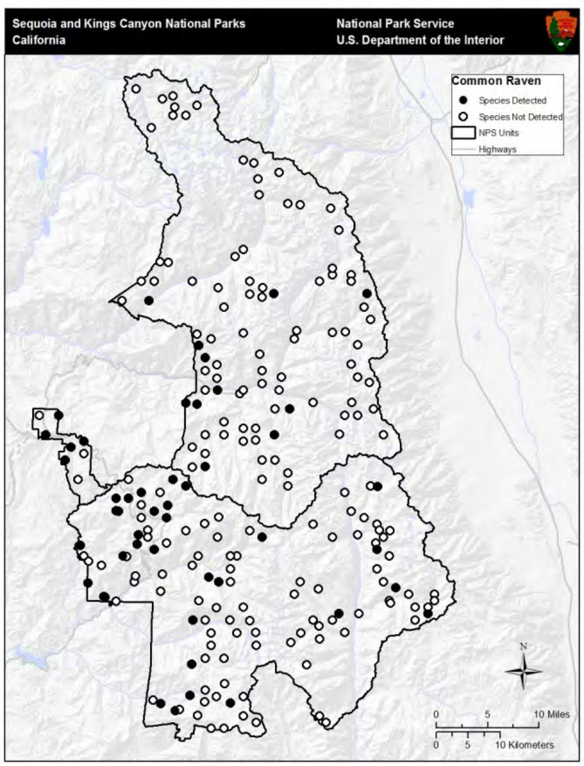

Figure 18. Bird survey transects where Common Raven was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

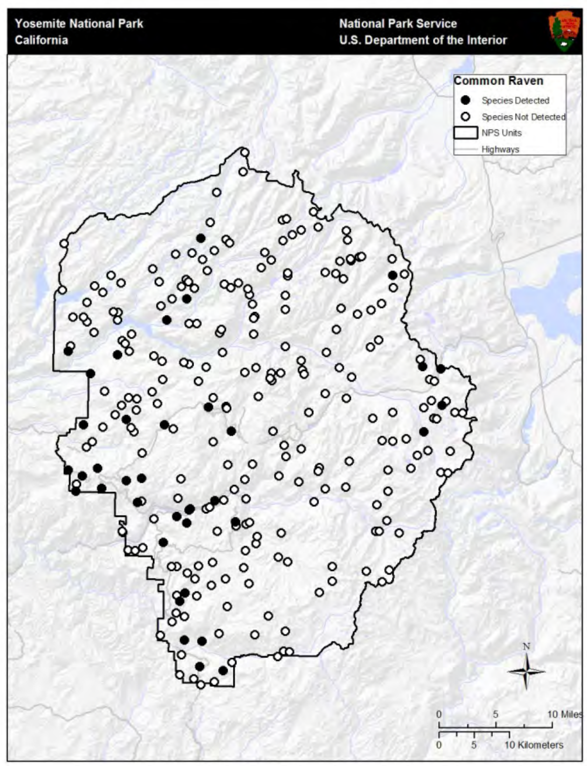

Figure 19. Bird survey transects where Common Raven was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Common Raven was observed from low- to high-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Common Raven in SEKI was 2182 m, with 95% of observations occurring between 678 and 3415 m. At YOSE, the mean elevation of observations was 1929 m with 95% of observations falling between 1211 m and 3022 m (Siegel et al. 2011).

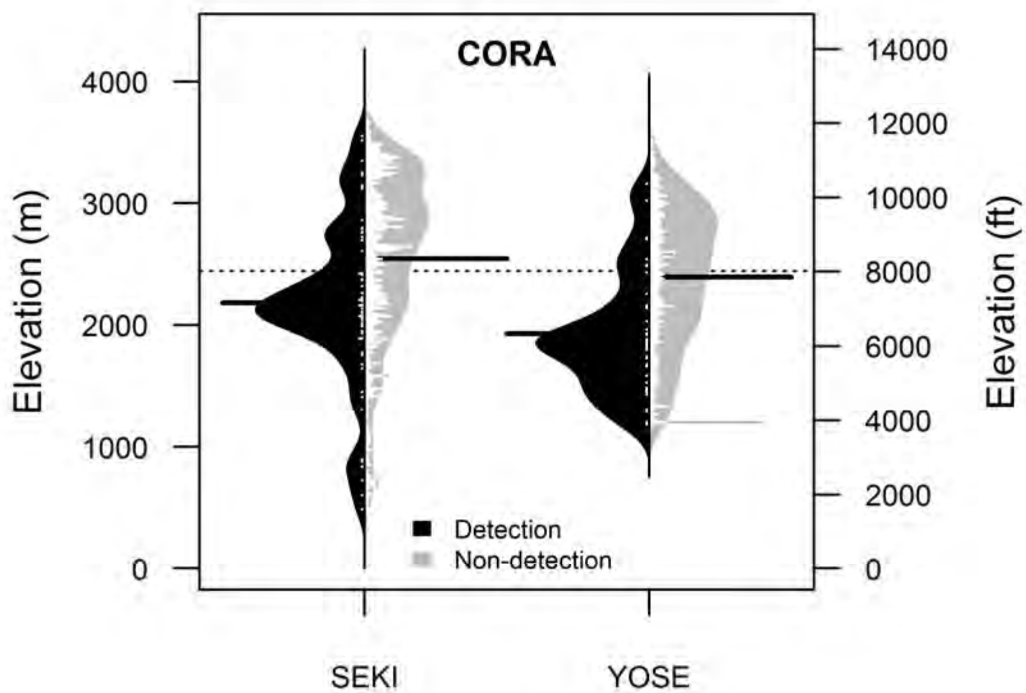

Figure 3. Elevational distributions of sites where Common Ravens (CORA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Common Ravens are detected much less often in the Sierra Region (BCR 15) than in California as a whole. They were detected in low to moderate numbers on all three individual BBS routes that intersect YOSE and SEKI. Significantly positive trends were observed in California as a whole and in the Sierra Region during 1966-2007 and 1980-2007 (Table 3).

Table 46. Relative abundance and trends for Common Raven according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	202	7.78	+5.1	0.00
	1980-2007			+4.4	0.00
Sierra Nevada (BCR 15)	1966-2007	31	2.24	+9.1	0.02
	1980-2007			+8.9	0.01
Route 14117 – Sequoia NP	1972-2005	1	2.56	-20.9	0.26
Route 14132 – Kings Canyon NP	1974-2005	1	0.75	+17.6	0.05
Route 14156 – Yosemite NP	1974-2007	1	2.00	+13.5	0.12

Common Ravens are infrequently captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Common Raven is common within the Sierra Nevada and SIEN parks and is increasing throughout California (Table 3). Furthermore, there are no apparent major threats to the species. Common Ravens are often considered a pest species and can be harassed and even killed intentionally by humans. Ravens are also sometimes killed while foraging along roadsides, but in general the species has benefited greatly with human development and expansion. Timber harvest outside of SIEN parks may contribute to local declines of the species and there is evidence of minor susceptibility to West Nile Virus. Finally, neither climate change, nor altered fire regimes appear to be major threats to Common Raven.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of Common Raven has significantly shifted 135.7 miles to the South and 110.8 miles away from the coast across its North American range over the past 40 years (Audubon 2009). While a shift inland toward areas with cooler winter temperatures could be interpreted as the species adapting to warmer temperatures, a large and significant southward shift is contrary to what is expected of species responding to climate change.

Given the species broad distribution across many climate zones and its use of many different habitat types, Common Raven is unlikely to be impacted by climate change as greatly as other bird species. However, if climate change causes the species' range to shift upward as is generally expected of many species, there is much higher habitat available for new colonization within Sequoia and Kings Canyon as well as Yosemite.

Altered Fire Regimes: Little research has been conducted on the direct impacts of fire on the Common Raven. However, given the species' generalist tendencies, any change in fire regime in the Sierra Nevada and subsequent alteration of habitat is unlikely to have a great effect on the Common Raven.

Habitat Fragmentation or Loss: Timber harvest activities have likely resulted in Common Raven declines in some areas (Boarman and Heinrich 1999). Because timber harvest is not permitted within SIEN parks, this is not of great concern for park populations.

Invasive Species and Disease: Two dead Common Ravens tested positive to West Nile Virus in California during 2009 (CDPH 2010). These two cases suggest that ravens are at least minimally susceptible to the disease. However, as compared with other species of the *Corvidae* family, Common Raven shows neither a great susceptibility to West Nile Virus, nor any subsequent population declines following the disease's spread to California (Koenig et al. 2007).

Human Use Impacts: Common Ravens were historically shot in many areas (Boarman and Heinrich 1999). While killings may continue to some degree, this is not a threat within SIEN parks. Likewise, anecdotal accounts suggest that collisions with human structures and electrocution by power lines causes some mortalities (Boarman and Heinrich 1999), but are not likely to have population level effects. Finally, human activities at nest and roosting sites alter raven behavior and can potentially lead to nest abandonment and reproductive failure in extreme cases (Boarman and Heinrich 1999).

In general human use and development of native habitat in the west has benefitted Common Raven by providing supplemental sources of food (e.g., garbage), water (e.g., irrigation) and shelter (e.g., bridges) (Boarman and Heinrich 1999, Siegel and DeSante 1999). Common Ravens are particularly drawn to roadsides in the Sierra Nevada where increasing vehicle traffic provides carrion in the form of road kill (Siegel and DeSante 1999).

Management Options and Conservation Opportunities

In most areas Common Ravens are common and not in need of protection. In fact, the species is often considered a pest and management actions are directed at reducing their negative impacts on sensitive species and human interests (Boarman and Heinrich 1999). Common Ravens are not threatened within SIEN parks. If they are deemed a pest, ensuring garbage storage is secure and reducing or removing roadkill will reduce artificial food sources and inflated raven populations. More drastic raven removal programs have been conducted in other areas, but their use within the SIEN is likely unwarranted.

Common Yellowthroat – *Geothlypis trichas*

Migratory Status
Short-distance/Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Common Yellowthroat is a rare migrant or summer resident and possible breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and Devils Postpile (DEPO) National Monument (Table 1).

Table 47. Breeding status and relative abundance of Common Yellowthroats in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Summer	Possible Breeder	Rare
Yosemite NP	Migrant	Possible Breeder	Rare
Devils Postpile NM	Migrant/Summer	Possible Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Common Yellowthroat is one of North America's most widespread warblers, breeding throughout the continental United States (including part of Alaska) and in parts of all Canadian provinces (Guzy and Ritchison 1999). Breeding areas in the Sierra Nevada region are largely restricted to the lowest elevation portions of the range. SIEN populations are of little importance to the overall range of the species, and although the species is occasionally detected in the parks during the breeding season, we know of no confirmed breeding records. The *arizela* subspecies occurs on the west slope and *occidentalis* on the east slope (Siegel and DeSante 1999).

Distribution and Habitat Associations
Common Yellowthroats occupy thick vegetation in a wide range of habitats from wetlands to prairie to pine forest (Guzy and Ritchison 1999). In the Sierra the species is restricted to moist habitats with low, dense cover, especially cattails, bulrushes, sedges, and willow thickets in or bordering marshes, ponds, and wet meadows (Siegel and DeSante 1999). Only one Common Yellowthroat was detected (Table 21. Breeding status and relative abundance of Cedar Waxwings in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency1	Breeding Status1	Abundance1
Sequoia and Kings Canyon NPs	Migrant/Winter	Non-Breeder	Uncommon
Yosemite NP	Migrant/Winter	Non-Breeder	Uncommon
Devils Postpile NM	Migrant/Winter	Non-Breeder	Rare

) during avian inventory projects in the SIEN parks (Figure 1). The detection occurred in a lower-elevation meadow at YOSE. The limited number of observations may reflect the species true rarity in park habitats.

Table 48. Number of Common Yellowthroats recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	1	1	Lower Elevation Meadow	0.03	NA
Yosemite NP	0	0	Not detected	NA	
Devils Postpile NM	1	1	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

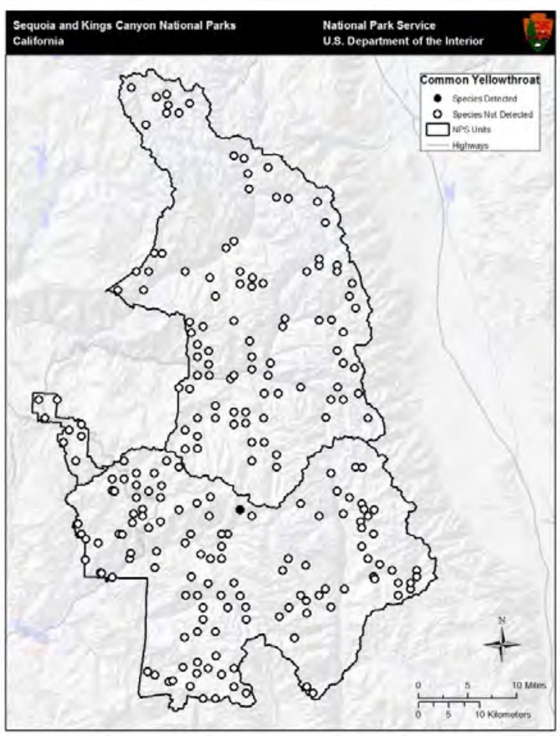

Figure 20. Bird survey transects where Common Yellowthroat was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

One Common Yellowthroat was observed at 2482 m in SEKI (Figure 2).

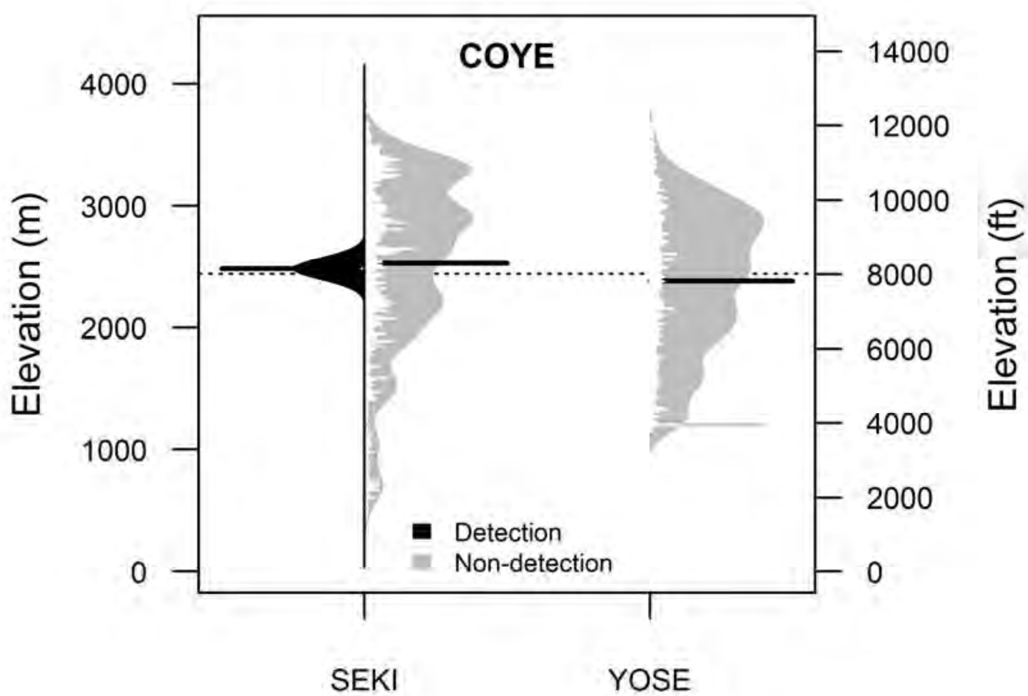

Figure 2. Elevational distributions of sites where Common Yellowthroat (COYE) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Common Yellowthroats are extremely rare in the Sierra Region (BCR 15), with detections on only one route in Sequoia NP (**Error! Reference source not found.**). A significant positive population trend was observed in California from 1966-2007.

Table 49. Relative abundance and trends for Common Yellowthroat according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	60	0.78	+5.8	0.00
	1980-2007			+2.7	0.33
Sierra Nevada (BCR 15)	1966-2007	NA[1]	NA	NA	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Common Yellowthroat were not captured in mist nets in SIEN MAPS stations, thus no data are available on population trends, productivity, or survival using mark-recapture data.

Stressors

Common Yellowthroat populations in California have declined over the past 40 years due to livestock grazing, flood-control measures, and agricultural, industrial, and urban development (Guzy and Ritchison 1999, Siegel and DeSante 1999). Brown-Headed Cowbird parasitism also poses a major risk to this species (Siegel and DeSante 1999). Logging practices can enhance habitat for these birds when such practices result in dense, thick vegetation, but migrating yellowthroats in the Sierra Nevada appear to favor marshes, meadows, and dense riparian habitats where timber harvest typically has little direct impact. Similarly, fire that creates thick stands of shrubs likely benefits the species. Dependence on wet situations renders the species vulnerable to a warming, drying climate, which could exacerbate population declines. Common Yellowthroat is a rare non-breeding migrant in SIEN parks, thus management in the parks is not likely to significantly affect populations.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Common Yellowthroat has significantly shifted almost 110 miles north and 46 miles inland throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving towards cooler, wetter climates. The assertion that Common Yellowthroat is already showing responses to climate change is corroborated by recent findings that the species has adjusted its migration timing, arriving significantly earlier on its spring breeding grounds in response to large-scale climate oscillations, which may increase with global climate change (MacMynowski and Root 2007). Furthermore, a study assessing migration timing between 1975 and 2000 (a period of recent climate change), showed that Common Yellowthroat has significantly shifted toward earlier spring arrival and earlier autumn departure (Mills 2005). These observations provide evidence that this species is responding to climate change through range shifts and migration timing, and will continue to do so within the Sierra in the coming decades.

Modeled distribution shifts of Common Yellowthroat predict a dramatic range contraction throughout much of California; most of the lower-elevation Sierra Nevada and coastal range populations would disappear and the species would remain only in a portion of the low-elevations of the Central Valley and southern deserts (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation, annual precipitation, and mean temperature of the warmest quarter (Maxent and GAM distribution models).

The Common Yellowthroat is potentially vulnerable to climate change. Its association with wet habitats indicates that an overall drying trend could pose a significant risk.

Altered Fire Regimes: Little data are available on fire effects on Common Yellowthroat. Hobson and Schieck (1999) did not detect the species in burned stands in boreal forests of Alberta, Canada, but a Common Yellowthroat was observed singing in a patch of riparian shrubs in a burned area in the southern Sierra Nevada (Siegel and Wilkerson 2005). Fire that results in dense vegetation, particularly when associated with wet areas such as riparian, meadow, or marsh, is likely to benefit this species.

Habitat Fragmentation or Loss: Loss of wet areas from draining, flood-control measures, and agricultural and urban development in both wintering and breeding areas has a negative impact on Common Yellowthroat populations (Gutz and Ritchison 1999), but these activities do not pose a major threat to the species within SIEN parks where riparian, meadow, and marsh habitats are protected from conversion. Common Yellowthroat may benefit from forest management activities that create areas of thick growth, although this benefit is relatively short-lived once overstory vegetation matures (Guzy and Ritchison 1999). In Alberta, Canada, Common Yellowthroats were found only in recent nearly clearcut stands (Hobson and Schieck 1999) and were among the most common species in clearcut plots in Nova Scotia (Freedman et al. 1981). Commercial logging does not impact Common Yellowthroat in SIEN parks, however.

Invasive Species and Disease: Nest predation or parasitism by Brown-headed Cowbirds is a threat to Common Yellowthroats (Siegel and DeSante 1999). Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report). Note however that Common Yellowthroat is at most a very rare breeder in SIEN parks.

There do not appear to be any major threats of disease to the Common Yellowthroat.

Human Use Impacts: Packstock grazing within the SIEN parks is a potential risk to Common Yellowthroat because it can attract cowbirds or degrade meadow habitat, but only a remote risk since the species is so rare and seldom if ever breeds in the parks.

Management Options and Conservation Opportunities

Common Yellowthroats are uncommon in SIEN parks and are not known to breed in the montane Sierra Nevada, thus management for this species in the parks is probably not a high priority.

Cooper's Hawk – *Accipiter cooperii*

Migratory Status
Long-distance migrant (NatureServe 2009)

Residency and Breeding Status
Cooper's Hawk is uncommon at Devils Postpile (DEPO) National Monument as well as Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks. The species breeds at YOSE and SEKI, and possibly at DEPO as well (Table 1).

Table 1. Breeding status and relative abundance of Cooper's Hawks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Uncommon
Yosemite NP	Year-round	Regular Breeder	Uncommon
Devils Postpile NM	Year-round	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 - Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Cooper's Hawk is distributed over much of North America, including the entire continental U.S. (Curtis et al. 2006). SIEN parks do not comprise a significant portion of the species' range.

Distribution and Habitat Associations
Cooper's Hawks can be found in a wide variety of wooded and occasionally scrub habitats (Gaines 1992). Cooper's Hawks were detected 3 times at SEKI (Figure 1) and not at all at YOSE or DEPO during avian inventory surveys (Table 2). However, individuals were observed away from survey transects at YOSE and DEPO during the survey field seasons. Habitat associations based on inventory data are not available.

Table 50. Number of Cooper's Hawks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	3	3	NA[1]	NA[1]	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Detected off-survey	NA	

[1]NA - Information not available due to insufficient data.

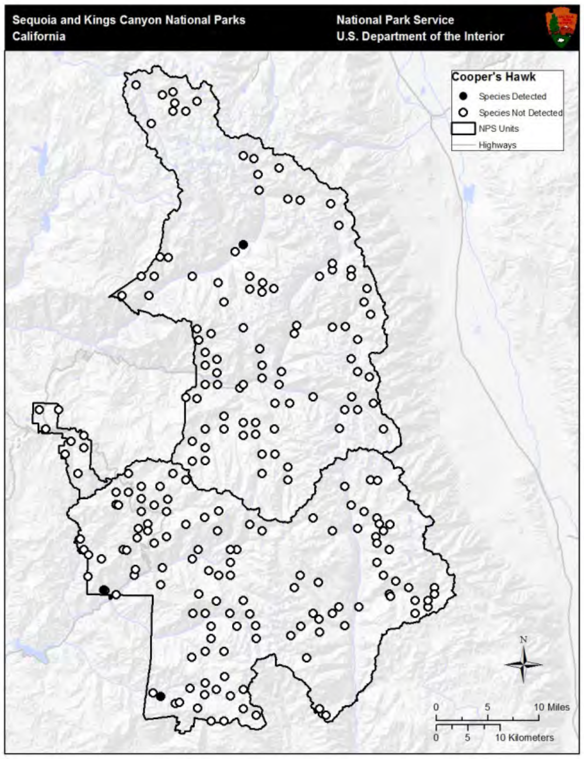

Figure 21. Bird survey transects where Cooper's Hawk was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

Cooper's Hawk was observed within the lower elevations of SEKI, but not at all in YOSE during recent avian inventory projects (Figure 2). At SEKI the species was detected only three times, the mean elevation of observations was 1297 m, with all three observations occurring between 651 and 1833 m (Siegel et al. 2011).

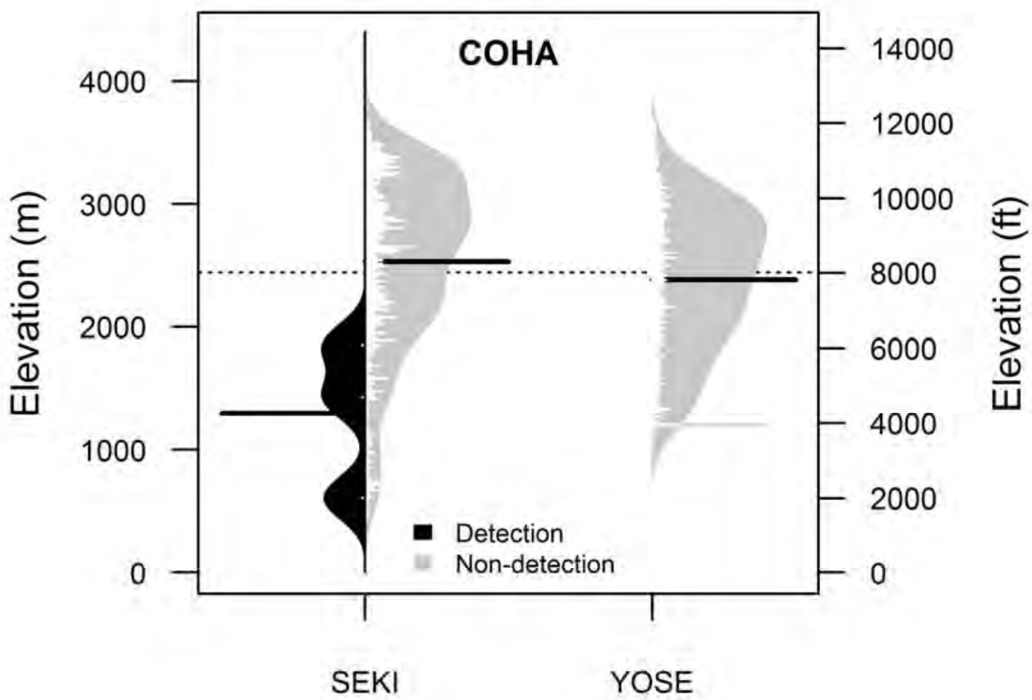

Figure 2. Elevational distributions of sites where Cooper's Hawk (COHA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Cooper's Hawks are found infrequently, but in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at YOSE and SEKI. A significant negative trend was observed across California during 1980-2007 (Table 3), but the low overall sample size makes the result unreliable.

Table 51. Relative abundance and trends for Cooper's Hawk according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007[1]	54	0.07	+0.9	0.82
	1980-2007[1]			-5.2	0.02
Sierra Nevada (BCR 15)	1966-2007[1]	6	0.04	+9.5	0.28
	1980-2007[1]			+2.2	0.61
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.10	-11.0	0.46
Route 14156 – Yosemite NP	1974-2007	1	0.04	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Cooper's Hawks are infrequently captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The most significant current threats to Cooper's Hawk are pesticide use and local habitat loss (NatureServe 2009). Although regulation of DDT use in the U.S. has helped populations rebound, continued heavy pesticide use in Central America still threatens the species. Habitat loss can be problematic elsewhere in Cooper's Hawk's range, but is not a major concern within the protected forests of the SIEN parks. Minor threats to the species within SIEN parks may include individual mortalities due to collisions with automobiles and human structures as well as natural occurrences of fatal diseases such as West Nile Virus. Possible effects of climate change and altered fire regime on the species are not well studied, but do not appear to be of significant concern.

Climate Change: The effects of climate change on Cooper's Hawk is not well understood. However, due to the species' wide use of habitats across many climate zones in the U.S. it is not likely to be severely threatened by shifts in temperature and rainfall. Any effects of climate change on Cooper's Hawk are likely to be indirect and in response to any local changes in prey species abundance. If climate change does result in a general shift of bird species upslope, the SIEN parks may begin to see greater numbers of Cooper's Hawk as it expands higher into the Sierra Nevada.

Altered Fire Regimes: Cooper's Hawk is likely affected by fire where nesting sites are destroyed. However, such impacts are local and problematic only in the short-term. Changes in fire regimes in the SIEN parks are not likely to have a major impact on Cooper's Hawk populations.

Habitat Fragmentation or Loss: Timber harvest at and around nesting sites can be detrimental to Cooper's Hawk populations. Likewise, heavy grazing has been shown to decrease reproductive success as compared to lightly grazed habitats (Curtis et al. 2006). The species' preference for a wide variety of habitats for nesting and the lack of timber harvest and heavy grazing within SIEN suggest that habitat degradation is not a major threat within the parks.

Invasive Species and Disease: Cooper's Hawks are known to carry diseases of concern such as West Nile Virus. A recent study tested 30 individuals in California for the disease and found 13% carried antibodies, but showed no visible signs to the illness (Hull et al. 2006). Furthermore, five dead birds tested positive for West Nile Virus across California in 2009 (CDPH 2010). Other known illnesses include a digestive tract disease (*Trichomonas gallinae*) (Rosenfield et al. 2009) and herpesviral disease (Pinkerton et al. 2008). Such diseases can prove fatal to individuals, but do not appear to be major threats at the population level.

Human Use Impacts: In the early twentieth century Cooper's Hawks were not protected by law and shooting and trapping were prevalent. Although occasional shooting of individuals at nest sites still continues it is considered unimportant to the species as a whole (Curtis et al. 2006). Illegal shooting of Cooper's Hawks within SIEN parks likely does not occur and is not a threat to local populations.

Like many other raptors, Cooper's Hawk suffered from DDT contamination in the mid-twentieth century, which led to egg thinning and declines in reproductive success. Following regulation of DDT in the 1970s contamination by the pesticide has ceased to be a concern for Cooper's Hawk in the U.S. (Curtis et al. 2006), but the species is still threatened by heavy pesticide use in its Central American wintering grounds (NatureServe 2009).

Collisions with human-made objects can cause mortality or injury to individual Cooper's Hawks (Curtis et al. 2006). This could be a local threat where heavy traffic and buildings exist within SIEN parks, but is minimal compared to urban areas where hawks also occur.

Management Options and Conservation Opportunities

In response to heavy persecution (shooting and trapping) of the species and declines in reproductive success due to contamination, Cooper's Hawks were widely protected and DDT was banned in the mid-twentieth century. Such regulations allowed the species to recover across the U.S. (Curtis et al. 2006). Aside from continued protection, Cooper's Hawk are not actively managed.

Broadcast recordings of Cooper's Hawk and Great Horned Owl calls have been shown to be an effective means of surveying Cooper's Hawk breeding pairs (Curtis et al. 2006). Similar techniques could be used to better determine abundance and breeding sites of hawks within the SIEN parks.

Dark-eyed Junco – *Junco hyemalis*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Dark-eyed Junco is a common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and a common summer resident and regular breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 52. Breeding status and relative abundance of Dark-eyed Juncos in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Dark-eyed Junco occurs across North America from northern Alaska south to northern Mexico (Nolan et al. 2002). The species breeds throughout most of Canada, the northeastern U.S., the Pacific Northwest, the Great Basin, and into the mountains of California. The Dark-eyed Junco is extremely abundant in the Sierra Nevada which constitutes an important portion of its breeding range in California (Siegel and DeSante 1999).

Distribution and Habitat Associations
Dark-eyed Juncos are common in virtually all forested habitats in the Sierra Nevada, especially at openings in forests, and at meadow and streamside edges (Siegel and DeSante 1999). They also breed in dense old-growth and mature forests as long as herbaceous growth is available, and seem to favor moist conditions (Siegel and DeSante 1999). Dark-eyed Juncos were detected at very high numbers (Table 2) along nearly every survey transect (Figures 1 and 2) during avianinventories in SIEN parks. Park inventories indicate juncos are abundant in many habitat types, from hardwood and conifer forests to meadows to open, sparse vegetation (Table 2); they are absent only from low-elevation habitats dominated by foothill vegetation.

Table 53. Number of Dark-eyed Juncos recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	802	1155	Aspen Forest	1.04	1.38 (0.89-2.14)
			Western White Pine Woodland	0.95	1.87 (1.16-3.01)
			Mid Elevation Rock/Sparse Veg.	0.94	1.42 (0.92-2.21)
			Undifferentiated Post-fire	0.85	1.61 (0.52-4.99)
			Lower Elevation Meadow	0.85	1.47 (1.04-2.09)
Yosemite NP	1280	2084	Montane Meadow	1.30	
			White Alder	1.27	
			Whitebark Pine/Lodgepole Pine	0.88	
			Lodgepole Pine	0.86	
			Quaking Aspen	0.85	
Devils Postpile NM	14	20	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

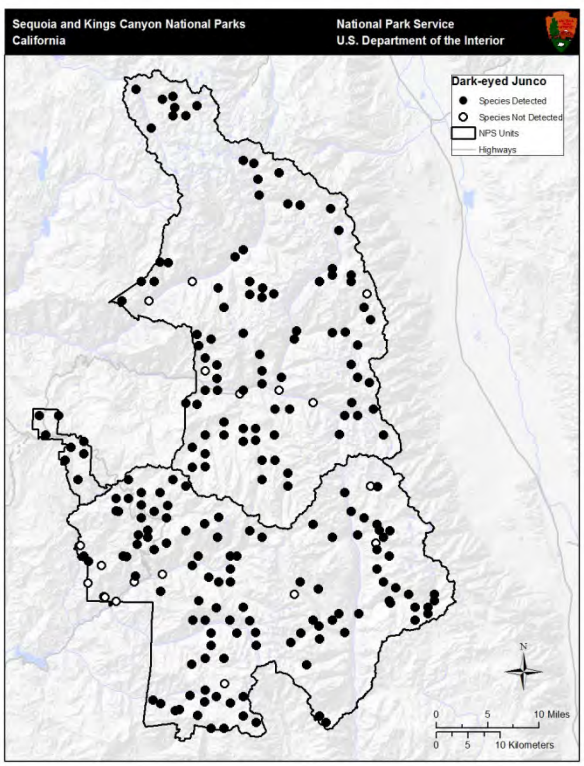

Figure 22. Bird survey transects where Dark-eyed Junco was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

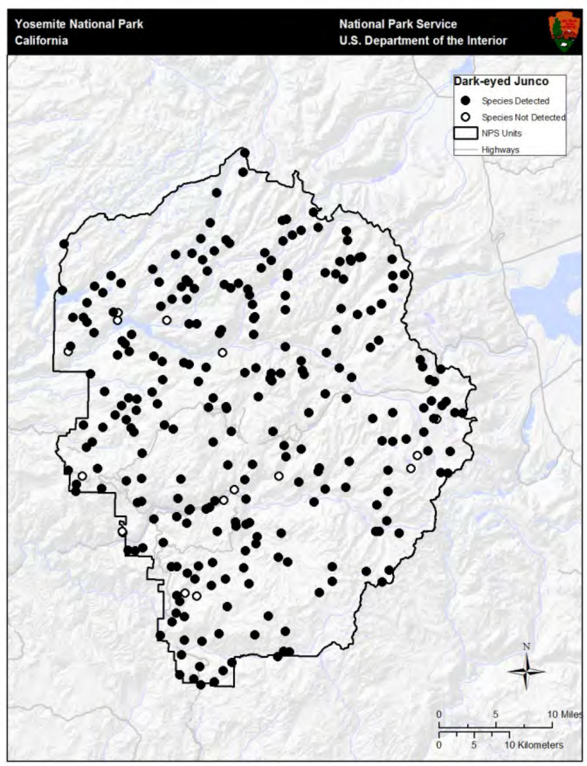

Figure 23. Bird survey transects where Dark-eyed Junco was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Dark-eyed Junco was detected at mid- to high-elevations in SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations for Dark-eyed Junco at SEKI was 2620 m, with 95% of observations occurring between 1433 and 3427 m. In YOSE, the mean elevation of observations was 2457 m with 95% of observations falling between 1337 and 3230 m (Siegel et al. 2011).

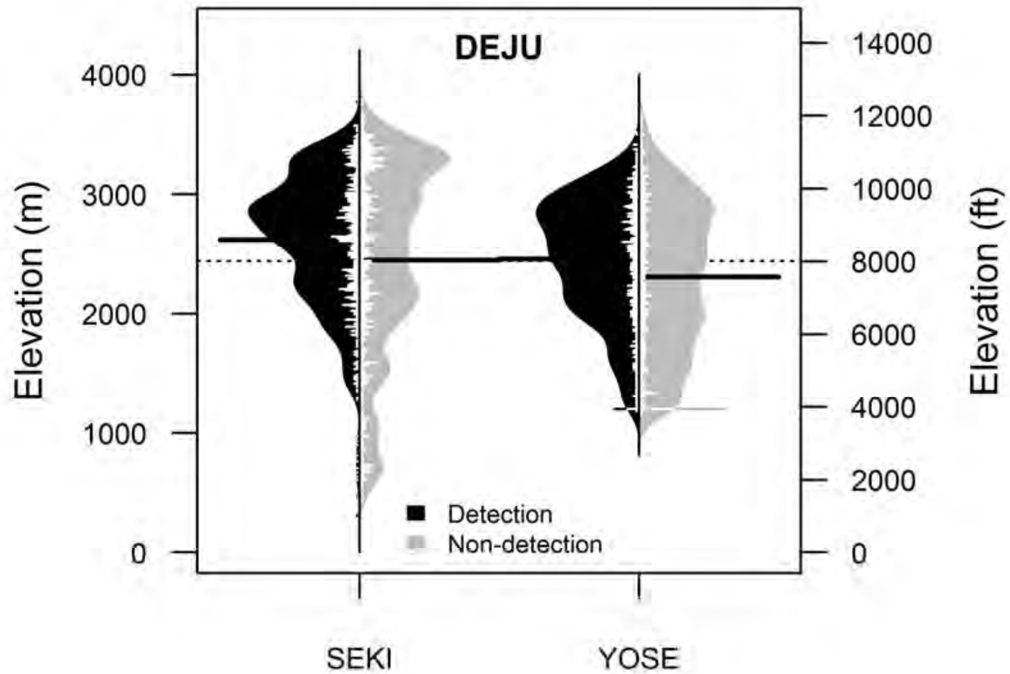

Figure 2. Elevational distributions of sites where Dark-eyed Junco (DEJU) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Dark-eyed Juncos were twice as abundant in the Sierra Nevada Region (BCR 15) than California as a whole (Table 3). The survey data reveal small but significant population declines throughout California from 1966-2007 and along the BBS route in Yosemite National Park from 1974-2007 (Table 3).

Table 54. Relative abundance and trends for Dark-eyed Junco according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	138	12.60	-1.3	0.02
	1980-2007			-1.0	0.08
Sierra Nevada (BCR 15)	1966-2007	35	24.77	-1.4	0.14
	1980-2007			-0.9	0.20
Route 14117 – Sequoia NP	1972-2005	1	8.31	+9.5	0.50
Route 14132 – Kings Canyon NP	1974-2005	1	4.15	-0.6	0.94
Route 14156 – Yosemite NP	1974-2007	1	34.31	-2.9	0.04

MAPS results from SIEN parks reveal no significant population or reproductive trends for Dark-eyed Juncos (Table 4).

Table 55. Population trends, productivity, trends, and survival estimates of Dark-eyed Junco at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	12.1	-2.74	0.53	-1.53	0.517 (0.048)
Yosemite NP	1993-2009	26.8	-0.85	1.21	+3.13	0.482 (0.115)
Devils Postpile NM	2002-2006	12.0	NA[2]	0.41	NA	0.711 (0.231)

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

The Dark-eyed Junco is one of the most familiar bird species in North America because of its ubiquity, abundance, tameness, and conspicuous ground-foraging winter flocks, which are often found in suburbs (especially at feeders), at edges of parks and gardens, around farms, and along rural roadsides and stream edges (Nolan et al. 2002). Despite its abundance, Breeding Bird Survey trends indicate long-term population declines of Dark-eyed Juncos in California and in Yosemite NP (Table 3). These declines are puzzling given the adaptability of this species to so many habitat types and to human activities. One possible reason for the declines may be the selective harvest of large trees in the Sierra Nevada; Dark-eyed Junco are more abundant in all habitat types and successional stages when large trees are present (Shieck and Song 2006). Because Dark-eyed Juncos appear to prefer moist habitats, a general drying-out of the Sierra climate could be a potential risk (Siegel and DeSante 1999). Cowbird parasitism is probably a minor risk.

Climate Change: Modeled distribution shifts of Dark-eyed Junco range in California predict contraction in the California coast range and Sierra foothills but greater probability of occurrence at higher elevations in the Sierra including the SIEN parks (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation, precipitation seasonality (Maxent distribution models) and annual mean temperature (GAM distribution models). The Dark-eyed Junco was observed from mid- to high-elevations of the SIEN parks (Figure 3). If climate change causes the species' range to shift upslope as is generally expected, there remains much higher-altitude meadow, hardwood, and coniferous forest habitat within SEKI and YOSE. Because the Dark-eyed Junco prefers moister habitat conditions, drying trends are likely to adversely impact these birds. Continued monitoring of the species' response to climate change is warranted.

Altered Fire Regimes: Dark-eyed Junco was a strong and significant indicator of recently burned forest in Oregon, potentially due to its affinity for bare ground (Fontaine et al. 2009). Junco densities were greater in salvaged than unsalvaged burned forests in Oregon, with a strong positive correlation with shrub volume (Cahall and Hayes 2009). After accounting for fire intensity, Dark-eyed Juncos in New Mexico increased significantly in response to moderate-intensity fire only (Smucker et al. 2005) while in Montana Dark-eyed Juncos decreased significantly with increasing burn intensity (Kotliar et al. 2007). The species was abundant in both burned and unburned forests in the eastern and southern Sierra (Rafael et al 1987, Burnett et al. 2010) but preferred unburned forests in northern Sierra (Siegel and Wilkerson 2005). Research results do not elucidate a clear pattern regarding fire effects on Dark-eyed Junco in SIEN parks, but some evidence exists that moderate-intensity fire may benefit the species, as long as shrubs and herbaceous ground cover are available.

Habitat Fragmentation or Loss: A review of effects of logging and fire in a variety of boreal forest habitats found Dark-eyed Junco present in most types, including early and late-successional stages both post-fire and post-harvest, but the species was always more abundant in all stage classes when large trees were present (Shiek and Song 2006). Thus, overall loss of the large-tree element in the Sierra Nevada may have contributed to population declines of the junco. Commercial logging is not a threat to the species in SIEN parks, however, and the parks may represent important refugia for this species.

Invasive Species and Disease: Dark-eyed Junco is susceptible to brood parasitism from invasive Brown-headed Cowbirds. Cowbirds are nest parasites that have been implicated in declines of many native bird species. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: The Dark-eyed Junco is tolerant of human habitation, and can be very common around campgrounds (Siegel and DeSante 1999). Some migrating juncos are killed by nocturnal collisions with television towers (Nolon et al. 2002). Habitat degradation due to packstock grazing within the parks is a potential concern for this species, at least locally where grazing is permitted because it can attract Brown-headed Cowbirds (see *Invasive Species and Disease* above).

Management Options and Conservation Opportunities

One approach park managers can take to maintain Dark-eyed Junco populations in SIEN parks is to preserve large trees in moist forest types. Dark-eyed Junco will benefit from carefully managing or eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE should be updated.

MAPS station operation and other means of monitoring Dark-eyed Junco populations in the parks should continue.

Downy Woodpecker – *Picoides pubescens*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Downy Woodpecker is an uncommon year-round resident at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and Devils Postpile (DEPO) National Monument (Table 1). The species is a regular breeder at SEKI and YOSE and a possible breeder at DEPO.

Table 56. Breeding status and relative abundance of Downy Woodpeckers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Uncommon
Yosemite NP	Year-round	Regular Breeder	Uncommon
Devils Postpile NM	Year-round	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Downy Woodpecker ranges throughout all of North America, although absent from southeastern and eastern desert areas (Jackson et al. 2002). The subspecies *P p. turati* is replaced by *gairdneri* in northwestern California, so the Sierra Nevada is important for this subspecies. However, because Downy Woodpecker in the Sierra is uncommon and limited to lower elevations, the importance of the SIEN parks to the species is small (Siegel and DeSante 1999).

Distribution and Habitat Associations
The Downy Woodpecker prefers riparian forests and woodlands, and occasionally uses upland oak woodland, mixed oak-conifer forest, or conifer forest (Siegel and DeSante 1999). The bird is generally associated with younger, more open forests (Jackson et al. 2002). Downy Woodpeckers were detected at relatively low abundance (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects at SEKI, YOSE, and DEPO. Due to the low number of birds detected, absolute density estimates were not available. Park inventories show a diverse range of habitat types where Downy Woodpeckers were detected, including Giant Sequoia, Lodgepole Pine, and Red Fir/White Fir forests in SEKI and Black Oak, Quaking Aspen, and Montane Meadow in YOSE (Table 2).

Table 57. Number of Downy Woodpeckers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	5	6	Giant Sequoia Forest	0.02	NA
			Lodgepole Pine	0.01	NA
			Red Fir/White Fir Forest	0.01	NA
Yosemite NP	12	13	Black Oak	0.07	
			Quaking Aspen	0.05	
			Montane Meadow	0.02	
Devils Postpile NM	1	1	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

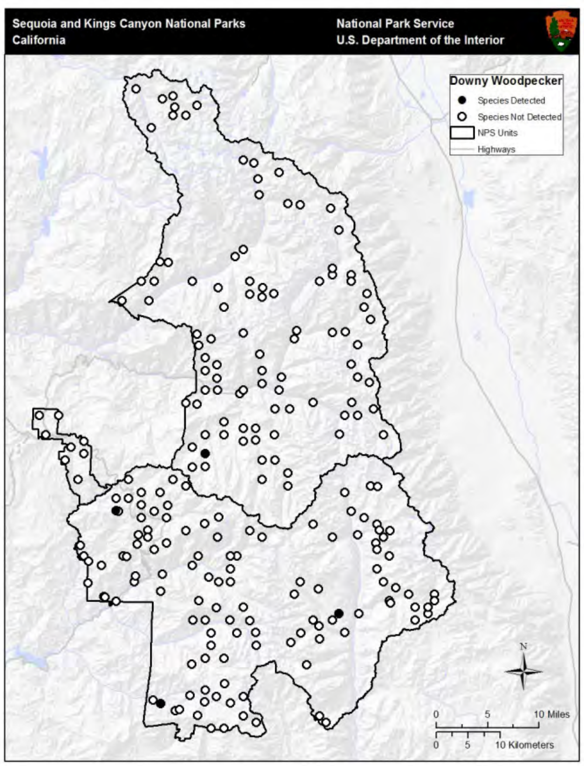

Figure 24. Bird survey transects where Downy Woodpecker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

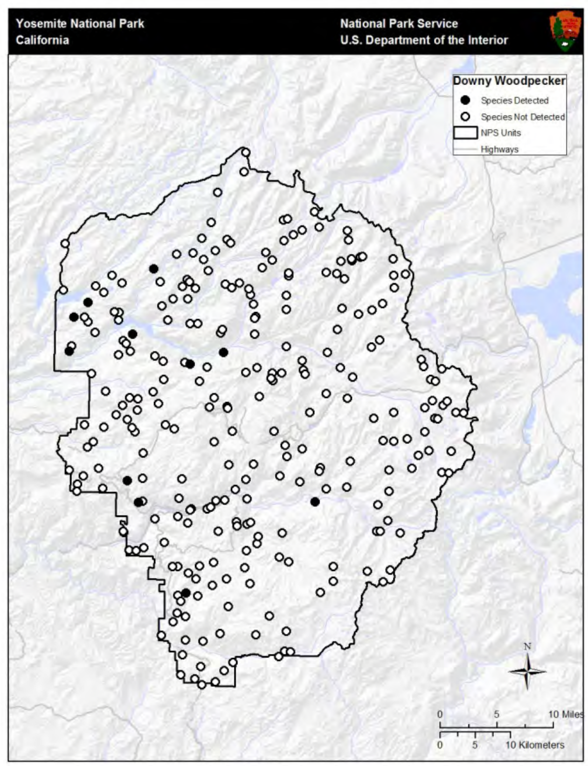

Figure 25. Bird survey transects where Downy Woodpecker was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Downy Woodpecker was detected at low- and mid-elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Downy Woodpecker in SEKI was 2168 m, with 95% of observations occurring between 1467 and 2759 m. In YOSE, the mean elevation of observations was 1881 m with 95% of observations falling between 1369 and 2431 m (Siegel et al. 2011).

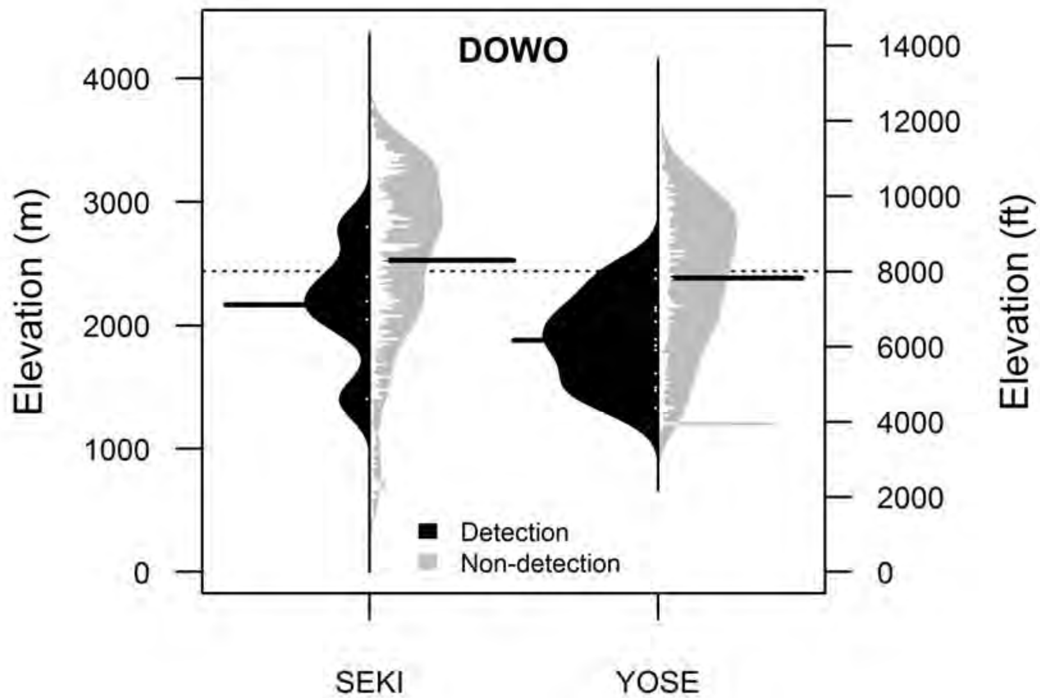

Figure 3. Elevational distributions of sites where Downy Woodpecker (DOWO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data show Downy Woodpeckers are equally abundant in the Sierra Region (BCR 15) as in California as a whole (Table 3). They were detected in moderate numbers along individual BBS routes at YOSE and SEKI, most often along the Kings Canyon routes. A strongly significant (but based on a very low detection rate) negative annual population trend of -60% was observed for the route in Kings Canyon NP (Table 3); too few birds were detected to estimate trends for the routes in Sequoia and Yosemite NPs.

Table 58. Relative abundance and trends for Downy Woodpecker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	97	0.31	-0.8	0.61
	1980-2007			+0.1	0.98
Sierra Nevada (BCR 15)	1966-2007[1]	16	0.27	+1.1	0.86
	1980-2007[1]			-0.2	0.98
Route 14117 – Sequoia NP	1972-2005	1	0.13	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.30	-59.5	0.00
Route 14156 – Yosemite NP	1974-2007	1	0.19	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

MAPS data from Yosemite NP (Table 4) indicate a highly significant population decline and a moderately significant decreasing reproductive trend between 1991 and 2008. These results agree with the highly significant decreasing population trends observed using BBS survey data from Kings Canyon NP (Table 3).

Table 59. Population trends, productivity, trends, and survival estimates of Downy Woodpecker at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.8	NA[2]	0.19	NA	NA
Yosemite NP	1993-2009	0.5	-13.59***	0.44	-31.25*	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Population and reproductive data for Downy Woodpeckers at Kings Canyon (BBS) and Yosemite (MAPS) National Parks indicate troubling downward trends in these parks.

Stressors

Downy Woodpecker is one of the most common woodpecker species in North America (Jackson et al. 2002), although the limited data available suggest the species may be declining fairly precipitously in Kings Canyon (Table 3) and Yosemite (Table 4) national parks. The species has a broad tolerance of habitats (Warren et al. 2005) but prefers riparian woodlands, particularly more open, younger forests. It is possible that maturation of forests in SIEN parks may be the cause of recent declines.

Loss or degradation of habitat due to human activities, invasive species, and disease do not appear to be major concerns for Downy Woodpeckers within the SIEN parks. Fire treatments that mimic natural fire regimes may benefit this species by creating younger, more open forest habitat.

Climate Change: The species' extensive range and relatively general use of habitats implies a wide climatic tolerance. Nonetheless, an analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Downy Woodpecker has shifted significantly northward by nearly 30 miles and over 13 miles inland throughout its North American range, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). In SIEN parks, the Downy Woodpecker is found in a variety of forest habitats (Table 2), but is most likely found in riparian forests and open conifer forests with a deciduous component. Any changes in watershed hydrology due to climate change that result in alteration or loss of riparian vegetation, particularly arborescent vegetation, could adversely impact the species. Otherwise, the Downy Woodpecker is likely to be relatively resilient to a warming climate given its general use of habitats.

Altered Fire Regimes: Downy Woodpeckers are found in open, younger forests and are likely to benefit from more frequent fire. They were detected more frequently in recently burned forest than in mature forest (Fontaine et al. 2009) and are able to nest successfully in burned forest (Saab et al. 2007). Declines in Downy Woodpeckers have been attributed to maturation of forests (Jackson et al. 2002); suppression of fire in SIEN parks may adversely affect this species. Future increases in fire frequency and expansion of post-fire habitats with numerous snags in the parks is likely to benefit Downy Woodpeckers by providing additional foraging and nesting sites.

Habitat Fragmentation or Loss: Downy woodpeckers are opportunistic feeders and have broad tolerance of habitats. Some clearing and thinning of forests may be positive for the Downy Woodpecker, since this is a species that does well in early successional habitats, open stands, and along habitat edges (Robinson and Robinson 1999, Jackson et al. 2002). However, extensive clearing of forests and intensive, even-aged, forest monoculture have a negative impact on populations, because the earliest successional stages do not provide nesting habitat (Jackson et al. 2002). Logging does not pose a threat to Downy Woodpeckers in the SIEN parks. Downy Woodpeckers are relatively tolerant of habitat alteration, but can be adversely impacted by loss of riparian habitat due to urbanization (Jackson et al. 2002). Riparian habitats are well-protected in SIEN parks.

Invasive Species and Disease: West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). The virus has caused mortality in many native birds. In 2009, West Nile Virus caused at least one Downy Woodpecker death in California (CDPU 2010).

Human Use Impacts: Pesticide use on forest insect outbreaks outside SIEN parks could be a risk to Downy Woodpeckers.

Management Options and Conservation Opportunities

The maintenance of natural fire regimes within SIEN parks is likely the best way to maintain Downy Woodpecker habitat. Unnecessary fire suppression should be avoided. Where fire treatments are conducted, maximizing snag retention should provide the decayed wood required for nesting sites. Park staff should collect and test any bird carcasses for West Nile Virus. Although the Downy Woodpecker is one of the most widespread and common woodpeckers in North America, the species is declining in SIEN parks. Additional monitoring could elucidate causes of decline.

Dusky Flycatcher – *Empidonax oberholseri*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Dusky Flycatcher is a common breeder at Sequoia and Kings Canyon (SEKI) national parks and Yosemite (YOSE) National Park. The species is a fairly common breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 60. Breeding status and relative abundance of Dusky Flycatchers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Common
Yosemite NP	Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Dusky Flycatcher occurs over much of western North America, but is generally limited to the higher mountains, at least in the U.S. (Siegel and DeSante 1999). Due to the species' preference for higher elevations and absence from the Central Valley (Sedgwick 1993), the Sierra Nevada and SIEN parks make up an important part of the species range in California.

Distribution and Habitat Associations
Dusky Flycatchers can be found in open-canopied forest stands and around clearings, meadows and shrub-covered slopes from mid-elevations up to tree-line, and at lower elevations in association with montane chaparral (Gaines 1992). Dusky Flycatchers were detected frequently (Table 2) along many survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were detected twice during the DEPO survey. Park inventories show associations with a number of different habitat types, but relative abundance was highest within Montane Chaparral and Montane Meadows within SEKI and YOSE respectively (Table 2). When adjusted for detectability, densities of Dusky Flycatchers at SEKI were highest in Foxtail Pine and Western Juniper Woodland.

Table 61. Number of Dusky Flycatchers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	457	541	Montane Chaparral	0.45	0.41 (0.26-0.65)
			Foxtail Pine	0.43	0.50 (0.25-1.00)
			Mid Elevation Meadow	0.42	0.42 (0.25-0.71)
			Whitebark Pine Woodland	0.38	0.36 (0.24-0.56)
			Western Juniper Woodland	0.37	0.49 (0.28-0.83)
Yosemite NP	535	640	Montane Meadow	0.50	
			Quaking Aspen	0.47	
			Jaffrey Pine/Red Fir	0.35	
			Montane/Alpine Riparian Shrub	0.34	
			Recent Burn	0.33	
Devils Postpile NM	2	2	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

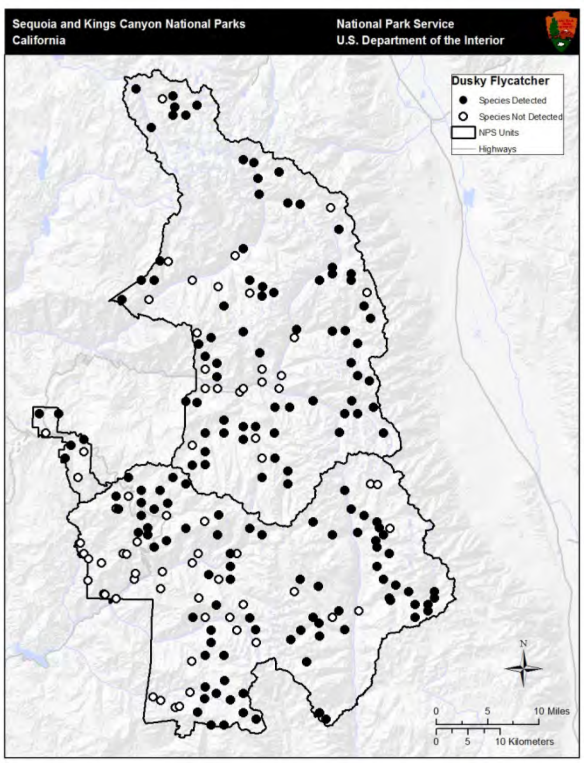

Figure 26. Bird survey transects where Dusky Flycatcher was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

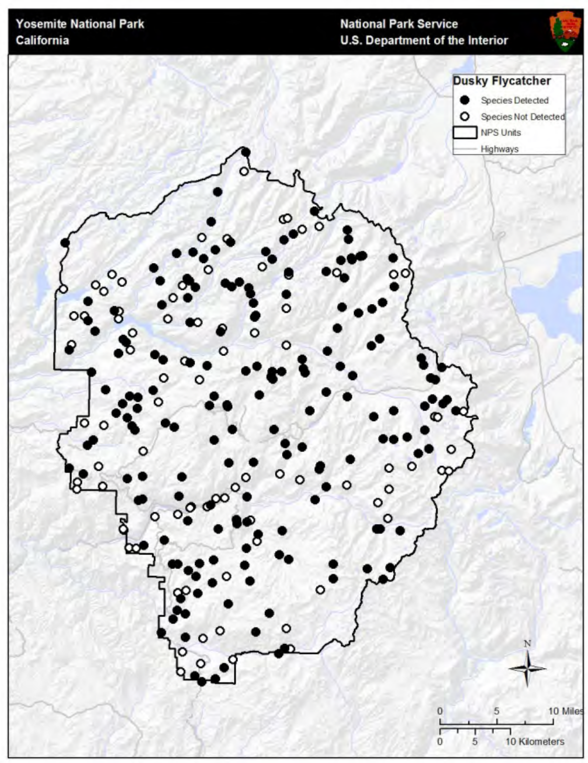

Figure 27. Bird survey transects where Dusky Flycatcher was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Dusky Flycatcher was observed within the middle to high-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Dusky Flycatcher in SEKI was 2820 m, with 95% of observations occurring between 1936 and 3436 m. At YOSE, the mean elevation of observations was 2512 m with 95% of observations recorded between 1612 and 3194 m (Siegel et al. 2011).

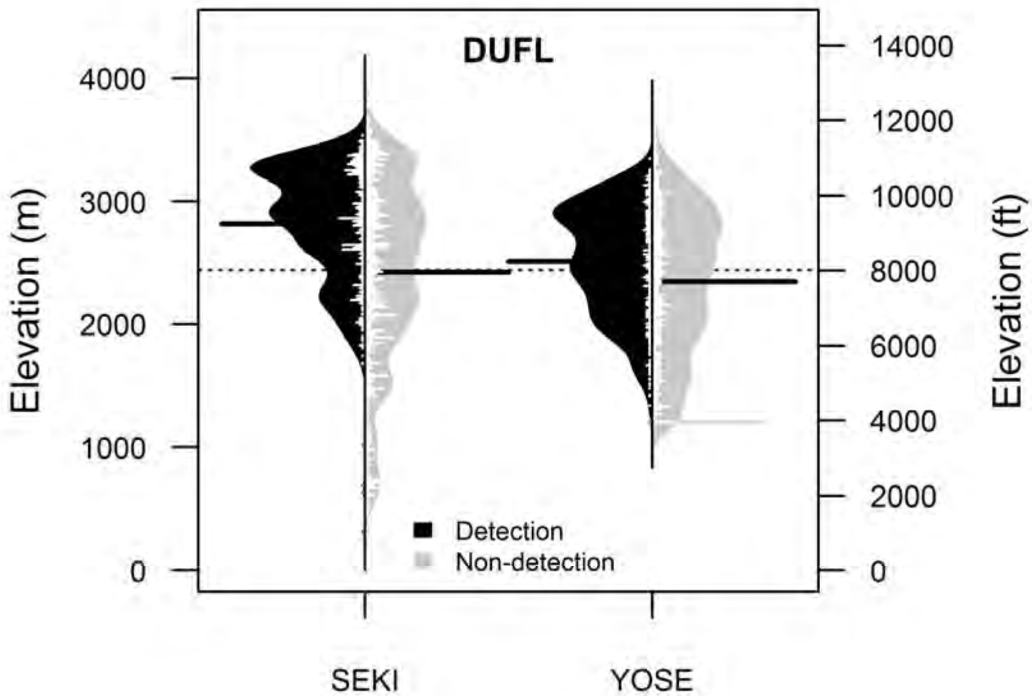

Figure 3. Elevational distributions of sites where Dusky Flycatchers (DUFL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Dusky Flycatchers are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at SEKI and in high numbers at YOSE. A significant positive trend was observed on the Yosemite route during 1974-2007 (Table 3).

Table 62. Relative abundance and trends for Dusky Flycatcher according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	65	2.86	+1.8	0.37
	1980-2007			-0.6	0.69
Sierra Nevada (BCR 15)	1966-2007	29	5.28	+1.7	0.47
	1980-2007			-0.4	0.84
Route 14117 – Sequoia NP	1972-2005	1	0.19	-18.7	0.71
Route 14132 – Kings Canyon NP	1974-2005	1	0.15	-29.6	0.28
Route 14156 – Yosemite NP	1974-2007	1	9.65	+12.2	0.01

MAPS data from Kings Canyon and Yosemite NPs show significantly negative population trends between 1991 and 2009. Productivity at these sites is moderate to low, but is increasing in YOSE. Adult survival at YOSE is moderate. Data from the DEPO station is insufficient to make inferences regarding demographic trends at that site (Table 4).

Table 63. Population trends, productivity, trends, and survival estimates of Dusky Flycatcher at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	2.8	-7.88***	0.32	-4.28	NA
Yosemite NP	1993-2009	8.7	-6.74***	0.24	+9.38**	0.450 (0.045)
Devils Postpile NM	2002-2006	1.7	NA[2]	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

While BBS data indicate healthy Dusky Flycatcher populations across California and the Sierra Nevada (Tables 3), MAPS data suggest worrisome declines within SIEN parks (Table 4), though the species remains common and widely distributed in the parks (Figures 1 and 2). Except perhaps climate change there are not any obvious major threats to the species, especially within protected areas such as the SIEN parks. Across the Sierra, degradation of riparian habitat due to recreational activities or livestock grazing can be detrimental to the species as can fire suppression that leads to forest expansion and densification. Likewise, brood parasitism from Brown-headed Cowbirds has been shown to impact Dusky Flycatchers somewhat and climate change has the potential to cause a shift of the species away from SIEN parks in the future. Fires appear to reduce Dusky Flycatcher abundance in the short-term, but timber harvest operations and fires that create forest openings may be beneficial to the Dusky Flycatcher in the long-term.

Climate Change: An analysis of shifts between the historical range of Dusky Flycatcher (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Dusky Flycatcher has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades. MAPS data from YOSE indicate that Dusky Flycatcher numbers have declined severely and significantly at Yosemite's lower-elevation MAPS stations (Big Meadow and Hodgdon Meadow), with non-significant declines evident at the mid-elevation station (Crane Flat) and non-significant increases at the two higher-elevation stations (Gin Flat East and White Wolf) – a pattern that seems consistent with a population that may already be shifting upslope (Siegel et al. 2007).

Dusky Flycatchers are found breeding primarily at the middle to higher elevations of SEKI and YOSE (Figure 3). If climate change causes the species' range to shift upward as is generally expected for many species, SEKI and YOSE could see a reduction in observations of Dusky Flycatcher at the lower elevations. Furthermore, the SIEN parks' location near the southern edge of Dusky Flycatcher's breeding range could prove problematic if the species shifts its' range northward as is also expected of species responding to climate change.

Altered Fire Regimes: Fires which maintain forest gaps used by the Dusky Flycatcher are beneficial to the species. Fire suppression that facilitates the expansion of trees into forest clearings or other shrubby areas may reduce the extent of suitable habitat for the Dusky Flycatcher (NatureServe 2009). However, a recent study of avian response to burns in a Northern California forest detected Dusky Flycatcher more frequently in unburned vs. recently burned forests (Burnett et al. 2010), suggesting burns are detrimental to the species, at least in the short-term.

Habitat Fragmentation or Loss: Dusky Flycatcher's association with shrubby habitats suggests the species benefits from timber harvest, which creates forest openings and thins dense coniferous forests (NatureServe 2009; Siegel and DeSante 2003, Sedgwick 1993). However, any degradation of riparian habitat due to channelization, grazing, agricultural conversion or recreational development would be detrimental to this species (Sedgwick 1993). Any effects from habitat conversion outside of SIEN parks may impact park populations of Dusky Flycatcher, but only indirectly.

Invasive Species and Disease: Although native to North America, Brown-headed Cowbirds have expanded their range since European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Dusky Flycatcher is occasionally parasitized by Brown-headed Cowbirds, but less than 3% of nests are parasitized in California (NatureServe 2009). A study of parasitism in eight national parks including YOSE and SEKI found that 3 out of 24 (12.5%) Dusky Flycatcher nests were parasitized (Halterman et al. 1999) with the only monitored SEKI nest avoiding parasitism (Halterman and Laymon 2000). An updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Overgrazing within Dusky Flycatcher habitat can have significant impacts on the species (NatureServe 2009) and any recreational activities that degraded stream-side habitats would be detrimental to Dusky Flycatcher (Sedgwick 1993). However, neither threat is a major concern within SIEN parks where grazing is nearly non-existent and streamside recreation is relatively low-impact.

Management Options and Conservation Opportunities

Dusky Flycatcher appears to be faring well across western North America with no need for special management efforts (Sedgwick 1993). However, the maintenance of riparian habitats within SIEN parks is important for this species. Furthermore, the reestablishment of more natural fire regimes that provide heterogeneity and early-seral habitat would be beneficial to Dusky Flycatcher (NatureServe 2009) within and beyond the SIEN parks. Likewise, care should be taken to ensure prescribed burns leave a healthy mosaic of multi-aged stands and leave pockets of unburned shrub habitat (NatureServe 2009).

European Starling – *Sturnus vulgaris*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
European Starling is a locally fairly common year-round resident and regular breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks but has not been reported at Devils Postpile National Monument (Table 1).

Table 64. Breeding status and relative abundance of European Starlings in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Fairly Common
Yosemite NP	Year-round	Regular Breeder	Locally Fairly Common
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: NNA – Not applicable
- California Status: SNA – Not applicable

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
European Starling were introduced into New York City in 1890 and by the late 1940s had spread across much of North America, becoming one of the most abundant terrestrial birds on the continent (Koenig 2003). Starling populations in the Sierra are generally only a fraction of what they are in most other areas of their range, so the Sierra is not of great importance to their overall population (Siegel and DeSante 1999).

Distribution and Habitat Associations
European Starlings are closely associated with human habitats such as urban and suburban areas, ranches, agricultural and pastoral areas, garbage dumps, and low-elevation campgrounds, although they will nest in more remote areas (Siegel and DeSante 1999). They are cavity nesters that readily usurp cavities of native species. During avian inventory projects, one starling was detected in Montane Meadow habitat at YOSE and one at in Blue Oak Woodland at SEKI (Table 2).

Table 65. Number of European Starlings recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	1	1	Blue Oak Woodland	NA[1]	NA
Yosemite NP	1	1	Montane Meadow	0.01	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

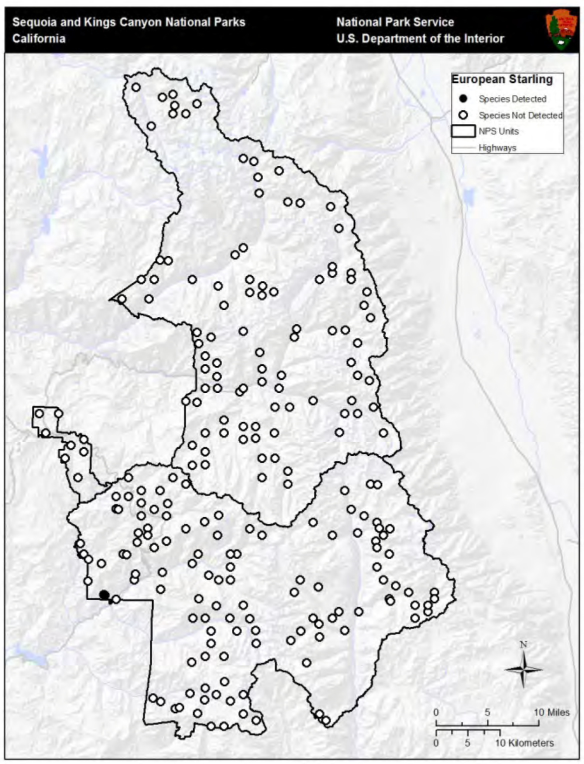

Figure 28. Bird survey transects where European Starling was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

One European Starling was detected during SEKI's avian inventory, at 489 m. One was also detected at YOSE but location data were recorded incorrectly so the elevation and the precise location are not available.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate European Starlings are extremely abundant in California as a whole, and relatively abundant in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at Kings Canyon and Yosemite NPs, but were very abundant along the route in Sequoia NP. Siegel and DeSante (1999) noted that the invasion of the starling into the Sierra began in the 1960s and BBS data documented steady increases until at least the end of the 20th century. To the contrary, a large, significant negative population trend was observed for European Starlings in the Sequoia NP during 1972-2005 (Table 3). The nomadic and colonial behavior of this species could bias the analysis if especially large flocks were observed during one or a few of the earlier years.

Table 66. Relative abundance and trends for European Starling according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	188	28.76	-0.8	0.14
	1980-2007			-0.2	0.67
Sierra Nevada (BCR 15)	1966-2007	20	4.04	+2.3	0.40
	1980-2007			+1.4	0.72
Route 14117 – Sequoia NP	1972-2005	1	17.81	-19.0	0.00
Route 14132 – Kings Canyon NP	1974-2005	1	0.10	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	0.81	-8.7	0.37

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Very few European Starlings were captured in mist nets at SIEN MAPS stations; data on productivity and survival within the parks therefore are not available.

Stressors

The European Starling has increased from a founder population of approximately 100 individuals released into New York City's Central Park in 1890 and 1891, to more than 200 million across most of North America – perhaps one-third of the entire global population (Cabe 1993). These birds inhabit an extremely wide variety of habitats but always in close association with humans.

In the Sierra, the European Starling aggressively usurps the nesting cavities of native species such as Purple Martin and Lewis' Woodpecker (Siegel and DeSante 1999). However, most populations of native species did not significantly decline upon invasion of starling populations (Koenig 2003). Only one group, the sapsuckers, exhibited population declines after starling invasion. Koenig (2003) noted "despite their aggressiveness and high abundance, and contrary to the fears of many North American ornithologists, European Starlings have yet to unambiguously and significantly threaten any species of North American cavity-nesting bird, with the possible exception of sapsuckers," although additional studies with longer-term data are warranted to confirm this conclusion. Regardless, the protected, relatively undisturbed habitats in SIEN parks offer important refugia for native cavity-nesters from the starling, which tends to avoid undisturbed woodlands and forests and shrublands (Cabe 1993).

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of European Starling throughout its North American range has significantly shifted 86 miles north and 77 miles inland over the past 40 years (Audubon 2009). European Starling currently breeds at low elevations of the Sierra Nevada and may colonize higher elevations as open habitats such as oak woodlands expand uphill with climate warming.

Altered Fire Regimes: Studies that examined European Starling occurrence in habitats in the Rocky Mountains found the species in early and late-successional burned sites more than any other type aside from Cottonwood Bottomland (Hutto 1995). Few other published data are available on fire effects to starlings. However, this species is not common in forested habitats or wooded areas far from human structures, so altered fire regimes are not likely to significantly impact this species in SIEN parks.

Habitat Fragmentation or Loss: European Starlings typically forage in open country on short, mown, or grazed fields in urban and agricultural areas, always in close association with humans. In North America, European Starlings avoid only large expanses of undisturbed non-grassland native habitats such as wooded or forested areas, arid chaparral, and desert (Cabe 1993). In the Sierra, increased residential development and other uses have contributed to population increases of starlings. The species may forage close to humans but often can be found in oak woodlands where an abundance of cavities are available for nesting. The intact habitat of the SIEN parks may in fact deter starlings, suggesting that these parks are important refugia for native cavity-nesting birds.

Invasive Species and Disease: West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). The virus has caused mortality in many native birds. In 2009, West Nile Virus caused at least 7 European Starling deaths in California (CDPU 2010).

Human Use Impacts: Human activities have unequivocally allowed European Starlings to increase in numbers and expand their range. Man-made structures such as building provide additional nest sites; agriculture creates open foraging habitat used by starlings; and garbage, livestock feeding, and certain crops have provided significant additional food resources for this species with a generalist diet (Cabe 1993).

Management Options and Conservation Opportunities

The most important thing park managers can do to manage and control invasive European Starling populations in the parks is to carefully manage large garbage repositories and livestock feed. European Starling populations in the parks should be monitored to determine whether this species is spreading further into the parks.

Evening Grosbeak – *Coccothraustes vespertinus*

Migratory Status

Resident (Siegel and DeSante 1999)

Residency and Breeding Status

Evening Grosbeak is an uncommon year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and probable breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 67. Breeding status and relative abundance of Evening Grosbeaks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Uncommon
Yosemite NP	Year-round	Regular Breeder	Uncommon
Devils Postpile NM	Year-round	Probable Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Evening Grosbeak is found in northern coniferous forests throughout Canada and the Rocky Mountains, parts of Montana, Wyoming, Idaho, and Utah, into Colorado, northeastern Arizona and northern New Mexico, and from the Canadian border south through Washington, Oregon, and California to the southern Sierra Nevada (Gillihan and Byers 2001). Disjunct populations also occur in Mexico. This species is fairly common in the Sierra which is very important to its overall California population (Siegel and DeSante 1999).

Distribution and Habitat Associations

In the Sierra Nevada Evening Grosbeaks breed in mature Mixed Conifer forest and in Red Fir stands with Lodgepole Pine and Jeffrey Pine, and intermediate (Gillihan and Byers 2001) to dense (Siegel and DeSante 1999) canopy cover. Some deciduous component is required for food resources (Siegel and DeSante 1999). These birds were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects in all SIEN parks. Park inventories show associations with a variety of habitats in SEKI and YOSE, including lower elevation meadows at SEKI and Canyon Live Oak in YOSE (Table 2).

Table 68. Number of Evening Grosbeaks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	60	84	Giant Sequoia Forest	0.20	0.15 (0.07-0.36)
			Red Fir/White Fir Forest	0.14	0.15 (0.07-0.35)
			Red Fir Forest	0.11	0.10 (0.05-0.21)
			Lower Elevation Meadow	0.06	0.13 (0.05-0.36)
Yosemite NP	52	96	Douglas-fir/Mixed Conifer	0.08	
			Canyon Live Oak	0.03	
			Jeffrey Pine/Red Fir	0.02	
			White Fir/Mixed Conifer	0.02	
			Red Fir	0.01	
Devils Postpile NM	1	1	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

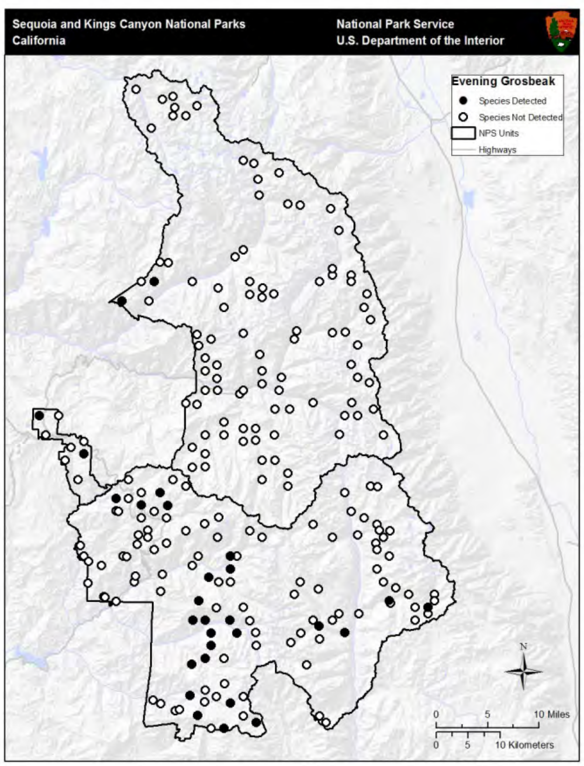

Figure 29. Bird survey transects where Evening Grosbeak was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

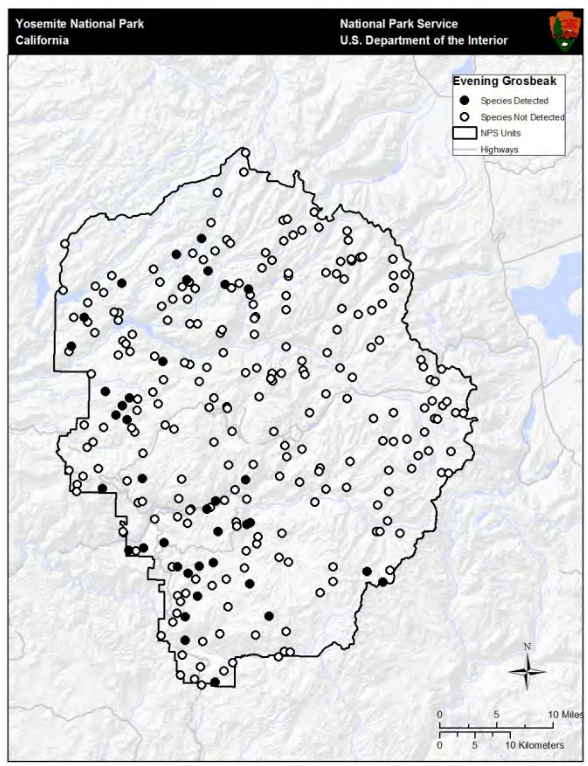

Figure 30. Bird survey transects where Evening Grosbeak was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Evening Grosbeak was detected at mid- to higher elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 2392 m, with 95% of observations occurring between 1860 and 3145 m. In YOSE, the mean elevation of observations was 2087 m with 95% of observations falling between 1213 and 2986 m (Siegel et al. 2011).

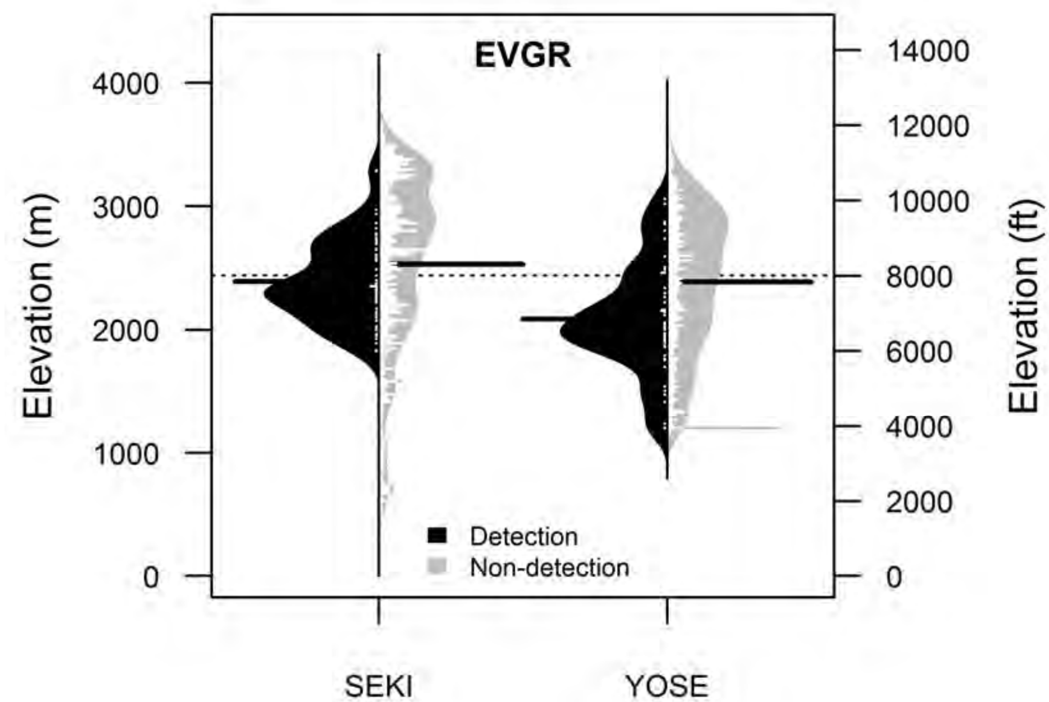

Figure 3. Elevational distributions of sites where Evening Grosbeak (EVGR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Evening Grosbeaks are much more abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). Significant negative population trends were observed in California from 1980-2007 (Table 3), and in the Sierra Region over the same time period. These birds were detected in relatively high numbers on individual BBS routes at Yosemite, and experienced a nearly significant (0.05) positive annual population trend of 23% at the park from 1974-2007. Abundance was much lower at Sequoia NP, and the species was not detected at Kings Canyon NP.

Table 69. Relative abundance and trends for Evening Grosbeak according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	31	0.62	-2.7	0.10
	1980-2007			-6.8	0.00
Sierra Nevada (BCR 15)	1966-2007	20	1.47	-2.7	0.20
	1980-2007			-4.4	0.02
Route 14117 – Sequoia NP	1972-2005	1	0.19	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	2.27	+22.9	0.05

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Too few Evening Grosbeaks were captured in mist nets in the SIEN MAPS stations to estimate population and reproductive trends and survival within the parks (Table 4).

Table 70. Population trends, productivity, trends, and survival estimates of Evening Grosbeak at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.1	NA[2]	0.00	NA	NA
Yosemite NP	1993-2009	0.4	NA	0.19	NA	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Breeding Bird Survey data suggest that Evening Grosbeaks are declining significantly throughout California, but are increasing in number in Yosemite NP and possibly elsewhere in the Sierra Region (Table 3). Because these birds prefer dense, mature forests containing true fir with a deciduous tree element (Siegel and DeSante 1999), clearcut and group-selection logging may be a significant risk, although thinning does not appear to adversely affect the species. Protected status of the SIEN parks makes them important refugia from habitat fragmentation and loss occurring elsewhere in their range, and may be the reason Evening Grosbeaks are thriving in Yosemite NP.

Fire treatments that mimic natural fire regimes and enhance the deciduous understory component of conifer forests should benefit this species.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Evening Grosbeak throughout its entire range has not shifted significantly in latitude over the past 40 years, but has moved significantly towards the coast (Audubon 2009). Evening Grosbeaks currently occur at middle elevations in the SIEN parks. If climate change causes the species' range to shift upslope in the future, there is likely to be sufficient coniferous forest at higher altitudes for new colonization, as long as dense coniferous forests remain intact above the grosbeak's current range. More concerning is the location of the SIEN parks at the southern end of the breeding range in the Sierra. If the species' range shifts northward in response to climate change, the southern Sierra Nevada and SIEN parks may support fewer Evening Grosbeaks in the future.

Altered Fire Regimes: Evening Grosbeaks prefer mature, dense coniferous forests for nesting, but depend upon a deciduous component for food sources. High-intensity fire may alter nesting habitat, but may also increase foraging opportunities. Fire apparently does not preclude use of a forest by Evening Grosbeaks, as several studies detected this species using early successional burned forests in the Rocky Mountains (Hutto 1995, Smucker et al. 2005) and older burned forests in the Sierra Nevada (Rafael et al. 1987). If future high-intensity fire increases in frequency and extent in SIEN parks, this species may benefit, but more study is required.

Habitat Fragmentation or Loss: Thinning and selective logging did not affect use of forest stands by Evening Grosbeaks, and in some cases increased their numbers, possibly because open forest allows more deciduous understory, a potential food source (Gillihan and Byers 2001, Hayes et al. 2003). Clearcut harvesting eliminates dense, mature forests preferred for nesting as well as deciduous vegetation for foraging. Owing to the lack of commercial logging in SIEN parks, habitat fragmentation and loss does not pose a significant threat to this species.

Invasive Species and Disease: Many Evening Grosbeaks died in a widespread salmonellosis outbreak in the early 1990s, attributed to use of artificial feeding stations (Dawson 1997).

Human Use Impacts: Large numbers of Evening Grosbeaks are sometimes killed by vehicles when flocks are attracted to grit and salt on roads (Gillihan and Byers 2001).

Management Options and Conservation Opportunities

Park managers can benefit Evening Grosbeaks by managing coniferous forests for a deciduous understory component. Actions include treatments that mimic natural fire regimes, including fire of varying intensities. Speed limits on roads should be strictly enforced to reduce collisions between Evening Grosbeaks and vehicles.

Due to its somewhat irruptive nature, Evening Grosbeak is a difficult species to monitor, but the ecology of this species is in need of further study - particularly the impacts of fire.

Flammulated Owl – *Otus flammeolus*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Flammulated Owl is an uncommon summer resident and regular breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks. The species is not reported from but may occasionally migrate or disperse through Devils Postpile (DEPO) National Monument (Table 1).

Table 71. Breeding status and relative abundance of Flammulated Owls in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Uncommon
Yosemite NP	Summer	Regular Breeder	Uncommon
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G4 – Apparently Secure (Uncommon but not rare)
- National Status: N4 – Apparently Secure (Uncommon but not rare)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Bird Species of Conservation Concern
- CA Department of Fish and Game Status: Not listed

Range Significance

The Flammulated Owl breeds in montane pine forests of western North America and winters from southern Mexico to El Salvador (McCallum 1994a). Its range is restricted to the mid-elevation montane zone and does not extend to the coastal pine belt or easternmost yellow pines (McCallum 1994a). Generally quite uncommon and of irregular distribution over most of their range, Flammulated Owls have relatively large local populations in the Sierra Nevada. The Sierra and SIEN parks are therefore of greater importance for this species than most other western montane bird species (Siegel and DeSante 1999).

Distribution and Habitat Associations

Flammulated Owls are obligate cavity nesters typically found in open forests of Black Oak mixed with conifers, especially Ponderosa Pine but also White Fir or Douglas-fir, interspersed with small openings of shrubs, oaks, or saplings (Siegel and DeSante 1999, McCallum 1994a, b). They are secondary cavity nesters and rely on cavities previously excavated by woodpeckers, most often Pileated Woodpeckers, Northern Flickers, and sapsuckers (McCallum 1994b), preferentially in larger-diameter Ponderosa Pine snags and California Black Oaks. The species is almost completely insectivorous, feeding primarily on nocturnal arthropods such as owlet moths, beetles, and crickets and grasshoppers (McCallum 1994a). Flammulated Owls were not detected during avian inventory surveys at any of the SIEN parks, but this is likely due to the low capability of these surveys to detect nocturnal owls.

Elevational Distribution
The breeding range of the Flammulated Owl is limited to the higher parts of the yellow pine belt, between elevations of 366 m to 1676 m in the northern, and up to 2743 m in the southern part of its range (Winter 1974).

Abundance, Trends and Demographic Data
Flammulated Owls were very infrequently detected during Breeding Bird Surveys (BBS) throughout California, but these surveys are designed for diurnal species and do not adequately detect most owl species. Similarly, Flammulated Owls are not frequently captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available. Virtually nothing is known about abundance and population trend of Flammulated Owls in the SIEN parks or throughout California. The species once was thought to be rare, but recent accounts suggest that it is “common but secretive,” and many guidebooks describe them as “locally common,” (McCallum 1994b). Despite their seeming abundance, however, Flammulated Owls have a life-history strategy similar to larger raptors with a relatively low annual reproductive rate and a relatively long lifespan (Linkhart and Reynolds 2006). A long-term study of Flammulated Owls in Colorado found that relatively few adults accounted for most offspring, thus lifetime reproductive success appears to be associated with habitat quality in territories (Linkhart and Reynolds 2006).

Stressors
Loss of old snags with large woodpecker holes may be one of the most important threats to Flammulated Owls, although not likely a substantial threat in SIEN parks owing to the lack of commercial logging or fuelwood harvesting. General declines in populations of Black Oaks due to fire suppression as well as poor large-insect production due to drought and other weather-related factors are potential risks within the parks. Pesticide drift from the Central Valley may also be a problem, but effects are unknown.

Direct loss and fragmentation of habitat from intensive logging, invasive species, and disease do not appear to be major concerns for Flammulated Owls within the SIEN parks. Fire treatments that mimic natural fire regimes – including low to moderate intensity fire to maintain open-forest conditions and some small patches of high-intensity fire to create shrubfields and rejuvenate oak production – should benefit this species. The lack of data on abundance, population trend, and habitat use of Flammulated Owls in the Sierra Nevada hampers appropriate management (Siegel and DeSante 1999).

Climate Change: Except for migration, the Flammulated Owl is restricted to montane elevations with seasonally temperate climates. Climate change may influence the distribution of the species indirectly through the prey base rather than directly through thermoregulatory abilities, as this species tends to forage at night when the temperatures are lowest for the day (McCallum 1994b). Due to the Flammulated Owl’s dependence upon large insects for food, any changes in climate that affect large-insect production, such as increased drought occurrence or other weather-related factors, could adversely impact the species (Siegel and DeSante 1999).

Altered Fire Regimes: Flammulated Owls favor relatively open conifer forests dominated by large pine snags and Black Oaks, interspersed with patches of shrubs, oaks, or saplings. High-intensity fire in the SIEN parks can eliminate large snags with suitable nesting cavities, but over the longer-term, fire of varying intensities likely maintains optimal habitat conditions for these owls. Elliot (1988) found similar numbers of Flammulated Owls before and after fire in oak-dominated forests in the Los Padres National Forest. High-intensity fire also attracts large woodpeckers that excavate cavities used by this owl for nesting. General declines in Black Oaks due to past and ongoing fire suppression throughout the Sierra Nevada may pose a risk to this and other oak-associated bird species (Siegel and DeSante 1999).

Habitat Fragmentation or Loss: The Flammulated Owl is thought to be vulnerable to loss and fragmentation of suitable habitat from intensive commercial logging (as opposed to selective thinning that retains old trees and some dense vegetation for roosting) (McCallum 1994a, b). These activities are not likely to pose a major threat to the species within SIEN parks.

Invasive Species and Disease: To our knowledge, there are no major threats from invasive species or disease to the Flammulated Owl within SIEN parks.

Human Use Impacts: Flammulated Owls are vulnerable to loss of individual nest trees because they cannot create their own cavities and must compete with other cavity-nesting birds and mammals for suitable sites upon arrival after spring migration. Management activities such as post-fire salvage logging, hazard-tree removal, fuelwood harvesting, or cutting fire lines during fire suppression could eliminate snags containing potentially suitable nesting cavities, but none of these are likely to be important factors in the SIEN parks.

Pesticide drift from the Central Valley as well as its use in tropical upland forests may pose a problem, as Flammulated Owls are almost completely insectivorous. Aerial spraying of carbaryl insecticides to reduce populations of forest insect pests also may affect the abundance of non-target insects important in the early spring diets of Flammulated Owls (McCallum 1994b). However, these effects have not been studied.

Management Options and Conservation Opportunities

Management actions that would most benefit Flammulated Owls in the parks include retaining large Ponderosa Pine snags and California Black Oaks with suitable nesting cavities, and allowing a patchy mosaic of fire of varying intensities to maintain open-forest habitats with islands of dense thickets and vegetation for roosting and foraging, small shrubfields, and successful Black Oak recruitment. Management for Pileated Woodpeckers, Northern Flickers, sapsuckers, and other large woodpeckers will ensure future nest sites for Flammulated Owls.

Little is known about the distribution, abundance, and demography of breeding Flammulated Owls in the SIEN parks, although Keane et al. (2011) documented the species’ presence at 6 sites in YOSE during recent Great Gray owl surveys. Park managers might consider initiating nocturnal surveys for this and other forest owl species, potentially in conjunction with surveys for Spotted and Great Gray Owls.

Fox Sparrow – *Passerella iliaca*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Fox Sparrow is a common summer or year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and at Devils Postpile (DEPO) National Monument (Table 1).

Table 72. Breeding status and relative abundance of Fox Sparrows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Common
Yosemite NP	Summer/Year-round	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Fox Sparrow is a common breeder in streamside thickets and chaparral across the northern boreal and western montane regions of North America, as well as one of the continent's most geographically variable birds (Weckstein et al. 2002). Large-billed Fox Sparrow (*megarhyncha* group) as well as *monoensis* and *stephensi* races breed from central Oregon through California, including the Coast Ranges, Siskiyou, and Warner Mountains, and in the Sierra Nevada to the Mono Lake district and the Greenhorn Mountains, and the mountains of southern California (Weckstein et al. 2002). The Sierra represents a very important part of the Fox Sparrow's breeding range in California, and especially important to the Sierra-endemic races (Siegel and DeSante 1999).

Distribution and Habitat Associations
In the Sierra Nevada, Fox Sparrow requires montane chaparral, either as pure stands or as clumps in the understory of open conifer and oak forest, or riparian vegetation near seeps and streams (Siegel and DeSante 1999, Weckstein et al. 2002). Fox Sparrows were detected in very high numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory surveys at all SIEN parks. After accounting for detection probability, park inventories show highest

associations with Montane Chaparral within SEKI; the species was most abundant in this habitat type in YOSE as well (Table 2). Fox Sparrows were also detected in a variety of coniferous forest types as well as aspen and recent burn.

Table 73. Number of Fox Sparrows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	325	533	Montane Chaparral	1.29	1.40 (0.79-2.48)
			Jeffrey Pine Woodland	0.84	0.84 (0.47-1.50)
			Red Fir/White Fir Forest	0.68	0.52 (0.29-0.94)
			Lower Elev. Rock/Sparse Veg.	0.64	0.67 (0.15-2.93)
			Aspen Forest	0.52	0.64 (0.32-1.30)
Yosemite NP	459	739	Montane Chaparral	0.96	
			Giant Sequoia	0.48	
			Western Juniper	0.42	
			Jeffrey Pine	0.41	
			recent Burn	0.39	
Devils Postpile NM	8	16	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

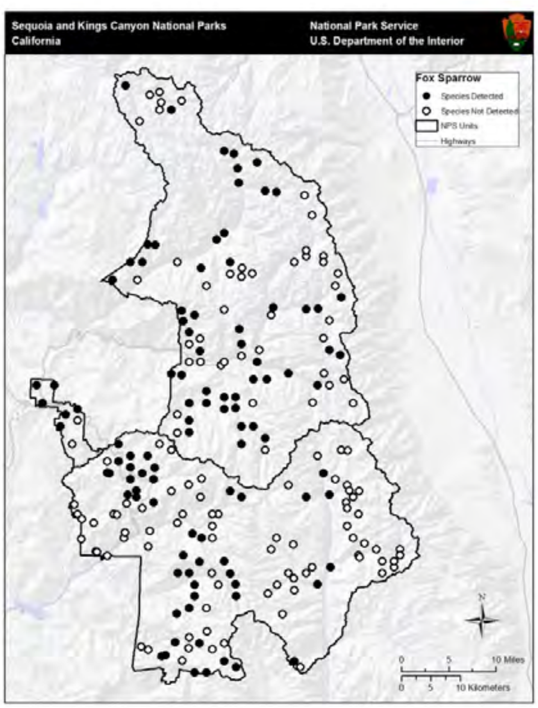

Figure 31. Bird survey transects where Fox Sparrow was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

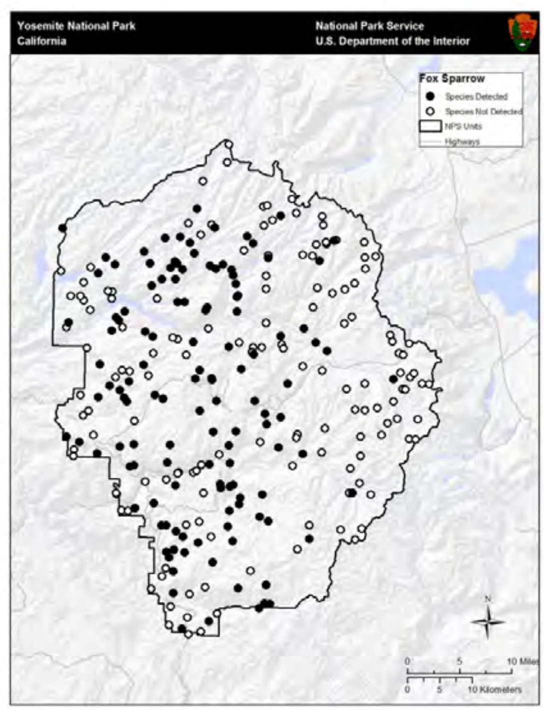

Figure 32. Bird survey transects where Fox Sparrow was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Fox Sparrow was detected at mid- to high-elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Fox Sparrow in SEKI was 2407 m, with 95% of observations occurring between 1823 and 3138 m. In YOSE, the mean elevation of observations was 2266 m with 95% of observations falling between 1676 and 2786 m (Siegel et al. 2011).

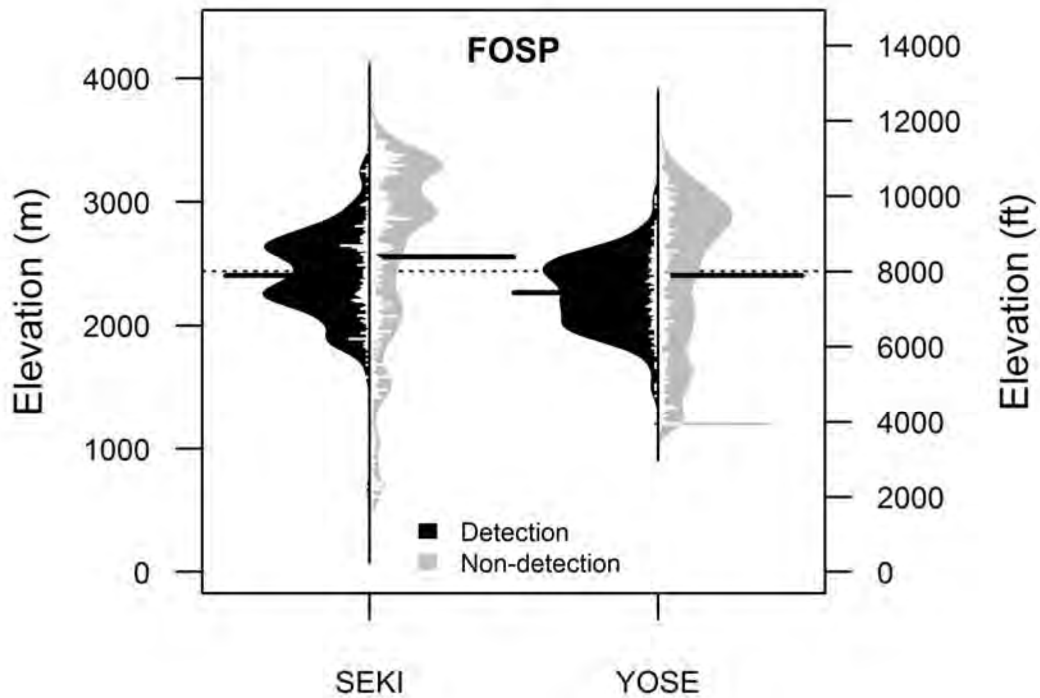

Figure 3. Elevational distributions of sites where Fox Sparrow (FOSP) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) indicate Fox Sparrows are far more abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were detected in high numbers on individual BBS routes at YOSE, but were substantially less abundant in SEKI. BBS data reveal a significant and relatively large positive population trend along the Yosemite NP route (Table 3).

Table 74. Relative abundance and trends for Fox Sparrow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	59	4.77	+0.4	0.54
	1980-2007			-0.4	0.60
Sierra Nevada (BCR 15)	1966-2007	30	11.78	+0.3	0.58
	1980-2007			-0.4	0.69
Route 14117 – Sequoia NP	1972-2005	1	0.56	-31.6	0.23
Route 14132 – Kings Canyon NP	1974-2005	1	0.40	+13.3	0.35
Route 14156 – Yosemite NP	1974-2007	1	6.73	+23.8	0.00

Similar to BBS trend data, SIEN MAPS station mark-recapture data reveal a relatively large, significant annual increasing trend for Fox Sparrows at Yosemite NP from 1993-2009 (Table 4). No significant trend was reported for Kings Canyon NP.

Table 75. Population trends, productivity, trends, and survival estimates of Fox Sparrow at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.8	-15.65	0.35	-7.49	NA
Yosemite NP	1993-2009	0.5	+19.05*	0.19	NA	NA
Devils Postpile NM	2002-2006	0.0	NA[2]	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Breeding Bird Survey (BBS) data did not detect any significant population trends for Fox Sparrow in California, but these surveys often miss local declines of more common species (CalPIF 2002). In fact, local declines and extirpations have been reported for this species in the Lassen and Yosemite regions (CalPIF 2002). Fire suppression is quite possibly the biggest threat to the Fox Sparrow in the Sierra Nevada. The species depends upon montane chaparral, either in pure stands or in openings in the forest, and fire suppression reduces extent of shrub cover. Post-fire management practices that eliminate shrubs in favor of re-planting conifers also threaten Fox Sparrows. Restoration of natural fire regimes, including increased frequency and extent of high-intensity fire, and allowing natural regeneration of chaparral will benefit this species. Brown-headed Cowbird parasitism, exacerbated by presence of packstock, is also a problem for Fox Sparrows, as are grazing activities that reduce shrub cover required for nesting and foraging.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Fox Sparrows has significantly shifted more than 286 miles north and nearly 20 miles inland throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms, providing evidence that the Fox Sparrow has already responded to climate change and will likely continue to shift its range in the coming decades (Audubon 2009). The assertion that Fox Sparrow is already showing responses to recent climate change is corroborated by recent findings that the species has adjusted its migration timing in response to climatic changes (MacMynowski and Root 2007).

Modeled distribution shifts of Fox Sparrows predict major range contractions throughout California, especially northern California and the lower-elevation western and eastern slopes of the Sierra Nevada (Stralberg and Jongsomjit 2008). A much lower probability of occurrence is predicted in the Sierra Nevada overall and the SIEN parks in particular, and then only at high elevations. The most important variables influencing current and projected distribution were temperature seasonality and mean diurnal range (Maxent distribution model) and vegetation and precipitation seasonality (GAM distribution model).

The Fox Sparrow is common at mid elevations in SIEN parks (Figure 3). If climate change causes the sparrow's range to move upslope in the Sierra Nevada as is generally expected, the species should persist in the SIEN parks as long as montane chaparral habitats expand uphill as well.

Altered Fire Regimes: Forest fire that creates patches of montane chaparral habitat strongly benefits Fox Sparrows. Studies examined by Hutto (1995) documented Fox Sparrows most often along streams and in early and mid-successional post-fire and post-clearcut stands. Fox Sparrow was a highly significant indicator of repeat-burned forests in Oregon, was not detected in mature forests or recent burns, and was rare in older once-burned forests (Fontaine et al. 2009). Fox Sparrows were one of the most abundant species in recently burned forests in the northern Sierra (Burnett et al. 2010) and exhibited a preference for 50-year old burned sites in the southern Sierra (Siegel and Wilkerson 2005). In the eastern Sierra, Fox Sparrows increased dramatically 10 years post-fire in the eastern Sierra Nevada and remained abundant two decades after fire (Bock and Lynch 1978, Rafael et al. 1987). A future increase in extent and frequency of high-intensity fire will increase habitat suitability for this species. Conversely, fire suppression and post-fire activities that eliminate shrubs regenerating post-fire in favor of conifers are likely some of the greatest threats to the Fox Sparrow in the Sierra Nevada.

Habitat Fragmentation or Loss: Forestry practices that result in open forests with a shrub understory, and clearcutting that converts large forested areas to shrub-covered hillsides likely benefits this species (Siegel and DeSante 1999, Weckstein et al. 2002). Fox Sparrow abundance was greater in heavily salvaged than unsalvaged burned stands, (Cahall and Hayes 2009). Thus, timber harvesting is not a significant threat to the species, and in fact favors this sparrow. Loss of winter shrubland habitat to development in southern California is an important risk (Siegel and DeSante 1999).

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Fox Sparrows are vulnerable to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Avian influenza virus (AIV) is known to mutate and cross the species barrier to infect humans, and is thus an important public health issue (Fuller et al. 2010). A recent study (Fuller et al. 2010) documented 10% of Fox Sparrows were AIV positive.

Human Use Impacts: Packstock grazing that reduces shrub cover likely adversely impacts Fox Sparrows (CALPIF 2002). Habitat degradation due to packstock grazing within the parks is therefore a potential concern for this species, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage montane chaparral habitat. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks (Siegel and DeSante 1999).

Management Options and Conservation Opportunities

The most important actions park managers can take to protect Fox Sparrow populations in the parks are to maintain and restore montane chaparral and other shrubland habitat within coniferous forests by restoring the fire cycle (including high-intensity fire), and to manage or eliminate cowbird feeding sites such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicated that a cowbird trapping program was not warranted (Halterman et al. 1999). However, this assessment is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

MAPS station operation and any other opportunities to monitor Fox Sparrow populations in the parks should continue, to assess how the species is responding to climate change and any other threats.

Golden Eagle – *Aquila chrysaetos*

Migratory Status

Partial Short/Medium distance migrant (Kochert et al. 2002)

Residency and Breeding Status

Golden Eagle is a locally uncommon breeder at Yosemite (YOSE), and Sequoia and Kings Canyon (SEKI) national parks. It is an uncommon possible breeder at Devils Postpile National Monument (Table 1).

Table 76. Breeding status and relative abundance of Golden Eagles in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Uncommon
Yosemite NP	Year-round	Regular Breeder	Locally Uncommon
Devils Postpile NM	Migrant/Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Golden Eagle breeds throughout western North America including the Sierra Nevada and much of California (Kochert et al. 2002). Given this wide distribution and its uncommonness in SIEN parks, the parks do not make up an important part of the species' greater range.

Distribution and Habitat Associations

Golden Eagles prefer open terrain to dense forest for spotting prey from the air (Gaines 1992). Golden Eagles were detected only once (Table 2, Figure 1) during the YOSE avian inventory project and were observed off-survey at SEKI and DEPO. Golden Eagles were not observed frequently enough to infer habitat preferences within the SIEN parks.

Table 77. Number of Golden Eagles recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA	NA
Yosemite NP	1	1	NA[1]	NA	
Devils Postpile NM	0	0	Detected off-survey	NA	

[1]NA - Information not available due to insufficient data.

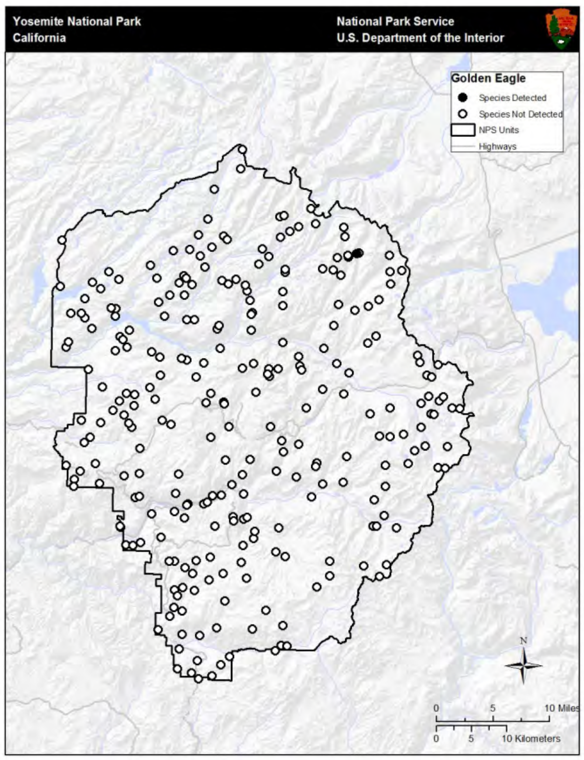

Figure 1. Bird survey transects where Golden Eagle was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution
Golden Eagle was observed once in the higher elevations (3210 m) of YOSE during the avian inventory survey (Figure 2) (Siegel et al. 2011).

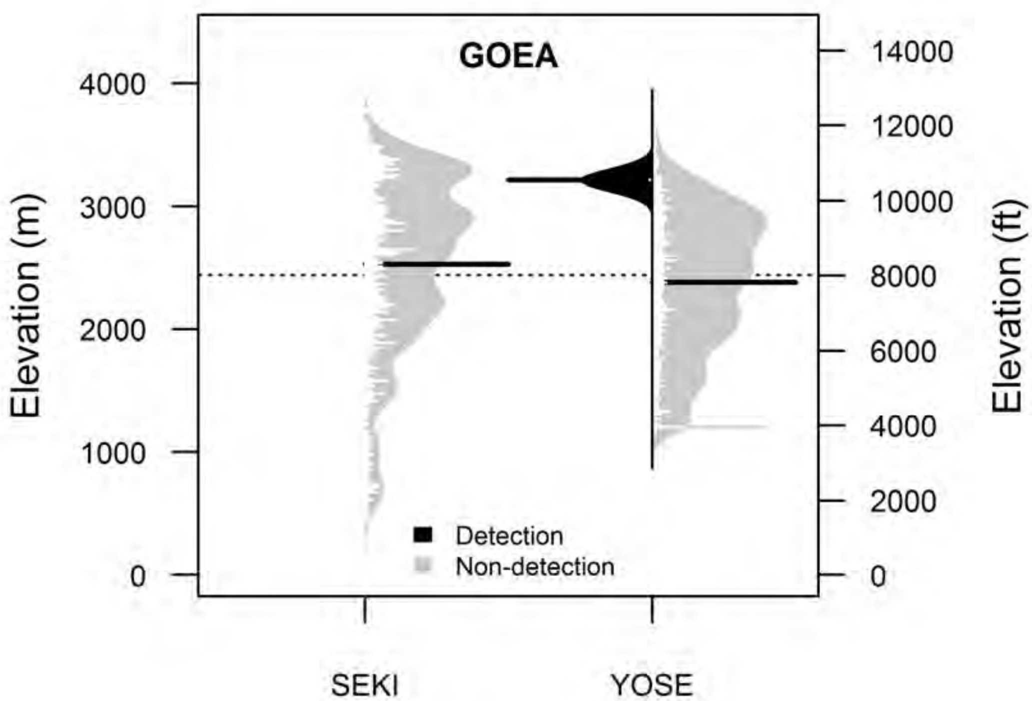

Figure 2. Elevational distributions of sites where Golden Eagles (GOEA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data
Breeding Bird Survey (BBS) data indicate Golden Eagles are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at SEKI and were not detected on the YOSE route. A significant negative trend was observed in the Sierra Region during 1966-2007, but the low overall sample size makes the reliability of the result questionable (Table 3).

Table 78. Relative abundance and trends for Golden Eagle according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	52	0.11	0.7	0.69
	1980-2007			+0.9	0.67
Sierra Nevada (BCR 15)	1966-2007[1]	5	0.03	-10.7	0.00
	1980-2007[1]			-9.7	0.04
Route 14117 – Sequoia NP	1972-2005	1	0.25	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.15	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Golden Eagles are not captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The greatest threats to Golden Eagle populations stem from interactions with humans and human-built structures. In particular, collisions with structures and electrocution by power lines cause the majority of non-natural Golden Eagle deaths. Although not as problematic in SIEN parks as in more developed areas, such interactions could still have some detrimental effect on park populations. Other potential threats include infectious diseases such as West Nile Virus and loss of habitat from large-scale fires. It is not likely that climate change will affect Golden Eagles directly, but indirect effects from habitat change and shifts in prey species could influence eagle populations in the future.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of Golden Eagle has significantly shifted 58.3 miles to the north and 17.4 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Golden Eagle has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

However, Golden Eagles' broad latitudinal range suggests climate does not directly determine their range and abundance. Furthermore, one analysis of migration records found that the species has not shown any significant long-term (since 1946) shifts in autumn migration timing in response to recent climate change (Bildstein 1998). Likely more important for Golden Eagle populations is the prevalence of open habitat with abundant prey. If climate change leads to aridification of the Sierra Nevada we may see a shift of some forest types to more open habitats. Such a shift in habitat structure could allow Golden Eagles access to areas previously too densely forested for their use. Conversely, if climate change leads to an increase in large fires, less Golden Eagle habitat might be available in any given year due to an increase in burned areas.

In addition to observed changes, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Golden Eagle received a sensitivity score of 31.63 (UW 2010), suggesting low to moderate sensitivity to the threat. Certainty of results was listed as 45.00 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Golden Eagle's sensitivity to climate change was its natural low annual productivity (UW 2010).

Altered Fire Regimes: Large-scale fires in scrub and jackrabbit habitat have lead to degradation of areas used by Golden Eagles for foraging and nesting in the intermountain west (Kochert et al. 2002). Such burns lead to reduced reproductive success of breeding pairs within burned areas for 4-6 years following fires (Kochert et al. 1999). Presumably large fires in California's scrubland have similar affects. Thus any increase in such fires within or near SIEN parks would be detrimental to Golden Eagle populations in the area.

Habitat Fragmentation or Loss: Golden Eagle is vulnerable to loss of habitat to agricultural and urban expansion (NatureServe 2009). This is not a problem within SIEN parks.

Invasive Species and Disease: Golden Eagles are known to be somewhat susceptible to West Nile Virus with 26 known individual deaths from the disease across the U.S. from 1999 to 2004 (Nermeth et al. 2006). This disease is of potential concern for California and SIEN populations since the 2003 arrival of the disease to the state (Reisen et al. 2004).

Human Use Impacts: Interactions with humans cause the majority (>70%) of recorded Golden Eagle deaths. In order of proportion of deaths caused, these interactions are: collisions with vehicles or structures (27%), electrocution (25%), gunshot (15%), and poisoning (6%) (Kochert et al. 2002). However, it should be noted that natural deaths are likely under-recorded where human population densities are low. Additionally, human activities near nesting sites can lead to nest failures (Kochert et al. 2002). Although these threats are not as prevalent as areas with more dense human populations, they remain somewhat relevant to the SIEN parks.

Unlike their Bald Eagle cousins, Golden Eagles were not greatly affected by DDT contamination thanks to their largely mammalian diet. However, some deaths do occur from secondary poisoning following consumption of contaminated prey (Kochert et al. 2002).

Management Options and Conservation Opportunities

The U.S. government has protected Golden Eagles since the Bald and Golden Eagle Protection Act was passed in 1962. The U.S. Fish and Wildlife Service allows a small number of individuals to be taken for falconry and Native American religious purposes. Such levels of take have limited impact on eagle populations (Kochert et al. 2002).

Healthy Golden Eagle populations require ample scrub habitat that supports prey species such as jackrabbit (Kochert et al. 2002). Therefore, park managers can ensure the maintenance of such habitats where they exist in SIEN parks through active fire suppression when needed to limit fire size and restoration of shrubs following burns (Kochert et al. 2002). Specialized surveys for Golden Eagles in and around SIEN parks would help to identify important nesting and foraging sites in the central and southern Sierra Nevada. Where nests are found within the SIEN parks, recreational activities should be restricted during the breeding season to prevent nest failures. Finally, park managers should ensure that power lines passing through SIEN parks are designed to prevent electrocution of perching eagles. Best practices for preventing raptor electrocutions can be found at the Avian Power Line Interaction Committee website (http://www.aplic.org/).

Golden-crowned Kinglet – *Regulus satrapa*

Migratory Status
Resident/short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Golden-crowned Kinglet is a common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and a fairly common year-round resident and probable breeder at Devils Postpile National Monument (Table 1).

Table 1. Breeding status and relative abundance of Golden-crowned Kinglets in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Common
Devils Postpile NM	Year-round	Probable Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Golden-crowned Kinglet formerly bred only in remote, boreal forests of North America but has been expanding its breeding range southwards in eastern North America (Ingold and Galati 1997). This species is very common in the Sierra Nevada, which is likely very important to the subspecies *amoenus* (Siegel and DeSante 1999).

Distribution and Habitat Associations
Golden-crowned Kinglets favor mature, shady mixed coniferous and fir forests, foraging high in the canopy (Siegel and DeSante 1999). Golden-crowned Kinglets were detected in high or fairly high numbers (Table 2) along survey transects (Figures 1 and 2) in all SIEN parks during avian inventory surveys. Park inventories show greatest densities of these birds in several types of true fir and Mixed Conifer forests within both SEKI and YOSE (Table 2).

Table 2. Number of Golden-crowned Kinglets recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	372	511	Giant Sequoia Forest	1.56	2.92 (1.61-5.28)
			Red Fir/White Fir Forest	1.34	2.54 (1.40-4.62)
			White Fir/Sugar Pine Forest	1.13	2.01 (1.11-3.73)
			Red Fir Forest	0.91	1.67 (0.91-3.07)
			Jeffrey Pine Woodland	0.43	0.82 (0.41-1.63)
Yosemite NP	494	719	Giant Sequoia	1.43	
			White Fir	1.10	
			Red Fir	1.01	
			White Fir/Mixed Conifer	0.88	
			Douglas-fir/Mixed Conifer	0.44	
Devils Postpile NM	5	5	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

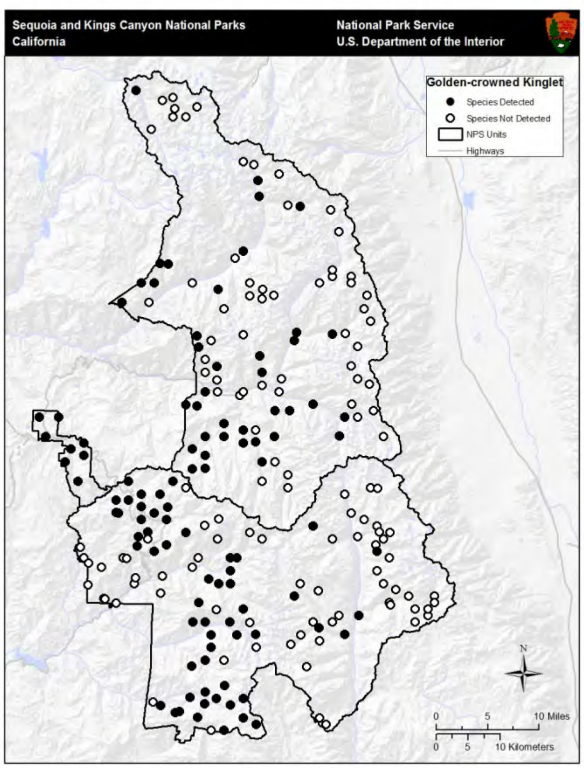

Figure 1. Bird survey transects where Golden-crowned Kinglet was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

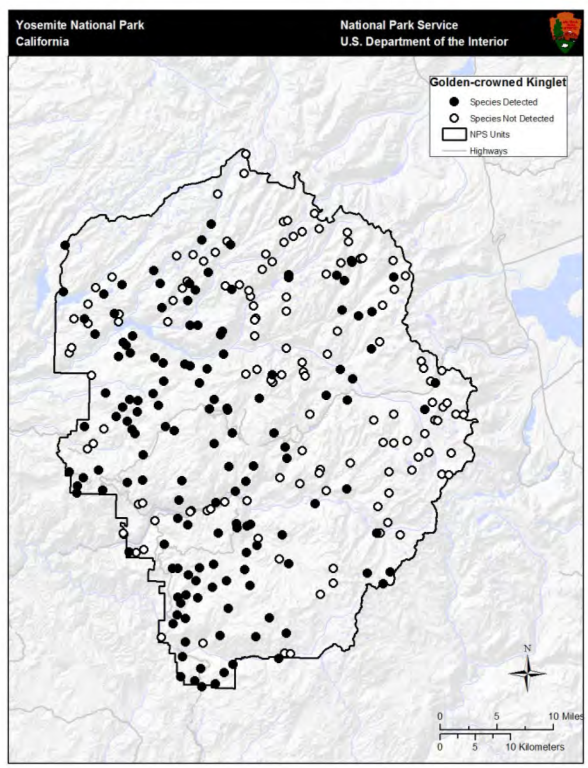

Figure 2. Bird survey transects where Golden-crowned Kinglet was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Golden-crowned Kinglet was detected at middle elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Golden-crowned Kinglet in SEKI was 2268 m, with 95% of observations occurring between 1727 and 2923 m. In YOSE, the mean elevation of observations was 2154 m with 95% of observations falling between 1452 and 2768 m (Siegel et al. 2011).

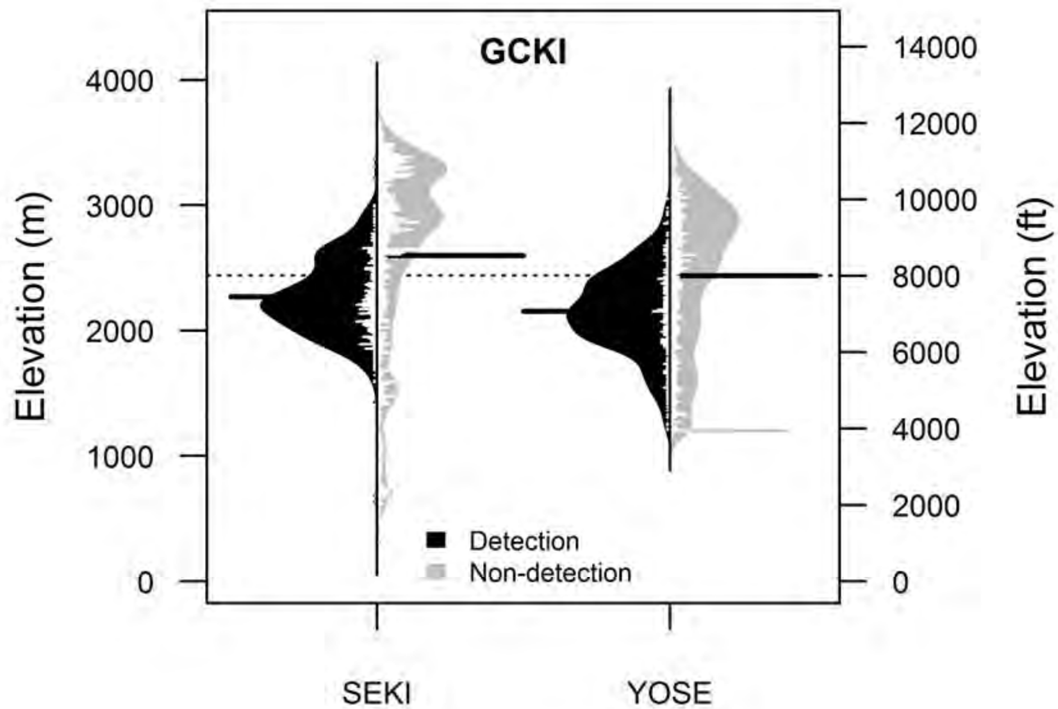

Figure 3. Elevational distributions of sites where Golden-crowned Kinglet (GCKI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Golden-crowned Kinglets are twice as abundant along routes in the Sierra Region (BCR 15) than in California as a whole (Table 3). The Golden-crowned Kinglet was very abundant along the route in Yosemite NP, but experienced a significant decline there from 1974-2007 (Table 3). A nearly significant steep population decline also was observed along the BBS route in Kings Canyon NP. Overall, the species declined in California at a rate of 2.6% per year from 1966-2007.

Table 3. Relative abundance and trends for Golden-crowned Kinglet according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). See Methods for an explanation of calculations. Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	69	2.72	-2.6	0.02
	1980-2007			-1.9	0.25
Sierra Nevada (BCR 15)	1966-2007	31	5.70	-3.0	0.04
	1980-2007			-3.0	0.33
Route 14117 – Sequoia NP	1972-2005	1	4.50	+16.1	0.50
Route 14132 – Kings Canyon NP	1974-2005	1	0.90	-22.0	0.07
Route 14156 – Yosemite NP	1974-2007	1	12.85	-5.7	0.03

Mark-recapture data from mist nets at SIEN MAPS stations indicate a significant increasing reproductive trend in Yosemite NP from 1993-2009 (Table 4). No significant population trends were recorded, but non-significant declines were observed at Yosemite, perhaps suggesting successful reproduction but poor recruitment into the adult population.

Table 4. Population trends, productivity, trends, and survival estimates of Golden-crowned Kinglet at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	2.6	+10.00	0.15	NA	NA
Yosemite NP	1993-2009	4.1	-5.23	3.33	+10.86***	0.231 (0.102)
Devils Postpile NM	2002-2006	0.0	NA[2]	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

The Golden-crowned Kinglet has been decreasing throughout the Sierra Nevada and perhaps the SIEN parks for the past several decades (Table 3). Major threats to the species in the Sierra include logging practices and high-intensity fire that eliminate or reduce tree density and canopy of mature and old forests. Management of forest stands for pure pine also negatively impacts Golden-crowned Kinglets (CalPIF 2002). Extreme winters such as those seen during El Niño years may cause massive mortality from which populations of this diminutive bird may take a long time to recover (Siegel and DeSante 1999), although productivity appears to be high (Table 4). Avian influenza and Brown-headed Cowbirds may be adversely impacting populations of this kinglet as well.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Golden-crowned Kinglet has significantly shifted in latitude over the past 40 years, but only about 87 miles to the north (Audubon 2009). Modeled distribution shifts of Golden-crowned Kinglet predict a lower probability of occurrence in the northern Sierra but a higher probability of occurrence at higher elevations in the southern Sierra, including the SIEN parks (Stralberg and Jongsomjit 2008). Golden-crowned Kinglet currently occurs at mid-elevations in SIEN parks (Figure 3) and may colonize higher elevations with climate warming. This species should persist only as long as dense, old fir and Mixed Conifer forests are available at higher elevations.

Altered Fire Regimes: Golden-crowned Kinglets are adversely impacted by high-intensity fire throughout their range. Hutto (1995) reported very few studies that detected this species either in early or mid-successional burned or clearcut forests in the Rocky Mountains. The kinglet declined in relative abundance after fire in Montana (Smucker et al. 2005) and was only detected in mature forests and not in recent, old, or repeatedly burned forests in Oregon (Fontaine et al. 2009). Golden-crowned Kinglets were only observed on unburned plots – in high numbers – during two post-fire sampling periods a burned landscape in the eastern Sierra (Bock and Lynch 1978). In the same eastern Sierra burned landscape for up to 25 years after fire, this species only bred on unburned plots (Rafael et al. 1987). Golden-crowned Kinglets were significantly more abundant in unburned forests in burned landscapes of the southern Sierra (Siegel and Wilkerson 2005) and the northern Sierra (Burnett et al. 2010), although they were detected in burned areas, suggesting enough green forests remained to support the species. These results suggest than an increase in future extent and frequency of high-intensity fire is likely to adversely affect Golden-crowned Kinglets.

Habitat Fragmentation or Loss: Logging likely poses one of the largest threats to the Golden-crowned Kinglet in the Sierra Nevada, particularly given that this species favors true fir and Mixed Conifer forests which are most subject to timber harvest. Studies have documented adverse effects of logging (Ingold and Galati 1997). In addition to clearcutting, the species is sensitive to habitat degradation due to forest thinning; detections decreased significantly in thinned compared to untreated stands in Douglas-fir forests in Oregon (Hayes et al. 2003). Clearcutting and thinning are widespread in the Sierra Nevada, but absent from SIEN parks, thus the parks may represent important habitat refugia for the kinglet in the mountain range.

Invasive Species and Disease: Golden-crowned Kinglets are susceptible to brood parasitism by Brown-headed Cowbirds. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Avian influenza virus (AIV) is known to mutate and cross the species barrier to infect humans, and is thus an important public health issue (Fuller et al. 2010). A recent study (Fuller et al. 2010) documented 50% of Golden-crowned Kinglets were AIV positive – the highest prevalence among the Passeriformes tested. Since passerines share the same habitat as poultry, they may be effective transmitters of the disease.

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for Golden-crowned Kinglets, at least locally where grazing is permitted, because it can attract Brown-headed Cowbirds. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Management Options and Conservation Opportunities

Golden-crowned Kinglets will benefit from ecosystem management in the SIEN parks that protects and maintains mature and old true fir and mixed conifer forests. The species can persist in burned landscapes as long as enough green forest matrix remains; thus the species would likely be resilient to restoration of fire regimes that include all fire intensities, but with relatively smaller patches of high-intensity burn. Thinning operations should be avoided in areas where kinglets are thriving. Park managers can also manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. Guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

MAPS station operation and other means of monitoring Golden-crowned Kinglet populations in the parks should continue in order to resolve whether population declines are indeed occurring, and if so, to determine their causes.

Golden-crowned Sparrow – *Zonotrichia atricapilla*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Golden-crowned Sparrow is a common winter resident in Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks. The species is not reported from but may occasionally migrate through Devils Postpile (DEPO) National Monument (Table 1).

Table 5. Breeding status and relative abundance of Golden-crowned Sparrows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Winter	Non-Breeder	Common
Yosemite NP	Winter	Non-Breeder	Common
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants and/or wintering birds undoubtedly occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G4 – Apparently Secure (Uncommon but not rare)
- National Status: N4 – Apparently Secure (Uncommon but not rare)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Bird Species of Conservation Concern
- CA Department of Fish and Game Status: Not listed

Range Significance
The Golden-crowned Sparrow breeds in Alaska, Yukon Territory, extreme southwest Northwest Territories, British Columbia, and mountains of western Alberta (Norment et al. 1998). In California, the Golden-crowned Sparrow spends its winter in the western half of the state, throughout foothills and lowlands, and is less common in the Sierra Nevada (Norment et al. 1998). Thus, the Sierra and SIEN parks are not very important for this species (Siegel and DeSante 1999).

Distribution and Habitat Associations
The Golden-crowned Sparrow breeds in the forest-tundra ecotone and shrubby tundra habitats in Alaska and Canada. On wintering grounds, this species is often found in or near dense riparian thickets of willow, cottonwood, or poison oak, but is also common in urban parks and gardens (Norment et al. 1998). This sparrow prefers areas that are moister and less open than areas preferred by the congeneric White-crowned Sparrow or the Dark-eyed Junco (Davis 1973, Norment et al. 1998). Golden-crowned Sparrows were not detected during avian inventory

surveys at any of the SIEN parks because this species generally occurs in California during winter only, and does not breed in the state.

Elevational Distribution

Overwintering Golden-crowned Sparrows are usually found below 900 m in California (Norment et al. 1998).

Abundance, Trends and Demographic Data

Golden-crowned Sparrows were not detected during Breeding Bird Surveys (BBS) or at SIEN MAPS stations, but these surveys are designed for breeding species and this sparrow only winters in California. The species was described as a "locally common to abundant breeder" in south coastal Alaska; a "common breeder" in coastal western and southwestern Alaska; and a "rare breeder" in southwestern and major mountain systems of interior Alaska (Norment et al. 1998). Christmas Bird Count data reveal a slight but significant annual population increase of 1.1% over the past 40 years throughout the species' range (Audubon 2009).

Stressors

The Golden-crowned Sparrow spends its winters in riparian zones, as well as in urban parks and gardens where water is present. It is one of the more abundant winter birds in shrublands and urban margins of California and Oregon valleys, and its habit of foraging on vegetables and flowers in gardens and cultivated fields historically earned it a reputation as a pest (Norment et al. 1998).

Direct loss and fragmentation of riparian habitat in foothills and lowland valleys is likely a significant threat to the Golden-crowned Sparrow's natural winter habitat, although this is not a major concern within the SIEN parks. This species may be impacted by climate change on its breeding grounds as well as its California and Oregon wintering grounds because of its association with dense riparian vegetation.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of wintering Golden-crowned Sparrows has significantly shifted 155 miles to the north and about 4 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms, providing evidence that the Golden-crowned Sparrow has already responded to climate change and will likely continue to shift its range in the coming decades (Audubon 2009).

The Golden-crowned Sparrow breeds in riparian habitat with scattered small conifers and deciduous shrubs at treeline, and in shrubby artic and alpine habitats (Norment et al. 1998). Climate change is most likely to adversely impact high-latitude and high-elevation breeders (Sekercioglu et al. 2008), thus climate change may be a significant risk to the Golden-crowned Sparrow, particularly if its range shifts to higher elevations and its preferred habitat does not accompany the range shift. Wintering habitat in California may be affected if a warming climate causes changes in watershed hydrology that result in alteration or loss of riparian vegetation.

Altered Fire Regimes: Wintering Golden-crowned Sparrows occupy dense, low-elevation riparian zones and urban or suburban parks and gardens. Altered fire regime is not likely to significantly impact the species, although burning of riparian vegetation may cause temporary loss of habitat. Riparian vegetation recovers rapidly after disturbances, however, and often requires periodic disturbances for long-term maintenance (Dwire and Kauffman 2003, Rood et al. 2007). Thus loss of riparian habitat from fire poses only a short-term risk to Golden-crowned Sparrows.

Habitat Fragmentation or Loss: Loss of the Golden-crowned Sparrow's natural riparian habitat due to urbanization and agricultural practices is likely a major threat to the species, but not within SIEN parks. Furthermore, the propensity of these sparrows to occupy urban parks and gardens and frequent bird feeders suggests that they are quite adaptable to some human alteration of habitats, although overall impacts are unknown. Habitat fragmentation or loss due to urbanization and agriculture is not a significant threat to Golden-crowned Sparrows in SIEN parks, although riparian habitat can be degraded by packstock grazing (see *Human Use Impacts*, below).

Invasive Species and Disease: To our knowledge, there are no major threats from invasive species or disease to the Golden-crowned Sparrow within SIEN parks or elsewhere in its range.

Human Use Impacts: Potential loss or damage of riparian vegetation from packstock grazing may impact wintering habitat for Golden-crowned Sparrows in SIEN parks.

Management Options and Conservation Opportunities

The management action that would most benefit overwintering Golden-crowned Sparrows in the SIEN parks is to maintain healthy riparian vegetation. If packstock grazing and/or climate change leads to degradation of riparian habitat, active restoration could benefit wintering Golden-crowned Sparrows. Even in the absence of clear effects of climate change, restoration of natural hydrologic processes and deciduous riparian vegetation where it has been degraded would ensure habitat for Golden-crowned Sparrows and other riparian-dependent bird species.

Gray-crowned Rosy-Finch – *Leucosticte tephrocotis*

Migratory Status
Resident/Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Gray-crowned Rosy-Finch is a fairly common year-round or summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, but was not recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 6. Breeding status and relative abundance of Gray-crowned Rosy-Finches in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Gray-crowned Rosy-Finch breeds in tundra and high-alpine habitats of northern and montane western North America, specifically in the Brooks, Rocky, Cascade, and Sierra Nevada mountain ranges, as well as the Aleutian and Pribilof Islands, and winters in the breeding range and throughout the Great Basin (Macdougall-Shackleton et al. 2000). The subspecies *L.t. dawsoni* is endemic to California, breeding above the treeline in high elevations of the Sierra Nevada from Tulare to Mono counties, but does not occur in the northern Sierra because of the absence of high-country breeding habitat (Siegel and DeSante 1999). Thus, the Sierra in general and the YOSE and SEKI in particular are extremely important to the subspecies.

Distribution and Habitat Associations
Gray-crowned Rosy-Finch breeds in alpine cirques surrounded by cliffs and steep talus slopes (Siegel and DeSante 1999). They forage in alpine and subalpine meadows, alpine tundra, along alpine lakeshores, and on snowbanks and glaciers where they feed on upslope, wind-dispersed insects. In winter the birds migrate down the east slope of the Sierra and forage on barren ground, sagebrush scrub, and open Pinyon-Juniper woodland (Siegel and DeSante 1999). Gray-

crowned Rosy-Finches were detected at moderate to high numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects in SEKI and YOSE but not at DEPO. Detections were concentrated in the higher-elevation eastern portions of the parks (Figures 1 and 2). Park inventories show highest densities of these birds in higher-elevation meadows, but they were also found frequently in Whitebark Pine associations (Table 2).

Table 7. Number of Gray-crowned Rosy-Finches recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	52	124	Higher Elevation Meadow	1.21	1.79 (0.83-3.86)
			Higher Elevation/Sparse Veg.	0.64	1.04 (0.41-2.30)
			Whitebark Pine Woodland	0.31	0.58 (0.32-1.06)
Yosemite NP	41	69	Barren	0.16	
			Whitebark Pine/Lodgpole Pine	0.10	
			Whitebark Pine/Mt. Hemlock	0.10	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

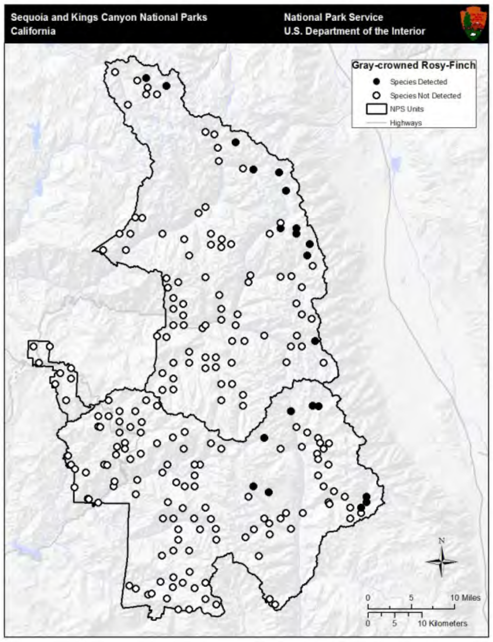

Figure 3. Bird survey transects where Gray-crowned Rosy-Finch was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

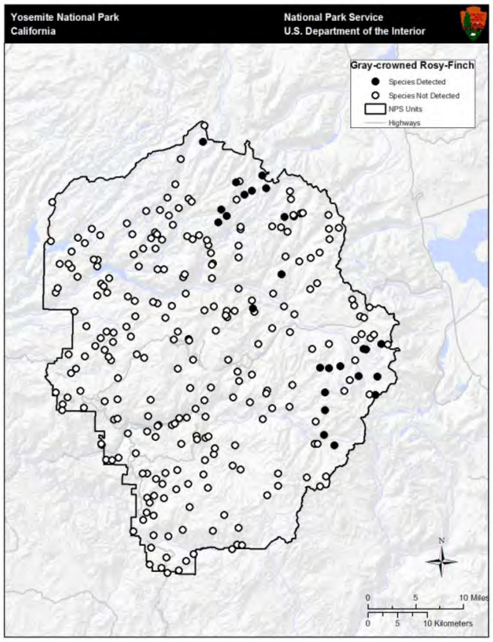

Figure 4. Bird survey transects where Gray-crowned Rosy-Finch was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Gray-crowned Rosy-Finch was detected at high elevations in SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations for this species at SEKI was 3408 m, with 95% of observations occurring between 3134 and 3570 m. In YOSE, the mean elevation of observations was 3228 m with 95% of observations falling between 2875 and 3653 m (Siegel et al. 2011).

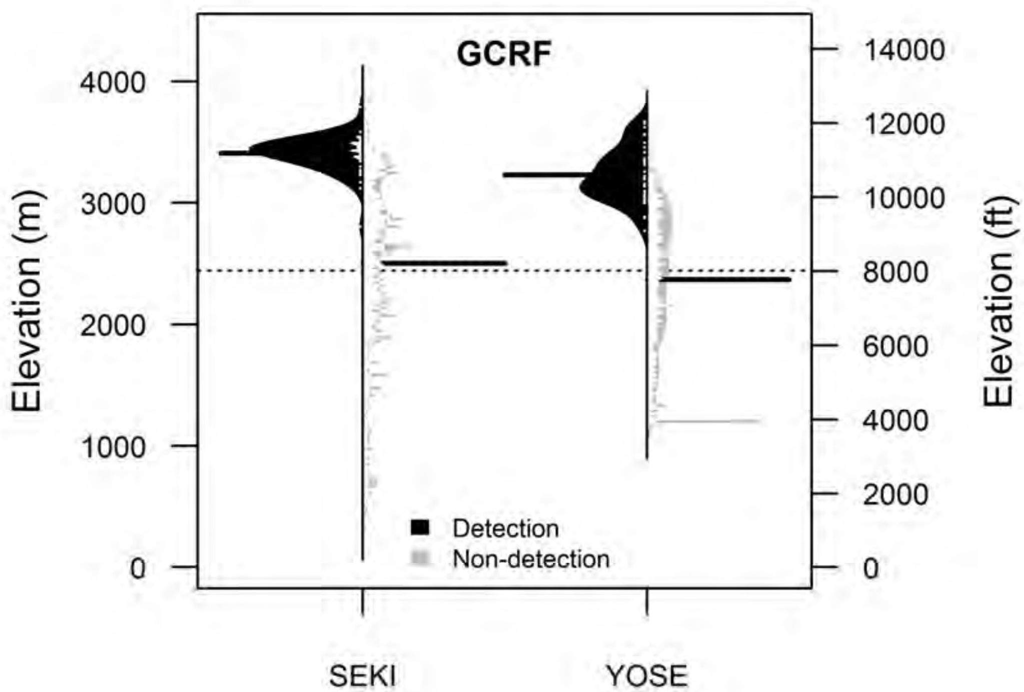

Figure 2. Elevational distributions of sites where Gray-crowned Rosy-Finch (GCRF) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) survey routes provide very poor coverage of high-elevation habitats, including subalpine forest and true alpine habitats. No Gray-crowned Rosy-Finches were detected on any BBS routes in California, thus abundance and population trend data are not available. Similarly, SIEN MAPS stations are not located in high-elevation habitats, and no Gray-crowned Rosy-Finches were captured in mist nets. Thus, no productivity or survival estimates are available for this species in SIEN parks.

Stressors

Gray-crowned Rosy-Finches may be the highest-altitude breeding bird in North America (Macdougall-Shackleton et al. 2000). From 40-50% of high-alpine habitats could be invaded by non-alpine vegetation by 2050 due to climate change (Franco et al. 2006, Hayhoe et al. 2004), although effects on these finches of invading vegetation into breeding grounds are unknown.

Stocking of non-native trout in alpine lakes of the Sierra Nevada may have contributed to historical population declines of the Gray-crowned Rosy-Finch and is a potentially significant threat (Epanchin et al. 2010). Urban development and agriculture in the Great Basin may have adversely impacted over-wintering habitats, although the nomadic nature and broad habitat use of Gray-crowned Rosy-Finches in these areas may mitigate impacts.

Climate Change: New tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. In addition to evaluating sensitivity, vulnerability assessments also incorporate climate change predictions, providing modeled, spatially explicit estimates of vulnerability. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Gray-crowned Rosy-Finch received a sensitivity score of 38.78 (UW 2010), suggesting moderate sensitivity to the threat. Certainty of results was listed as 13.75 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Gray-crowned Rosy-Finch's sensitivity to climate change was its need for high-elevation habitat (UW 2010).

Gray-crowned Rosy-Finch is one of the few bird species to breed in high-alpine regions of the Sierra Nevada (Epanchin et al. 2010). This species exhibits a specialized physiology that may render it susceptible to changes in temperature, precipitation, and oxygen levels that could occur in high-elevation areas as a result of climate change (UW 2010). Thus, climate change has the potential to significantly impact Gray-crowned Rosy-Finches. For example, loss of snowpack may reduce insect prey and warmer temperatures may cause other species to encroach on the finch's breeding habitat (UW 2010). Conversely, increasing temperatures may allow Gray-crowned Rosy-Finches to conserve more energy on breeding grounds, allowing them to reduce foraging activities or giving them the ability to produce more than one brood per year (UW 2010). In general, more research on the observed and potential impacts of climate change on Gray-crowned Rosy-Finches is needed (UW 2010).

Altered Fire Regimes: Fires do not typically affect the high-alpine breeding habitats of the Gray-crowned Rosy-Finch in the SIEN parks or elsewhere in its range. Their wintering habitat is generally in open country with areas of bare ground, including mountain meadows, shrublands, roadsides, towns, cultivated areas, rocky hillsides, and margins of dry ditches (Macdougall-Shackleton et al. 2000); thus, fire probably does not affect over-wintering habitat either.

Habitat Fragmentation or Loss: Habitat fragmentation and loss probably do not pose a threat to Gray-crowned Rosy-Finches in the SIEN parks or elsewhere in the species' range aside from potentially minor impacts of development and agriculture on the over-wintering grounds.

Invasive Species and Disease: Stocking of non-native trout into high-alpine lakes is a potentially significant impact on the Gray-crowned Rosy-Finch from human use of an invasive species (Epanchin et al. 2010). Significantly more finches were observed foraging at alpine lakes without fish than fish-containing lakes, and number of foraging birds was correlated to the number of mayfly nymphs collected. While Gray-crowned Rosy-Finches eat seeds as well as insects, adults commonly feed insects to their young because they are high-quality, protein-rich, easily assimilated food for chicks (Epanchin et al. 2010). The lack of availability of mayfly prey at many stocked lakes increases travel costs and may decrease breeding success of these finches. Fish were stocked in Yosemite lakes until the early 1970s, and in Sequoia, Kings Canyon, and Yosemite national parks, the proportion of lakes with fish has increased from less than 1% to approximately 35-50% (Knapp 1996). Introduced trout in SIEN parks could be adversely affecting the Gray-crowned Rosy-Finch.

Gray-crowned Rosy-Finches in Alaska were susceptible to avian pox (Trapp 1980) but little data are available to determine whether this disease poses a threat to finches in the SIEN parks.

Human Use Impacts: For impacts of fish stocking, see *Invasive Species and Disease* above. Human activity is negligible on the breeding grounds, due to the remoteness of these sites. Great Basin habitats east of the Sierra Nevada in which Gray-crowned Rosy-Finches winter have been altered by grazing, agricultural conversion, pesticide use, and some exurban development, but impacts are relatively small and are non-existent in SIEN parks.

Management Options and Conservation Opportunities

The management action that would most benefit Gray-crowned Rosy-Finches in the SIEN parks is the removal of non-native trout from at least a subset of the previously fishless lakes. This management action is already occurring in the SIEN parks to restore Sierra Nevada yellow-legged frog populations in some high-elevation lakes, and these sites could be used to document responses of Gray-crowned Rosy Finch to fish removal. This finch may be greatly impacted by climate change due to its physiological adaptations to cold climates and the high elevation of its breeding habitat. As such, the species' response to changing climate should be closely monitored, although research is hindered by the lack of surveys due to the remoteness of the breeding grounds; the MAPS and BBS programs do not monitor this species in the Sierra, and virtually nothing is known about population trends or demographics.

Great Blue Heron – *Ardea herodias*

Migratory Status

Short-distance migrant (Butler 1992)

Residency and Breeding Status

Great Blue Heron is a rare summer visitor to Sequoia and Kings Canyon (SEKI) National Parks and to Devils Postpile (DEPO) National Monument. The species is an uncommon summer visitor to Yosemite (YOSE) National Park (Table 1).

Table 8. Breeding status and relative abundance of Great Blue Herons in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Primarily Summer	Non-Breeder	Rare
Yosemite NP	Primarily Summer	Non-Breeder	Uncommon
Devils Postpile NM	Primarily Summer	Non-Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Great Blue Heron is widespread throughout North America and California, but is not often found in the Sierra Nevada Mountains (Butler 1992), making SIEN parks unimportant to the species' greater range.

Distribution and Habitat Associations

Great Blue Herons frequent water bodies such as ponds, lakes and reservoirs as well as fields and boggy meadows (Gaines 1992). Great Blue Herons were detected rarely (Table 2) along a few survey transects (Figure 1) during avian inventory projects at SEKI and were not observed during surveys in YOSE or DEPO. However, the species was detected in YOSE away from survey transects during the same period. Habitat associations for the species are not available from inventory data.

Table 9. Number of Great Blue Herons recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	3	3	NA[1]	NA	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

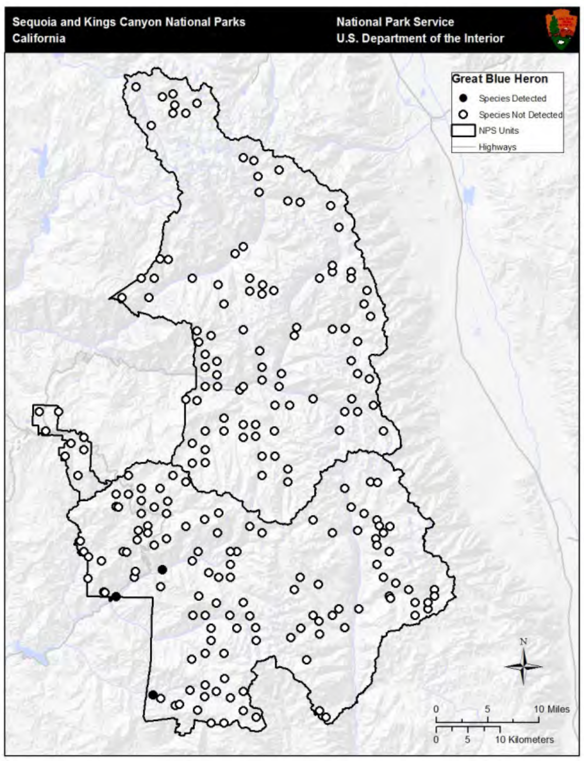

Figure 5. Bird survey transects where Great Blue Heron was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

Great Blue Heron was observed within the lower-elevations of SEKI but not YOSE during avian inventory surveys (Figure 2). The mean elevation of observations of Great Blue Heron in SEKI was 872 m (Siegel et al. 2011).

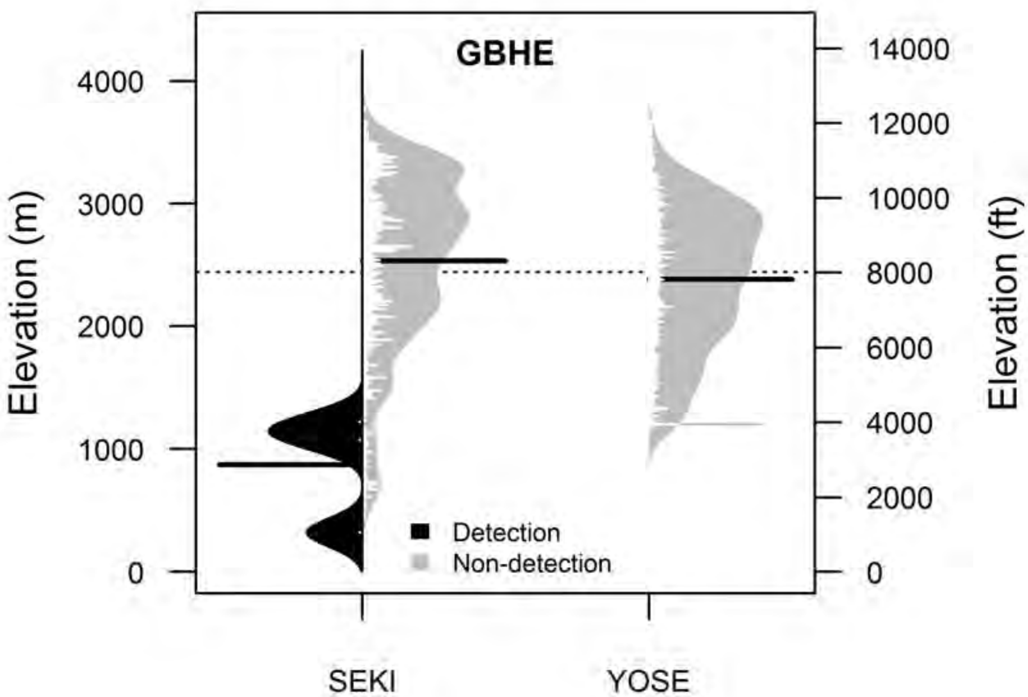

Figure 2. Elevational distributions of sites where Great Blue Herons (GBHE) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Great Blue Herons are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at SEKI, but not on the YOSE route. A significant negative trend (but nevertheless based on very few detections) was observed on the Sequoia route during 1972-2005 (Table 3).

Table 10. Relative abundance and trends for Great Blue Heron according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	102	0.90	+0.9	0.27
	1980-2007			-0.6	0.58
Sierra Nevada (BCR 15)	1966-2007[1]	8	0.11	+29.2	0.12
	1980-2007[1]			+12.3	0.28
Route 14117 – Sequoia NP	1972-2005	1	0.19	-72.9	0.00
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Great Blue Herons are generally not captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Loss of nesting habitat, human disturbance during the breeding season, and the presence of environmental contaminants can lead to reduced reproductive success of the Great Blue Heron. Such threats may affect SIEN populations of Great Blue Herons to a small degree, but are of greater concern elsewhere in the species' range. West Nile Virus affects the species to some extent and could pose a threat within the SIEN parks if the disease becomes more prevalent there. Finally, climate change and altered fire regimes may have some negative impact on Great Blue Heron, but more study is needed.

Climate Change: An analysis of Christmas Bird Count data does not show a significant latitudinal shift over the past 40 years, but does show a shift of the species' center of abundance inland by 54.1 miles (Audubon 2009). Inland areas generally experience cooling winters, thus a shift in this direction suggests that the Great Blue Heron may be adapting to climate warming. However, without a corresponding northward shift, evidence that the species has responded to recent climate change is not strong.

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Great Blue Heron received a sensitivity score of 39.80 (UW 2010), suggesting moderate sensitivity to the threat. Certainty of results was rated as 40 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Great Blue Heron's sensitivity to climate change was its need for specialized habitat (UW 2010).

Great Blue Herons are found in the lower elevation of SIEN parks (Figure 3), but not commonly. If climate change causes the species' range to shift upward as is generally expected, the parks may experience a great number of occurrences of the species in the future, at least around water bodies.

Altered Fire Regimes: Great Blue Herons do not frequent forests or other habitats that are likely to be most affected by altered fire regimes. Where fires impact habitat bordering water bodies used by the species, herons will be impacted locally and in the short-term, but this is not likely to be a major threat to the species.

Habitat Fragmentation or Loss: Loss of nesting trees along waterways either due to human removal or natural disturbance can reduce Great Blue Heron nesting success (Henny and Kurtz 1978, Skagen et al. 2001). However, where natural nesting sites have been lost, Great Blue Heron have been observed nesting on human structures isolated from disturbance. Such observations suggest that man-made platforms may be used to supplement limited habitat (Henny and Kurtz 1978). Loss of nesting habitat is less of a concern within SIEN parks as it is elsewhere in the species' range.

Invasive Species and Disease: A single dead Great Blue Heron was documented as being infected by West Nile Virus in California during 2009 (CDPH 2010). This record shows that the species is at least minimally susceptible to the disease, but that West Nile Virus is not likely to be a major threat.

Human Use Impacts: Great Blue Herons are susceptible to environmental contaminants, especially DDT (and its metabolite DDE), which can lead to eggshell thinning and reproductive failures (Butler 1992). Although DDT is no longer used within the U.S. and concentrations of DDE are in decline, other contaminants such as PCBs and mercury still threaten the Great Blue Heron (Harris et al. 2003, Champoux et al. 2006). Furthermore, reproductive success can be reduced due to human disturbance near nesting sites, especially disturbance from activities such as road building and logging. Studies suggest a 300 m human activity buffer to prevent nest failures (Butler 1992). Threats of environmental contaminants and human disturbance are less prevalent within SIEN parks as in other areas, but still exist within the parks to a lesser degree.

Management Options and Conservation Opportunities

Protection of nesting, feeding, and wintering grounds are likely most important for the conservation of the Great Blue Heron (Butler 1992). In addition to habitat protection a reduction in environmental contaminants in the San Joaquin Valley would benefit Great Blue Herons that visit the SIEN parks. However, due to the rarity of Great Blue Heron within the SIEN parks and because most threats to the species occur outside park boundaries, there is little park managers can do to contribute to the conservation of this species.

Great Gray Owl – *Strix nebulosa*

Migratory Status

Resident (Siegel and DeSante 1999)

Residency and Breeding Status

Great Gray Owl is a rare year-round resident and regular breeder at Yosemite (YOSE) National Park, and is occasionally detected in Sequoia and Kings Canyon (SEKI) National Parks although no breeding has been documented there (Table 1). Great Gray Owls move downslope to lower-elevation meadows and forest openings during the winter. The owl has not been reported at Devils Postpile (DEPO) National Monument but occasionally may migrate or disperse through the area.

Table 11. Breeding status and relative abundance of Great Gray Owls in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Non-Breeder	Accidental
Yosemite NP	Year-round	Regular Breeder	Rare
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N4 – Apparently Secure (Uncommon, but not rare)
- California Status: S1 – Critically Imperiled (Very high risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Subspecies not listed
- CA Department of Fish and Game Status: State endangered

Range Significance

The Great Gray Owl's range in North America is limited to parts of the boreal forest in Canada, Alaska, and the northern midwestern states, with local populations in south-central and northeastern Oregon, southeastern Idaho, northwestern Wyoming, and YOSE and environs (Bull and Duncan 1993). The majority of recent sightings and breeding records from the Sierra Nevada are from YOSE and immediately adjacent areas (Siegel 2001 and 2002, Maurer 2004, 2006, Siegel 2006). Recent genetic work by Hull et al. (2010a) has revealed that the YOSE population of Great Gray Owls has been demographically isolated from other *S. nebulosa* populations for an extensive period of time, and the authors recommend designating a separate subspecies *S. n. yosemitensis* for the Sierra Nevada lineage. Genetic diversity also was extremely low for this subspecies, which is typical of recent population bottlenecks and likely attributable to habitat loss and fragmentation (Hull et al. 2010a). The Sierra population of Great Gray Owl is small and of relatively little importance to the species as a whole, however, given that *S. n. yosemitensis* is essentially restricted to YOSE and immediate environs, this park is unequivocally imperative for the conservation of this subspecies (Siegel and DeSante 1999, Hull et al. 2010a).

Distribution and Habitat Associations

Throughout North America, the Great Gray Owl occupies a broad array of forest types, from subalpine coniferous forests through dense boreal and montane coniferous forests to stunted forests transitional to arctic tundra (Johnsgard 1988). In the Sierra Nevada, the owls require extensive, densely vegetated wet or moist meadows margined by old-growth coniferous forest from the Mixed Conifer through the Red Fir to the lower Lodgepole Pine zones (Siegel and DeSante 1999). Great Gray Owls breed in conifer stands with large snags and high canopy closure in the immediate vicinity of a montane meadow. The vast majority of known nesting sites have been within 250 m of a meadow, with most averaging 150 m from the meadow's edge (Maurer 2006, Siegel 2006). Great Gray Owls use existing structures for nests, primarily abandoned stick nests of large hawks and corvids, as well as mistletoe and broom growths, and flat-topped broken snags or stumps with natural depressions (Maurer 2004). A radio-telemetry study estimated an 18-ha core-use 'activity' area focused on meadow boundaries (Riper and van Wagtendonk 2006).

Great Gray Owls were not detected during diurnal avian inventory surveys at any of the SIEN parks, but this is likely due to the low capability of these surveys to detect nocturnal owls. However, several targeted surveys recently have been conducted for Great Gray Owls in YOSE and surrounding forests (Siegel 2001, 2002, Maurer 2004, 2006, Riper and van Wagtendonk 2006, Siegel 2006). These studies confirmed the strong association between Great Gray Owls and meadow habitats.

Elevational Distribution

Bull and Duncan (1993) noted Great Gray Owls breed in the Sierra Nevada from 750 to 2250 m, although Gaines (2008) limited the subspecies' elevation from 1400 to 2300 m.

Abundance, Trends and Demographic Data

Great Gray Owls were not detected during Breeding Bird Surveys (BBS) throughout California, but these surveys are designed for diurnal species and do not adequately detect most owl species. Similarly, Great Gray Owls are not captured at SIEN MAPS stations. However, data on population trends and demographic rates within the parks are available from targeted surveys for this subspecies (Maurer 2004, 2006). Maurer (2006) reported approximately 50 meadows in the Sierra Nevada that Great Gray Owls are known to currently inhabit, including 35 meadows in YOSE, but reproduction has been documented at <20 sites in California during the past decade. Maurer (2006) estimated the current population of *S. n. yosemitensis* at approximately 80 individuals, with the majority of owls and highest densities in YOSE. These surveys suggested no detectable population changes in YOSE and environs over the past few decades, but did suggest possible declines in California outside this area since earlier times, likely due to loss and fragmentation of old-growth forests.

Stressors

Maurer (2004, 2006) provides a thorough assessment of population status and threats to the Great Gray Owl in YOSE and surrounding area. Historical and current logging of mature and old coniferous forest and livestock grazing has reduced suitable breeding and foraging habitat throughout the Sierra Nevada, although these are no longer significant threats to the owls in SIEN parks.

Relatively high levels of resource protection within YOSE probably have allowed the subspecies to persist there while it declined or disappeared from other parts of the Sierra Nevada. However, human activity and development in meadow systems within YOSE clearly continue to have negative effects on the Great Gray Owl. Impacts include recreational hiking and skiing trails, roads, campgrounds, and other facilities. Artificial noise and lights and automobile traffic adversely impact Great Gray Owl survival, occupancy, foraging success, and reproductive success (Maurer 2006). Vehicle collisions in particular pose a significant risk for Great Gray Owls, particularly at Crane Flat, and may be rendering that breeding territory into a local population sink. Human presence in meadows, primarily birders, disrupts Great Gray Owl foraging behavior, which reduces foraging success and compromises breeding success (Maurer 2006).

Climate Change: Great Gray Owls breed in mid-elevation Red Fir, Mixed Conifer, and Lodgepole Pine forest types but migrate downslope during winter (Riper and van Wagtendonk 2006). They are strongly associated with moist or wet meadows in both their breeding and wintering ranges. If climate change results in drier meadows for a longer portion of the breeding season, and adversely impact vole and gopher populations, foraging and reproductive success of Great Gray Owls may be reduced.

Altered Fire Regimes: Fire effects on Great Gray Owls are largely unknown, although Riper and van Wagtentonk (2006) reported a radio-tagged female continued to use an area burned by a large fire at Big Meadow in YOSE. A male Great Gray Owl was consistently detected before and after a prescribed fire at Wawona Meadow, although owl detections shifted to the other side of the meadow and no detections occurred within the post-burn perimeter during the year of the fire (Maurer 2006). High-intensity fire may eliminate currently suitable nest sites and dense forest structure, but in turn may create suitable nesting snags for future use. Pocket gophers and voles are both important prey items in YOSE; the extent that fire in meadows enhances or reduces populations of these small mammals would likely determine the suitability of post-fire foraging habitat. Research is urgently needed on the effects of fire on Great Gray Owls.

Habitat Fragmentation or Loss: Habitat fragmentation or loss due primarily to logging has been implicated in the loss of Great Gray Owls from most of the Sierra Nevada (Maurer 2004, Hull et al. 2010a), but is not a significant threat in SIEN parks. In fact, the owls likely persist in and around YOSE due to the significant habitat protections afforded by the park. However, because the subspecies moves downslope in winter, it is vulnerable to exurban development along the western edge of Yosemite.

Invasive Species and Disease: West Nile Virus, which has caused high levels of mortality in many North American hawks and owls, was not detected in Great Gray Owls in the Sierra

Nevada (Hull et al. 2010b, Keane et al. 2011). To our knowledge, there are no major threats of invasive species or disease to this species.

Human Use Impacts: Grazing of mid-elevation meadows is a major threat and probable contributor to the very low current population size of *S. n. yosemitensis*. Grazing thins the vegetation and makes the meadow more attractive to Great Horned Owls, which tent to exclude Great Gray Owls (Siegel and DeSante 1999). Moreover, removal of plant cover, either by fire, grazing, mowing, or other means, may reduce the abundance of many species of rodents. For example, grazed areas had lower values of meadow habitat variables associated with vole density (Maurer 2006). Packstock grazing within the parks is a potential concern for Great Gray Owls, at least locally where grazing is permitted. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized (Siegel and DeSante 1999). Nonetheless, given the critically endangered status of this owl, all possible threats should be monitored closely in SIEN parks.

Despite the lack of grazing in the SIEN parks, other human-use impacts to meadows likely are a significant threat to the critically imperiled population of Great Gray Owls in California. Maurer (2004, 2006) described many ongoing human impacts to meadows occupied by Great Gray Owls in YOSE. For example, impacts at Crane Flat meadow include birders who flush foraging owls, several visitor and employee facilities such as a campground, store, gas station and related operations, parking lots and park staff housing, Yosemite Institute environmental education facility and operation, automobile traffic and road maintenance operations, fuels management projects including prescribed fires, hazard tree removal, and associated noise and lighting. Mauer (2004) recommended that the impacts to Great Gray Owls of these human developments and activities at Crane Flat and at other high-use meadows, such as Aspen Valley, Hodgdon, and Wawona, should be assessed and minimized.

Collision with vehicles is a very significant source of mortality to Great Gray Owls. In fact, over a 15-year period, at least 14 Great Gray Owls were hit and at least 12 killed by vehicles in the YOSE region (Maurer 2006).

Management Options and Conservation Opportunities

Options for park managers to protect Great Gray Owl populations in the SIEN parks include minimizing human-caused disturbance in recent or active nest stands, including the popular Crane Flat meadow (Maurer 2004, 2006). Fuels control and shrub-removing activities near suitable meadow habitats should be timed to occur outside the breeding period (e.g., after July 1) to minimize any potential adverse impacts to the owl.

Speed limits on roads should be strictly enforced to reduce collisions between Great Gray Owls and vehicles. Park personal, including law enforcement, should receive continued training of the intent of the lowered speed limit (Maurer 2006). As recommended by Maurer, consider posting speed-limit signs that say “Endangered Owl Crossing – slow down” to educate the public about reasons for lowered speed limits. If owl mortality continues unabated, consider constructing speed bumps near meadow habitats.

Another longer-term priority for conserving Great Gray Owls in SIEN parks is to maintain wet and moist meadow habitats surrounded by mature and old-growth coniferous forest. If climate change leads to substantial meadow desiccation and declines in reproductive success, restoration of meadow hydrology could benefit breeding Great Gray Owls. Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites would likely benefit Great Gray Owls and other meadow-dependent bird species.

Finally, Keane et al. (2011) recommend building on recent work with automated recording units (ARUs) and genetic analysis of molted feathers collected during occupancy surveys to identify and monitor the survival, reproduction and recruitment of Great Gray Owls in a cost-effective and minimally intrusive manner.

Great Horned Owl – *Bubo virginianus*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Great Horned Owl is a common year-round resident and regular breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks and an uncommon year-round resident and possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 12. Breeding status and relative abundance of Great Horned Owls in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Common
Devils Postpile NM	Year-round	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Great Horned Owl has the most extensive range, the widest prey base, and the most variable nesting sites of any North American owl (Houston et al. 1998). The species breeds from western and central Alaska, across most of Canada and all of the U.S., and south throughout the Americas to Tierra del Fuego (Houston et al. 1998). The Great Horned Owl's extremely broad distribution throughout North America and the wide variety of habitats it occupies means that the SIEN parks are not critically important for this species (Siegel and DeSante 1999).

Distribution and Habitat Associations
The Great Horned Owl is found in deciduous, mixed, or conifer forests, but prefers open and second-growth temperate woodlands, swamps, orchards, and agricultural areas. Siegel and DeSante (1999) noted that the birds "seem to shun dense old-growth mid-elevation forests and densely vegetated mid-elevation meadows." Great Horned Owls may be a threat to Spotted Owls through competition or predation as new areas are opened up by logging. Conifers are favored over deciduous trees for roosting, and a wide variety of nesting sites are suitable, including stick nests of other birds, snags, large tree hollows, crotches or holes in cacti, cliff ledges, and caves

(Johnsgard 1988). Foraging areas are typically relatively open, but also include some woodlands or groves, or at least scattered trees for perching (Johnsgard 1988).

Only one Great Horned Owl was detected (Table 2) during daytime avian inventory surveys at YOSE, SEKI, and DEPO. One additional owl was detected off-survey at YOSE. These numbers were too low to derive inferences on habitat associations or to estimate density of the species in SIEN parks.

Table 13. Number of Great Horned Owls recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	1	1	NA[1]	NA	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data. Note that owls were not surveyed in the same manner as diurnal species and are not well-represented by the above statistics (see Siegel and DeSante 2002, Siegel and Wilkerson 2004, and Siegel and Wilkerson 2005).

Elevational Distribution

Great Horned Owl was observed within the middle-elevation zone of SEKI during avian inventory surveys (Figure 1). The mean elevation of observations was 2049 m; no confidence interval is available because only one owl was detected (Siegel et al. 2011).

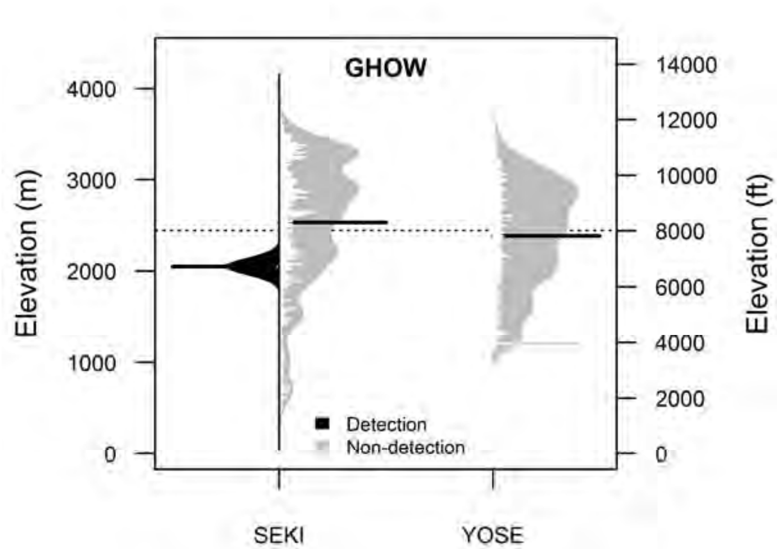

Figure 1. Elevational distributions of sites where Great Horned Owls (GHOW) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions

delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Great Horned Owls are found in lower abundance in the Sierra Region (BCR 15) than in California as a whole. No population trends were observed throughout California as a whole during any of the time periods (Table 3). A significant positive annual trend of 16% was observed in the Sierra Region during 1966-2007 and 1980-2007, but the low detection rates make these results questionable (Table 3). Population increase in the Sierra Nevada may be due to logging that created forest openings. Too few Great Horned Owls were detected in the SIEN parks to estimate population trends.

Table 14. Relative abundance and trends for Great Horned Owl according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	97	0.28	+0.6	0.66
	1980-2007			-2.3	0.32
Sierra Nevada (BCR 15)	1966-2007[1]	16	0.18	+17.8	0.01
	1980-2007[1]			+18.7	0.03
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	NA	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Stressors

Great Horned Owl populations are robust and not in need of targeted management. Climate change, alteration of fire regimes, loss or fragmentation of habitat, invasive species, disease, and human impacts do not appear to be major concerns for the Great Horned Owl within the SIEN parks.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Great Horned Owl has significantly shifted 43 miles south and over 86 miles towards the coast throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). While this evidence suggests that the Great Horned Owl is shifting its range in response to climate change, the species is a generalist, adapts well to habitat changes, and is broadly distributed throughout many habitat types. Therefore, climate change is unlikely to adversely affect Great Horned Owls.

Altered Fire Regimes: No studies have examined effects of fire on Great Horned Owls. High-intensity fire may create forest openings favored by the owls, and increase populations of prey.

Habitat Fragmentation or Loss: Great Horned Owls adapt remarkably well to habitat change as long as nest sites are available (Houston et al. 1998). Increased residential and agricultural developments are important risks, although the species often thrives close to human habitation. On the other hand, forest fragmentation is likely to benefit the species, as long as nest and roost sites and a thriving prey base are available.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Great Horned Owl.

Human Use Impacts: The Great Horned Owl historically was shot as 'vermin,' and this probably remains a small threat today (Siegel and DeSante 1999, Houston et al. 1998). Harassment from increasing crow populations in the lowest foothills may be a risk (Siegel and DeSante 1999).

Secondary poisoning by bio-accumulation of pesticides from contaminated prey may cause death or behavioral changes that lead to death (Houston et al. 1998). This threat is most significant in agricultural areas rather than in SIEN parks. The Great Horned Owl is also vulnerable to collision with vehicles as well as electrocution.

Management Options and Conservation Opportunities

Speed limits on roads should be strictly enforced to reduce collisions between Great Horned Owls and vehicles. Containment of food waste at camp and picnic sites can help control the corvids that harass owls. The Great Horned Owl is a significant predator of smaller forest owls as well as the imperiled California Spotted Owl. As such, the SIEN parks would benefit from quantifying distribution, abundance, and demography of Great Horned Owls during surveys for other owls, to identify potential sources of mortality for rarer owls and inform park managers in developing conservation measures.

Green-tailed Towhee – *Pipilo chlorurus*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Green-tailed Towhee is a fairly common summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) National Parks, an uncommon summer resident and regular breeder at Yosemite (YOSE) National Park, and fairly common summer resident and probable breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 15. Breeding status and relative abundance of Green-tailed Towhees in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Uncommon
Devils Postpile NM	Summer	Probable Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common; widespread and abundant)
- National Status: N5 – Secure (Common; widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Green-tailed Towhee breeds in the Pacific Northwest, Rocky Mountains, Great Basin, California, Texas, and Mexico (Dobbs et al. 1998). The species is much less common in the Sierra than in other parts of its range, thus the Sierra is less important to its overall population (Siegel and DeSante 1999).

Distribution and Habitat Associations
Green-tailed Towhees most commonly utilize dry, shrubby hillsides (shrub-steppe) and post-disturbance shrubby second growth (Dobbs et al. 1998). Green-tailed Towhees on the west slope of the Sierra Nevada are found in montane chaparral, often mixed with sparse coniferous forest in dry sites (Siegel and DeSante 1999). Green-tailed Towhees were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventories in all SIEN parks. After accounting for detection probabilities, park inventories indicate strong associations with Sagebrush/Dwarf Shrubland, Undifferentiated Riparian, and Montane Chaparral in SEKI (Table 2). The species was detected most often in Montane Chaparral and Quaking Aspen in YOSE.

Table 16. Number of Green-tailed Towhees recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	114	177	Sagebrush/Dwarf Shrubland	1.41	1.54 (0.73-3.24)
			Undifferentiated Riparian	0.89	0.73 (0.24-2.16)
			Montane Chaparral	0.65	0.76 (0.37-1.57)
Yosemite NP	51	62	Montane Chaparral	0.15	
			Quaking Aspen	0.14	
			Western Juniper	0.07	
Devils Postpile NM	1	1	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

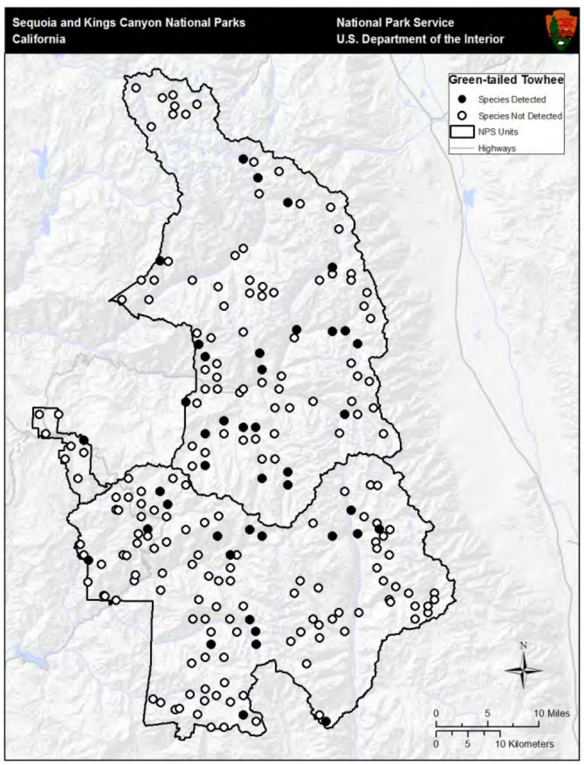

Figure 6. Bird survey transects where Green-tailed Towhee was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

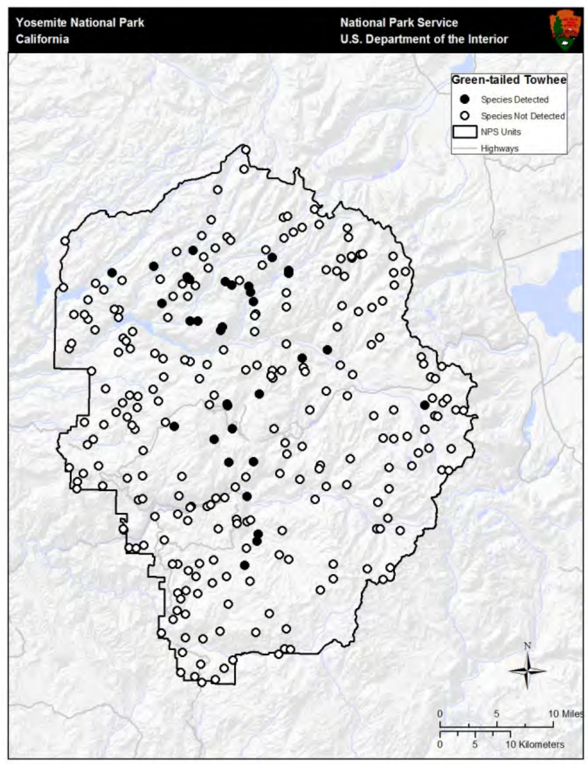

Figure 7. Bird survey transects where Green-tailed Towhee was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Green-tailed Towhee was detected at mid-elevations in SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Green-tailed Towhee at SEKI was 2608 m, with 95% of observations occurring between 1944 and 2992 m. In YOSE, the mean elevation of observations was 2421 m with 95% of observations falling between 1949 and 2783 m (Siegel et al. 2011).

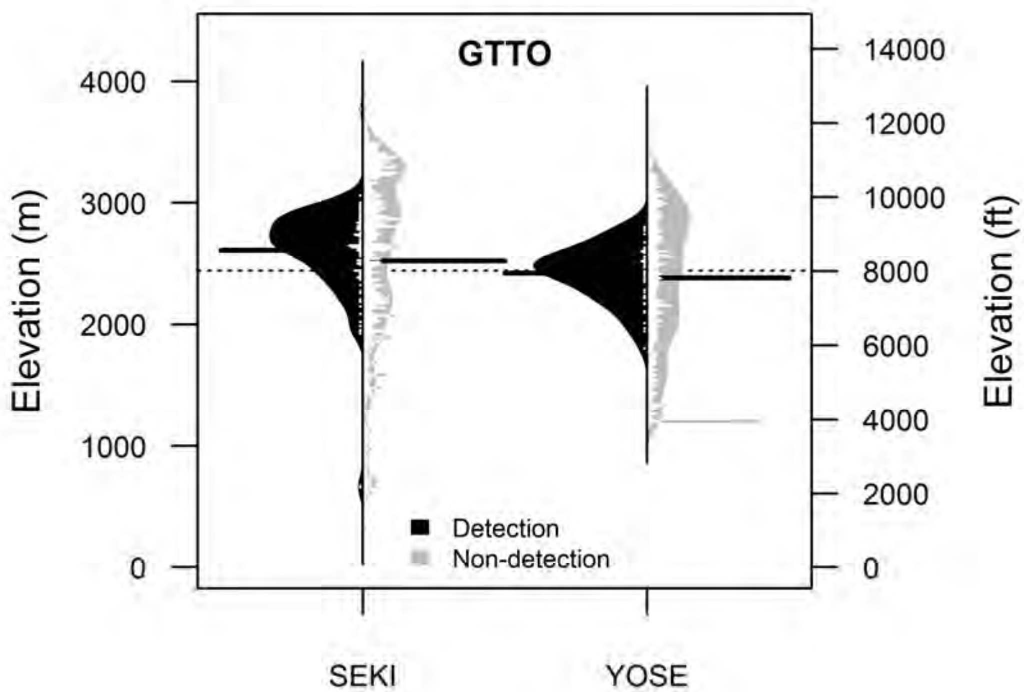

Figure 3. Elevational distributions of sites where Green-tailed Towhee (GTTO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) indicate Green-tailed Towhee is somewhat more abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). The species was less abundant along the BBS routes in SIEN parks. No statistically significant population trends were observed (Table 3).

Table 17. Relative abundance and trends for Green-tailed Towhee according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	57	2.48	+0.9	0.32
	1980-2007			+1.5	0.24
Sierra Nevada (BCR 15)	1966-2007	23	4.15	+0.8	0.48
	1980-2007			+1.5	0.32
Route 14117 – Sequoia NP	1972-2005	1	0.13	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.15	+16.7	0.24
Route 14156 – Yosemite NP	1974-2007	1	0.23	+30.4	0.19

[1]NA - insufficient data; trend analysis requires at least 14 detections (Sauer et al. 2008).

Too few Green-tailed Towhees were captured in mist nets at SIEN MAPS stations to obtain data on productivity, survival, and population trends for this species (Table 4).

Table 18. Population trends, productivity, trends, and survival estimates of Green-tailed Towhee at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.0	NA[2]	NA	NA	NA
Yosemite NP	1993-2009	0.3	NA	0.00	NA	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Stressors

Breeding Bird Survey data suggest no significant population trends over the past 40 years for Green-tailed Towhees in SIEN parks or the Sierra as a whole (Table 3). Breeding Green-tailed Towhees prefer species-rich shrub communities within shrub-steppe habitats, and disturbed and open areas of montane forest, often created by forest fires (Dobbs et al. 1998, see also *Altered Fire Regimes* below). Future increases in high-intensity forest fire are likely to replenish suitable breeding habitat and strongly benefit Green-tailed Towhees, and the restoration of natural fire cycles may be the most effective measure to conserve this species.

Livestock operations, including packstock grazing in national parks, may adversely impact Green-tailed Towhees by degrading montane riparian and meadow habitats used by upslope dispersers and by attracting nest-parasitizing Brown-headed Cowbirds.

Climate Change: An analysis of shifts between the historical range of Green-tailed Towhee (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of the Green-tailed Towhee has shifted significantly northward by 13 miles and inland by 36 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). These observed shifts throughout its range and in the Sierra Nevada in particular suggest the species may have already responded to climate change and will likely continue to shift its range in the coming decades (Audubon 2009).

In SIEN parks, the Green-tailed Towhee was detected most often in shrubby habitats at mid elevations (Figure 3). If climate change causes this towhee's range to move upslope in the Sierra Nevada as is generally expected, the species should persist and thrive in the SIEN parks as long as appropriate shrub habitats expand uphill as well.

Altered Fire Regimes: Studies have consistently found a strong positive effect of fire on Green-tailed Towhees, and several studies only detected this species in burned forests. Green-tailed Towhee nested only on burned forests during surveys of burned and green forests conducted over a 25-year period in the eastern Sierra Nevada (Rafael et al. 1987), and similarly was only observed in burned forests in New Mexico (Kotliar et al. 2007). The species was a strong indicator of habitats burned twice at high-intensity in Oregon, and in fact was completely restricted to these types (Fontaine et al. 2009). The Green-tailed Towhee was detected in both burned and unburned forests in the southern Sierra, but exhibited a preference for 50-year old burned sites (Siegel and Wilkerson 2005). Should fire intensity and frequency increase in the SIEN parks in coming years, the Green-tailed Towhee is likely to strongly benefit.

On the other hand, widespread fire suppression may result in reduced breeding habitat through both degradation of suitable disturbed forest habitat (through forest succession) and limitation of post-fire succession (Dobbs et al. 1998). Fire suppression may potentially limit breeding populations of Green-tailed Towhees in coniferous forests. Policies of prescribed natural fire likely strongly benefit this species in SIEN parks.

Habitat Fragmentation or Loss: Green-tailed Towhees commonly utilize post-disturbance shrubby second growth (Dobbs et al. 1998). Ten percent of studies in the Northern Rocky Mountains examined by Hutto (1995) detected Green-tailed Towhees in mid-successional clearcuts, while no studies reported this species in early-successional clearcuts. Thus, logging may temporarily eliminate habitat but the species can re-occupy cut-over forests once shrubs have re-grown (Siegel and DeSante 1999). Logging, however, does not significantly impact Green-tailed Towhees in SIEN parks.

Invasive Species and Disease: Nest predation or parasitism by Brown-headed Cowbirds may be a serious problem for Green-tailed Towhees (Siegel and DeSante 1999). Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Packstock grazing in SIEN parks may pose a threat to montane riparian and meadow habitats used by upslope dispersers (Siegel and DeSante 1999). However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing in SIEN parks are likely relatively small and localized (Siegel and DeSante 1999). Nonetheless, further research is warranted to determine impacts of packstock on important riparian habitats and cowbird presence in SIEN parks.

Management Options and Conservation Opportunities

The most effective management actions park managers can take to conserve Green-tailed Towhee populations in SIEN parks include restoring natural fire cycles to increase open habitat with dry, shrubby regrowth to provide suitable breeding habitat in high-elevation coniferous regions. Managers also can manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in the SIEN indicates that a trapping program is not warranted (Halterman et al. 1999). However, this assessment is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004)

Hairy Woodpecker – *Picoides villosus*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Hairy Woodpecker is a common year-round resident at all Sierra Nevada Network (SIEN) parks (Table 1).

Table 19. Breeding status and relative abundance of Hairy Woodpeckers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Year-round	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The species is distributed across much of North America including throughout the Sierra Nevada. SIEN populations have only limited importance to the overall range of the species. However, the subspecies *hyloscopus* is limited to the southern Sierra from Yosemite southward, including the coast ranges of southern California, and the mountains of northern Baja California (Jackson et al. 2002). For this subspecies the SIEN parks play an important conservation role (Siegel and DeSante 1999).

Distribution and Habitat Associations
Hairy Woodpeckers occur in mature forests where snags and trees of moderate to large size are found. These habitat characteristics are more important for Hairy Woodpecker occurrence than forest type or elevation (Gaines 1992). Hairy Woodpeckers are found throughout SEKI and YOSE (Figures 1 and 2) and occur commonly in all four SIEN parks relative to other woodpecker species (Table 2). SEKI's avian inventory (Siegel and Wilkerson 2005) found Hairy Woodpeckers in the greatest density within California Black Oak forest. Otherwise the species was found most often in a variety of coniferous forest types within both SEKI and YOSE (Table 2).

Table 20. Number of Hairy Woodpeckers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	63	68	California Black Oak Forest	0.08	0.10 (0.03-0.32)
			Jeffrey Pine Woodland	0.08	0.08 (0.04-0.17)
			Ponderosa Pine/Incense-cedar	0.07	0.06 (0.02-0.20)
Yosemite NP	192	207	Ponderosa Pine	0.20	
			Ponderosa Pine/Mixed Conifer	0.16	
			Giant Sequoia	0.16	
			Douglas-fir/Mixed Conifer	0.12	
			White Fir/Mixed Conifer	0.12	
Devils Postpile NM	4	4	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

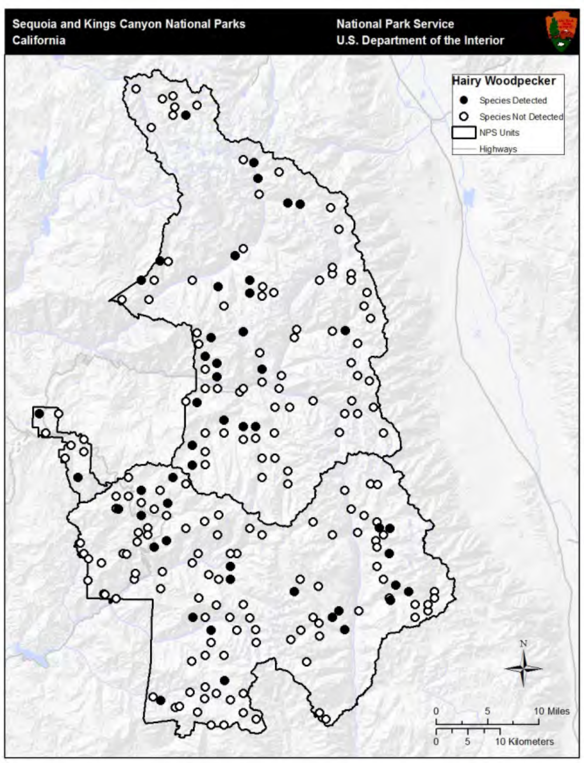

Figure 8. Bird survey transects where Hairy Woodpecker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

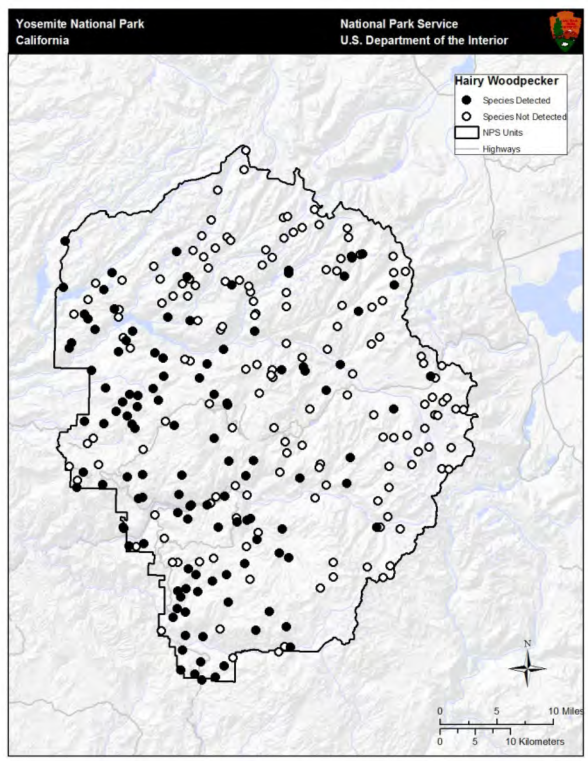

Figure 9. Bird survey transects where Hairy Woodpecker was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Hairy Woodpecker was observed within the mid-elevations of both SEKI and YOSE during avian inventory projects (Figure 3). The mean elevation of observations of Hairy Woodpecker at SEKI was 2502 m, with 95% of observations made between 1620 and 3319 m. At YOSE, the mean elevation of observations was 2043 m with 95% of observations falling between 1219 and 2912 m (Siegel et al. 2011).

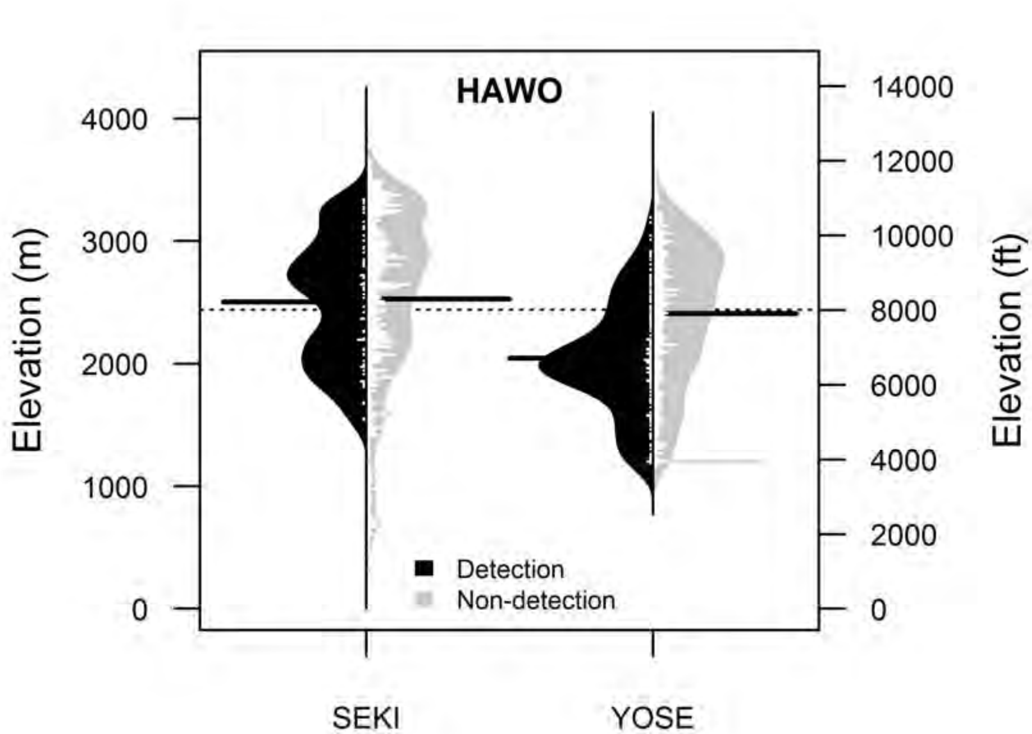

Figure 3. Elevational distributions of sites where Hairy Woodpeckers (HAWO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Hairy Woodpeckers are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole (**Error! Reference source not found.**). They were detected in low numbers on individual BBS routes at YOSE and SEKI. BBS data show no significant population trends in the area of interest.

Table 21. Relative abundance and trends for Hairy Woodpecker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	114	1.01	+0.3	0.67
	1980-2007			-0.3	0.67
Sierra Nevada (BCR 15)	1966-2007	29	1.49	+1.6	0.21
	1980-2007			+0.5	0.69
Route 14117 – Sequoia NP	1972-2005	1	0.69	0.0	1.00
Route 14132 – Kings Canyon NP	1974-2005	1	1.00	+2.3	0.83
Route 14156 – Yosemite NP	1974-2007	1	1.69	-1.1	0.85

MAPS data for Hairy Woodpeckers in YOSE show possibly declining populations (although not statistically significant) at banding stations (Table 4). Stations at SEKI and DEPO show lower adult capture rates and reproductive indices than YOSE, but capture rates are too low to infer trends at these locations. Low capture rates can be attributed both to the species' large territory size and to the fact that SIEN MAPS stations are located in meadows rather than the species' preferred upland forest habitats.

Table 22. Population trends, productivity, trends, and survival estimates of Hairy Woodpecker at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.4	NA[2]	0.17	NA	NA
Yosemite NP	1993-2009	0.8	-3.67	0.86	-0.59	0.554 (0.018)
Devils Postpile NM	2002-2006	0.0	NA	0.02	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Abundance and trend data show a healthy Hairy Woodpecker population across the Sierra Nevada, and inventories of the SIEN parks show that the species is distributed across a wide variety of forest types.

Stressors

Outside of protected forests, Hairy Woodpeckers are most threatened by habitat loss and fragmentation from logging operations, especially clearcutting. However, due to the lack of logging within SIEN parks this is not a major concern. Climate change and competition from European Starlings appear to be minor threats at present, but could pose greater problems to Hairy Woodpeckers in the future, including decreased occurrence of the species within SIEN parks. Frequent fires within the SIEN parks are beneficial to the species and an increase in fire frequency and fire intensity due to climate change could enhance park habitats for the species in the future.

Climate Change: An analysis of Christmas Bird Count (CBD) data suggests that the center of abundance of Hairy Woodpecker has significantly shifted 135.2 miles to the north and 16.8 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Hairy Woodpecker has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Despite observed abundance shifts, the species' extensive range and relatively general use of habitats implies a wide climatic tolerance. As the Sierra Nevada warms, species expanding or moving their ranges upslope could introduce new competition for resources. This is unlikely to be a major problem since Hairy Woodpeckers are found within lower elevation communities as well. However, the location of SIEN parks at the southern edge of Hairy Woodpecker's California range could lead to a decrease in occurrences of the species within the SIEN if its range moves northward as is generally expected of most species.

Altered Fire Regimes: Hairy Woodpecker is reliant upon mature and dead trees of moderate to large size (Gaines 1992) and often selects large dead trees as nest sites in western North America (Jackson et al. 2002). In addition to nesting, this species uses post-fire habitats for foraging (Hanson and North 2008) and has been found to favor areas following high-intensity fires (Kotliar et al. 2007). Increased fire frequency and expansion of post-fire habitats with numerous snags in the parks is likely to benefit Hairy Woodpeckers by providing additional foraging and nesting sites.

Habitat Fragmentation or Loss: Loss of old growth forest as well as forest fragmentation, especially from clearcutting, appear to have caused declines elsewhere in Hairy Woodpecker's range (Jackson et al. 2002), and have even resulted in local extirpations (Marshall 1988). Due to the lack of logging within National Parks, habitat loss and fragmentation should not be considered a major threat within the SIEN.

Invasive Species and Disease: Competition for nesting sites with European Starlings is a possible threat to Hairy Woodpecker reproductive success. However, studies have failed to demonstrate significant negative effects on native cavity nesters, including Hairy Woodpeckers (Koenig 2003) and only one European Starling was observed in SEKI and zero in YOSE during recent avian inventories (Siegel and DeSante 2002, 2005).

Human Use Impacts: Aside from habitat destruction and fragmentation, human activities do not appear to be a major threat to Hairy Woodpeckers.

Management Options and Conservation Opportunities

The maintenance of mature forest and natural fire regimes within SIEN parks is likely the best way to maintain healthy populations of Hairy Woodpeckers. Unnecessary fire suppression and any additional forest fragmentation from park development should be avoided. Where fire treatments are necessary, maximizing snag retention and downed woody debris will help maintain densities of Hairy Woodpeckers (Burnett et al. 2008). If in the future there is a reduction of high-quality Hairy Woodpecker habitat, managers could consider construction of nest boxes as a supplement to natural nesting sites. However, this does not appear necessary at present, and increasing fire frequency may yield more, rather than fewer, snags for nest sites in the future. Despite the apparent health of the species at present, potential future threats such as climate change should be monitored.

Hammond's Flycatcher – *Empidonax hammondii*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Hammond's Flycatcher likely breeds at all Sierra Nevada Network (SIEN) units. The species is fairly common at Sequoia and Kings Canyon (SEKI) National Parks and at Yosemite (YOSE) National Park, and uncommon at Devils Postpile (DEPO) National Monument (Table 1).

Table 23. Breeding status and relative abundance of Hammond's Flycatchers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)
-

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Hammond's Flycatcher occurs over much of western North America, breeding as far south as the southern Sierra Nevada (Sedgwick 1994), but in California is generally limited to montane areas (Siegel and DeSante 1999). SIEN parks provide important montane habitat for Hammond's Flycatcher at the southern extend of its breeding range.

Distribution and Habitat Associations
Hammond's Flycatchers are found in a variety of conifer forests during the summer months in the Sierra Nevada (Gaines 1992). Hammond's Flycatchers were detected in low to medium densities (Table 2) along a moderate number of survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were not observed during the DEPO survey. Park inventories show highest associations with undifferentiated postfire habitat and Giant Sequoia forests within SEKI and YOSE respectively (Table 2).

Table 24. Number of Hammond's Flycatchers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	43	44	Undifferentiated Postfire	0.21	0.15 (0.02-1.32)
			Sagebrush/Dwarf Shrubland	0.14	0.10 (0.03-0.30)
			Undifferentiated Riparian	0.13	0.09 (0.01-0.66)
Yosemite NP	85	100	Giant Sequoia	1.11	
			Ponderosa Pine	0.20	
			White Fir	0.18	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

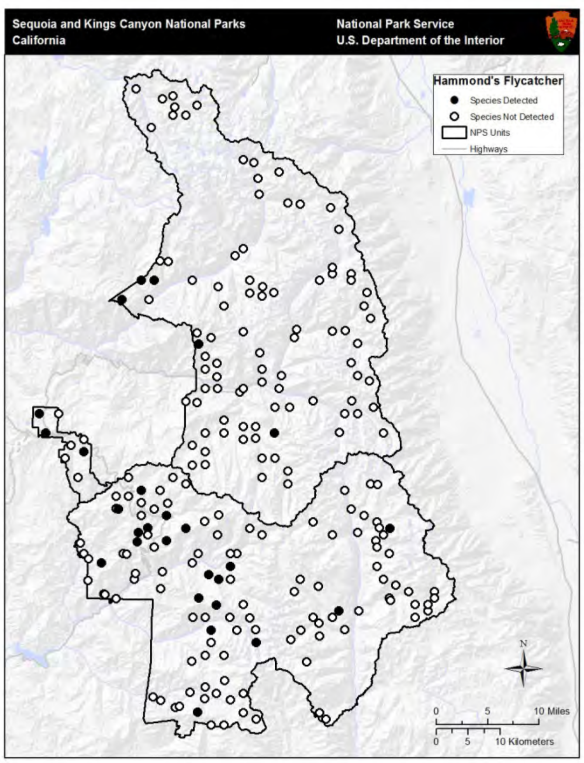

Figure 10. Bird survey transects where Hammond's Flycatcher was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

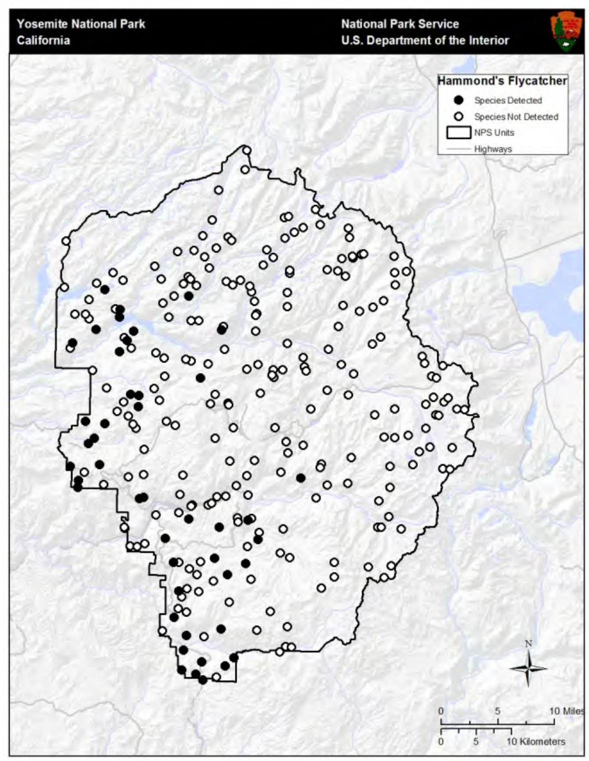

Figure 11. Bird survey transects where Hammond's Flycatcher was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Hammond's Flycatcher was observed within the lower to middle-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Hammond's Flycatcher in SEKI was 2240 m, with 95% of observations occurring between 1649 and 3310 m. At YOSE, the mean elevation of observations was 1873 m with 95% of observations falling between 1258 and 2605 m (Siegel et al. 2011).

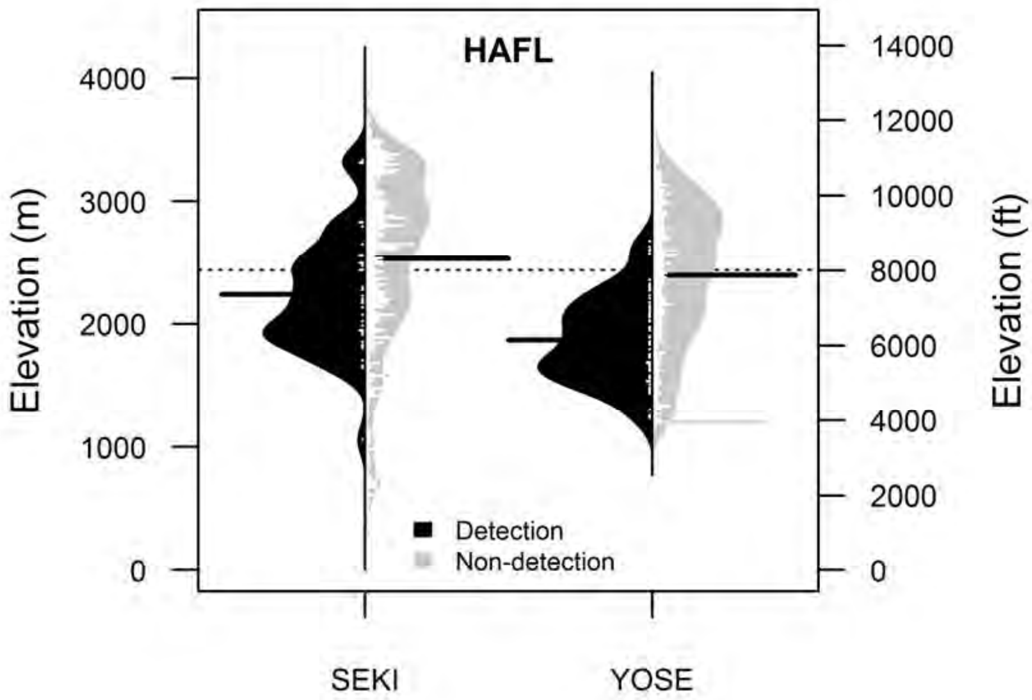

Figure 3. Elevational distributions of sites where Hammond's Flycatchers (HAFL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Hammond's Flycatchers are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at SEKI and in moderate numbers on the BBS route at YOSE. Significant positive trends were observed over the past three decades along the Sequoia NP and YOSE routes with very dramatic increases at Sequoia (Table 3).

Table 25. Relative abundance and trends for Hammond's Flycatcher according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	47	1.65	-0.3	0.81
	1980-2007			0.0	0.95
Sierra Nevada (BCR 15)	1966-2007	24	3.80	-0.7	0.68
	1980-2007			-0.9	0.59
Route 14117 – Sequoia NP	1972-2005	1	0.25	+431.0	0.01
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	5.85	+11.4	0.01

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

MAPS data from Kings Canyon and Yosemite NPs show no significant population trends between 1991 and 2009 in the meadows where stations are located. High and likely increasing productivity at YOSE stations suggest a healthy population with moderate adult survival. Kings Canyon MAPS stations show an apparent decline in productivity, although the trend is not statistically significant. Demographic data are not available for the DEPO MAPS station due to a lack of captures (Table 4).

Table 26. Population trends, productivity, trends, and survival estimates of Hammond's Flycatcher at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.2	0.00	0.36	-20.28	NA
Yosemite NP	1993-2009	1.5	-1.19	2.78	+10.78*	0.397 (0.237)
Devils Postpile NM	2002-2006	0.0	NA[2]	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Population trends suggest Hammond's Flycatcher populations are healthy across California and the Sierra Nevada. However, despite this apparent security, there are a number of threats which suggest Hammond's Flycatcher should be monitored. Deforestation from large-scale timber harvest of mature forests is the greatest known threat to Hammond's Flycatcher (NatureServe 2009). Similar to the effects of timber harvest, large, stand-replacing fires can lead to loss of suitable habitat for the species as well, although the species was detected frequently in burned areas during the avian inventory at SEKI (see above). Although not an imminent problem, recent range shifts and the current extent of the species' range suggests that Hammond's Flycatcher may be vulnerable to climate change, at least within the southern Sierra Nevada. Brown-headed Cowbirds may pose a threat to Hammond's Flycatcher outside of SIEN parks, but do not appear to be a major concern within these areas. Finally, impacts from human use and from disease do not appear to be major threats to this species.

Climate Change: An analysis of shifts between the historical range of Hammond's Flycatcher (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to both temperature and precipitation change by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Hammond's Flycatcher has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades. Data from the YOSE MAPS stations appear to corroborate ongoing range shift in this species; populations pooled across all stations show no significant population trends, but examination of station-specific trends reveals that populations have declined non-significantly at the lower elevation stations (Big Meadow and Hodgdon Meadow), but have increased at the two higher-elevation stations (Crane Flat and Gin Flat East) (Siegel et al. 2007).

Hammond's Flycatchers are largely restricted to lower and mid-elevation zones of SEKI and YOSE (Figure 3). If climate change causes the species' range to shift upward as is generally expected, there remains higher-altitude habitat for new colonization within Sequoia and Kings Canyon as well as Yosemite, provided dense coniferous forests remain intact above the flycatcher's current range. More concerning is the location of the SIEN parks at the southern end of Hammond's Flycatcher's breeding range. If the species' range shifts northward in response to climate change, the southern Sierra Nevada and SIEN parks may begin to support less Hammond's Flycatchers in the future.

Altered Fire Regimes: Large, stand-replacing fires that destroy habitat are detrimental to Hammond's Flycatcher, especially when fires occur in mature forests (NatureServe 2009). Burnett et al. (2010) detected Hammond's Flycatcher significantly more frequently in unburned vs. burned forests in the northern Sierra. However, detections of this species increased in all burn intensities, including high-intensity, in Montana, although detections were greatest at unburned points (Smucker et al. 2005). If more frequent, high-intensity fires occur in the Sierra Nevada and SIEN parks, Hammond's Flycatchers might experience greater losses of suitable breeding habitat, but further research is warranted. Climate change is also likely to exacerbate this problem as it is expected to contribute to increasing fire frequency and intensity in the future (Millar et al. 2009).

Habitat Fragmentation or Loss: The logging of Douglas-fir forests was shown to have restricted Hammond's Flycatcher range in northwestern Washington (Sedgwick 1994), and possibly has similar effects elsewhere within the species' range. Hammond's Flycatcher selects mature and old-growth forests for breeding and avoids young stands, making logging of older stands detrimental to the species (Sedgwick 1994). Timber harvests, especially clearcutting, may lead to population declines in affected areas due to direct habitat loss and forest fragmentation (NatureServe 2009).

Invasive Species and Disease: Although native to North America, Brown-headed Cowbirds have expanded their range since European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Hammond's

Flycatchers are known to be Brown-headed Cowbird hosts (NatureServe 2009), but cowbird occurrence and parasitism rates within the SIEN parks have been found to be low (Halterman et al. 1999). For example, during a 1995-96 study at SEKI, only 2-3% of passerine nests monitored were parasitized by cowbirds; however, no Hammond's Flycatcher nests were monitored during the study (Halterman et al. 2000).

Human Use Impacts: Aside from human activities that lead to a reduction in suitable habitat (see above), human use impacts do not appear to be a major threat to Hammond's Flycatcher especially in protected areas such as the SIEN parks.

Management Options and Conservation Opportunities

The preservation of dense, mature coniferous forests is most important for the breeding success of Hammond's Flycatcher. Due to the absence of timber harvest within SIEN parks, the greatest threat to such habitat may be large, high-intensity fires. However, the species can persist in burned landscapes as long as enough green forest matrix remains; thus the species would likely be resilient to restoration of fire regimes that include all fire intensities, but with relatively smaller patches of high-intensity burn. Also of concern is the potential range shift of Hammond's Flycatcher due to climate change. Monitoring of Hammond's Flycatcher should continue in order to detect any effects of climate change and other threats on the species within SIEN parks and the greater Sierra Nevada. If Brown-headed Cowbirds become a problem for Hammond's Flycatcher within the SIEN parks, management of artificial food sources such as packstock stables may be necessary.

Harlequin Duck – *Histrionicus histrionicus*

Migratory Status
Short/Medium-distance migrant (Robertson et al. 1999)

Residency and Breeding Status
Harlequin Duck is a rare breeder in Yosemite National Park (YOSE). There are historical records of occurrences in Sequoia and Kings Canyon (SEKI) national parks, but not confirmation that the species ever bred there. The species has never been reported in Devils Postpile National Monument (DEPO) (Table 1).

Table 27. Breeding status and relative abundance of Harlequin Ducks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	No recent records	Unconfirmed as Breeder	
Yosemite NP	Summer	Local Breeder	Rare
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); may have occurred historically.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S2 – Imperiled (High risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not Listed
- CA Department of Fish and Game Status: Species of Special Concern

Range Significance
The primary breeding range of Harlequin Duck is limited to northwestern North America, as far south as Oregon and in eastern Canada (Robertson et al. 1999). The species was considered extirpated from its historical breeding range in the central Sierra until a female and four ducklings were observed in Yosemite Valley in 2002 (Beedy 2008). SIEN parks are not an important part of Harlequin Duck's current range, but could provide valuable habitat if the species were to return to its historical breeding grounds in the central Sierra.

Distribution and Habitat Associations
Harlequin Ducks breed in turbulent mountain rivers flanked by banks with high vegetative cover (Beedy 2008). Harlequin Ducks were not observed during recent inventories of SIEN parks (Table 1).

Table 28. Number of Harlequin Ducks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Not detected	NA[1]	NA
Yosemite NP	0	0	Not detected	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Abundance, Trends and Demographic Data

There is insufficient Breeding Bird Survey (BBS) data across California and the Sierra Nevada to make estimates of abundance and trends and no individuals were observed along BBS routes within SEKI and YOSE (Table 3).

Table 29. Relative abundance and trends for Harlequin Duck according to Breeding Bird Survey (BBS) data (Sauer et al. 2008 Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	NA[1]	NA	NA	NA
	1980-2007			NA	NA
Sierra Nevada (BCR 15)	1966-2007	NA	NA	NA	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Harlequin Ducks do not often utilize meadow habitats where MAPS stations operate. For this reason and because of their rarity within SIEN parks, they are not sampled by the SIEN MAPS efforts, and data on productivity and survival are not available.

Despite regular occurrences of Harlequin Ducks along California's north coast (Beedy 2008) the species is too rare within California's interior to be monitored by the BBS. Anecdotal observations suggest that Harlequin Ducks rarely utilize the Sierra Nevada for breeding as far south as Yosemite Valley, but not as far south as SEKI.

Stressors

Hunting of Harlequin Ducks in the twentieth century has likely led to the loss of breeding range within the Sierra Nevada (Beedy 2008). Currently, degradation of mountain streams and heavy recreation near potential nesting sites may be preventing re-colonization of portions of their historical range. Effects of introduced fish populations on insect prey in some streams may also be an impediment to recolonization. While many human activities such as hunting and timber harvest are not problems for the species within SIEN parks, recreational use in and around breeding streams remains a concern. Furthermore, reduced winter survival from coastal contaminants, capture in fishing nets, and the threat of climate change may compound the challenges to an already reduced breeding population. Altered fire regimes and disease do not appear to be major threats to Harlequin ducks in SIEN parks.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Harlequin Duck has significantly shifted 14.7 miles to the south over the past 40 years, corresponding with increases in temperature (Audubon 2009). Range shifts to the south are contrary to predicted species response to climate change, suggesting that non-climate factors are more important to the distribution of Harlequin Duck than climate change. However, given their already tenuous grip on their central Sierra Nevada breeding range, this additional threat is not likely to help the species in the region. Additionally, the Sierra Nevada is located at the extreme southern edge of Harlequin Duck's breeding range. If contrary to CBC data, the species' range moves pole-ward as is generally expected of many species, we are not likely to see the species breeding within SIEN parks into the future.

In addition to observed changes new tools are being developed to assess a species' sensitivity to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Harlequin Duck received a sensitivity score of 55.10 (UW 2010), suggesting moderate sensitivity to the threat. Certainty of results was listed as 36.25 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Harlequin Duck's sensitivity to climate change was its dependence on sensitive habitats such as coastal lowlands/marshes/estuaries and perennial streams (UW 2010).

Altered Fire Regimes: Increased fire frequencies may impact Harlequin Ducks locally and in the short-term through burning of habitat. However, this is not likely a major threat to the species.

Habitat Fragmentation or Loss: Degradation of stream habitats by timber harvest, hydraulic mining, and construction of reservoirs may preclude the species from re-colonizing parts of their historical breeding range (Beedy 2008). Loss of breeding habitat is a greater threat outside of SIEN parks.

Invasive Species and Disease: Recent evidence from outside the SIEN suggests that introduced fish populations may adversely affect Harlequin Duck, through their effects on insect prey populations (LeBourdais et al. 2009). To our knowledge, there are no major threats of disease to the Harlequin Duck.

Human Use Impacts: Harlequin Duck may have been largely removed from its breeding range in California by hunting pressure from fishermen early in the 20th century, although the amount of hunting experienced by the species in California is largely undocumented (Beedy 2008). Current harvest rates of Harlequin Ducks elsewhere in their range are low, but hunting of the species remains legal in western North America (Roberson et al. 1999). Harlequin Ducks are also susceptible to disturbance by hikers, rafters, fisherman, and researchers at nesting sites. Such disturbances may discourage Harlequin Ducks from re-colonizing previously used streams and can reduce nesting success where breeding does occur (Beedy 2008).

Additionally, populations of the species in its breeding range can be impacted by threats in wintering habitat. For example, Harlequin Duck is susceptible to ingestion of contaminants such as plastics, pesticides, and spilled oil (Esler et al. 2000, Beedy 2008) as well as to capture by fishing nets (Robertson et al. 1999). Hunting and ingestion of contaminants do not threaten Harlequin Ducks within the SIEN parks. However, where nesting occurs within the parks, disturbance by recreational activities may be a concern.

Management Options and Conservation Opportunities

If Harlequin Ducks continue to breed within SIEN parks, information should be gathered about the number of breeding individuals and the location of nesting sites. Multi-species bird surveys such as the BBS do not sample this species well. Therefore, species-specific, standardized surveys should be conducted along streams in the Yosemite region to determine if and where Harlequin Ducks are breeding. Once breeding sites are identified, recreational activities in the area should be restricted to prevent nest failure from human disturbance (Beedy 2008). NatureServe (2009) recommends trails and roads should be restricted to 50 m from inhabited streams and should not be visible from the nesting sites. Addressing introduced fish populations within otherwise promising Harlequin Duck habitat may also facilitate recolonization. Finally, although the magnitude of current hunting pressure on the species in California is largely unknown, a cessation of hunting (outside parks, where hunting is legal) may benefit this species greatly.

Hermit Thrush – *Catharus guttatus*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Hermit Thrush is a common summer and year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and an uncommon summer resident and regular breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 30. Breeding status and relative abundance of Hermit Thrushes in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Common
Yosemite NP	Summer/Year-round	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

The Hermit Thrush is one of the most widely distributed forest-nesting migratory birds in North America (Jones and Donovan 1996). This thrush breeds across much of Canada and the western and northeastern U.S., as well as in a tiny isolated area in northern Baja California, Mexico, and winters over much of the southern U.S. through Mexico to Guatemala (Jones and Donovan 1996). The subspecies *sequoiensis* is largely limited to the Sierra Nevada where it is quite abundant; thus the mountain range is extremely important to this subspecies (Siegel and DeSante 1999). Other subspecies of Hermit Thrush migrate and winter in the Sierra, but *sequoiensis* winters in Mexico, and is thus considered a Neotropical migrant (Siegel and DeSante 1999).

Distribution and Habitat Associations

Hermit Thrushes breed in northern hardwood, boreal, and mountainous coniferous forests. In the Sierra, this species is found in dense, shady, mostly mature Mixed Conifer and Red Fir forests and less commonly in mixed hardwood-conifer and Douglas-fir forests at mid elevations, and in more open Lodgepole Pine, subalpine conifer, and Aspen forests at higher elevations and the east slope (Siegel and DeSante 1999). Hermit Thrushes were detected in relatively high numbers along survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE

(Table 2). The species was found in a variety of coniferous forests and meadows, but especially Lodgepole Pine in SEKI and Montane Meadow, Mountain Hemlock, and Western Juniper in YOSE (Table 2).

Table 31. Number of Hermit Thrushes recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	336	423	Lodgepole Pine Forest	0.14	0.16 (0.04-0.62)
			White Fir/Sugar Pine Forest	0.09	0.04 (0.01-0.16)
			Higher Elevation Meadow	0.05	0.06 (0.01-0.27)
			Red Fir/White Fir Forest	0.04	0.07 (0.02-0.27)
			Foxtail Pine	0.03	0.10 (0.02-0.37)
Yosemite NP	292	363	Montane Meadow	0.11	
			Mountain Hemlock	0.10	
			Western Juniper	0.10	
			Jeffrey Pine/Red Fir	0.07	
			Red Fir	0.07	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

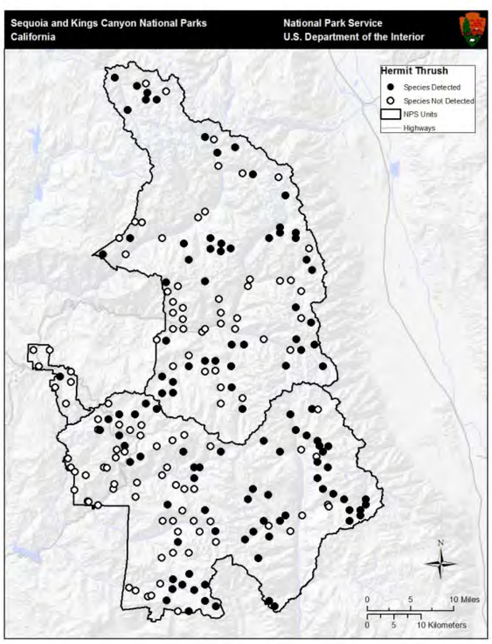

Figure 12. Bird survey transects where Hermit Thrush was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

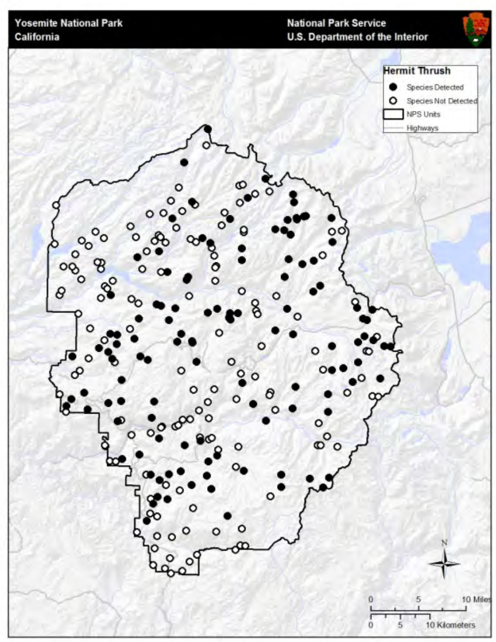

Figure 13. Bird survey transects where Hermit Thrush was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Hermit Thrush was detected at mid to high elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 2942 m, with 95% of observations occurring between 1963 and 3449 m. In YOSE, the mean elevation of observations was 2608 m with 95% of observations falling between 1718 and 3172 m (Siegel et al. 2011).

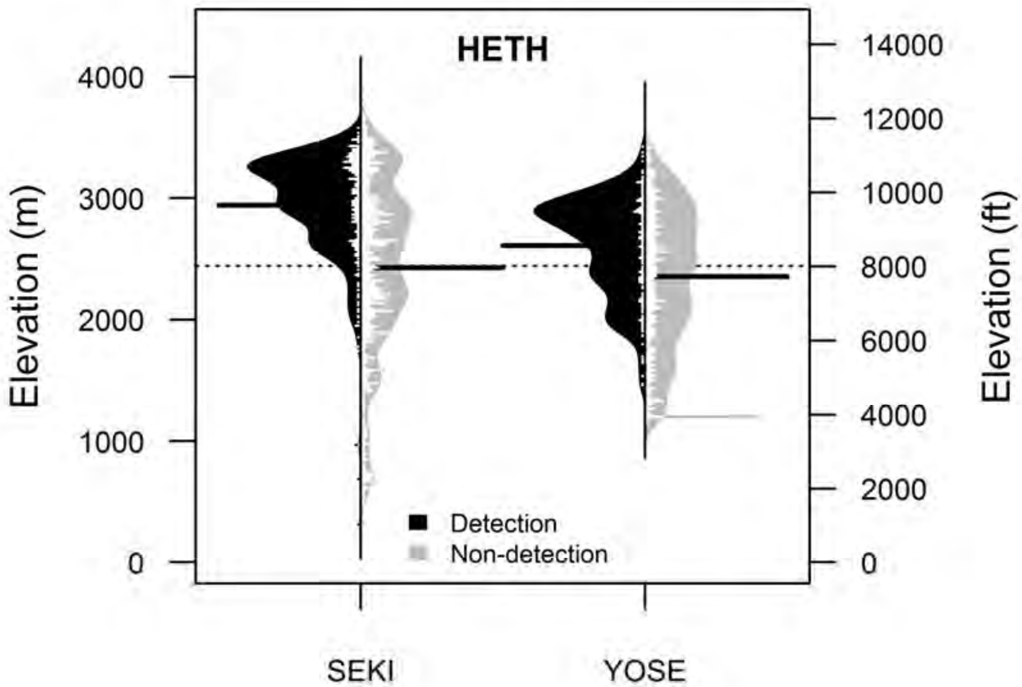

Figure 3. Elevational distributions of sites where Hermit Thrush (HETH) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) survey data indicate Hermit Thrush were equally abundant in the Sierra Nevada Region (BCR15) as in California as a whole (Table 3). No significant population trends were documented but a nearly significant dramatic annual population increase of 28% (but based on low detection rates) was observed along the route in Sequoia NP from 1974-2005 (Table 3). This potential increase should be investigated further using more rigorous survey methodology.

Table 32. Relative abundance and trends for Hermit Thrush according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	78	3.82	-0.4	0.60
	1980-2007			-0.6	0.43
Sierra Nevada (BCR 15)	1966-2007	27	3.95	-0.6	0.75
	1980-2007			-1.7	0.18
Route 14117 – Sequoia NP	1972-2005	1	1.63	+27.8	0.06
Route 14132 – Kings Canyon NP	1974-2005	1	0.15	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	6.88	-1.1	0.72

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Mark-recapture data from SIEN MAPS stations revealed no significant population trends for Hermit Thrush, which is not captured in large numbers at SIEN MAPS stations (Table 4).

Table 33. Population trends, productivity, trends, and survival estimates of Hermit Thrush at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.3	NA[2]	0.33	NA	NA
Yosemite NP	1993-2009	1.8	-1.39	0.34	+1.43	0.429 (0.151)
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

The association between the Hermit Thrush and dense, mostly mature forests suggests that loss or fragmentation of breeding habitat in the Sierra Nevada may pose a substantial risk, yet no significant population trends have been recorded with regional BBS surveys (Table 3). The species may be adversely impacted by a warmer, drier climate and an increase in extent and frequency of high-intensity fire in the future. Brown-headed Cowbirds and collisions with buildings and towers affect some individuals, but population-level impacts are likely not severe.

Climate Change: An analysis of Christmas Bird Count (CBC) data indicates the center of abundance of Hermit Thrush has shifted significantly northward by over 91 miles and inland by nearly 25 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). The assertion that Hermit Thrush is already showing responses to climate change is corroborated by recent findings that the species is significantly adjusting its arrival date on the breeding grounds in response to temperature (MacMynowski and Root 2007). These observed shifts provide evidence that the Hermit Thrush has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Hermit Thrushes nest in moist, shady coniferous forests, so a general drying trend may adversely impact breeding habitat (Siegel and DeSante 1999) and the species is already shifting its center of abundance northwards and inland in tandem with climate change. If the species expands upslope in the Sierra Nevada as generally expected, there is substantial moist coniferous forest for continued occupation in SIEN parks. However, if climate change results in drier conditions in its preferred forest and meadow habitats, this species is likely to suffer.

Altered Fire Regimes: Hermit Thrushes are strongly associated with mature, green forests, but may be somewhat tolerant of forest fire depending upon how it burns. Twenty-two percent and 40% of studies in the Rocky Mountain region reported Hermit Thrushes occupying early and mid-successional post-fire forests, respectively (Hutto 1995). Hermit Thrushes reached their highest abundance in burned Black Spruce forests in Quebec, Canada, where canopy height and stem density was lowest (Imbeau et al. 1999). Hermit Thrushes were also found in burned forest sites in the northern Sierra, but the authors concluded that the burned areas contained enough green forest to support this species (Burnett et al. 2010). Conversely, Hermit Thrush was not detected on burned plots from 6 to 25 years post-fire in the eastern Sierra (Rafael et al. 1987), nor was it found on burned forests in the southern Sierra (Siegel and Wilkerson 2005). The species was a strong indicator of unburned mature forests in Oregon (Fontaine et al. 2009), and decreased with increasing burn intensity in New Mexico, although was similarly abundant in low-intensity burned and unburned plots (Kotliar et al. 2007). Data from the Sierra and other western forests suggest adverse impacts to Hermit Thrushes from high-intensity fire.

Habitat Fragmentation or Loss: Some researchers have hypothesized that Hermit Thrush populations may be relatively resilient to logging that creates small-scale patches in forests and woodlands, although most studies concluded that these birds were less abundant in logged forests or forest edges (Jones and Donovan 1996, King et al. 1997, Norton and Hannon 1997). Effects of logging may vary by site and scale. Many Neotropical migrants are harmed by habitat loss and fragmentation on the wintering grounds, but the Hermit Thrush winters in more temperate montane habitats in Mexico that are less altered than other forest types (Siegel and DeSante 1999). Regardless, logging is not a problem for the species in the SIEN parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Hermit Thrushes are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Hermit Thrushes are susceptible to collisions with towers and buildings (Jones and Donovan 1996).

Management Options and Conservation Opportunities

The most important things park managers can do to protect Hermit Thrush populations in the parks is to carefully manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE should be updated (Halterman et al. 1999).

MAPS station operation and other means of monitoring Hermit Thrush populations in the parks should continue to elucidate population trends.

Hermit Warbler – *Dendroica occidentalis*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Hermit Warbler is a common summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and a rare summer resident and possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 34. Breeding status and relative abundance of Hermit Warblers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Common
Yosemite NP	Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Possible Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G4 – Apparently Secure (Uncommon, but not rare)
- National Status: N4 – Apparently Secure (Uncommon, but not rare)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Hermit Warbler breeds in coniferous forests of the Coast, Cascade, and Sierra Nevada mountain ranges of southern Washington, Oregon, and central and northern California (Pearson 1997). Populations of this species are very high in the Sierra, which represents an extremely important part of the species' overall range (Siegel and DeSante 1999).

Distribution and Habitat Associations
The Hermit Warbler inhabits mature upland forests with high canopy cover of coniferous trees (Pearson 1997). In the Sierra Nevada, the species is found in mixed-conifer forests dominated by Sugar Pine, Jeffrey and Ponderosa pine, Lodgepole Pine, Red and White fir, Douglas-fir, and Incense-cedar (Pearson 1997, Siegel and DeSante 1999). Hermit Warblers were detected in high numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects in YOSE and SEKI. All detections were in coniferous forests, and the species was most abundant in Giant Sequoia (Table 2).

Table 35. Number of Hermit Warblers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	117	158	Giant Sequoia Forest	0.42	0.48 (0.21-1.12)
			White Fir/Sugar Pine Forest	0.36	0.42 (0.18-0.95)
			Red Fir/White Fir Forest	0.26	0.24 (0.10-0.57)
Yosemite NP	297	420	Giant Sequoia	0.64	
			White Fir/Mixed Conifer	0.32	
			White Fir	0.31	
			Ponderosa Pine/Mixed Conifer	0.28	
			Jeffrey Pine/Red Fir	0.26	
Devils Postpile NM	1	1	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

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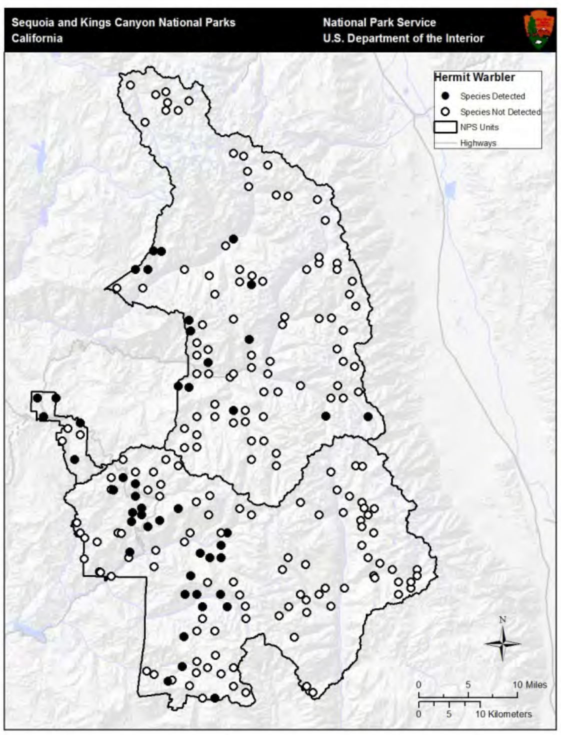

Figure 14. Bird survey transects where Hermit Warbler was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

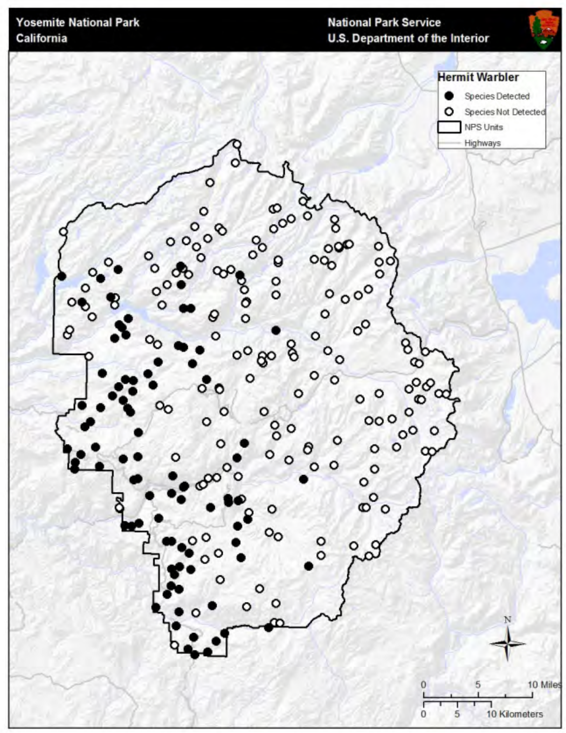

Figure 15. Bird survey transects where Hermit Warbler was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Hermit Warbler was observed at mid-elevations of SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Hermit Warbler in SEKI was 2186 m, with 95% of observations occurring between 1677 and 3062 m. At YOSE, the mean elevation of observations was 1881 m with 95% of observations falling between 1252 and 2459 m (Siegel et al. 2011).

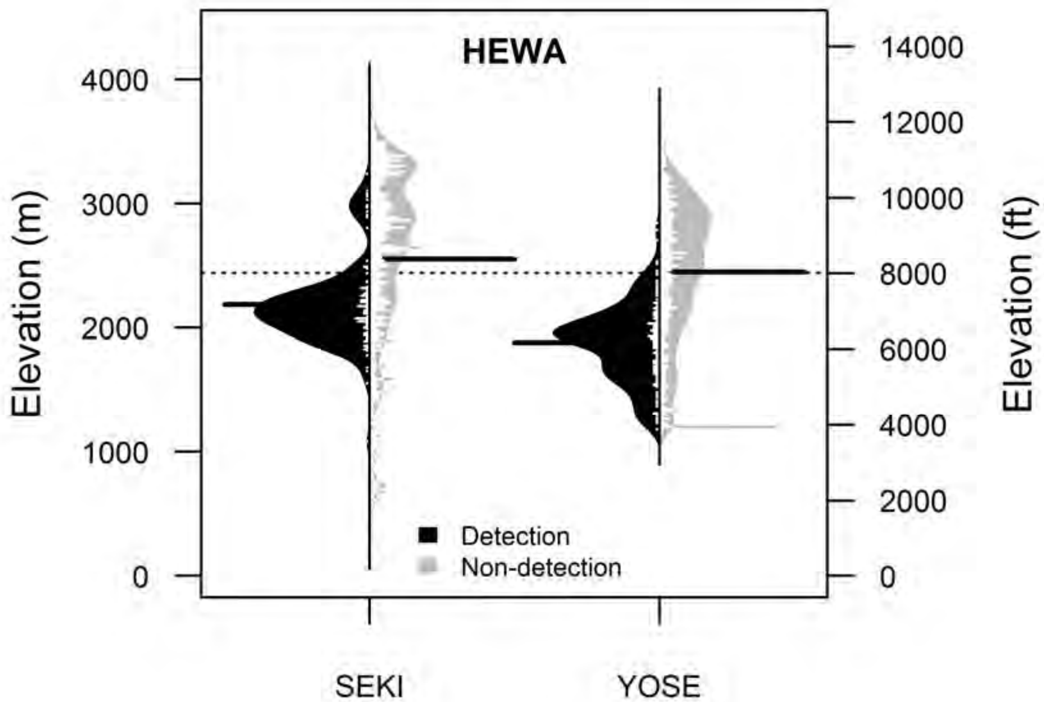

Figure 3. Elevational distributions of sites where Hermit Warblers (HEWA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Hermit Warblers are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole (**Error! Reference source not found.**). They were detected in low numbers on individual BBS routes at SEKI but were very abundant at YOSE. No significant population trends were observed along any BBS routes during any time period.

Table 36. Relative abundance and trends for Hermit Warbler according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	77	5.05	-0.5	0.73
	1980-2007			-1.5	0.12
Sierra Nevada (BCR 15)	1966-2007	31	7.70	+0.6	0.56
	1980-2007			-1.0	0.51
Route 14117 – Sequoia NP	1972-2005	1	0.19	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.10	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	28.77	-2.0	0.36

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Hermit Warblers were captured in relatively high numbers at MAPS stations in Yosemite NP and lower numbers at Kings Canyon NP and DEPO (Table 4). Mark-recapture data reveal a significant declining population trend and significant increasing reproductive index from 1993-2009 in Yosemite NP. Since the reproductive index is the ratio of adults to young birds, this may indicate high local nest success, but poor recruitment into the adult population, perhaps due to factors on the wintering grounds or migration routes. A non-significant positive trend was observed at Kings Canyon NP.

Table 37. Population trends, productivity, trends, and survival estimates of Hermit Warbler at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.4	+35.00	0.17	NA	NA
Yosemite NP	1993-2009	7.7	-4.70***	1.68	+7.71***	0.606 (0.054)
Devils Postpile NM	2002-2006	0.3	NA[2]	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Breeding populations of Hermit Warblers are vulnerable to habitat loss and fragmentation because they are habitat specialists, have a narrow geographic distribution, and do not have large populations (Pearson 1997). This species prefers mature, dense coniferous forests and is highly susceptible to clearcut harvest and thinning, which are common outside the SIEN parks. High-intensity fire reduces habitat suitability for Hermit Warblers, but the species occurs in burned landscapes as long as sufficient green forest remains. Mature forest habitat is well-protected in the SIEN parks, yet Hermit Warblers declined significantly at Yosemite MAPS stations over the past 15 years (Table 4), possibly suggesting habitat loss or degradation on the wintering grounds.

Threats to the species in SIEN parks include nest parasitism by Brown-headed Cowbirds and local fuel-reduction projects that reduce canopy cover.

Climate Change: An analysis of shifts between the historical range of Hermit Warbler (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009) This observation suggests that Hermit Warbler may be responding to climate change, and may continue to do so in the future. This species breeds in middle elevations of SEKI and especially YOSE (Figure 3). If climate change causes the species' range to shift upward as is generally expected, there are sufficient amounts of higher-altitude coniferous forest for new colonization within SEKI and YOSE, thus the species may be adaptable to a warming climate.

Altered Fire Regimes: Hermit Warbler was a strong predictor of mature conifer forests in a study of burned landscapes in Oregon (Fontaine et al. 2009). The species was detected most often in mature forest but also to some extent in old burns, but very rarely or never in recent or repeat burns. However, Hermit Warblers were one of the most abundant species not only in green but in a burned forest in the northern Sierra Nevada, suggesting the species is capable of inhabiting burned landscapes, as long as a sufficient amount of green forest remains (Burnett et al. 2010). An increase in extent and frequency of high-intensity fire in mature forest will likely reduce suitable habitat for Hermit Warblers.

Habitat Fragmentation or Loss: Large-scale clearcut harvesting and thinning of coniferous forests in the Sierra Nevada has eliminated and fragmented habitat for Hermit Warblers. Hermit Warblers avoid young clear-cuts or very young second-growth forests, but become common once the canopy layer is well-developed (Pearson 1997). In a managed Douglas-fir forest in Oregon, Hermit Warblers decreased in thinned stands (Hayes et al. 2003). Habitat loss and fragmentation is not likely to pose a major threat to the species within SIEN parks where such habitats are protected from large-scale logging.

Invasive Species and Disease: Nest predation or parasitism by Brown-headed Cowbirds is a threat to Hermit Warblers (Siegel and DeSante 1999). Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Hermit Warblers often congregate in montane meadows and riparian habitats during up-mountain dispersal (Siegel and DeSante 1999). Thus habitat degradation due to packstock grazing within the parks is a potential concern for this species, at least locally where grazing is permitted, because it can damage meadows and riparian shrubs as well as attract Brown-headed Cowbirds. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Management Options and Conservation Opportunities

The most important things park managers can do to protect Hermit Warbler populations in the SIEN parks is to manage ecosystems to maintain dense, high-canopy coniferous forests. Protection and restoration of riparian and montane meadow habitats as well as careful management or elimination of Brown-headed Cowbird feeding sites such as stables will benefit Hermit Warblers. Guidelines for implementing cowbird control programs are available (e.g., Siegle and Ahlers 2004).

MAPS station operation and other means of monitoring Hermit Warbler populations in the parks should continue to resolve whether population declines are indeed occurring, and if so, to determine their causes.

Horned Lark – *Eremophila alpestris*

Migratory Status

Short-distance Migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Horned Lark is a locally uncommon breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, but has not been reported at Devils Postpile National Monument (DEPO).

Table 38. Breeding status and relative abundance of Horned Larks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Locally Uncommon
Yosemite NP	Summer	Regular Breeder	Locally Uncommon
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status (*E. a. actia*): S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Horned Lark breeds widely across much of the United States, Canada, and northern Mexico (Beason 1995). The Sierra Nevada and especially SIEN park populations of this broadly distributed species are small, suggesting the Sierra is not of great importance to the species (Siegel and DeSante 1999). However, for the California Horned Lark subspecies (*E. a. actia*), which is only found within California (NatureServe 2009), SIEN parks comprise a more important role.

Distribution and Habitat Associations

On the west slope of the Sierra Nevada, Horned Larks nest in dry alpine meadows and other sparsely vegetated areas at high elevation (Gaines 1992). One or more distinct subspecies nest in open grassland in the lower foothills and have historically been detected at YOSE and SEKI (Beedy and Granholm 1985), but we know of no recent records of low-elevation birds in the parks. Horned Larks were detected in low numbers (Table 2) along just one survey transect (Figures 1) at SEKI during avian inventory surveys at SEKI, YOSE and DEPO. The species was also observed to be breeding in a sparsely vegetated meadow near Evelyn Lake during the YOSE inventory, but was not detected during formal surveys (R. Siegel, *personal observation*).

Table 39. Number of Horned Larks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings	2	3	NA[1]	NA	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

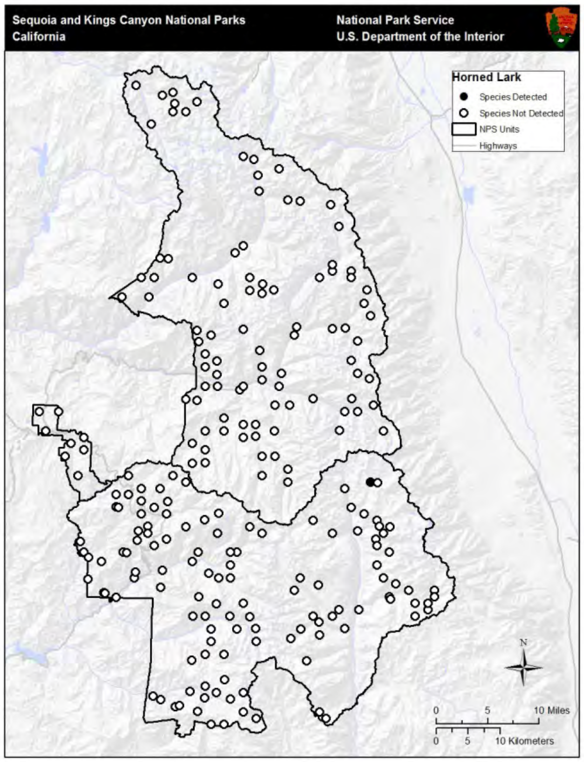

Figure 16. Bird survey transects where Horned Lark was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

All three Horned Lark detections during the avian inventory at SEKI occurred along the same transect, around 3500 m (Figure 2, Siegel et al. 2011).

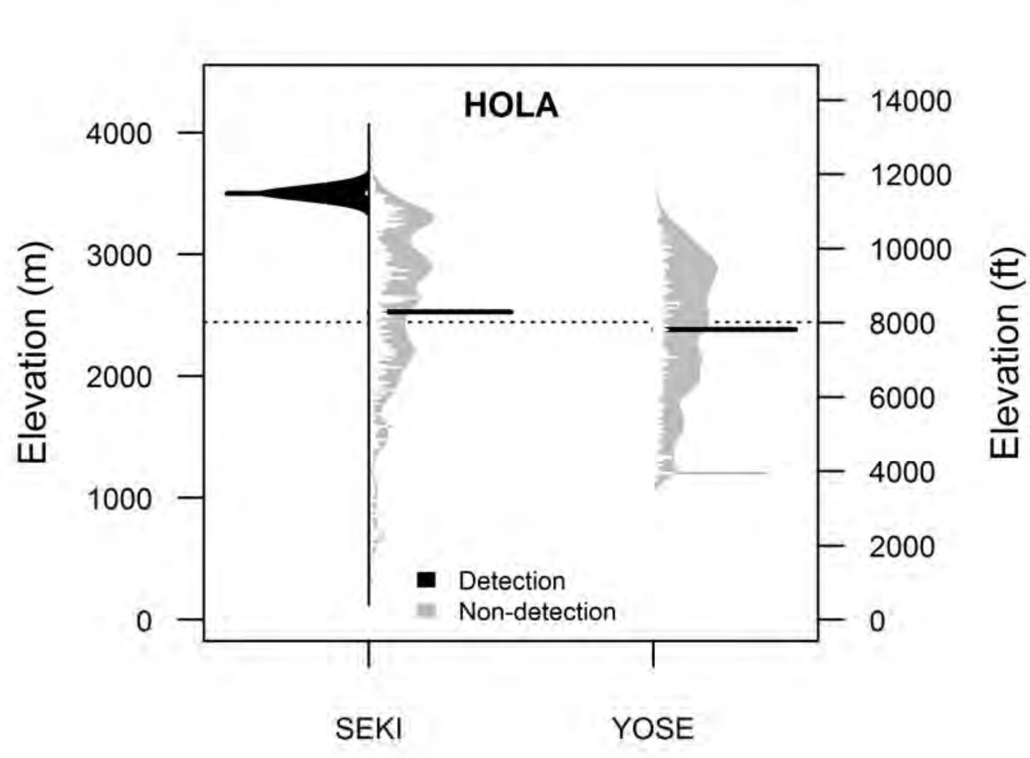

Figure 2. Elevational distributions of sites where Horned Larks (HOLA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Horned Larks are detected much less often in the Sierra Region (BCR 15) than in California as a whole, which is probably an accurate reflection of their distribution. However, it should be noted that few if any BBS routes sample the species' high-elevation habitat in the Sierra. Horned Larks were not detected along the three individual BBS routes that intersect YOSE and SEKI. A significantly negative trend was observed in California as a whole during 1966-2007 and 1980-2007 (Table 3).

Table 40. Relative abundance and trends for Horned Lark according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	114	14.49	-3.5	0.00
	1980-2007			-4.9	0.00
Sierra Nevada (BCR 15)	1966-2007[1]	5	3.20	-1.3	0.38
	1980-2007[1]			-1.9	0.22
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Horned Larks are not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Most troubling for Horned Lark is a significant California-wide decline in recent years (Sauer et al. 2008). The expansion of agriculture in California's Central Valley and corresponding pesticide use may be contributing to this decline by reducing suitable habitat and exposing individuals to contaminants. These negatives from agriculture appear to outweigh any benefits grain crops may provide Horned Lark by adding supplemental food sources. Habitat loss from agricultural development and pesticide use are not direct threats to Horned Lark within the SIEN parks, but the species could face loss of alpine habitat if climate change leads to an expansion of forests into alpine areas that are currently barren of trees. An increase of fire frequency and intensity may have the opposite effect, where large fires provide more open habitat and increase seed production and availability. Finally, invasive species and disease do not appear to be major threats to Horned Lark, although information on these threats is limited.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of Horned Lark has significantly shifted 53.8 miles away from the coast across its North American range over the past 40 years, corresponding with increases in temperature, but have not shown a corresponding latitudinal shift during the same time period (Audubon 2009). Shifts inland where winter temperatures are generally cool may indicate adaptation to a warming climate, but without a corresponding northward range shift evidence of climate adaptation is inconclusive.

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. To evaluating vulnerability, assessments also incorporate climate change predictions, providing modeled, spatially explicit, estimates of vulnerability. Sensitivity and vulnerability assessments have been conducted for the subspecies Streaked

Horned lark (*E. a. strigata*) found in Oregon and Washington, but have not yet been conducted for the Californian subspecies. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, the Streaked Horned Lark received a sensitivity score of 51.02 (UW 2010), suggesting moderate sensitivity to the threat. Certainty of results was listed as 38.75 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Streaked Horned Lark's sensitivity to climate change was its need for specialized habitat (UW 2010). A similar assessment of vulnerability of Streaked Horned Lark in the Willamette Valley, Oregon gave the subspecies a vulnerability score of 4 (a score of 5 representing least vulnerable), indicating low vulnerability to climate change at least within this region (Steel et al. 2010).

Horned Larks are found above tree line in the Sierra Nevada (Gaines 1992). If climate change leads to encroachment of forest into the alpine zone and loss of treeless areas, Horned Lark could see range contraction in the region. If such a loss of alpine habitats occurs, the areas within SIEN parks with highest elevation - especially within SEKI - could provide invaluable refugia for this and other alpine species.

Altered Fire Regimes: A comparison of bird species' response to burned and unburned grasslands in Arizona showed that Horned Lark was attracted to burned areas for at least 2 or 3 years following a wildfire, likely due to increased seed production and availability following the disturbance (Bock and Bock 1992). A similar study in shrub steppe habitat in the Columbia Basin, Washington showed a similar response with Horned Lark increasing in abundance in the years following a large wildfire (Earnst et al. 2009). An increase in fire frequency and intensity that leads to larger disturbed, early-seral habitats, could be beneficial to Horned Lark.

Habitat Fragmentation or Loss: Horned Lark has been known to disperse following land cover conversion (Beason 1995) and has lost habitat with the expansion of agriculture (Siege and DeSante 1999, NatureServe 2009). Such habitat losses are not directly relevant to SIEN parks where agriculture is not conducted, but may be contributing to statewide declines (Table 3).

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Horned Lark.

Human Use Impacts: Pesticide poisoning leading to deaths of Horned Lark individuals have been reported and exposure of agricultural contaminants are likely a problem within the California Central Valley in particular (Beason 1995, Siegel et al. 1999). While the species has lost habitat to agricultural development (NatureServe 2009), it also benefits somewhat from the availability of grain within agrarian areas (Beason 1995).

Management Options and Conservation Opportunities

The most important things park managers can do to protect Horned Lark populations in the parks are to maintain alpine and other open habitat where the species breeds and forages. Fire management practices that ensure the continued availability of such habitats through controlled burns or avoidance of fire suppression would benefit the species. If climate change leads to encroachment of forests into open areas, controlled burns or manual removal of trees could be used to maintain sufficient habitat for Horned Larks. High elevation areas in the Sierra are generally not well surveyed for bird species - monitoring that includes or emphasizes alpine habitats would improve our understanding of the species and its response to threats such as climate change.

House Finch – *Carpodacus mexicanus*

Migratory Status

Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

House Finch is a locally fairly common summer or year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 41. Breeding status and relative abundance of House Finches in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Locally Fairly Common
Yosemite NP	Summer	Regular Breeder	Locally Uncommon
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds undoubtedly occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

The native range of the House Finch is from southern British Columbia, southwestern Montana, Wyoming, and eastern Colorado south to Oaxaca, Mexico (Hill 1993). Introduced populations occur throughout the east coast of the U.S. The Sierra Nevada is of negligible importance to this ‘lowland’ species (Siegel and DeSante 1999).

Distribution and Habitat Associations

House Finch strongly prefers areas around human habitats and avoids forested areas, although it may occur infrequently in oak and Pinyon-Juniper woodlands (Siegel and DeSante 1999) as well as chaparral, riparian areas, and open coniferous forest (Hill 1993). These birds were detected in very low numbers (Table 2) along survey transects (Figure 1) during avian inventory projects in SEKI and were not found in YOSE or DEPO. Park inventories show an association with Mixed Chaparral (Table 2).

Table 42. Number of House Finches recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	4	4	Mixed Chaparral	0.03	NA[1]
Yosemite NP	0	0	Not detected	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

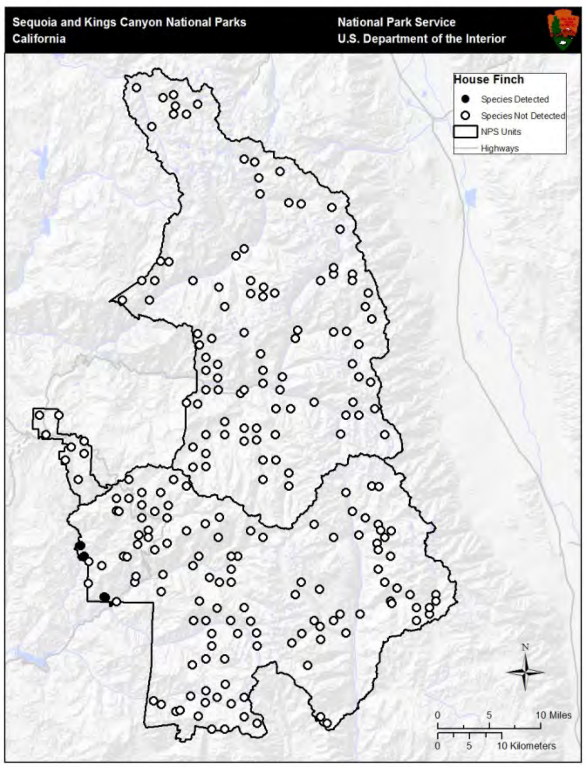

Figure 17. Bird survey transects where House Finch was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

House Finch was detected at low elevations in SEKI but not YOSE during recent inventory surveys (Figure 2). The mean elevation of observations was 641 m, with 95% of observations occurring between 601 and 740 m (Siegel et al. 2011).

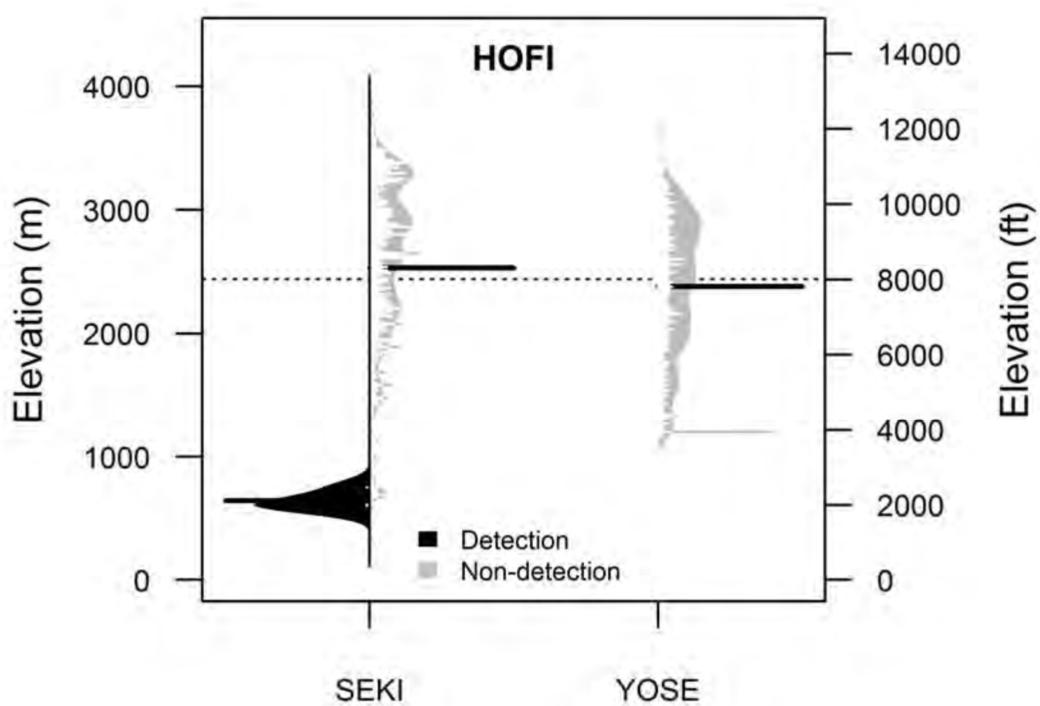

Figure 2. Elevational distributions of sites where House Finch (HOFI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate that House Finch was far less abundant in the Sierra Region (BCR 15) than California as a whole (Table 3). House Finch populations declined significantly throughout California from 1966-2007. No significant population trends were observed in the Sierra Nevada or in the SIEN parks, although a nearly significant ($P = 0.09$) increasing trend of 19.6% was observed in Sequoia NP from 1974-2005 (Table 3). Some evidence exists for a possible decline along the BBS route in Yosemite NP, but results were based on very few detections and were not statistically significant.

Table 43. Relative abundance and trends for House Finch according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	194	33.39	-2.0	0.01
	1980-2007			-1.4	0.05
Sierra Nevada (BCR 15)	1966-2007	17	3.31	+2.5	0.32
	1980-2007			+4.0	0.12
Route 14117 – Sequoia NP	1972-2005	1	12.56	+19.6	0.09
Route 14132 – Kings Canyon NP	1974-2005	1	1.50	-4.6	0.55
Route 14156 – Yosemite NP	1974-2007	1	0.73	-16.3	0.19

House Finch was not captured in sufficient numbers at SIEN MAPS stations to determine demographic trends; no productivity or survival data are available.

Stressors

Throughout most of its range, House Finch benefits from human alterations of the environment. Human developments provide food, cover, water, and reduction in predators (Hill 1993). However, the species is declining slightly but significantly in California (Table 3). The reasons for this population decline are unknown (Hill 1993), but potential threats from inhabiting human-altered landscapes, such as predation by domestic cats, may play a role. The species is also one of the most highly susceptible to West Nile Virus.

House Finch occurs at low elevations, inhabits open habitats such as chaparral and oak or pinyon woodlands, and is likely to easily adapt to climate change. Some timber harvest and fire treatments that create open forest conditions and shrublands are likely to benefit House Finches.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of House Finch in North America has significantly shifted northward by nearly 270 miles and inland by nearly 173 miles over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions indicate the species may be moving towards cooler regions as the climate warms (Audubon 2009), providing evidence that House Finch has already responded to climate change and will likely continue to shift its range in the coming decades.

House Finches are found at low elevations (~600 meters) in Sequoia NP (Figure 2) and the species is already shifting its range northwards and inland in response to climate change. If climate change also causes the species' range to move upslope in the Sierra Nevada as is generally expected, there is likely to be sufficient amounts of Mixed Chaparral or oak habitats, particularly if these habitat types expand upslope as well, and the species may be seen more frequently in SIEN parks.

Altered Fire Regimes: House Finch was detected significantly more often in burned than unburned forests in the southern Sierra Nevada (Siegel and Wilkerson 2005), suggesting the ability to adapt to increased extent and intensity of fire. The species is not found in dense coniferous forests, so fire suppression may pose a risk to this species throughout the Sierra Nevada.

Habitat Fragmentation or Loss: Timber practices in coniferous forests probably have not adversely impacted House Finch populations, and may actually create open conditions favored by the species. Owing to the lack of commercial logging in SIEN parks, this activity does not affect House Finches either positively or negatively. Urbanization also is not likely to threaten this species, which often occurs in disturbed areas associated with humans. Although predation by domestic cats may play a role in observed population declines (see *Human Use Impacts*), Hill (1993) noted that predation “seems unlikely” to seriously affect population size.

Invasive Species and Disease: West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). A recent study reported House Finch had one of the highest rates of flavivirus infection in California (Wheeler 2009). In 2009, West Nile Virus caused at least 32 House Finch deaths in California – one of the highest death rates of any of the species that occur in the SIEN (CDPU 2010).

Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. House Finches are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Many House Finch fledglings are taken by house cats and other predators due to the proximity of this species to human habitations (Hill 1993). However, domestic pets are not a problem in SIEN parks. Campgrounds, buildings, and other human infrastructures in the SIEN parks may benefit this species.

Management Options and Conservation Opportunities

House Finches favor open woodlands, chaparral, and human-associated habitats, but occur only in localized areas within SIEN parks – although some evidence exists for an increasing population in or near Sequoia NP. Perhaps the management action that would most benefit House Finches in the parks is allowing a patchy mosaic of fire of varying intensities to maintain forest openings and edge habitats. House Finches are highly susceptible to West Nile Virus; park staff should collect and test any bird carcasses for flavivirus infection.

House Wren – *Troglodytes aedon*

Migratory Status
Short-distance/Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
House Wren is a fairly common summer and year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and at Devils Postpile National Monument (Table 1).

Table 44. Breeding status and relative abundance of House Wrens in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Northern House Wren (aedon group) breeds across most of central and northern U.S. and south-central Canada and winters in the southern U.S. and all of Mexico (Johnson 1998). The Sierra does not constitute an important part of the range of the subspecies *parkmanii* (Siegel and DeSante 1999).

Distribution and Habitat Associations
In the west, the House Wren occurs in wooded areas around water, or in residential areas with trees and shrubs, in deciduous or mixed deciduous-coniferous woodlands in canyons and riparian areas, and open forests (Johnson 1998). In the Sierra, this species prefers riparian and other moist hardwood habitats with a shrub layer, nesting in crevices or cavities often in association with human habitations (Siegel and DeSante 1999). House Wrens were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE, but only one detection was recorded at DEPO. Park inventories show greatest densities of these birds in Blue Oak Forest (where the density was quite high) in SEKI and Montane Chaparral in YOSE (Table 2).

Table 45. Number of House Wrens recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	42	57	Blue Oak Forest	0.80	0.80 (0.27-2.38)
			Live Oak/California Buckeye	0.19	0.30 (0.10-0.89)
			Canyon Live Oak Forest	0.12	0.09 (0.03-0.31)
			Mixed Chaparral	0.11	0.29 (0.14-0.61)
Yosemite NP	30	50	Montane Chaparral	0.24	
			Recent Burn	0.11	
			Black Oak	0.10	
			Foothill Pine	0.09	
Devils Postpile NM	1	1	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

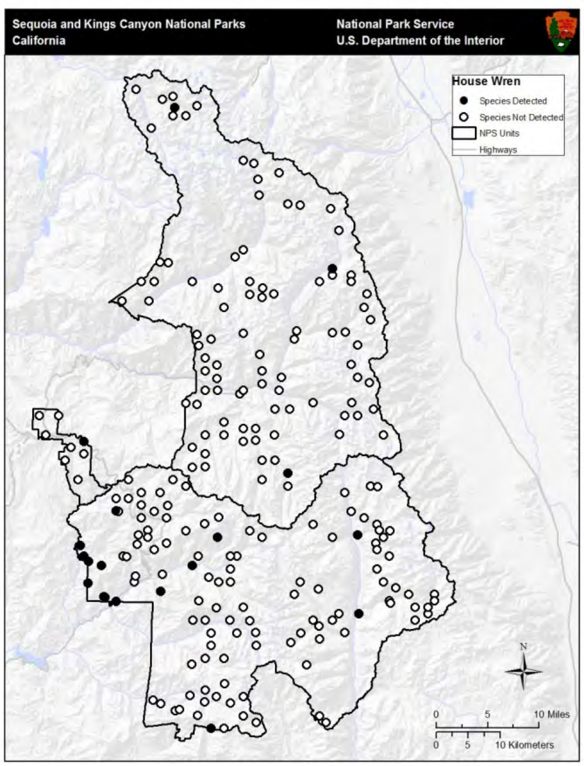

Figure 18. Bird survey transects where House Wren was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

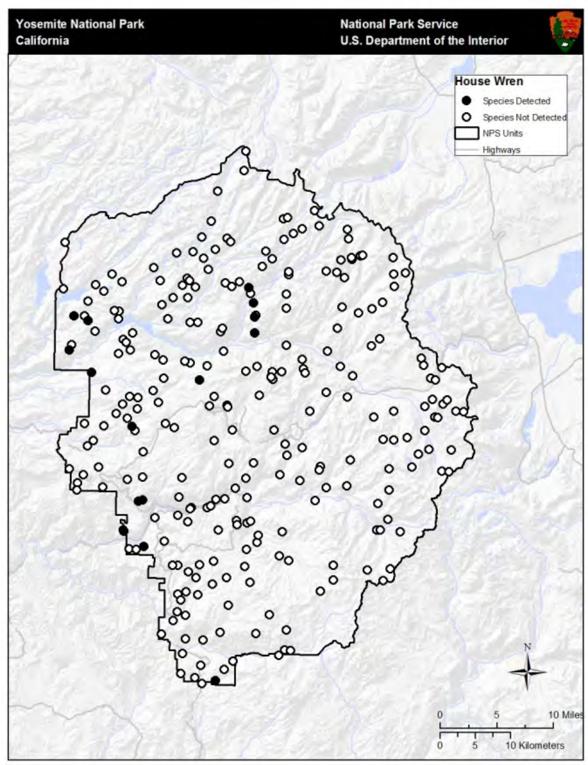

Figure 19. Bird survey transects where House Wren was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

House Wren was detected at low to middle elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of House Wren in SEKI was 1286 m, with 95% of observations occurring between 574 and 2935 m. In YOSE, the mean elevation of observations was 1732 m with 95% of observations falling between 1291 and 2463 m (Siegel et al. 2011).

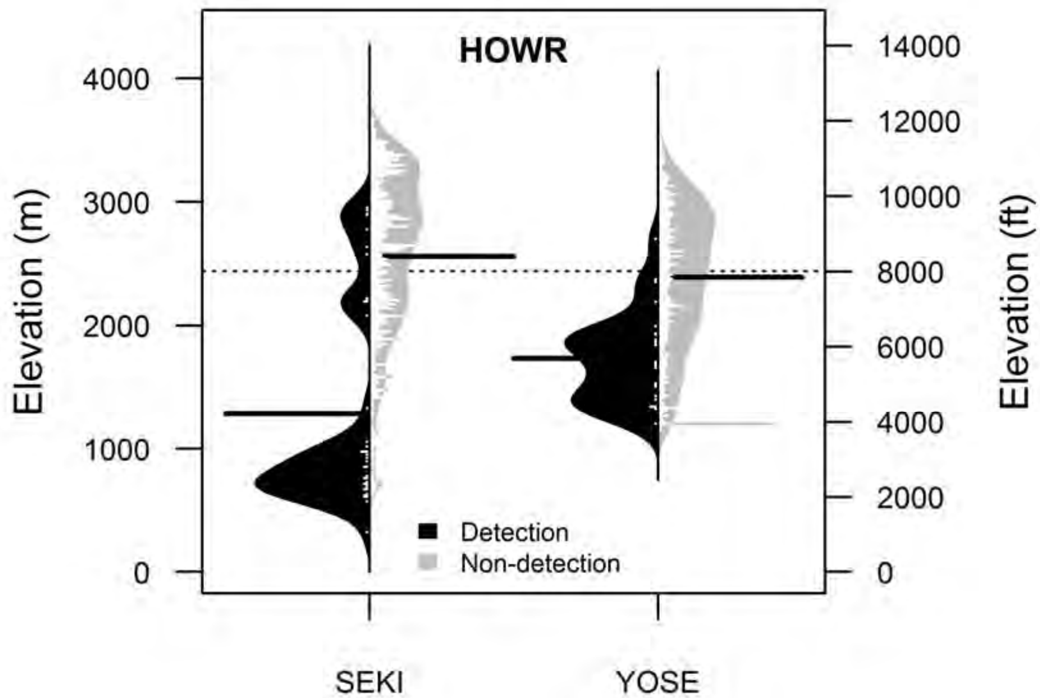

Figure 3. Elevational distributions of sites where House Wren (HOWR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate House Wrens are similarly abundant in both the Sierra Region (BCR 15) and in California as a whole (Table 3). They were more abundant along the individual BBS route in Sequoia NP than along the routes at the other parks. No significant population trends were observed during any time periods, although a nearly significant slight decline was estimated for California from 1980-2007 (Table 3).

Table 46. Relative abundance and trends for House Wren according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	147	3.59	-0.5	0.56
	1980-2007			-1.2	0.07
Sierra Nevada (BCR 15)	1966-2007	24	3.41	-0.4	0.85
	1980-2007			-0.6	0.83
Route 14117 – Sequoia NP	1972-2005	1	6.13	-13.7	0.38
Route 14132 – Kings Canyon NP	1974-2005	1	1.65	-3.0	0.63
Route 14156 – Yosemite NP	1974-2007	1	2.08	-2.2	0.68

Mark-recapture data from SIEN park MAPS stations reveals a significant negative population trend at the Yosemite stations from 1993-2009.

Table 47. Population trends, productivity, trends, and survival estimates of House Wren at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.1	NA[2]	0.00	NA	NA
Yosemite NP	1993-2009	0.9	-7.40**	1.86	+3.30	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

The House Wren's preference for open, shrubby woodlands and forest edges has enabled it to expand its population and breeding range following extensive fragmentation of forests and creation of suburban backyards since the arrival of Europeans (Johnson 1998). The species is associated with riparian areas, oak woodlands and chaparral in the SIEN parks (Table 2) and the Sierra in general (Siegel and DeSante 1999). As a cavity nester, the House Wren is susceptible to nest usurping by European Starlings, and is also vulnerable to brood parasitism by Brown-headed Cowbirds. A warming climate, future increases in high-intensity fire, and suitable habitat provided in suburban backyards may benefit this species over other birds.

Climate Change: An analysis of Christmas Bird Count (CBC) data found that the center of abundance of House Wrens has shifted significantly northwards by 38 miles and inland by nearly 12 miles over the past 40 years throughout its range (Audubon 2009). This observed shift is small but may indicate the species has already responded to climate change by moving towards cooler regions and will likely continue to shift its range within the Sierra in the coming decades.

The House Wren is found in oak and chaparral habitat types and recent burns (Table 2) at low to middle elevations (Figure 3) in SIEN parks. Oak – especially Blue Oak – habitat types are predicted to expand in the Sierra in response to climate change (Stralberg and Jongsomjit 2008) which would benefit House Wrens. The species also responds positively to fire, and thus will also benefit if climate change results in a greater frequency and intensity of fire.

Altered Fire Regimes: Fire, set by lightning or Native Americans, historically has been an important component of oak woodlands in California. The decimation of the Native American population and the introduction of livestock and associated non-native annual grasses by European settlers altered fire regimes of this habitat type (Purcell and Stephens 2005). European settlers burned extensively to convert shrublands and woodlands to grasslands for livestock. Oak recruitment increased in some areas coincident with European settlement due to fire, but many areas of Blue Oak woodlands were entirely cleared and permanently converted to annual grassland (Purcell and Stephens 2005).

Although Blue Oak seedlings may be killed by frequent fire, seedlings and saplings are capable of resprouting after fire, and fire increases acorn and leaf production by reducing competition with understory vegetation, which in turn improves habitat for House Wrens (Purcell and Stephens 2005). This species prefers open, shrubby woodlands, however, so overly frequent fire would reduce the shrub layer. Thus, the House Wren is likely to benefit from moderately frequent fire in oak woodlands in SIEN parks (Purcell et al. 2005).

In conifer forests, House Wren increased with increasing burn intensity in New Mexico (Kotliar et al. 2007), increased after fire in Montana (Smucker et al. 2005), and only occurred in burned forests in Oregon (Fontaine et al. 2009). Similarly, the species was only detected in burned forests in the southern Sierra (Siegel and Wilkerson 2005) and the eastern Sierra (Bock and Lynch 1978, Rafael et al. 1987). A future increase in extent and frequency of high-intensity fire in conifer forests of the SIEN parks should strongly benefit this species. Conversely, policies of fire suppression, post-fire salvage logging, and shrub elimination may adversely impact House Wrens.

Habitat Fragmentation or Loss: The majority of oak woodlands in California are privately owned and receive little management or regulatory protection. More recently, urban development has become the dominant reason for loss of oak woodlands. Extensive clearing of oak woodlands for urban development is likely a threat to House Wrens in lower-elevation foothill habitats (Siegel and DeSante 1999), but does not impact the species in the SIEN parks. Moreover, this species is tolerant of human habitation and takes readily to conditions in suburban backyards, so may not be as adversely impacted as other birds found in oak woodlands.

In burned conifer forests, House Wrens nested in salvage logged areas but nest densities were far higher in unlogged forests (126 in unlogged versus 43 in logged; Hutto and Gallo 2006). Cahall and Hayes (2009) found no significant effect of post-fire logging treatments on densities of House Wrens in Oregon, however, but the authors did not examine nesting. Regardless, post-fire salvage logging is not a threat to the species in SIEN parks.

Invasive Species and Disease: European Starlings were introduced to New York City in 1890 and by the middle of the 20th century had spread across much of North America with the exception of Mexico. House Wrens are susceptible to nest usurpation by starlings (Siegel and DeSante 1999), but extent of competition with starling in SIEN parks is unknown.

Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. House Wrens are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see species account for Brown-headed Cowbird in this report).

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for House Wrens, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage shrubs and degrade oak woodland habitats. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Oak woodlands in north-central coastal California have been falling victim to Sudden Oak Death syndrome (SOD), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SOD probably was introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to House Wrens if it reaches those regions of the Sierra Nevada.

Significant numbers of House Wrens are killed in collisions with TV towers during migration (Johnson 1998) but this is not a threat in SIEN parks.

Management Options and Conservation Opportunities

Ecosystem management that protects the shrubby understory in open oak woodlands and pine forests and restores the nature fire regime (including high-intensity fire) will benefit House Wren populations in SIEN parks. Managers can also carefully manage or consider eliminating Brown-headed Cowbird feeding sites (Heath 2008) such as stables. Guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004). Park managers can monitor the effects of European Starlings, and implement a removal program for these invasive species if monitoring indicates substantial conflict with House Wrens and other cavity-nesters. Managers should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SOD, and preventative measures including quarantine of the area could be immediately implemented if SOD is identified. Management guidelines and regulations pertaining to SOD can be found at the California Oak Mortality Task Force website (http://www.suddenoakdeath.org/).

Hutton's Vireo – *Vireo huttoni*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Hutton's Vireo is a fairly common local breeder at Sequoia and Kings Canyon (SEKI) National Parks and is an uncommon local breeder at Yosemite (YOSE) National Park. The species was not reported at Devils Postpile (DEPO) National Monument (Table 1).

Table 48. Breeding status and relative abundance of Hutton's Vireos in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Locally Uncommon
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Hutton's Vireo is distributed along the Pacific coast of the U.S., the Sierra Nevada, and parts of Mexico (Davis 1995). Within California, populations along the coastal range are larger than those found within the Sierra Nevada (Siegel and DeSante 1999), making SIEN parks less important than other parts of this species' relatively restricted range.

Distribution and Habitat Associations
Hutton's Vireos are often found in moderately dense woodlands with shrubby understories (Gaines 1992). Hutton's Vireos were detected in low densities (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were not observed during the DEPO survey. Park inventories show highest associations with Blue Oak forests and Mixed Chaparral within SEKI and YOSE respectively (Table 2).

Table 49. Number of Hutton's Vireos recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	12	14	Blue Oak Forest	0.13	0.16 (0.04-0.62)
			Ponderosa Pine Woodland	0.08	0.06 (0.01-0.37)
			Mixed Chaparral	0.08	0.05 (0.01-0.21)
Yosemite NP	5	5	Mixed Chaparral	0.12	
			Douglas fir/Mixed Conifer	0.04	
			Canyon Live Oak	0.03	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

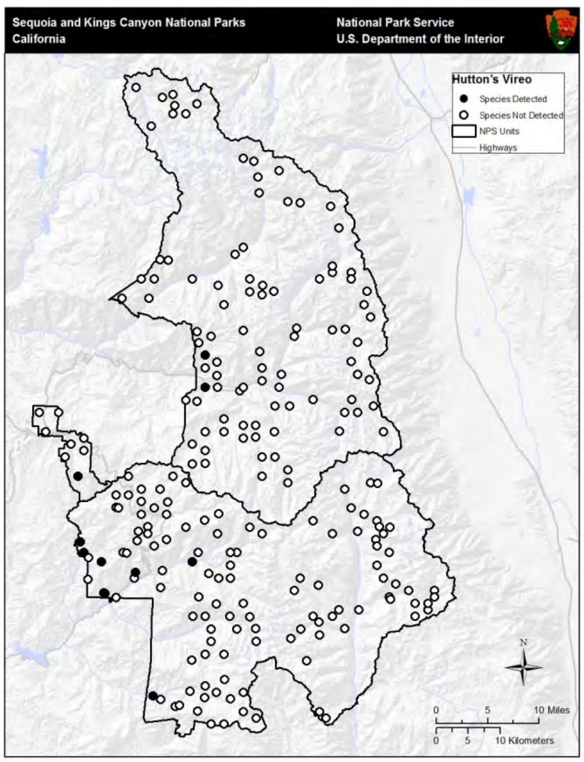

Figure 20. Bird survey transects where Hutton's Vireo was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

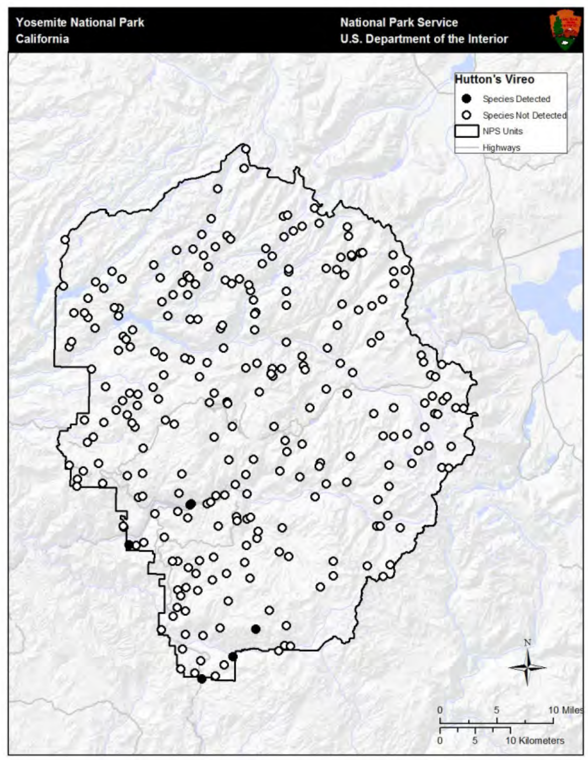

Figure 21. Bird survey transects where Hutton's Vireo was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Hutton's Vireo was observed within the lower-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Hutton's Vireo in SEKI was 1102 m, with 95% of observations occurring between 524 and 2101 m. At YOSE, the mean elevation of observations was 1681 m with 95% of observations falling between 1372 and 2359 m (Siegel et al. 2011).

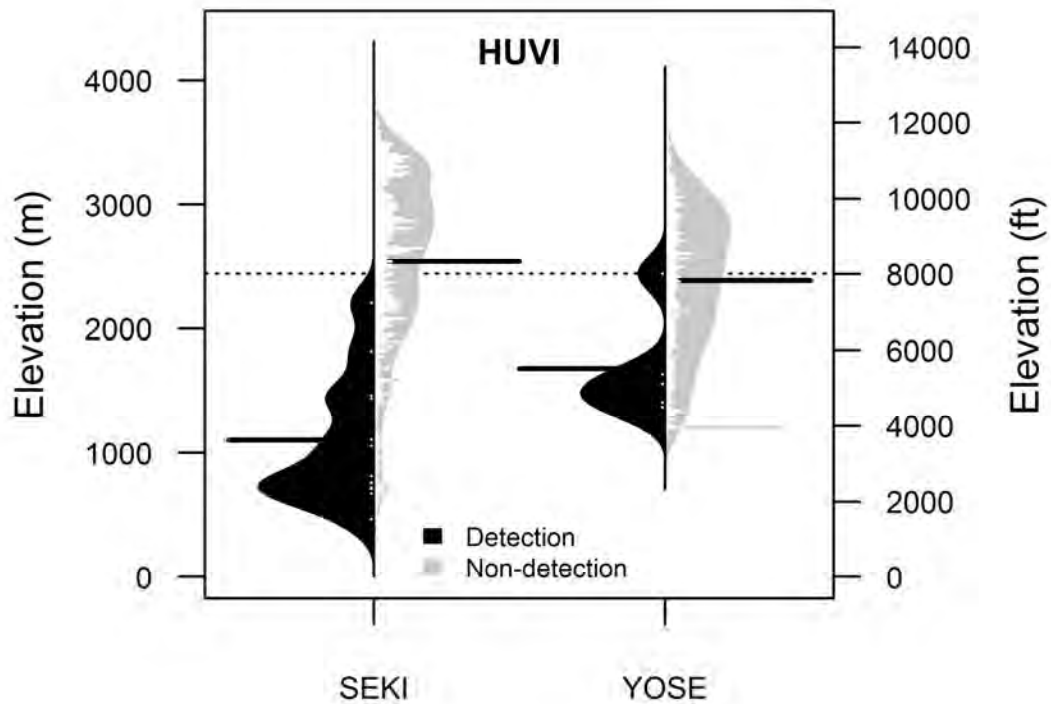

Figure 3. Elevational distributions of sites where Hutton's Vireos (HUVI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites.The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Hutton's Vireos are detected in approximately the same densities in the Sierra Region (BCR 15) as in California as a whole, but were observed along only eight transects within the Sierra Nevada. They were detected in low numbers on individual BBS routes at YOSE and SEKI. A significant positive trend was observed in the Sierra Region over the long-term and a nearly significant short-term trend was seen over the short-term (Table 3).

Table 50. Relative abundance and trends for Hutton's Vireo according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	98	1.78	+0.6	0.47
	1980-2007			+0.5	0.68
Sierra Nevada (BCR 15)	1966-2007	16	1.51	+7.4	0.04
	1980-2007			+6.7	0.08
Route 14117 – Sequoia NP	1972-2005	1	0.19	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.15	+0.9	0.95
Route 14156 – Yosemite NP	1974-2007	1	1.73	+3.2	0.71

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Hutton's Vireos were not captured frequently enough at SIEN MAPS stations to make inferences regarding productivity and survival within the parks

Stressors

The greatest threat to Hutton's Vireo appears to be loss of oak woodlands due to development. This is not a concern within SIEN parks, but could affect park populations where development supplants oak habitat near park boundaries. Of concern both within and beyond park boundaries is the loss of oaks and subsequent degradation of habitat due to the spread of the Sudden Oak Death disease, were it to spread to the Sierra Nevada. Pesticide use and disturbance at nest sites could pose a minor threat to Hutton's Vireo, but only nest disturbance would directly affect SIEN populations. Finally, Hutton's Vireo appears to be responding to climate change, but modeled predictions are not dire for this species and any range shifts are unlikely to lead to a loss of Hutton's Vireo from SIEN parks.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Hutton's Vireo has significantly shifted 44.5 miles to the north and 21.2 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). This observed shift provides evidence that Hutton's Vireo has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Modeled distribution shifts of Hutton's Vireo are mixed in their predicted response of the species to climate change, with no combination of climate and distribution models showing dramatic differences between current and future probabilities of occurrence (Stralberg and Jongsomjit 2008). Where predicted changes are apparent, Hutton's Vireo is expected to occur more frequently in the northern half of the state, especially along the north coast and northern Sierra, with no change or slight reductions in occurrence in the southern Sierra and along the southern California coast. The most important variables influencing current and projected distribution were vegetation (both distribution models), annual precipitation (Maxent distribution model), and annual mean temperature (GAM distribution model) (Stralberg and Jongsomjit 2008).

Hutton's Vireos are found breeding within the lower elevations of both YOSE and SEKI (Figure 3). If the species shifts its range northward and upward as is expected of most species, there remains ample area available for colonization within SIEN parks. However, the vireo's ability to adapt to climate change through range shifts also depends on the ability of its associated habitat to shift as well.

Altered Fire Regimes: Hutton's Vireo's response to fire is not well studied. However, any loss of habitat, especially oak woodland due to large fires is likely to be detrimental to Hutton's Vireo in the short term.

Habitat Fragmentation or Loss: Hutton's Vireo is vulnerable to loss of foothill oak habitat to development (Siegel and DeSante 1999) and degradation of habitat along the Salinas River likely led to the extirpation of Hutton's Vireo in the Salinas Valley (Davis 1995). However, in western Mexico Hutton's Vireo may prefer disturbed conditions when trees are left intact (Davis 1995). Merenlender et al. (2009) showed that Hutton's Vireo is rare in northern California oak woodlands with exurban and suburban development. These results suggest that undeveloped parcels, such as the oak woodlands found in the lower elevations of SEKI are very important for the species, given expanding human populations in the Sierra foothills.

Invasive Species and Disease: Sudden Oak Death (SOD), a pathogen that threatens several California oak species could indirectly reduce Hutton's Vireo populations where the disease leads to large oak die-off and subsequent loss of vireo habitat (Monahan and Koenig 2006). The disease first appeared in California in the 1990s and is currently limited to 14 coastal counties (Alexander and Lee 2010), but could expand eastward into counties surrounding SIEN parks.

Human Use Impacts: The use of pesticides to control insect pests may be detrimental to Hutton's Vireo by reducing a potentially important food source and disturbance during nest-building often leads to nest abandonment (Davis 1995). Other threats from human use impacts are not apparent. Impacts on Hutton's Vireo from pesticide use would not directly affect SIEN populations, but nest disturbance could occur where high use areas overlap with breeding habitat.

Management Options and Conservation Opportunities

Hutton's Vireo is increasing across the Sierra and appears stable throughout California (Table 3). Due to the apparent health of the species there is no need for intensive management of Hutton's Vireo. However, the maintenance of the vireo's habitat within SIEN parks, especially oak woodlands is important for the species persistence. Protected oak woodlands will become increasingly important as development in the foothills near SIEN parks increases and Hutton's Vireo habitat is degraded.

Sudden Oak Death (SOD) is a potential concern for Hutton's Vireo habitat and may require management in the future. Currently the disease is limited to counties along the California coast (Alexander and Lee 2010).

SIEN managers should be cognizant of any spread of the disease into the Sierra Nevada and take early action in the event of SOD outbreaks (Alexander and Lee 2010). Management guidelines and regulations pertaining to SOD can be found at the California Oak Mortality Task Force website (http://www.suddenoakdeath.org/).

Killdeer – *Charadrius vociferus*

Migratory Status

Partial medium-distance migrant (Jackson et al. 2000)

Residency and Breeding Status

Killdeer is an uncommon occasional breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks. The species is a rare possible breeder at Devils Postpile National Monument (Table 1).

Table 51. Breeding status and relative abundance of Killdeers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Occasional Breeder	Locally Uncommon
Yosemite NP	Summer/Year-round	Occasional Breeder	Locally Uncommon
Devils Postpile NM	Migrant/Summer	Possible Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Killdeer is distributed across North America including all of California (Jackson et al. 2000). SIEN parks do not make up an important part of the species' range.

Distribution and Habitat Associations

Killdeers are associated with moist open habitats such as wet meadows, mudflats, and margins of ponds and streams (Gaines 1992). Killdeers were detected twice in SEKI (Figure 1) and not at all at YOSE or DEPO during park inventories (Table 2). Due to the small number of observations, habitat associations for the SIEN parks are not available from inventory data.

Table 52. Number of Killdeers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	2	2	NA[1]	NA	NA
Yosemite NP	0	0	Not detected	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

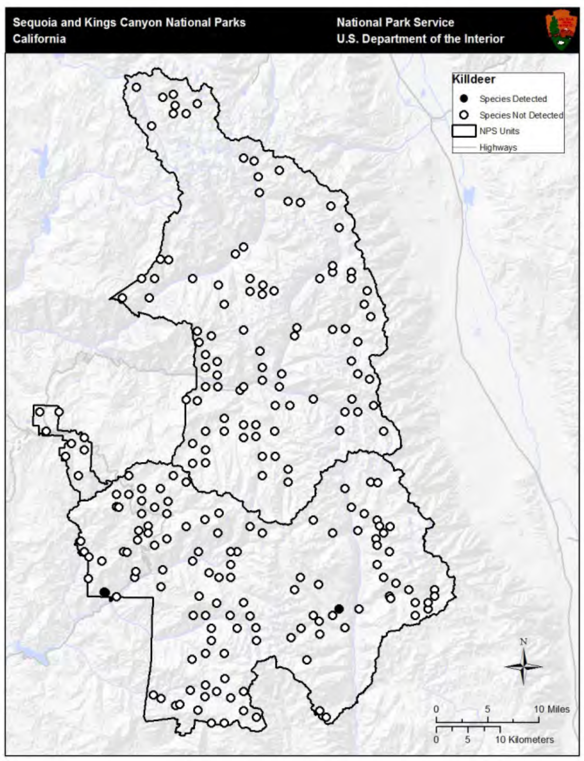

Figure 22. Bird survey transects where Killdeer was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

Killdeer was observed twice at SEKI during recent park inventories, with a mean elevation of 1697 m (Figure 2) (Siegel et al. 2011).

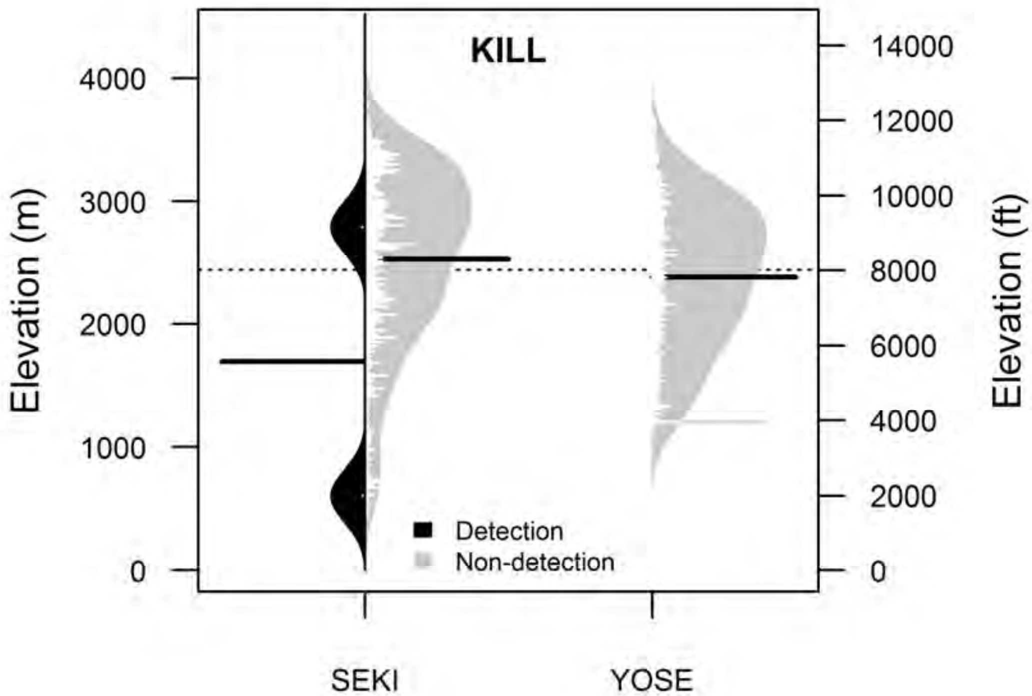

Figure 2. Elevational distributions of sites where Killdeer (KILL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Killdeers are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at YOSE and SEKI. A significant negative population trend was observed across California both in the long and short-term. This negative trend appears to be mirrored in the Sierra Nevada (although not statistically significant) in recent years (1980-2007) (Table 3).

Table 53. Relative abundance and trends for Killdeer according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	156	4.70	-1.8	0.00
	1980-2007			-1.5	0.02
Sierra Nevada (BCR 15)	1966-2007	15	0.71	-2.5	0.37
	1980-2007			-6.7	0.07
Route 14117 – Sequoia NP	1972-2005	1	0.13	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.04	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Killdeers are not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The greatest threats to Killdeer occur where the species lives closely with humans. Historically the species was shot in large numbers, although such mortalities have been reduced greatly in recent decades. Possibly the greatest modern threats to Killdeer are collisions with vehicles and human infrastructure as well as contamination from pesticides or other toxins. Although such factors may threaten SIEN populations to some degree, they are less concerning than in other parts of the species' range where human activities are more prevalent. Human changes of habitat have mostly been beneficial to Killdeer in the past, but alteration of waterways can lead to the loss of suitable habitat locally. Finally, climate change, altered fire regimes, and impacts of invasive species and disease do not appear to be major threats to this species.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Killdeer has significantly shifted 78.0 miles to the south and 14.3 miles toward the coast over the past 40 years (Audubon 2009). In general species are expected to move toward cooler areas as the climate warms. Contrary to this assumption, the shifts observed by the Christmas Bird Count show Killdeer moving toward areas with warmer winter temperatures. This suggests that climate change is not affecting Killdeer as much or at least in the same way as it is most species.

Due to the ubiquity of Killdeer across North America in a variety of climates, it is unlikely that changing temperature and precipitation patterns will directly threaten the species as a whole. In fact, a study of breeding North American birds over the past 50 years showed no significant change in breeding timing or clutch size of Killdeer (Torti and Dunn 2005). However, study site locations did not experience temperature increases as great as at other locations during the same period (Torti and Dunn 2005). Killdeer may respond indirectly to climate change as their habitat and other species around them respond to changing temperature and precipitation patterns, but such shifts are not likely to be a major threat to SIEN populations.

Altered Fire Regimes: There is little information on how Killdeer respond to fire. This is likely because their nesting and foraging grounds are not found within forest habitats most affected by changing fire regimes. Fire management practices that result in expansion of forests will reduce Killdeer habitat, while any reduction of dense forests by fire is likely to increase Killdeer habitat.

Habitat Fragmentation or Loss: Habitat change has likely had a net positive effect on Killdeer populations. The species suffers with the construction of dams and stream channelization, but these losses of habitat have been compensated by the creation of habitat through the clearing of forests (Jackson et al. 2000).

Invasive Species and Disease: Invasive species and disease do not appear to be major threats to Killdeer across its range. To our knowledge, these threats are insignificant within SIEN parks as well.

Human Use Impacts: Shooting of Killdeer was widespread in the early twentieth century, but declined as legal protections were put in place. Some killings by hunters still occur, but do not have great effects on the species (Jackson et al. 2000) and should have no impact on SIEN populations.

Killdeer are often found living close to humans. Because of this, they are particularly susceptible to contamination from pesticides and other toxins (Jackson et al. 2000). Likewise, Killdeer are more prone to collisions with vehicles and human infrastructure than other shorebirds. For example, Killdeer will sometimes nest within gravel road shoulders, increasing the risk of collisions with vehicles (Jackson et al. 2000). These threats are of significant concern for Killdeer that inhabit areas with heavy agriculture or urban development, but are less concerning for individuals within the SIEN parks.

Management Options and Conservation Opportunities

The relative rarity of Killdeer within SIEN parks coupled with abundant and widespread populations elsewhere in North America make active management of the species within SIEN a low priority. However, if collisions between Killdeer and vehicles ever become a major concern within SIEN parks, gravel shoulders should be altered or replaced so as not to mimic natural breeding habitat. Alternatively, Killdeer nests can be moved a few centimeters at a time away from dangerous areas to reduce such conflicts (Jackson et al. 2000).

Lawrence's Goldfinch – *Spinus lawrencei*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Lawrence's Goldfinch is a rare, irregular breeder at Yosemite (YOSE), and probably Sequoia and Kings Canyon (SEKI) national parks as well. It has not been recorded recently at Devils Postpile (DEPO) National Monument (Table 1).

Table 54. Breeding status and relative abundance of Lawrence's Goldfinches in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Irregular Breeder	Rare
Yosemite NP	Summer/Year-round	Irregular Breeder	Rare
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G3 – Vulnerable (Moderate risk of extinction or elimination)
- National Status: N3 – Vulnerable (Moderate risk of extinction or elimination)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Lawrence's Goldfinch occurs for the most part only in California, with a sizeable portion of its range in the Sierran foothills. For this reason the Sierra Nevada and potentially SIEN parks are of great importance for the conservation of this species (Siegel and DeSante 1999).

Distribution and Habitat Associations
Lawrence's Goldfinch prefers dry meadows and open woodlands on the lower west slope of the Sierra Nevada (Gaines 1992). Lawrence's Goldfinch was not detected in any of the SIEN parks during avian inventories, but anecdotal detections off surveys were made in SEKI and YOSE (Table 2). When the species does occur within the parks it is usually only as a transient. Detection rates could be biased somewhat low because of the tendency of the species to mix into flocks of Lesser Goldfinches, where they may go unnoticed.

Table 55. Number of Lawrence's Goldfinches recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA[1]	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Lawrence's Goldfinch was not observed during inventory surveys of the SIEN parks; thus, elevational distribution data are not available.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Lawrence's Goldfinches are found in low abundance both in the Sierra Region (BCR 15) and in California as a whole. Only five Sierra Nevada routes have observations of the species, indicating that it occurs rather uncommonly across the range, and also reflecting that foothill habitats are poorly sampled by the BBS in the Sierra Nevada (Siegel and Wilkerson 2005b). They were detected in low numbers on individual BBS routes at Sequoia NP and YOSE and not at all in Kings Canyon NP. There are no significant trends reported, but the Sequoia NP route shows an apparent dramatic increase in relative abundance of this locally irruptive species (Table 3).

Table 56. Relative abundance and trends for Lawrence's Goldfinch according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	58	0.66	-1.4	0.41
	1980-2007			-7.0	0.18
Sierra Nevada (BCR 15)	1966-2007	5	0.62	+0.2	0.95
	1980-2007			-2.4	0.81
Route 14117 – Sequoia NP	1972-2005	1	0.81	+62.1	0.13
Route 14132 – Kings Canyon NP	1974-2005	1	0.00	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	1.85	-2.4	0.82

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Lawrence's Goldfinches were captured in low numbers at MAPS stations in Kings Canyon and Yosemite. No trend data are available for either capture rates or productivity, and productivity indices have little meaning because of small sample sizes (Table 4).

Table 57. Population trends, productivity, trends, and survival estimates of Lawrence's Goldfinches at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.1	NA[2]	0.00	NA	NA
Yosemite NP	1993-2009	0.4	NA	0.51	NA	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Lawrence's Goldfinch is a rare visitor to the SIEN parks and thus is not greatly threatened by any activities within park boundaries. Outside of protected areas the species is susceptible to development of its habitat and Brown-headed Cowbird brood parasitism, but may benefit from increasing fire frequencies and from many human disturbances such as grazing and agriculture. The effects of climate change on Lawrence's Goldfinch are not well understood, but the species may benefit from aridification of upland habitats and SIEN parks may see an increase in occurrences in the future.

Climate Change: An analysis of shifts between the historical range of Lawrence's Goldfinch (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation (but not temperature) changes (Tingley et al. 2009). This observed shift provides evidence that Lawrence's Goldfinch has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Lawrence's Goldfinches are found breeding below 1500 m in xeric habitat in the central Sierra (Gaines 1992). If climate change causes the species' breeding range to shift upslope as is generally expected, there is much higher-elevation habitat for new colonization within the SIEN parks. In fact, due to Lawrence's Goldfinch's affinity for arid habitats (Davis 1999), any expansion of dry woodlands or chaparral as a result of climate warming could allow the species to expand its breeding range, including further into SIEN parks.

Altered Fire Regimes: Alteration of habitat through fire that increases the abundance of annual seed plants can benefit Lawrence's Goldfinch (Davis 1999). Additionally, accelerated fire intervals that might result in more of the landscape being dominated by chaparral could be beneficial to the species.

Habitat Fragmentation or Loss: Development of Lawrence's Goldfinch habitat, especially oak woodland and chaparral outside of protected areas is a potential threat to the species (Davis

1999, Siegel and DeSante 1999). This is not a major problem within SIEN parks, but could be a threat to birds that dwell at or near the parks' lower-elevation boundaries.

Invasive Species and Disease: Although native to North America, Brown-headed Cowbirds have expanded their range since European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and trails. Lawrence's Goldfinches are susceptible to brood parasitism by Brown-headed Cowbirds, but cowbird occurrence and parasitism rates within SIEN parks has been found to be relatively low (Halterman et al. 1999). For example, during a 1995-96 study at SEKI, only 2-3% of passerine nests monitored were parasitized by cowbirds (Halterman and Laymon 2000).

Human Use Impacts: Lawrence's Goldfinch may actually benefit from human disturbance regimes such as grazing and agriculture where they increase the abundance of annual see plants (Davis 1999).

Management Options and Conservation Opportunities

Due to the rarity of Lawrence's Goldfinch within SIEN parks there is little park managers can do to manage the species. However, MAPS station operation (although to date the SIEN stations have not captured many Lawrence's Goldfinches) and other means of monitoring the species in the parks should continue to document any expansion of the species' range into the parks in response to climate change.

Lazuli Bunting – *Passerina amoena*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Lazuli Bunting is a fairly common summer resident and regular breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, and an uncommon summer resident and regular breeder at and Devils Postpile (DEPO) National Monument (Table 1).

Table 58. Breeding status and relative abundance of Lazuli Buntings in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Lazuli Bunting occurs west of Great Plains and south of boreal forest in Canada (Greene et al. 1996). The Sierra Nevada comprises a fairly important part of the species' range in California (Siegel and DeSante 1999).

Distribution and Habitat Associations
Lazuli Bunting prefers broken chaparral, shrubby open oak woodlands, and shrubby riparian habitat, often in xeric areas of the moister west slope and riparian habitat on the drier east slope of the Sierra Nevada (Siegel and DeSante 1999). The birds can be found on the edges of many coniferous habitats but generally with oaks, montane chaparral, or riparian habitat or meadows present (Siegel and DeSante 1999). Lazuli Buntings were detected in moderate to high numbers (Table 2) along survey transects in YOSE and SEKI (Figures 1 and 2) but not DEPO during avian inventory surveys. Detections were in a wide variety of habitat types but most often Mixed Chaparral and oak associations (Table 2).

Table 59. Number of Lazuli Buntings recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	58	73	Mixed Chaparral	0.42	0.59 (0.34-1.03)
			Live Oak/California Buckeye	0.24	0.36 (0.14-0.91)
			Canyon Live Oak Forest	0.14	0.15 (0.06-0.39)
			Blue Oak Forest	0.13	0.13 (0.03-0.53)
			California Black Oak Forest	0.12	0.15 (0.05-0.44)
Yosemite NP	76	118	Mixed Chaparral	0.36	
			Recent Burn	0.28	
			Montane Chaparral	0.17	
			Quaking Aspen	0.14	
			Ponderosa Pine	0.13	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

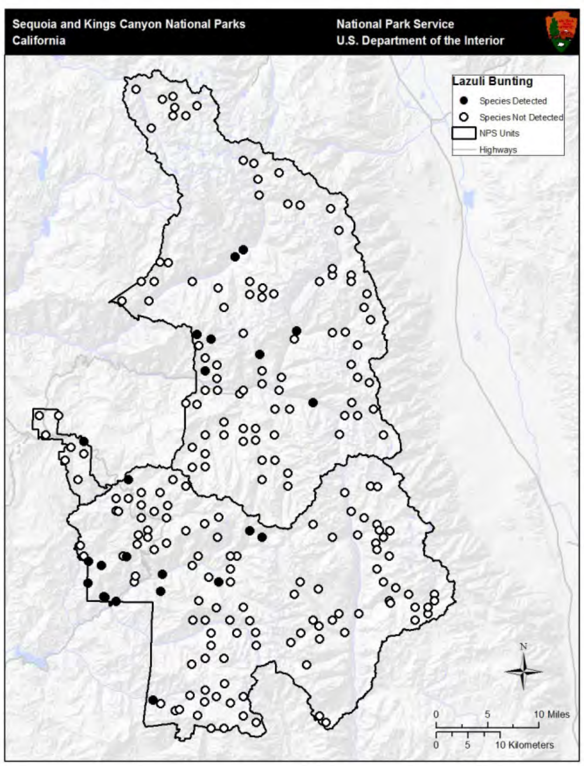

Figure 23. Bird survey transects where Lazuli Bunting was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

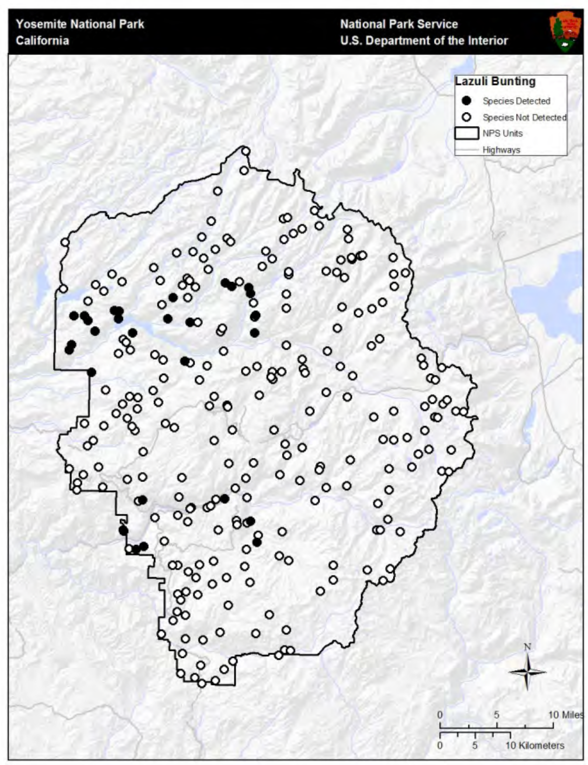

Figure 24. Bird survey transects where Lazuli Bunting was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Lazuli Bunting was detected at low- to mid-elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 1523 m, with 95% of observations occurring between 594 and 2787 m. In YOSE, the mean elevation of observations was 1722 m with 95% of observations falling between 1195 and 2714 m (Siegel et al. 2011).

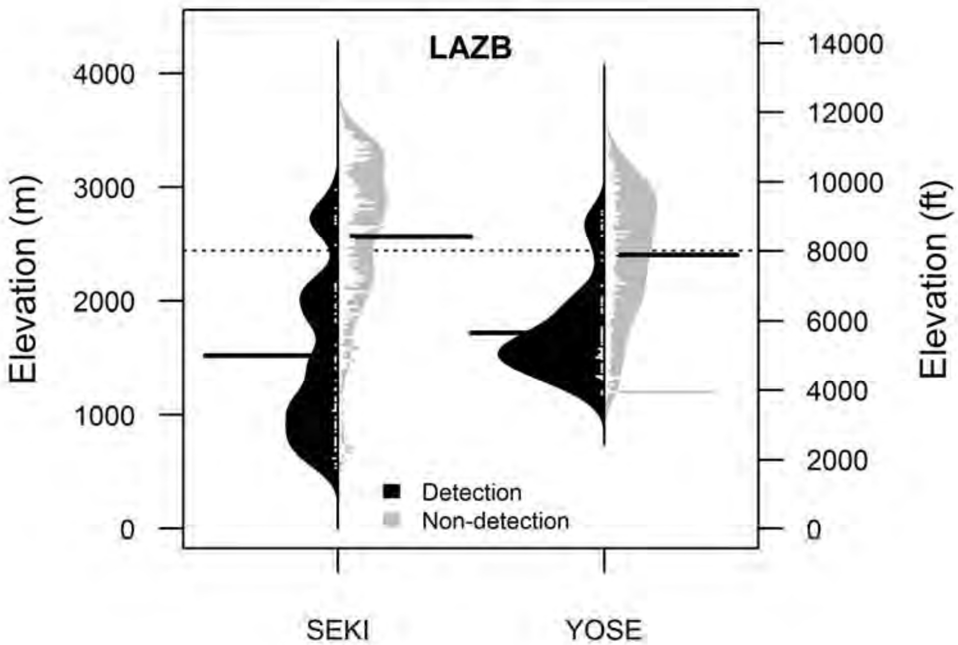

Figure 3. Elevational distributions of sites where Lazuli Bunting (LAZB) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Lazuli Bunting was equally abundant in the Sierra Region (BCR15) and in California as a whole (Table 3). No significant population trends were evident throughout California during any time period, but these data reveal significant (P = 0.01) increases along the route in Kings Canyon NP from 1974-2005 (Table 3). Non-significant population increases were recorded along the routes in Sequoia and Yosemite NPs as well.

Table 60. Relative abundance and trends for Lazuli Bunting according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	135	1.87	+1.1	0.49
	1980-2007			+0.3	0.80
Sierra Nevada (BCR 15)	1966-2007	23	1.35	+5.7	0.09
	1980-2007			+5.3	0.27
Route 14117 – Sequoia NP	1972-2005	1	0.88	+46.0	0.22
Route 14132 – Kings Canyon NP	1974-2005	1	1.90	+19.2	0.01
Route 14156 – Yosemite NP	1974-2007	1	3.12	+9.5	0.11

Contrary to BBS survey results, mark-recapture data from SIEN MAPS stations document a large and significant decreasing population trend for Lazuli Bunting in Yosemite NP from 1993-2009 (Table 4). Much of this decline appears to be related to the initial post-fire increase in Lazuli Bunting in the vicinity of the Big Meadow MAPS station, after that area burned in 1990; Lazuli Buntings tend to colonize recent burned areas in large numbers, and then gradually abandon them.

Table 61. Population trends, productivity, trends, and survival estimates of Lazuli Bunting at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.7	NA[2]	0.17	NA	NA
Yosemite NP	1993-2009	8.3	-10.81***	0.50	+4.34	0.679 (0.057)
Devils Postpile NM	2002-2006	1.5	NA	1.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Lazuli Bunting populations appear relatively stable in California (Table 3). This spectacularly plumaged bird may nevertheless by threatened by loss of oak woodland and riparian habitats due to urban development and livestock grazing. Lazuli Bunting increases rather dramatically after fire, thus greater extent and intensity of future fires will benefit the species. Although these buntings are associated with early successional shrubby habitats, they do not thrive in heavily logged forests as they do in post-fire areas. As long as healthy riparian and meadow habitat, oak woodlands, and chaparral fields remain abundant through the Sierra Nevada, this species is likely to adapt to climate change. Lazuli Buntings are highly susceptible to Brown-headed Cowbird nest parasitism, which has been implicated in local bunting declines.

Climate Change: An analysis of shifts between the historical range of Lazuli Bunting (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to both precipitation and temperature change by shifting its range to follow its climatic niche to a cooler and wetter occupied range (Tingley et al. 2009). These observed shifts provide evidence that Lazuli Bunting have already responded to climate change and will likely continue to shift within the Sierra in the coming decades.

Lazuli Buntings are most abundant in dry, shrubby habitats but also are associated with riparian and meadow habitats (Greene et al. 1996, Siegel and DeSante 1999). The species is already shifting its range in the Sierra Nevada concomitant with rising temperatures. If climate change causes the bunting's range to move upslope in the Sierra Nevada as is generally expected, there is likely sufficient chaparral and oak woodlands as well as riparian habitat for the species to colonize, particularly if these habitat types expand uphill as well, as predicted (Stralberg and Jongsomjit 2008). However, changes in hydrology due to climate change that result in alteration or loss of riparian vegetation could adversely impact the species.

Altered Fire Regimes: The ground- and shrub-foraging Lazuli Bunting favors shrubby and early successional habitats (Greene et al. 1996). Studies have consistently found a strong positive effect of fire on this species. Lazuli Bunting nested only on burned forests during surveys of burned and green forests conducted over a 25-year period in the eastern Sierra Nevada (Bock and Lynch 1970, Rafael et al. 1987). The species was a strong indicator of habitats burned twice at high-intensity in Oregon; it was most abundant in and nearly restricted to these types (Fontaine et al. 2009). The Lazuli Bunting was one of the most abundant species in two large fires in the northern Sierra Nevada, where it was 21 times more abundant than in green forests (Burnett et al. 2010); the bunting was also significantly more abundant in burned than unburned forests in the southern Sierra (Siegel and Wilkerson 2005). In Montana, Lazuli Bunting increased in abundance following fire of all intensities and continued to increase each year postfire (Smucker et al. 2005). Should fire intensity and frequency increase in coming years, the Lazuli Bunting is likely to strongly benefit. Policies of prescribed natural fire will help this species to thrive in SIEN parks.

Habitat Fragmentation or Loss: Loss of oak woodlands and riparian habitat due to urbanization is a major threat to Lazuli Bunting (Siegel and DeSante 1999). The majority of oak woodlands in California are privately owned and receive little management or regulatory protection. Historically, foothill oak woodlands have been extensively grazed, but more recently, urban development has become the dominant reason for loss of oak woodlands. Lazuli Bunting adapts well to the presence of humans, using thickets and hedges along agricultural fields and residential gardens (Greene et al. 1996). However, some natural habitat is required for the species to persist in an area. Extensive clearing of oak woodlands and shrublands for urban development is a major threat to Lazuli Bunting in lower-elevation foothill habitats, but does not impact the species in the SIEN parks.

Logging also has been suggested to benefit Lazuli Buntings because the species favors shrubby and early successional habitats (Siegel and DeSante 1999) but others have noted that, although an abundant breeder in recent postfire habitats, Lazuli Bunting was less common in early successional managed forest treatments such as group-selection cuts, seed-tree cuts, and clearcuts (Hutto 1995). Logging does not pose a significant threat to Lazuli Bunting in the SIEN parks due to the lack of commercial logging.

Invasive Species and Disease: Nest predation or parasitism by Brown-headed Cowbirds has been implicated in declines of some Lazuli Bunting populations; parasitized nests rarely fledge any of their own young (Greene et al. 1996). Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).
Human Use Impacts: Lazuli Bunting commonly frequent bird feeders, and are vulnerable to predation by domestic cats (Greene et al. 1996), although this is not a risk to the birds in SIEN parks. Birds that breed or winter near agricultural fields may ingest pesticides (Greene et al. 1996). Lazuli Bunting are trapped and sold as cage pets on the wintering grounds, but impacts on populations are not known (Greene et al. 1996).

Packstock grazing within the SIEN parks is a potential risk to Lazuli Buntings, at least locally where grazing is permitted, because grazing can degrade oak woodland and riparian and meadow habitats, and it can attract Brown-headed Cowbirds. As compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks, although the high vulnerability of Lazuli Buntings to cowbird parasitism suggests that cowbird control may be warranted.

Oak woodlands in north-central coastal California have been falling victim to Sudden Oak Death (SOD), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SOD was probably introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Lazuli Bunting and other oak-associated species if it reaches those regions of the Sierra Nevada.

Management Options and Conservation Opportunities
The most important things park managers can do to protect Lazuli Bunting populations in the parks are to maintain riparian and montane habitats and to manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in the SIEN indicates that a trapping program is not warranted (Halterman et al. 1999). However, this assessment is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

If climate change leads to substantial meadow desiccation, changes in watershed hydrology, and reproductive success declines, restoration of meadow hydrology could benefit breeding Lazuli Buntings (Cain et al. 2003). Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites, perhaps along with active restoration of riparian deciduous vegetation, would likely benefit Lazuli Bunting and other riparian and meadow-dwelling bird species.

Managers should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SODS, and preventative measures including quarantine of the area could be immediately implemented if SODS is identified.

MAPS station operation and other means of monitoring Lazuli Bunting populations in the parks should continue to track future population changes.

Lesser Goldfinch – *Spinus psaltria*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Lesser Goldfinch is a locally common summer or year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and an uncommon summer resident and possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 62. Breeding status and relative abundance of Lesser Goldfinches in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Locally Common
Yosemite NP	Summer/Year-round	Regular Breeder	Locally Common
Devils Postpile NM	Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Lesser Goldfinch inhabits a wide variety of habitats of the western U.S. from Oregon east into Colorado and Texas, and south to Mexico (Watt et al. 1999). The Sierra Nevada is relatively unimportant to the species, either in California or overall (Siegel and DeSante 1999).

Distribution and Habitat Associations
In the Sierra Nevada, Lesser Goldfinch prefers open, wooded habitats, including oak woodlands, open oak-conifer forests, foothill chaparral with riparian woodlands, piñon-juniper woodlands, and even rural, urban, and suburban parks and gardens as long as there is a good water source (Siegel and DeSante 1999, Watts et al. 1999). These birds were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects in SEKI and YOSE, but not in DEPO. Park inventories show the strongest associations with Blue Oak forests in SEKI and Mixed Chaparral in YOSE (Table 2). Additional detections were in relatively xeric oak, pine, and chaparral habitats.

Table 63. Number of Lesser Goldfinches recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	38	59	Blue Oak Forest	1.34	2.50 (1.38-4.55)
			Live Oak/California Buckeye	0.33	0.75 (0.35-1.61)
			Mixed Chaparral	0.28	0.29 (0.15-0.58)
Yosemite NP	31	63	Mixed Chaparral	0.68	
			Ponderosa Pine	0.20	
			Black Oak	0.13	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

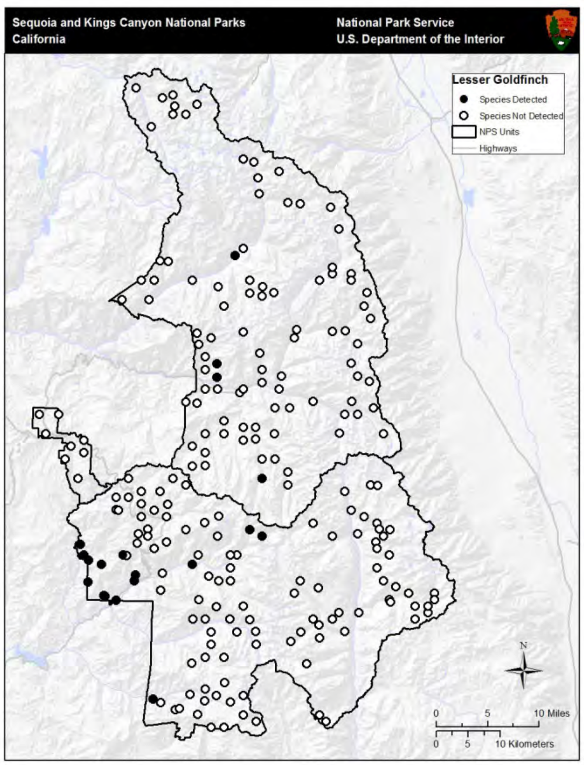

Figure 25. Bird survey transects where Lesser Goldfinch was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

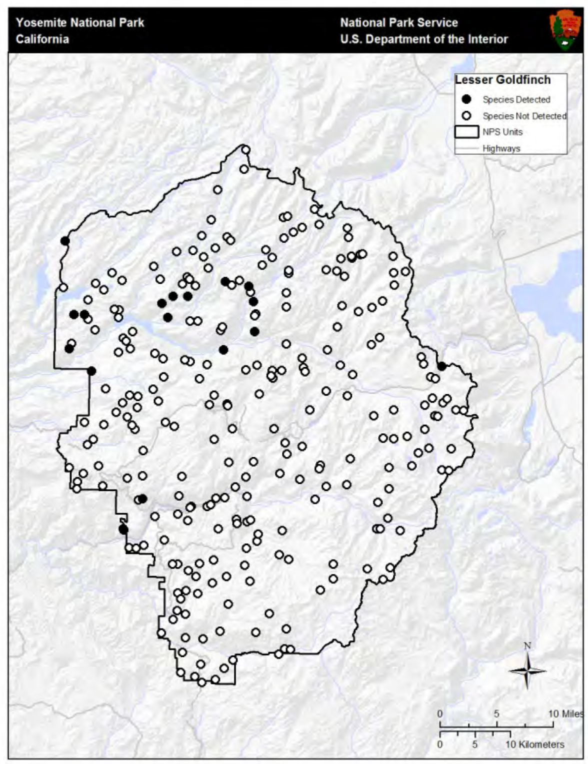

Figure 26. Bird survey transects where Lesser Goldfinch was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Lesser Goldfinch was detected at lower elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 1060 m, with 95% of observations occurring between 430 and 2747 m. In YOSE, the mean elevation of observations was 1714 m with 95% of observations falling between 1202 and 2905 m (Siegel et al. 2011).

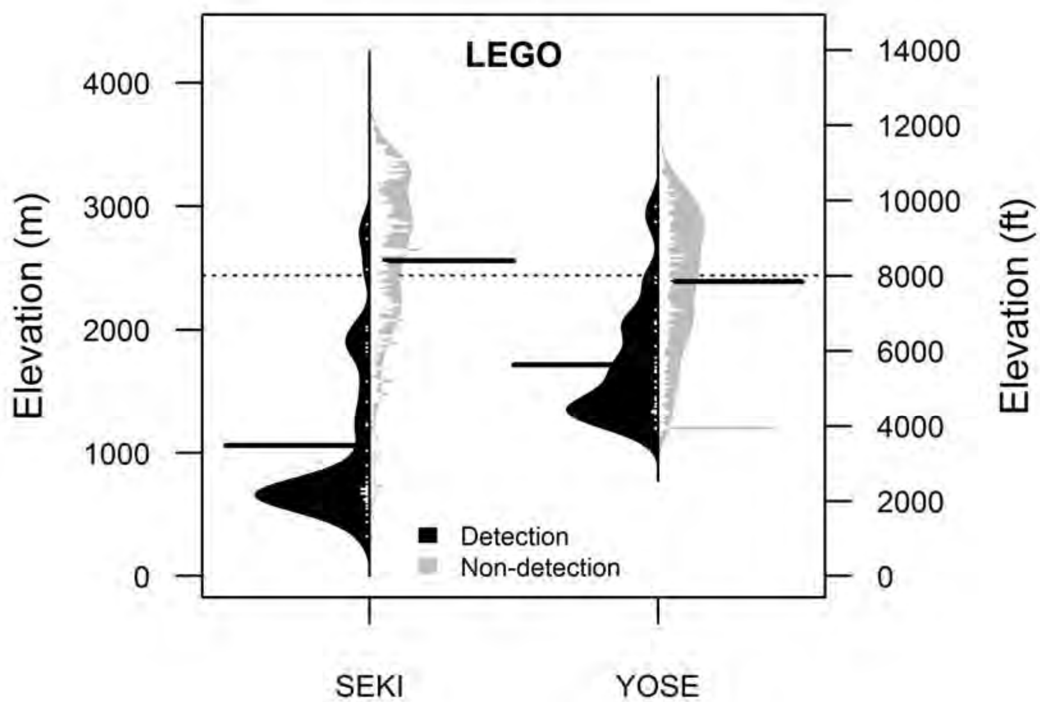

Figure 3. Elevational distributions of sites where Lesser Goldfinch (LEGO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Earlier Breeding Bird Survey (BBS) data suggested that Lesser Goldfinches were declining in the Sierra Nevada (Siegel and DeSante 1999). More recent BBS data indicated the species was abundant in both the Sierra Region (BCR 15) and California as a whole (Table 3), and no significant population trends were observed. However, some evidence exists for an increasing population in the Sierra Nevada from 1980-2007. Non-significant increases were observed in Sequoia and Kings Canyon NPs, but not in Yosemite (Table 3).

Table 64. Relative abundance and trends for Lesser Goldfinch according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). See Methods for an explanation of calculations. Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	168	5.68	-0.3	0.74
	1980-2007			-0.3	0.64
Sierra Nevada (BCR 15)	1966-2007	22	4.54	+4.3	0.07
	1980-2007			+5.6	0.07
Route 14117 – Sequoia NP	1972-2005	1	9.63	+11.1	0.38
Route 14132 – Kings Canyon NP	1974-2005	1	3.95	+3.7	0.54
Route 14156 – Yosemite NP	1974-2007	1	7.92	-0.4	0.92

SIEN MAPS data suggest a strongly significant population decline of Lesser Goldfinches in Yosemite NP from 1993-2009. These data also indicate an increasing reproductive trend during the same time period as well as an increasing population trend from 1991-2009 in Kings Canyon NP, but results were not statistically significant (Table 4).

Table 65. Population trends, productivity, trends, and survival estimates of Lesser Goldfinch at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.5	+1.67	0.14	NA	NA
Yosemite NP	1993-2009	2.8	-5.86**	0.88	+1.72	NA
Devils Postpile NM	2002-2006	0.0	NA[2]	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Lesser Goldfinches may be increasing in Sequoia and Kings Canyon NPs but appear to be decreasing in Yosemite NP (Tables 3 and 4). Loss of oak woodlands and altered fire regimes throughout the Sierra may be impacting this species. Cowbird parasitism also may be a problem. The species is tolerant of human alteration of habitat, so fragmentation and loss of habitat due to development may not pose as great a risk to Lesser Goldfinch as to other species.

Climate change may not be a significant impact to Lesser Goldfinch if it results in xeric conditions in forests, but the species is already shifting its range inland, which may be cause for concern. Fire treatments that maintain open conditions in foothill oak and pine forests as well as Mixed Chaparral should benefit this species.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Lesser Goldfinch has not shifted in latitude throughout its North American range, but has significantly shifted nearly 27 miles inland over the past 40 years, corresponding with increases in temperature (Audubon 2009). Similarly, an analysis of shifts between the historical range of Lesser Goldfinch (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). These observed shifts provide evidence that Lesser Goldfinch has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Lesser Goldfinches prefer xeric conditions as long as a water source is available to them (Siegel and DeSante 1999). If climate change results in drier oak and pine habitats in the SIEN parks, this species may benefit, but further study is warranted.

Altered Fire Regimes: Fire, set by lightning or Native Americans, historically has been an important component of oak woodlands in California. The decimation of the Native American population and the introduction of livestock and associated non-native annual grasses by European settlers altered fire regimes of this habitat type (Purcell and Stephens 2005). European settlers burned extensively to convert shrublands and woodlands to grasslands for livestock. Oak recruitment increased in some areas coincident with European settlement due to fire, but many areas of Blue Oak woodlands were entirely cleared and permanently converted to annual grassland (Purcell and Stephens 2005).

Although Blue Oak seedlings may be killed by frequent fire, seedlings and saplings are capable of resprouting after fire, and fire increases acorn and leaf production by reducing competition with understory vegetation, which in turn improves habitat for Lesser Goldfinch (Purcell and Stephens 2005). Mixed Chaparral habitats are also well-adapted to fire; some shrub species resprout after fire while others regenerate from seed banks, (Riggan et al. 1994) but with overly frequent fire can type-convert to annual grasslands. Lesser Goldfinches were associated with Blue Oak woodlands in SEKI and Mixed Chaparral in YOSE, and thus are likely to benefit from moderately frequent fire in these parks.

Habitat Fragmentation or Loss: The majority of oak woodlands in California are privately owned and receive little management or regulatory protection. Historically, foothill oak woodlands have been extensively grazed, and between 1945 and 1985 approximately 480,000 hectares of oaks were cleared to enhance forage production (Aigner et al. 1998). More recently, urban development has become the dominant reason for loss of oak woodlands. However, Lesser Goldfinch adapts fairly well to residential developments (Siegel and DeSante 1999, Watts et al. 1999). Some natural habitat is required for the species to persist in an area, so extensive clearing of oak woodlands for urban development may be a threat to Lesser Goldfinch in lower-elevation foothill habitats, but does not impact the species in the SIEN parks.

Invasive Species and Disease: West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). The virus has caused mortality in many native birds. In 2009, West Nile Virus caused at least four Lesser Goldfinch deaths in California (CDPU 2010). Lesser Goldfinch is also susceptible to brood parasitism from invasive Brown-headed Cowbirds. Cowbirds are nest parasites that have been implicated in declines of many native bird species.

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for this species, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because it can alter meadow habitats. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Management Options and Conservation Opportunities

Park managers can benefit Lesser Goldfinch and other vulnerable birds by managing or considering elimination of cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicates that a cowbird trapping program is not warranted (Halterman et al. 1999). However, this assessment is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004). Park staff should collect and test any bird carcasses for West Nile Virus.

MAPS station operation and other means of monitoring Lesser Goldfinch populations in the parks should continue to determine causes of declines in Yosemite.

Lincoln's Sparrow – *Melospiza lincolnii*

Migratory Status

Short-distance/Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Lincoln's Sparrow is a fairly common breeder at Sequoia and Kings Canyon (SEKI) National Parks and Yosemite (YOSE) National Park and is an uncommon breeder at Devils Postpile (DEPO) National Monument.

Table 66. Breeding status and relative abundance of Lincoln's Sparrows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Primarily Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: No listing
- CA Department of Fish and Game Status: No listing

Range Significance

The Lincoln Sparrow is distributed over much of Canada and the mountains of western U.S. including the Sierra Nevada, but absent from eastern U.S. The subspecies *alticola* is found in the Great Basin and Rocky Mountain regions as well as the Sierra and Cascades north to Oregon and Idaho. Because Lincoln's Sparrow is more common in the Sierra Nevada than elsewhere in its range, the Sierra should be considered very important to the species (Siegel and DeSante 1999).

Distribution and Habitat Associations

Lincoln's Sparrows generally prefer meadow habitats for breeding and foraging in the Sierra Nevada (Gaines 1992). The species was detected fairly commonly (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory projects in SIEN parks. As would be expected, park inventories show highest associations with lower elevation and montane meadows within SEKI and YOSE, respectively (Table 2). Detections in forested habitats were much less frequent than detections in meadows, and most of those were probably of birds inhabiting small patches of meadow or riparian habitat within a forest matrix.

Table 67. Number of Lincoln's Sparrows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	49	70	Lower Elevation Meadow	0.51	0.89 (0.55-1.43)
			Aspen Forest	0.17	0.19 (0.05-0.74)
			Giant Sequoia Forest	0.08	0.12 (0.04-0.31)
Yosemite NP	46	60	Montane Meadow	0.43	
			Recent Burn	0.11	
			White Fir	0.05	
Devils Postpile NM	2	2	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

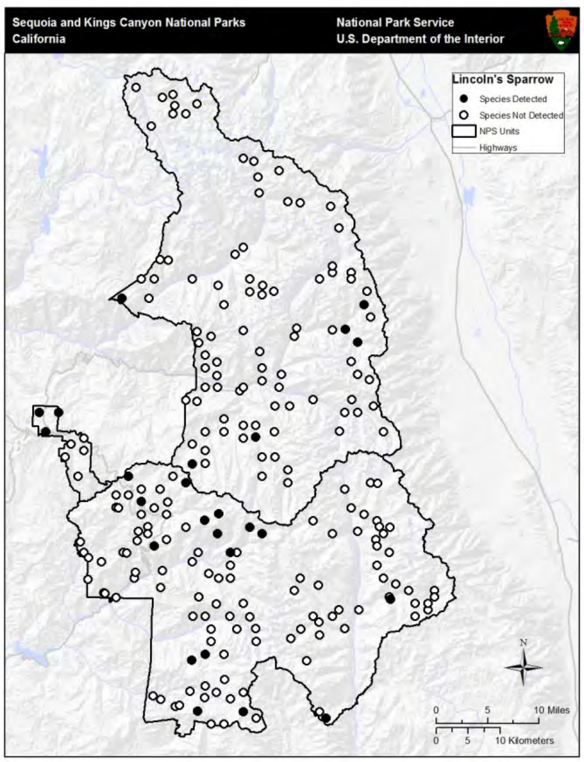

Figure 27. Bird survey transects where Lincoln's Sparrow was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

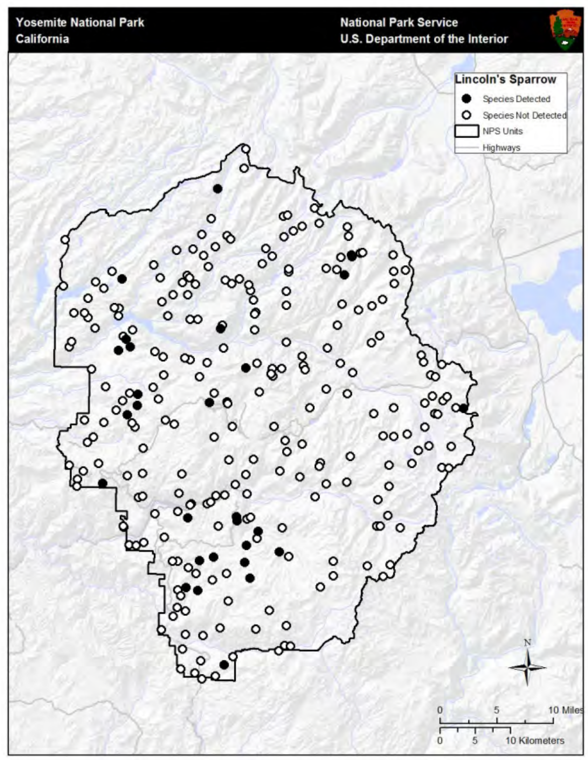

Figure 28. Bird survey transects where Lincoln's Sparrow was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Lincoln's Sparrow was observed within the middle-elevations of both SEKI and YOSe during avian inventory surveys (Figure 3). The mean elevation of observations of Lincoln's Sparrow in SEKI was 2564 m, with 95% of observations occurring between 1889 and 1301 m. At YOSE, the mean elevation of observations was 2281 m with 95% of observations falling between 1851 and 3232 m (Siegel et al. 2011).

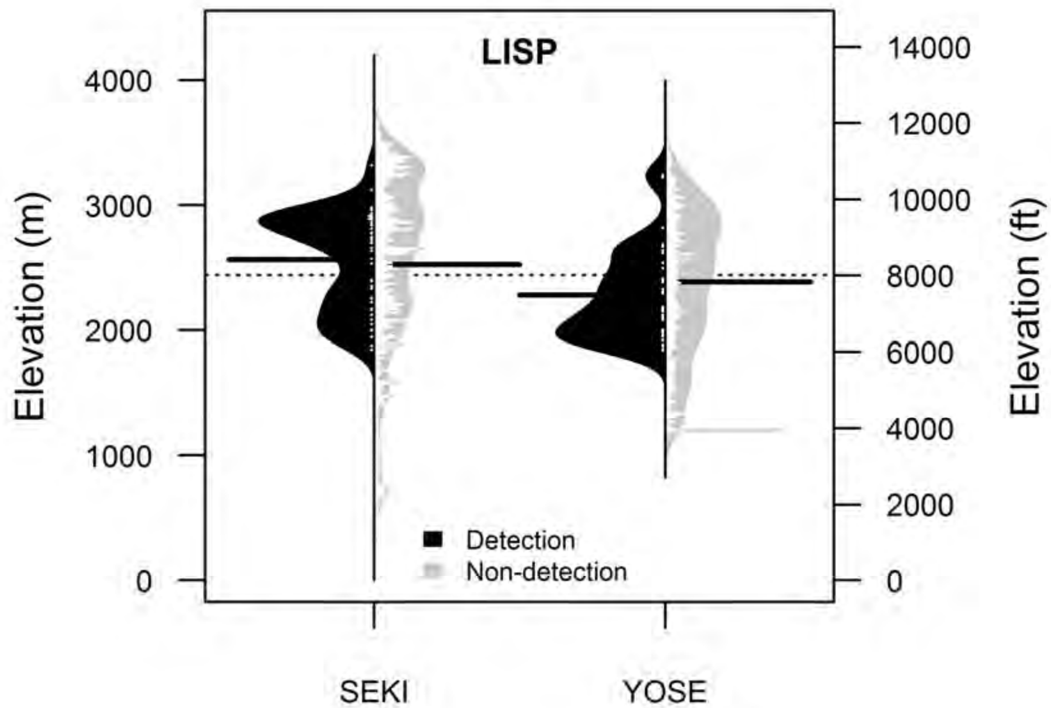

Figure 3. Elevational distributions of sites where Lincoln's Sparrow (LISP) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Lincoln's Sparrows are found in low numbers across the state, but in somewhat greater abundance in the Sierra Region (BCR 15). They were detected in low numbers on an individual BBS route that passes through YOSE and have not been observed along BBS routes that pass through SEKI. BBS routes do not indicate any significant population trends (Table 3).

Table 68. Relative abundance and trends for Lincoln's Sparrow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	12	0.16	-1.0	0.67
	1980-2007			-3.9	0.23
Sierra Nevada (BCR 15)	1966-2007[1]	8	0.26	+0.2	0.93
	1980-2007[1]			-1.2	0.66
Route 14117 – Sequoia NP	1972-2005	1	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	1.12	-7.5	0.23

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

MAPS data from Kings Canyon and Yosemite NPs show no significant positive or negative population of reproductive trends in the meadows where stations are located, suggesting populations are relatively stable. Capture rates are highest at YOSE stations and lowest at DEPO. Adult survival estimates are very similar at Kings Canyon and YOSE banding stations (Table 4).

Table 69. Population trends, productivity, trends, and survival estimates of Lincoln's Sparrows at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	9.2	+2.77	0.64	+12.59	0.475 (0.063)
Yosemite NP	1993-2009	15.6	+1.46	0.77	-1.37	0.483 (0.018)
Devils Postpile NM	2002-2006	1.5	NA[2]	2.55	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Any factor that degrades meadow habitats within SIEN is a major threat to Lincoln’s Sparrow. The most troubling concerns for the species within SIEN parks are drying of meadows due to climate change and the risk of degradation due to packstock grazing. Evidence of elevational shifts due to climate change has already been observed and shifts are likely to continue. During this transition up-slope, montane meadows in protected areas such as SIEN will become increasingly important for Lincoln’s Sparrow and may act as refugia from climate change as lower elevation meadows become less suitable. Altered fire regimes and Brown-headed Cowbird parasitism may have some negative impact on this species, but are likely minor threats compared to other factors.

Climate Change: Elevational range shifts of Lincoln's Sparrow have been observed in recent decades. In some low elevation meadows where the species previously bred (e.g., Yosemite Valley), it is now apparently absent. Furthermore, the species appears to be expanding into montane meadows at higher elevations than it previously occupied, up to 3000 m above sea level (Siegel and DeSante 1999). One plausible explanation for this shift is that Lincoln's Sparrows are adjusting their elevational range as the climate warms. The assertion that Lincoln's Sparrow is already showing responses to recent climate change is corroborated by recent findings that the species has adjusted its migration timing in response to climatic changes (MacMynowski and Root 2007). However, the apparent shifting of Lincoln's Sparrow's elevation range in the Sierra may also be driven in part by competition from Song Sparrows, which also appear to be shifting their range upslope and may be better able to compete in drier meadows (Siegel and DeSante 1999).

Altered Fire Regimes: Lincoln's Sparrow was observed in moderate densities within recently burned sites of YOSE (Table 2) indicating that it is at least tolerant of burned areas around meadows, so long as core meadow habitats remain intact. A change in fire regimes is likely a minor threat as compared to other factors affecting the species.

Habitat Fragmentation or Loss: Lincoln's Sparrow is vulnerable to loss and degradation of meadow habitats, and appears particularly vulnerable to habitat degradation resulting from heavy livestock grazing (Siegel and DeSante 1999). Since livestock grazing (other than localized packstock grazing) is absent from the parks, this should not be a large issue within SIEN. Meadow restoration efforts both within the parks and on adjacent lands would likely benefit Lincoln Sparrow populations within the SIEN.

Invasive Species and Disease: Although native to North America, Brown-headed Cowbirds have expanded their range with European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and trails (Halterman et al. 1999). Lincoln's Sparrows are susceptible to brood parasitism by Brown-headed Cowbirds, but cowbird occurrence and parasitism rates within SIEN parks has been found to be rare (Halterman et al. 1999). For example, during a 1995-96 study at SEKI, only 2-3% of passerine nests monitored were parasitized by cowbirds (Halterman and Laymon 2000). An updated assessment may be warranted, however.

Human Use Impacts: Damage to meadow habitats from livestock grazing has been found to drastically increase the probability of local extirpation of Lincoln's Sparrow (Cicero 1997). Habitat degradation due to packstock grazing within the parks is therefore a potential concern for this species, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage riparian shrubs.

Management Options and Conservation Opportunities

The most important things park managers can do to protect Lincoln's Sparrow populations in the parks are to maintain meadow habitats used by the species and to carefully manage or consider eliminating cowbird feeding sites such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicated that a cowbird trapping program was not warranted (Halterman et al. 1999). However, if future studies show an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Meadow desiccation has been implicated in reduced nesting success of Willow Flycatchers and Yellow Warblers, by granting easier access to mammalian predators (Cain et al. 2003). The same process may also affect Lincoln's Sparrow, which nests in similar habitats but chooses quite different microhabitats for nest placement. If climate change leads to substantial meadow desiccation and reduces reproductive success, restoration of meadow hydrology could benefit breeding Lincoln's Sparrows. Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites, perhaps along with active restoration of riparian deciduous vegetation, would likely benefit Lincoln's Sparrow and other riparian and meadow-dwelling bird species.

MAPS station operation and any other opportunities to survey Lincoln's Sparrow populations in the parks should continue, to assess how the species is responding to climate change and any other threats.

Long-eared Owl – *Asio otus*

Migratory Status
Resident/short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Long-eared Owl is a rare summer resident and breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks. The species is not reported from but may occasionally migrate or disperse through Devils Postpile (DEPO) National Monument (Table 1).

Table 70. Breeding status and relative abundance of Long-eared Owls in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Possible Breeder	Rare
Yosemite NP	Summer	Occasional Breeder	Rare
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Species of Special Concern

Range Significance
Long-eared Owl is widely distributed throughout the Holarctic. In North America, the species breeds across central Canada and intermittently south through northern Baja California in the western U.S. and Virginia in the eastern U.S. (Hunting 2008). Some populations winter in the breeding range, but northernmost owls usually migrate to the southern U.S. and Mexico. Long-eared Owls are more numerous on the east than the west slope of the Sierra Nevada, but because overall numbers in California are relatively low, all birds in the SIEN parks are important to the state population (Siegel and DeSante 1999).

Distribution and Habitat Associations
Long-eared Owls nest in riparian, oak-conifer, and eastside pine and juniper forests in the Sierra Nevada, and are associated with edges between forests and grasslands or shrublands (Gaines 1992, Marks et al. 1994, Hunting 2008). Nomadism in response to prey availability and abundance has been documented in Europe, but is not well-understood in North America (Hunting 2008). Long-eared Owls were not detected during avian inventory surveys at any of the SIEN parks, but this is likely due to the low capability of these surveys to detect nocturnal owls.

Elevational Distribution

Long-eared Owls breed from sea level to 2134 m in California, although atypical higher-elevation records have been noted (Shuford and Gardali 2008). No specific data on elevation distribution within SIEN parks are available.

Abundance, Trends and Demographic Data

Long-eared Owls were not located during Breeding Bird Surveys (BBS) throughout California, but these surveys are designed for diurnal species and do not adequately detect most owl species. Similarly, Long-eared Owls are not frequently captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available. No abundance estimates are available for Long-eared Owls in North America, though the species is considered relatively common in the western U.S. and populations appear stable despite annual fluctuations (Marks et al. 1994). However, the California population is sufficiently tenuous as to warrant designation as a species of special concern. Little is known about population trends in the California, particularly in the Sierra Nevada. Early researchers noted the species was already declining in the state by the early 1940s (Siegel and DeSante 1999), and in southern California recent local declines attributed to loss of riparian and grassland habitats to urban development have been documented (Marks et al. 1994).

Stressors

The Long-eared Owl is negatively impacted by destruction of riparian vegetation, conversion of habitat to agriculture and development, and reforestation of open areas (Marks et al. 1994). Loss of riparian woodlands and isolated tree groves is especially detrimental to Long-eared Owls in arid areas, where nesting habitat occurs in narrow bands along watercourses.

Loss and degradation of riparian habitat are not substantial threats within SIEN parks, apart from potential localized impacts of packstock grazing. Factors threatening Long-eared Owl populations elsewhere in California, such as urban development and agricultural conversion of grasslands, are less problematic in SIEN protected areas. Invasive species and disease do not appear to be major concerns for Long-eared Owls within the SIEN parks, although human activities that increase local corvid and raccoon (*Procyon lotor*) abundance may result in greater predation of owl nests. Fire treatments that mimic natural fire regimes likely benefit this species by maintaining edge habitat for foraging.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Long-eared Owl has shifted significantly towards the coast by more than 50 miles throughout its North American range, corresponding with increases in temperature (Audubon 2009). This shift provides evidence that Long-eared Owls are already experiencing range modifications as a response to climate change.

Long-eared Owl occurs in a variety of forest types but is associated with riparian and meadow habitats in the Sierra Nevada (Siegel and DeSante 1999). These owls currently breed at relatively low elevations, but if a warming climate causes their range to shift upslope, available riparian and meadow habitat exists in the SIEN parks for them to colonize. However, any changes in watershed hydrology due to climate change that result in alteration or loss of meadows and riparian vegetation, particularly arborescent vegetation, could adversely impact the species.

Altered Fire Regimes: Long-eared Owls nest in relatively dense forest stands adjacent to grasslands, meadows, or shrublands (Marks et al. 1994) as well as in riparian vegetation along watercourses (Siegel and DeSante 1999). Localized losses of riparian vegetation and isolated tree groves from high-intensity fire may impact individual owl nests, but fire maintains the long-term mosaic of grasslands and shrublands within forests that comprise preferred habitat for Long-eared Owls. Major prey items include voles, mice, shrews, pocket gophers, small rabbits, and passerine birds (Marks et al. 1994), many of which respond favorably to conditions created by moderate- and high-intensity fire. Thus, frequent fire of all intensities likely benefits Long-eared Owls over the long term by maintaining a mosaic of forest, shrubland, and grassland habitats, and by potentially increasing prey abundance.

Habitat Fragmentation or Loss: The Long-eared Owl is vulnerable to loss of riparian vegetation (Marks et al. 1994, Siegel and DeSante 1999) but this is not likely to pose a major threat to the species within SIEN parks due to the lack of urban development and agriculture.

Invasive Species and Disease: Little is known about disease and parasites in Long-eared Owls (Marks et al. 1994). To our knowledge, there are no major threats of invasive species or disease to this species.

Human Use Impacts: The direct effects of livestock grazing on Long-eared Owls have not been studied (Marks et al. 1994), but loss of riparian vegetation from packstock grazing is a potential concern for the species. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Nest predation by ravens (*Corvus corax*) and other corvids as well as by raccoons can contribute to local and regional declines of Long-eared Owls (Shuford and Gardali 2008). Human activities that increase abundance of corvids and raccoons, such as leaving uncontained food and garbage at camp and picnic sites in SIEN parks, may increase predation of Long-eared Owl nests. Pesticide drift from Central Valley agriculture could adversely impact the species but no specific data are available (Shuford and Gardali 2008).

Management Options and Conservation Opportunities

The most important actions managers can do to protect Long-eared Owl populations in SIEN parks are to maintain a mosaic of forest, riparian, grassland, shrubland, and meadow habitats and to contain food waste at camp and picnic sites to control the numbers of potential nest predators (Shuford and Gardali 2008). In addition, impacts of packstock grazing on Long-eared Owl riparian habitat should be assessed.

Little is known about the distribution and abundance of breeding and overwintering Long-eared Owls in the SIEN parks. Park managers might consider initiating nocturnal surveys for this and other forest owl species, potentially in conjunction with surveys for Spotted and Great Gray Owls.

MacGillivray's Warbler – *Oporornis tolmiei*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

MacGillivray's Warbler is a common summer resident at all Sierra Nevada Network (SIEN) parks and the monument (Table 1).

Table 71. Breeding status and relative abundance of MacGillivray's Warblers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Common
Yosemite NP	Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Bird of conservation concern
- CA Department of Fish and Game Status: Not listed

Range Significance

The species occurs over much of western North America, but is generally limited to the higher mountains, at least in the U.S. At least one subspecies (*tolmiei*) occurs in the Sierra, although others may as well. The Sierra Nevada is important to the MacGillivray's Warbler where it is very common (Siegel and DeSante 1999).

Distribution and Habitat Associations

MacGillivray's Warblers prefer riparian zones of humid forests in the Sierra (Gaines 1992). MacGillivray's Warblers were detected frequently (Table 2) along many survey transects (Figures 1 and 2) during avian inventory projects at SIEN parks. Park inventories show highest associations with Montane Chaparral and Giant Sequoia forests within SEKI and YOSE respectively (Table 2), but these results are to some degree artifacts of the study design, which classified habitats according to the dominant vegetation within 50 m of the survey station; MacGillivray's Warblers often occurred in small patches of riparian vegetation within a larger matrix of upland habitat.

Table 72. Number of MacGillivray's Warblers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	210	258	Montane Chaparral	0.59	0.85 (0.56-1.28)
			Sagebrush/Alpine-Subalp. Shrub	0.42	0.71 (0.42-1.22)
			Giant Sequoia Forest	0.34	0.48 (0.24-0.97)
			Lower Elevation Meadow	0.34	0.42 (0.22-0.85)
Yosemite NP	190	231	Giant Sequoia	0.96	
			Black Oak	0.33	
			Recent Burn	0.22	
Devils Postpile NM	11	12	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

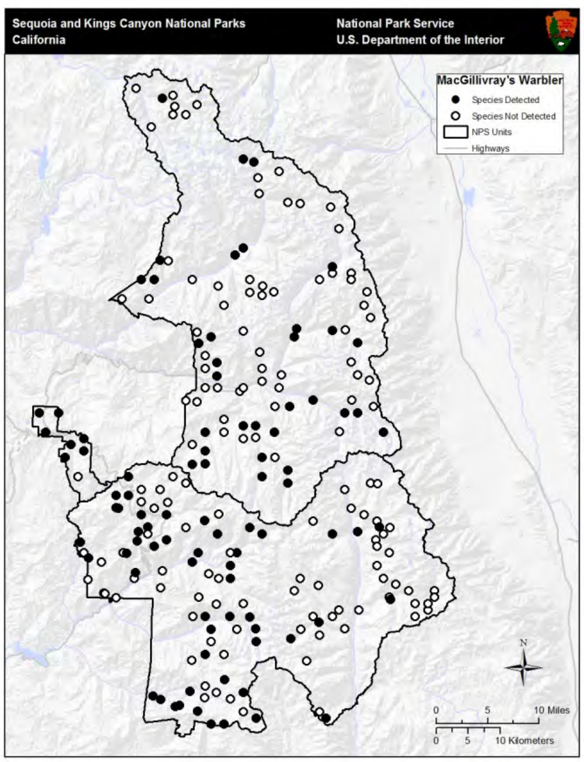

Figure 29. Bird survey transects where MacGillivray's Warbler was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

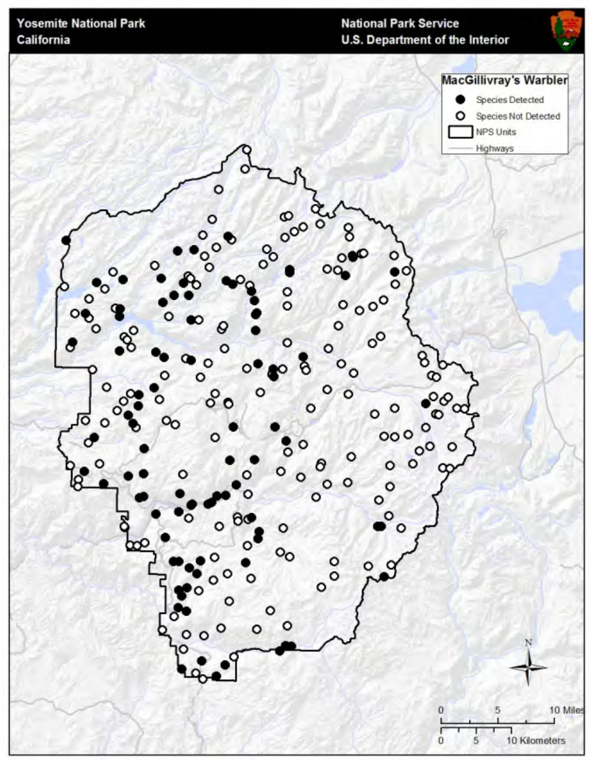

Figure 30. Bird survey transects where MacGillivray's Warbler was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

MacGillivray's Warbler was observed within the mid elevations of SEKI and mid to lower elevations of YOSE during recent avian inventory projects (Figure 3). The mean elevation of observations of MacGillivray's Warbler made in SEKI was 2332 m, with 95% of observations made between 1363 and 2998 m. In YOSE, the mean elevation of observations was 1881 m with 95% of observations falling between 1252 and 2459 m (Siegel et al. 2011).

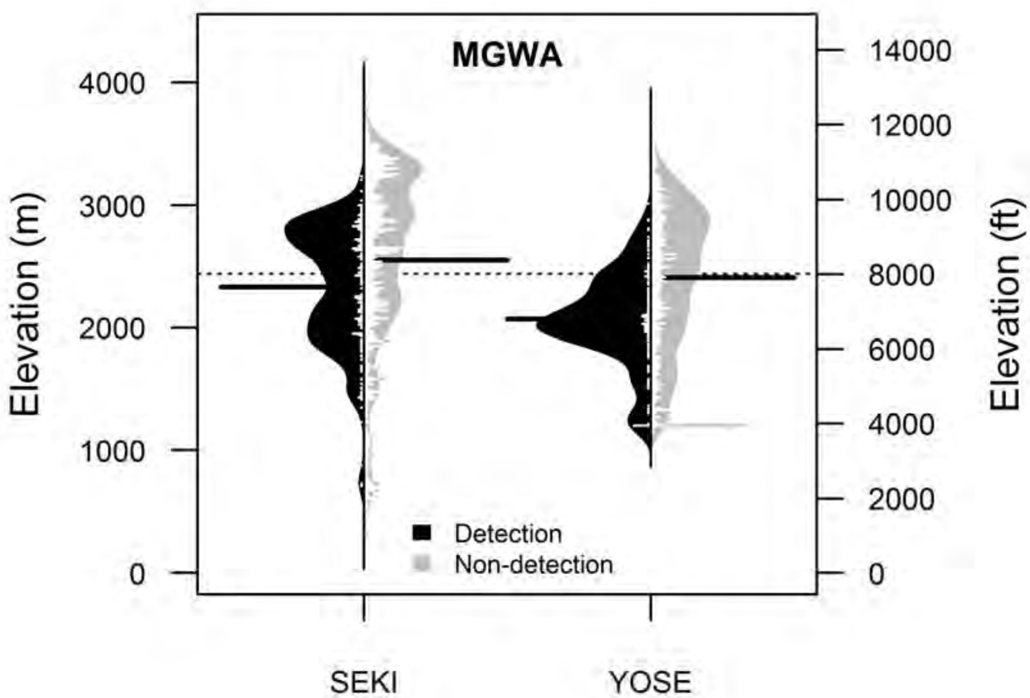

Figure 3. Elevational distributions of sites where MacGillivray's Warbler (MGWA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate MacGillivray's Warblers are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at SEKI, but higher numbers at YOSE. Populations appear to be generally stable across the state and Sierra. However, the BBS route through Sequoia NP has shown a dramatic and significant decline during 1972-2005. An apparent negative trend was also observed along the Kings Canyon route (Table 3). Note however that absolute detection rates on both routes are quite low.

Table 73. Relative abundance and trends for MacGillivray's Warbler according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	70	1.74	-0.5	0.68
	1980-2007			-0.6	0.46
Sierra Nevada (BCR 15)	1966-2007	28	2.90	-0.6	0.77
	1980-2007			-0.7	0.70
Route 14117 – Sequoia NP	1972-2005	1	0.50	-64.0	0.00
Route 14132 – Kings Canyon NP	1974-2005	1	0.75	-12.6	0.11
Route 14156 – Yosemite NP	1974-2007	1	9.04	+5.7	0.22

MAPS data from both Kings Canyon and YOSE show high capture rates of MacGillivray's Warbler between 1991 and 2009 and a positive population trend at Kings Canyon's banding sites. This appears to be balanced by relatively low productivity, but high adult survival. Although productivity in Kings Canyon is slightly lower than YOSE there is a near significant positive trend at these banding stations (Table 4).

Table 74. Population trends, productivity, trends, and survival estimates of MacGillivray's Warblers at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	21.8	+3.71	0.52	+10.44*	0.558 (0.033)
Yosemite NP	1993-2009	17.4	+2.22**	0.69	-2.44	0.554 (0.018)
Devils Postpile NM	2002-2006	6.6	NA[1]	0.48	NA	0.286 (0.121)

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

A changing climate may be the greatest threat to MacGillivray's Warbler in the coming decades. Observed and modeled responses to temperature and precipitation as well as resulting vegetation shifts indicate that the species' range is in flux. The southern Sierra Nevada including SIEN parks may be especially vulnerable to a decrease in MacGillivray's Warbler occurrences in the future.

With the possible exception of some packstock grazing pressure on montane meadows, habitat loss and degradation are not substantial threats within SIEN parks. Likewise, due to the absence of larger-scale livestock grazing and nearby agriculture, Brown-headed Cowbirds do not appear to be a major threat to MacGillivray's Warbler within the parks (Halterman et al. 1999). Increased fire or controlled burns could potentially degrade MacGillivray's Warbler nesting habitat, but there is no evidence of such a problem at this time.

Due to the potentially major threat of climate warming, MacGillivray's Warbler should continue to be monitored within SIEN parks to better understand how it is responding to this and other threats.

Climate Change: An analysis of shifts between the historical range of MacGillivray's Warbler (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to both temperature and precipitation changes (Tingley et al. 2009). This observed shift provides strong evidence that MacGillivray's Warbler has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

MAPS data from Kings Canyon suggest that during La Niña years (characterized by mild winters and early springs) MacGillivray's Warbler is one of several species that tend to exhibit reduced capture rates of young birds and/or depressed productivity rates (Siegel et al. 2009). La Niña conditions are expected to become more frequent in the coming years (Siegel et al. 2009), which may therefore reduce adult populations over time. However, MAPS data also show higher adult capture rates during La Niña years, implying higher survivorship during mild winters (Siegel et al. 2009). Any increase in adult survivorship during such years could help offset reduced productivity somewhat.

Additionally, a study of changes in vegetation and avian breeding in a montane riparian system in Arizona found that climate change over a recent 20-year period resulted in the loss of Canyon Maple, where MacGillivray's Warbler nested, and led to local extirpation of the species at a site where it had previously been common (Martin 2007). MacGillivray's Warbler shows willingness to nest in a number of different shrub species within the Sierra Nevada (Beedy and Granholm 1985) so may not be as vulnerable to vegetation shifts as it was at Martin's study site. However, Martin (2007) illustrates how species such as MacGillivray's Warbler can be indirectly affected by climate change through biotic interactions with directly affected species.

Modeled distribution shifts of MacGillivray's Warbler predict range contractions of the species across California. The most prominent decreases in occurrence are expected in the southern Sierra including SIEN parks. The most important variables influencing current and projected distribution were temperature seasonality, distance to stream (Maxent distribution model), vegetation, and annual mean temperature (GAM distribution model) (Stralberg and Jongsomjit 2008).

MacGillivray's Warblers are found breeding below 3000 m in SIEN parks (Figure 3) providing some potential for upslope expansion if suitable habitat exists. Even if abundance of the species decreases broadly across the southern Sierra, SEKI and YOSE may provide refugia for MacGillivray's Warbler if montane meadows and riparian areas are not desiccated beyond suitability within the parks. If modeled range shifts are accurate, montane habitats in Northern California are likely to become more important for the species in the future as other areas become less suitable.

Altered Fire Regimes: MacGillivray's Warblers rely on dense underbrush for nesting habitat (Gaines 1992). Both fires and fire management strategies that remove understory vegetation will reduce reproductive success. Increased frequency of fire/and or management to reduce fires could be detrimental to this species.

Habitat Fragmentation or Loss: MacGillivray's Warbler is vulnerable to loss of riparian and montane meadow habitat (Siegel and DeSante 1999), but this is not likely to pose a major threat to the species within SIEN parks.

Invasive Species and Disease: Although native to North America, Brown-headed Cowbirds have expanded their range since European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and trails. MacGillivray's Warblers are susceptible to brood parasitism by Brown-headed Cowbirds, but cowbird occurrence and parasitism rates within SIEN parks has been found to be relatively rare (Halterman et al. 1999). For example, during a 1995-96 study at SEKI, only 2-3% of passerine nests monitored were parasitized by cowbirds. Out of ten MacGillivray's Warbler nests found and monitored at SEKI, none were parasitized (Halterman and Laymon 2000). An updated assessment may be warranted.

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for this species, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage riparian shrubs. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Management Options and Conservation Opportunities

The most important things park managers can do to protect MacGillivray's Warbler populations in the parks are to maintain riparian and meadow habitats used by the species and to eliminate or manage cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicates that a cowbird trapping program is not warranted (Halterman et al 1999). However, if future studies show an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Meadow desiccation has been implicated in leading to reduced nesting success of Willow Flycatchers and Yellow Warblers, by granting easier access to mammalian predators (Cain et al. 2003). The same process is likely to affect MacGillivay's Warblers, which often nest in similar locations. If climate change leads to substantial meadow desiccation and reduces reproductive success, restoration of meadow hydrology could benefit breeding MacGillivray's Warblers. Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites, perhaps along with active restoration of riparian deciduous vegetation, would likely benefit MacGillivray's Warbler and other riparian and meadow-dwelling bird species.

MAPS station operation and any other opportunities to survey McGillivray's Warbler populations in the parks should continue, to assess how the species is responding to climate change and any other threats.

Mallard – *Anas platyrhynchos*

Migratory Status
Short/medium-distance migrant; some sedentary populations (Drilling et al. 2002)

Residency and Breeding Status
Mallard is a summer resident at all Sierra Nevada Network (SIEN) parks and the monument with varying levels of abundance (Table 1).

Table 75. Breeding status and relative abundance of Mallards in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).[1]

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Primarily Summer	Local Breeder	Uncommon
Yosemite NP	Primarily Summer	Local Breeder	Fairly Common
Devils Postpile NM	Primarily Summer	Local Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Mallards are distributed over much of North America including virtually all of the continental United States (Drilling et al. 2002). The Sierra Nevada and SIEN parks have little importance for the conservation of this species.

Distribution and Habitat Associations
In the mountains, Mallards prefer water bodies bordered by marsh or dense herbaceous vegetation (Gaines 1992). Mallards were detected once in SEKI (Figure 1) and in low densities in YOSE (Table 2) along a handful of survey transects (Figure 2) during avian inventory projects. Mallards also occur within DEPO, but were not observed during the park inventory. Although Mallard was detected in low densities in coniferous forest and chaparral in YOSE, these results are largely artifacts of the study design, which classified habitats according to the dominant vegetation within 50 m of the survey stations. Vegetation classifications did not describe habitat features important for waterfowl and Mallards likely favored water bodies found within these habitat types.

Table 76. Number of Mallards recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	1	1	NA[1]	NA	NA
Yosemite NP	18	43	Ponderosa Pine Jeffrey Pine/Red Fir Montane Chaparral	0.07 0.04 0.03	
Devils Postpile NM	0	0	Detected off-survey	NA	

[1]NA - Information not available due to insufficient data.

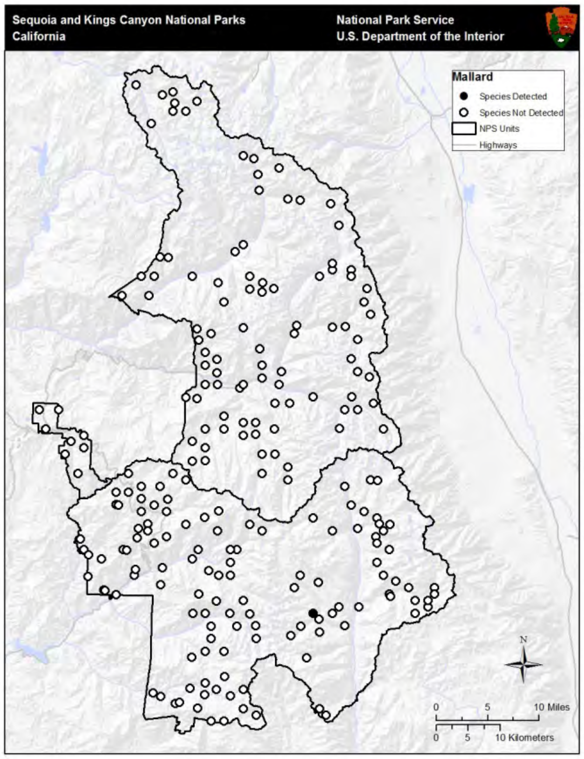

Figure 31. Bird survey transects where Mallard was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

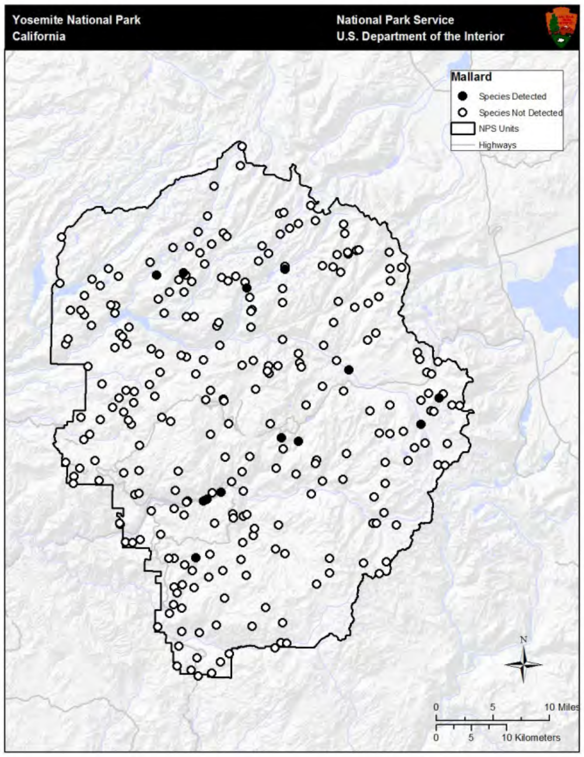

Figure 32. Bird survey transects where Mallard was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Mallard was observed across a wide elevational range in YOSE and once at 3073 m in SEKI during recent avian inventory projects (Figure 3). The mean elevation of observations of Mallard made in YOSE was 2026 m, with 95% of observations made between 1200 and 2949 m (Siegel et al. 2011).

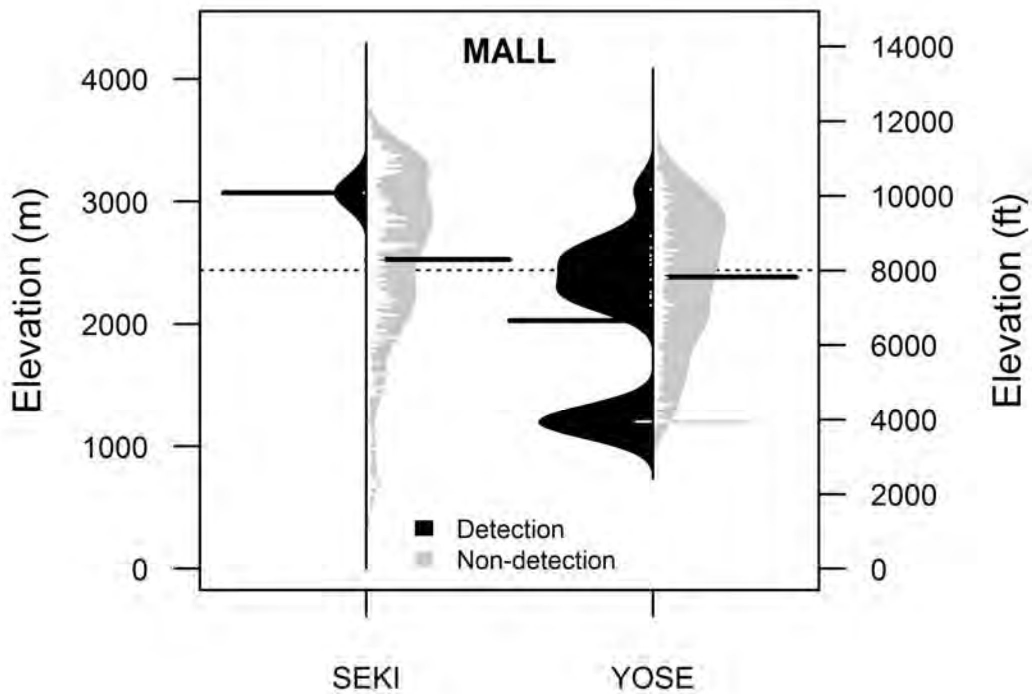

Figure 3. Elevational distributions of sites where Mallard (MALL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Mallards are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were not detected on individual BBS routes at either YOSE or SEKI. A significant positive trend was observed in California both in the short and long-term and may include an increase across the Sierra Nevada as well (Table 3).

Table 77. Relative abundance and trends for Mallard according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	137	5.93	+4.9	0.00
	1980-2007			+4.3	0.00
Sierra Nevada (BCR 15)	1966-2007[1]	19	1.02	+10.9	0.29
	1980-2007[1]			+11.0	0.33
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Mallards are generally not captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

BBS abundance and trend data for Mallard across the state show a healthy and growing population (Sauer et al. 2008). The species remains uncommon in the Sierra and SIEN parks, but this is likely due to the species' preference for large bodies of water, which are more prevalent in the lowlands of the state (Beedy and Granholm 1985).

Stressors

Mallards are abundant and widespread across North America and California, but less prominent within the Sierra Nevada and SIEN parks. The species as a whole is healthy and faces few major threats. Hunting pressure and disease are likely the greatest concerns for some populations, although hunting is highly regulated and not permitted within national parks. Other minor threats include habitat loss in some areas and collisions with structures and automobiles. Climate change and altered fire regimes are not immediate concerns, but should be monitored for increasing prevalence in the future.

Climate Change: Due to the ubiquity of Mallards across North America and their wide tolerance for different climates and habitats, climate change is not likely to affect the species as much as many other species. In fact, climate change may help Mallard populations in some areas by decreasing the severity of winter weather (Sauter et al. 2010) and potentially increasing nest success during warm springs (Drever and Clark 2007). However, if climate change results in drying of Mallard habitat within SIEN parks, local breeding populations could suffer.

Altered Fire Regimes: Increased fire frequencies may impact Mallards locally and in the short-term through burning of habitat. However, this is not likely a major threat to the species.

Habitat Fragmentation or Loss: Alterations of wetlands and grasslands outside of protected areas has resulted in loss of Mallard habitat and reduced breeding success (Drilling et al. 2002). However, this is not a concern within SIEN parks.

Invasive Species and Disease: There have been large outbreaks of disease, such as avian botulism which can be devastating to waterfowl populations in U.S. and Canadian wetlands (Rocke et al. 1999). Such an outbreak could have dire consequences in any SIEN park if the disease were to spread to local populations. Additionally, there is some concern that migratory waterfowl such as Mallards may act as carriers of disease that are potentially harmful to humans, such as avian influenza (Brochet et al. 2009). A recent study of the prevalence of avian influenza among wild birds in the U.S. found that 5.9% of Mallards carried the disease, demonstrating at least some susceptibility of the species (Fuller et al. 2010).

Human Use Impacts: Mallards are the most sought-after game duck in North America. Over-harvest can have detrimental impacts on local populations, but has not impacted the species at large (Drilling et al. 2002) and is not a concern for the SIEN parks where hunting is not permitted.

Mallards are somewhat susceptible to collisions with buildings, automobiles, and wires (especially where they cross water bodies) (Drilling et al. 2002). This could be a minor and local problem where structures and roads border Mallard habitat in the SIEN parks.

Management Options and Conservation Opportunities

Mallards are heavily managed for conservation and economic value. Breeding habitat is well protected across much of its range and hunting limits are set each year based on estimates of duck abundance (Drilling et al. 2002).

Although Mallards are not common in SIEN parks, a lack of major threats indicates that additional management actions by the parks are not necessary for the conservation of the species in California and the Sierra Nevada. However, maintenance of waterways and surrounding habitats, including montane meadows, is necessary to maintain this species within the parks.

Mountain Bluebird – *Sialia currucoides*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Mountain Bluebird is a fairly common summer and/or year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and Devils Postpile National Monument (DEPO) (Table 1).

Table 78. Breeding status and relative abundance of Mountain Bluebirds in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Fairly common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Mountain Bluebird breeds throughout the Rocky Mountains north of Mexico and south of east-central Alaska, and as far west as the northern California coast ranges to Mendocino County, the Sierra-Cascades axis to northern Kern County, and southern California mountains (Power and Lombardo 1996). The Sierra Nevada is very important to Mountain Bluebird in its California range.

Distribution and Habitat Associations
The Mountain Bluebird breeds in prairie-forest edges with groves of trees, short grasses, and few shrubs, as well as savannas, recently burned areas, clearcuts, edges of alpine tundra, and sagebrush flats (Power and Lombardo 1996). In the Sierra the species occurs in open country with short grass for foraging and snags with cavities for nesting, and are most common at the edges of large meadows, grassland, and alpine barrens (Siegel and DeSante 1999) as well as recently burned forest stands (Siegel et al. 2010). Mountain Bluebirds were detected in fairly low numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects at all SIEN parks. Park inventories show highest associations with Western White Pine woodland

within SEKI (Table 2). Also at SEKI, the species was far more abundant in Foxtail Pine than in Whitebark Pine (Siegel and Wilkerson 2005a).

Table 79. Number of Mountain Bluebirds recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	37	56	Western White Pine Woodland	0.19	0.34 (0.08-1.36)
			Foxtail Pine	0.11	0.23 (0.01-0.55)
			Higher Elevation Meadow	0.09	0.13 (0.04-0.44)
Yosemite NP	21	23	Subalpine/Alpine Meadow	0.04	
			Montane Alpine/Riparian Shrub	0.03	
			Whitebark Pine	0.03	
Devils Postpile NM	5	5	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

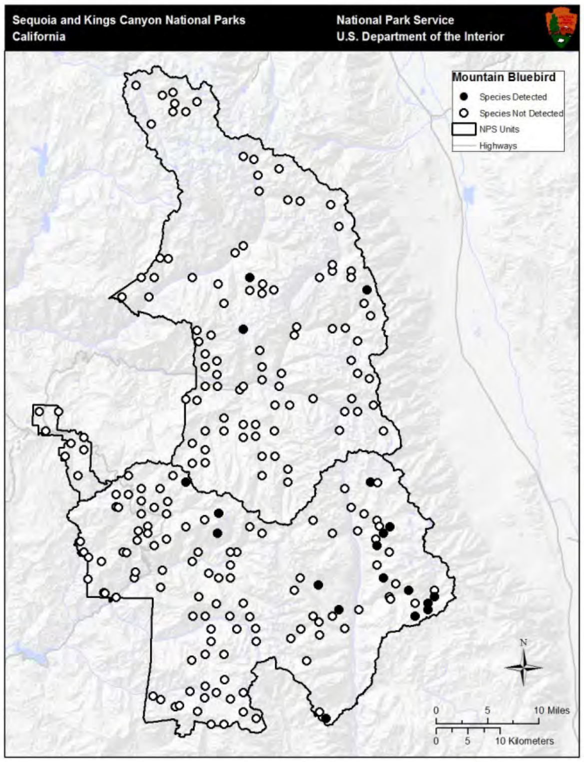

Figure 33. Bird survey transects where Mountain Bluebird was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

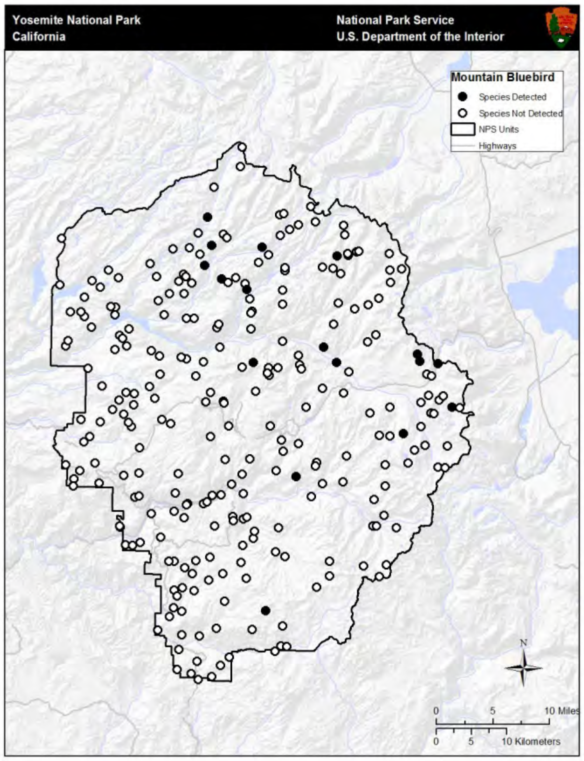

Figure 34. Bird survey transects where Mountain Bluebird was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Mountain Bluebird was detected at higher elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Mountain Bluebird in SEKI was 3301 m, with 95% of observations occurring between 2872 and 3673 m. In YOSE, the mean elevation of observations was 2880 m with 95% of observations falling between 2340 and 3310 m (Siegel et al. 2011).

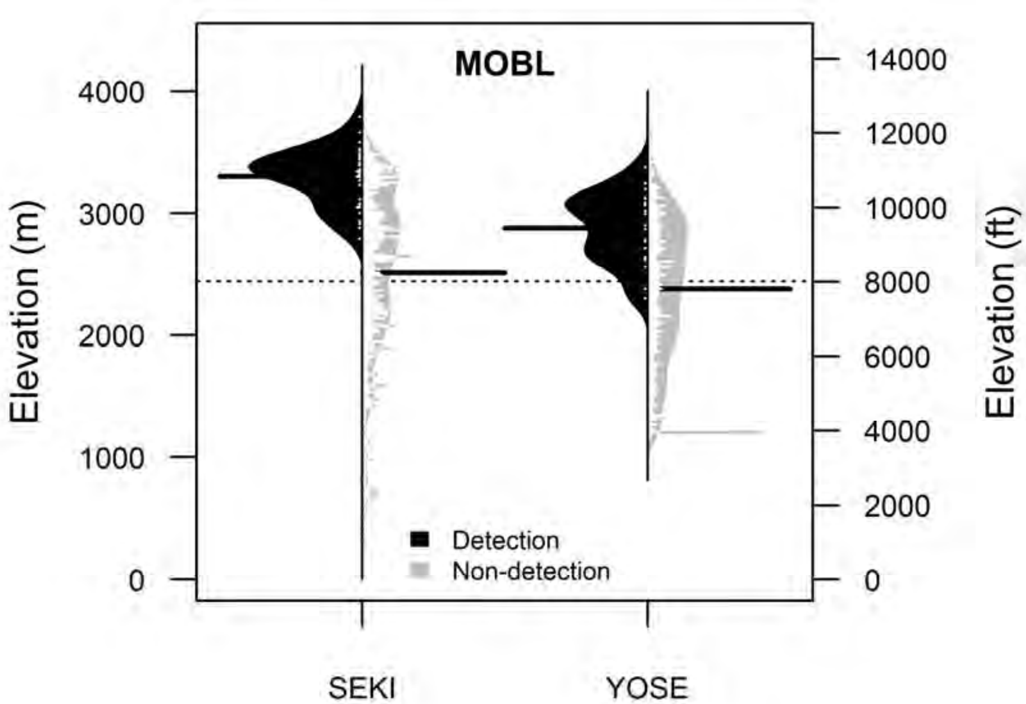

Figure 3. Elevational distributions of sites where Mountain Bluebird (MOBL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Mountain Bluebirds are less abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were detected in low numbers on the individual BBS route at Yosemite NP and were not detected at all along the routes in Sequoia and Kings Canyon NPs. No significant population trends were observed anywhere in California over the past 40 years (Table 3).

Table 80. Relative abundance and trends for Mountain Bluebird according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	35	1.60	+3.2	0.37
	1980-2007			+4.4	0.28
Sierra Nevada (BCR 15)	1966-2007	13	0.67	-2.7	0.24
	1980-2007			+0.8	0.80
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.08	-16.5	0.28

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Few Mountain Bluebirds were captured in mist nets at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The Mountain Bluebird is an unusual thrush: it eats a substantial number of insects, hovers while foraging, nests in cavities, and lives in much more open habitats than those occupied by other thrushes (Power and Lombardo 1996). Mountain Bluebird numbers increase rather dramatically following fire, thus greater extent and intensity of future fires will strongly benefit the species. Post-fire logging and other management activities that remove nesting cavities is likely the most significant threat to this species. As Mountain Bluebirds are high-elevation species, they may be adversely impacted by climate change if sufficient forest habitat is not available upslope of their current breeding range to provide nesting cavities.

Climate Change: An analysis of shifts between the historical range of Mountain Bluebird (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to both temperature and precipitation changes by shifting its range to follow its climatic niche (Tingley et al. 2009). Furthermore, an analysis of Christmas Bird Count (CBC) data indicates the center of abundance of Mountain Bluebird has shifted significantly southward by 71 miles and inland by 180 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). These observed shifts provide evidence that Mountain Bluebird will likely continue to shift its range within the Sierra in the coming decades, although the southward shift for wintering bluebirds is opposite of the predicted response to a warming climate.

Mountain Bluebird currently breeds at high elevations in the SIEN parks (Figure 3), and was typically detected in open pine forests and montane and alpine meadows (Table 2). This species likely has limited possibilities for colonizing new areas upslope with climate warming, as it already occupies the highest-elevation forest types in the parks.

Altered Fire Regimes: Studies have consistently found a strong positive effect of high-intensity fire on Mountain Bluebirds. Nearly all studies detected Mountain Bluebirds in early post-fire forests in the Rocky Mountains (Hutto 1995). This bluebird was more abundant in burned than unburned aspen forests in Wyoming (Dieni and Anderson 1999) and increased dramatically after high-intensity fire in Montana (Smucker et al. 2005). Mountain Bluebirds were detected only in burned forests in the eastern Sierra Nevada throughout 25 years after fire, with the greatest densities of nesting pairs in the earliest post-fire forests (Rafael et al. 1987). The species was not detected at all in unburned forests in the northern Sierra (Burnett et al. 2010) and only very rarely in unburned forests in the southern Sierra (Siegel and Wilkerston 2005). These bluebirds selected larger diameter snags for nesting than what was generally available for nesting in the northern Sierra burned forests (Burnett et al. 2010), suggesting an adverse impact of logging large burned trees during salvage operations.

The Mountain Bluebird likely has suffered from a half-century of fire suppression and widespread post-fire salvage logging in the Sierra Nevada (Hutto and Gallo 2006, Hutto 2008). This species will benefit from the restoration of natural fire regimes within SIEN parks, including patches of intensely burned forests to provide optimal nesting and foraging habitat. Moreover, if drier conditions in the Sierra Nevada lead to an increase in the extent and intensity of fire, Mountain Bluebird reproductive success and survival are likely to increase, as long as the extent of post-fire salvage logging does not increase concomitantly.

Habitat Fragmentation or Loss: Mountain bluebirds likely benefit more than any other bluebird from timber harvesting in green forests, but only as long as large snags are retained for nesting (Power and Lombardo 1996). Post-fire salvage logging and other types of sanitation logging can adversely impact this bird by removing potential nesting cavities. Cahall and Hayes (2009) found no difference in Mountain Bluebird abundance in variously thinned burned forests in Oregon and Haggard and Gaines (2001) detected the most bluebirds in post-fire forests with medium densities of snags in eastern Washington, but Saab et al. (2007) documented significantly higher nest densities of this species in unlogged burns. Snag removal is not likely to pose a major threat to Mountain Bluebirds within SIEN parks, aside from localized hazard tree removal. The large size and relatively unfragmented nature of these parks as well as protection from post-fire salvage logging make them potentially important habitat for the persistence of this species.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Mountain Bluebirds are susceptible to brood parasitism by Brown-headed Cowbirds, but not severely. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Packstock grazing within the parks is a potential concern for Mountain Bluebird, at least locally where grazing is permitted, because it can attract Brown-headed Cowbirds. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Management Options and Conservation Opportunities

The most important thing SIEN park managers can do to protect Mountain Bluebird populations in the parks is to allow patches of intensely burned forests to occur. High-intensity burns benefit not only Mountain Bluebirds but a host of other fire-dependent birds. The parks might also consider an education program to the public about the value of high-intensity fire to many wildlife species.

Park managers also can strive to carefully manage or eliminate cowbird feeding sites (Shuford and Gardali 2008) such as stables. Guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004). Finally, monitoring of Mountain Bluebird populations and other high-elevation bird species in the parks would be very valuable, to determine impacts of climate change on distribution and populations of species that may be particularly vulnerable to climate change.

Mountain Chickadee – *Poecile gambeli*

Migratory Status

Resident (Siegel and DeSante 1999)

Residency and Breeding Status

Mountain Chickadee is a common breeder at Devils Postpile National Monument (DEPO) as well as Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks (Table 1).

Table 81. Breeding status and relative abundance of Mountain Chickadees in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Common
Devils Postpile NM	Year-round	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Mountain Chickadee is somewhat patchily distributed over much of the western United States and western Canada (Mccallum et al. 1999). The Sierra Nevada is fairly important to its overall range, particularly because the species is highly abundant there (Siegel and DeSante 1999).

Distribution and Habitat Associations

Mountain Chickadees in the Sierra Nevada are habitat generalists, nesting in most montane and higher-elevation wooded habitats (Gaines 1992). The species was detected in high densities (Table 2) along numerous survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and at many inventory survey stations at DEPO. Park inventories show rather uniformly high densities in numerous forest types (Table 2).

Table 82. Number of Mountain Chickadees recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	689	1033	Western White Pine Woodland	0.76	0.87 (0.47-1.42)
			Foxtail Pine	0.63	0.72 (0.52-0.98)
			Red Fir Forest	0.61	0.67 (0.49-0.92)
			Lodgepole Pine Forest	0.58	0.58 (0.43-0.77)
			Red Fir/White Fir Forest	0.56	0.59 (0.42-0.84)
Yosemite NP	1039	1926	Western White Pine	0.85	
			Jeffrey Pine/Red Fir	0.70	
			Red Fir	0.68	
			Montane Meadow	0.60	
			Jeffrey Pine	0.57	
Devils Postpile NM	24	34	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

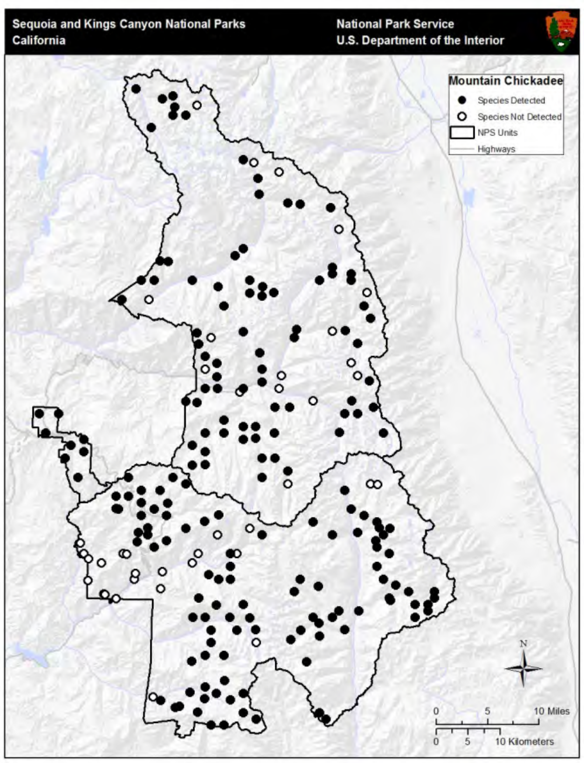

Figure 35. Bird survey transects where Mountain Chickadee was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

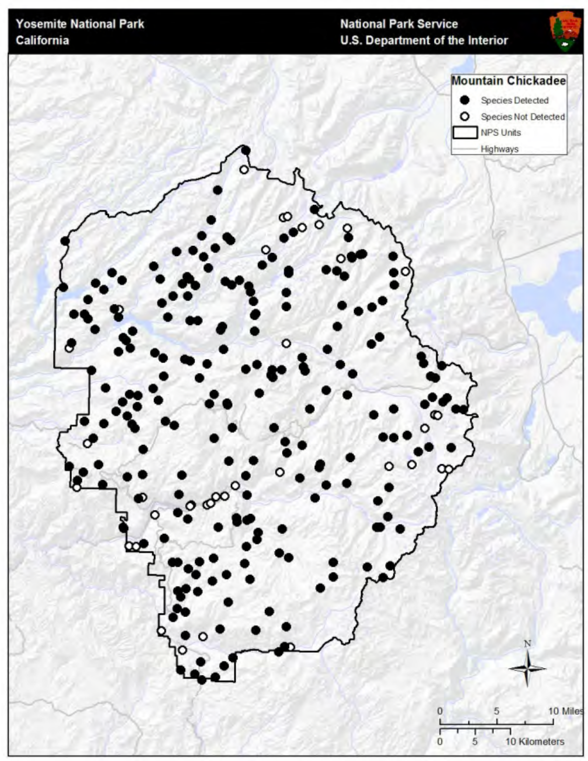

Figure 36. Bird survey transects where Mountain Chickadee was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Mountain Chickadee was observed from relatively low to high elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Mountain Chickadee in SEKI was 2665 m, with 95% of observations occurring between 1725 and 3380 m. At YOSE, the mean elevation of observations was 2420 m with 95% of observations falling between 1545 and 3155 m (Siegel et al. 2011).

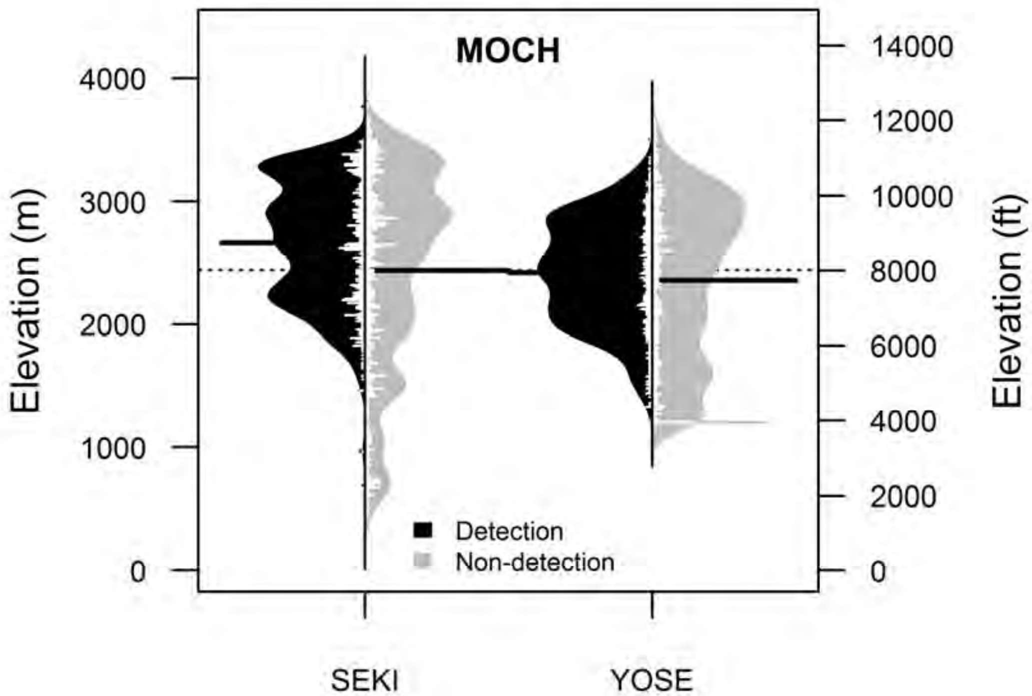

Figure 3. Elevational distributions of sites where Mountain Chickadees (MOCH) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Mountain Chickadees are detected much more often in the Sierra Region (BCR 15) than in California as a whole. They were detected in high numbers on all three BBS routes that intersect SIEN parks, particularly the Yosemite NP route. Highly significant negative trends were evident over both 1966-2007 and 1980-2007 in California as a whole and the Sierra Nevada region (Table 3).

Table 83. Relative abundance and trends for Mountain Chickadee according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	94	10.20	-1.4	0.00
	1980-2007			-1.6	0.00
Sierra Nevada (BCR 15)	1966-2007	33	25.04	-1.6	0.00
	1980-2007			-1.6	0.00
Route 14117 – Sequoia NP	1972-2005	1	8.50	-22.9	0.00
Route 14132 – Kings Canyon NP	1974-2005	1	7.15	-5.6	0.14
Route 14156 – Yosemite NP	1974-2007	1	20.65	+1.3	0.55

MAPS data from Kings Canyon and Yosemite NPs show significant positive population trends for Mountain Chickadee, in rather stark contrast to the regional BBS trends (Table 4).

Table 84. Population trends, productivity, trends, and survival estimates of Mountain Chickadee at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	2.6	+18.40**	0.35	+42.22	0.313 (0.277)
Yosemite NP	1993-2009	4.4	+6.09***	0.85	-0.27	0.486 (0.053)
Devils Postpile NM	2002-2006	2.5	NA[2]	0.25	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Mountain Chickadee is one of the most common birds of montane coniferous forest of the western United States, but has been experiencing significant population declines throughout California and in the Sierra, particularly in Sequoia NP (Table 3), although MAPS data reveal substantial population increases at stations in Kings Canyon and Yosemite NPs (Table 4). This cavity nester is threatened by large-scale timber harvesting as well as localized removal of potential nesting trees in thinning and salvage projects. The species may be resilient to climate change due to its generalist habitat use, but may be adversely impacted by increased frequency and extent of high-intensity forest fire. Siegel and DeSante (1999) suggested that the Mountain Chickadee be monitored as an indicator species for resident coniferous forest birds. As such, managers would benefit from understanding the reasons for population declines of this common species.

Climate Change: An analysis of shifts between the historical range of Mountain Chickadee (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Mountain Chickadee has shifted significantly northward by 67 miles and inland by 29 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be responding to climate change by moving towards cooler regions (Audubon 2009). These observed shifts provide evidence that Mountain Chickadees have already responded to climate change and will likely continue to shift their range within the Sierra in the coming decades.

The Mountain Chickadee is a common bird species found in most types of coniferous forests (Table 2) from low to high elevations in SIEN parks (Figure 3). If climate change causes the species' range to shift upward as is generally expected, there is much higher-elevation coniferous forest habitat available for colonization within SEKI and YOSE. The generalist use of habitat by this species suggests that it is likely adaptable to a warming climate.

Altered Fire Regimes: Mountain Chickadee can occupy intensely burned forests but is typically more abundant in lightly burned or unburned stands. The species was widespread in unburned coniferous forests but was also frequently detected in mid- and especially early-successional burned forests in the Rocky Mountains (Hutto 1995). This chickadee nested in burned forests in Montana, but only in unlogged plots (Hutto and Gallo 2006). The Mountain Chickadee increased significantly at both burned and unburned survey points after forest fire in Montana; the species appeared to increase at unburned, low, and moderately burned points and decrease at severely burned points, although these results were not statistically significant (Smucker et al. 2005). The chickadee was most abundant in unburned forests and was not detected at all in highly burned forests in New Mexico (Kotliar et al. 2007). In the Sierra Nevada, the Mountain Chickadee was more abundant in unburned forests than in all fire areas combined in the northern Sierra (Burnett et al. 2010) and densities were significantly greater in unburned forests in the southern Sierra (Siegel and Wilkerson 2005). Nest densities were higher in unburned forests 6-8 years post-fire in the eastern Sierra, but were equal 15 and 25 years after fire (Raphael et al. 1987). Results from numerous studies suggest that Mountain Chickadees can occupy burned stands but generally seem to prefer unburned or lightly burned forests. Mountain Chickadees might exhibit a neutral response to the restoration of natural fire regimes in SIEN parks, as long as sufficient amounts of green forests are retained in the matrix.

Habitat Fragmentation or Loss: The Mountain Chickadee is adversely impacted by logging, which may explain observed long-term population declines in the Sierra Nevada. Densities of chickadee pairs were substantially lower in unlogged than logged Mixed Conifer forests in Arizona (Mccallum et al. 1999). Mountain Chickadees in boreal forests of the northern Rockies occupied logged plots, but detections there were associated with overstory of residual conifers (Stuart-Smith et al. 2008). Lower densities were recorded in thinned than untreated stands of Ponderosa Pine in the northern Cascades (Gaines et al. 2007); densities decreased following thinning treatments in Ponderosa Pine in Arizona (Hurteau et al. 2008); and the species nested in burned but not in salvage-logged plots in Montana (Hutto and Gallo 2006). Clearcutting and thinning are widespread in the Sierra Nevada, but absent from SIEN parks, thus the parks may represent important habitat refugia for the Mountain Chickadee.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Mountain Chickadees are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Packstock grazing in SIEN parks is a potential concern for Mountain Chickadees, at least locally where grazing is permitted, because it can attract Brown-headed Cowbirds. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Management Options and Conservation Opportunities

Mountain Chickadees will benefit from ecosystem management in the SIEN parks that protects and maintains dead and dying trees within coniferous forests. The Mountain Chickadee probably can persist in burned landscapes as long as enough green forest matrix remains; thus the species would likely be resilient to restoration of fire regimes that include all fire intensities as long as high-intensity patches are not very large. Park managers can also carefully manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

MAPS station operation and other means of monitoring Mountain Chickadee populations in the parks should continue in order to determine whether populations are indeed increasing in Kings Canyon and Yosemite national parks.

Mountain Quail – *Oreortyx pictus*

Migratory Status
Short-distance migrant (Gutiérrez and Delehanty 1999)

Residency and Breeding Status
Mountain Quail is a common year-round resident and breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and is a summer resident and breeder at Devils Postpile National Monument (DEPO) (Table 1).

Table 85. Breeding status and relative abundance of Mountain Quail in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Mountain Quail is limited to the mountain ranges of far western North America, ranging from Washington State to Baja California. The species' primary range falls within the Sierra Nevada, Cascades, and Coast Ranges (Gutiérrez and Delehanty 1999), making SIEN parks an important part of the species' distribution.

Distribution and Habitat Associations
Mountain Quail show a preference for steep and rugged slopes or canyons covered with brushy vegetation, and wooded edges of mid-elevation meadows and clearings (Gaines 1992). Mountain Quail were detected commonly (Table 2) along numerous survey transects (Figures 1 and 2) during avian inventory projects at SIEN parks. Park inventories show highest associations with Lower elevation/Sparse Vegetation and Ponderosa Pine forests within SEKI and YOSE, respectively (Table 2).

Table 86. Number of Mountain Quail recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	194	215	Lower elevation/Sparse Veg.	0.21	0.08 (0.01-0.65)
			Jeffrey Pine Woodland	0.06	0.05 (0.03-0.09)
			Red Fir/White Fir Forest	0.05	0.06 (0.04-0.10)
Yosemite NP	429	571	Ponderosa Pine	0.13	
			Ponderosa Pine/Mixed Conifer	0.07	
			Jeffrey Pine	0.07	
Devils Postpile NM	13	13	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

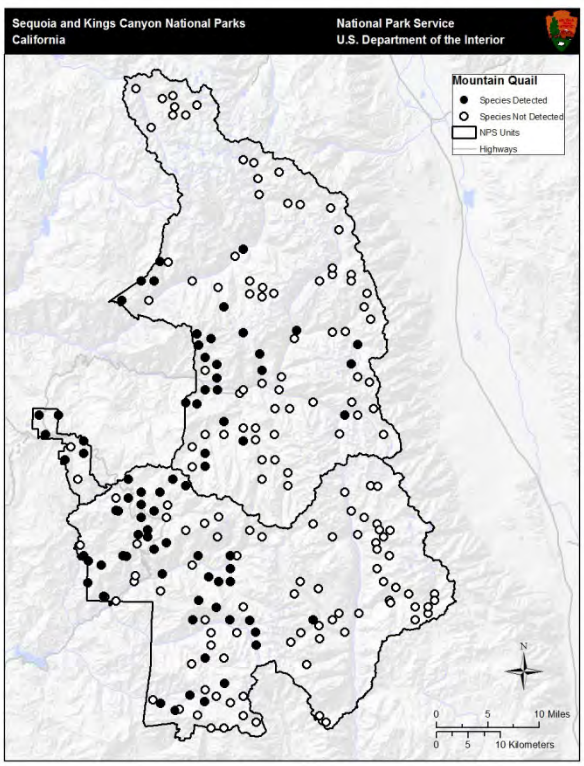

Figure 37. Bird survey transects where Mountain Quail was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

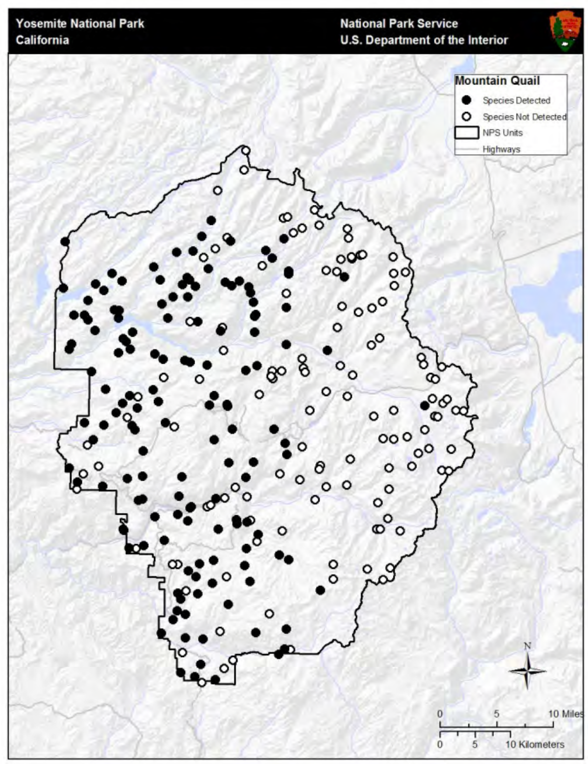

Figure 38. Bird survey transects where Mountain Quail was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution
Mountain Quail was observed within the mid to lower elevations of both SEKI and YOSE during recent avian inventory projects (Figure 3). The mean elevation of observations of Mountain Quail in SEKI was 2082 m, with 95% of observations occurring between 665 and 3084 m. In YOSE, the mean elevation of observations was 2010 m with 95% of observations falling between 1308 and 2740 m (Siegel et al. 2011).

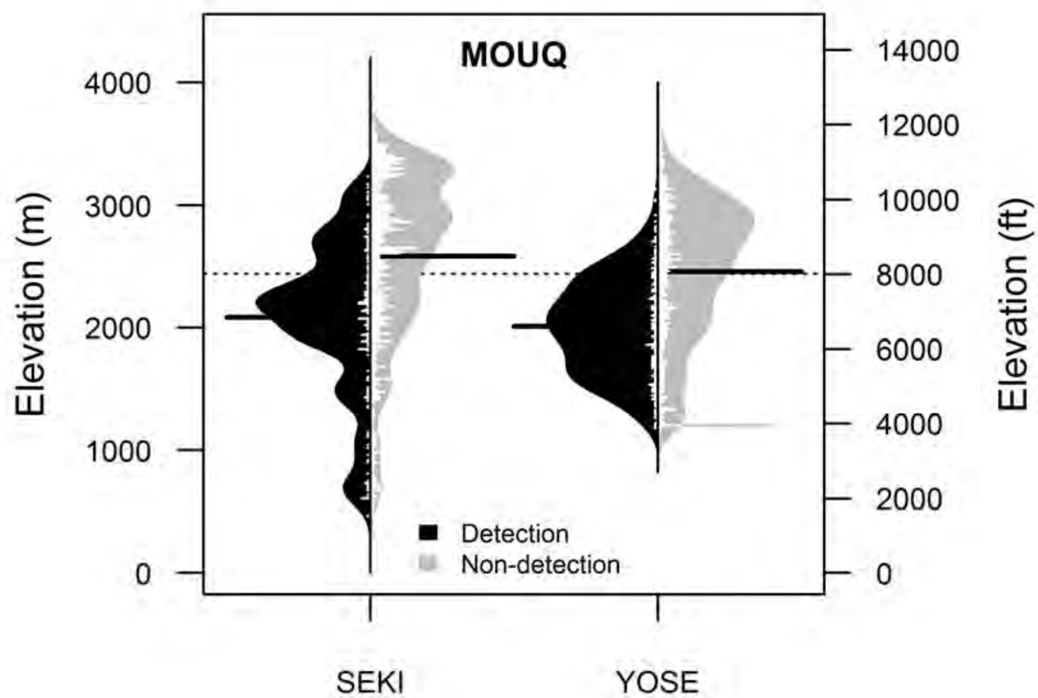

Figure 3. Elevational distributions of sites where Mountain Quail (MOUQ) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data
Breeding Bird Survey (BBS) data indicate Mountain Quail are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in high numbers on the individual BBS route at YOSE and in moderate numbers on routes at SEKI. A significant positive and dramatic trend was observed on the Kings Canyon route during 1974-2005, but otherwise Mountain Quail populations appear stable across the state and the Sierra Nevada (Table 3).

Table 87. Relative abundance and trends for Mountain Quail according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	118	4.81	+0.6	0.40
	1980-2007			+0.2	0.79
Sierra Nevada (BCR 15)	1966-2007	34	6.87	+0.1	0.97
	1980-2007			-0.1	0.89
Route 14117 – Sequoia NP	1972-2005	1	3.94	+6.2	0.77
Route 14132 – Kings Canyon NP	1974-2005	1	1.80	+41.5	0.01
Route 14156 – Yosemite NP	1974-2007	1	13.15	+5.3	0.33

Mountain Quail are not frequently captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Habitat loss due to agricultural or urban development is likely the greatest concern for Mountain Quail outside of SIEN parks and may impact park populations somewhat during winter migrations to lower elevations. Within the park network, the largest potential threat is range contraction due to climate change. However, any increase in fire frequency due to climate change may benefit the species by creating and maintaining early-seral habitat in the parks. Hunting, livestock grazing, invasive species, and disease do not appear to be major threats within SIEN parks.

Climate Change: An analysis of shifts between the historical range of Mountain Quail (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Moutain Quail has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Modeled distribution shifts of Mountain Quail predict range contractions of the species at the southern and lower edges of its range across California (Stralberg and Jongsomjit 2008). These projections are consistent with the general assumption that species will shift their ranges pole-ward and upslope with climate change. The most important variables influencing current and projected distribution were vegetation, distance to stream (Maxent distribution model), and temperature seasonality (GAM distribution model) (Stralberg and Jongsomjit 2008). Mountain Quail are currently observed breeding below 3300 m within SIEN parks (Figure 3). There remains some potential for Mountain Quail to move to higher elevations within the parks as vegetation and temperatures shift with climate change. Because the SIEN parks contain high-elevation habitat, they may act as refugia in the Sierra Nevada for the Mountain Quail as the region warms.

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Mountain Quail received a sensitivity score of 47.96 (UW 2010), suggesting moderate sensitivity to the threat. Certainty of results was listed as 36.25 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Mountain Quail's sensitivity to climate change was its dependence on sensitive habitats such as alpine/subalpine shrub-dominated communities (UW 2010).

Altered Fire Regimes: Mountain Quail are often found within early-seral shrub vegetation such as that found following fire or other disturbance (Gutiérrez and Delehanty 1999). If an increase in fire frequency leads to conversion of dense forested habitats to shrub-dominated vegetation, Mountain Quail may benefit. As ground-nesters, Mountain Quail may be adversely affected by prescribed burns that are implemented during the spring, prior to the start of the natural fire season, but before nestlings have fledged.

Habitat Fragmentation or Loss: Agriculture and development can result in direct habitat loss, especially within the lower elevation winter range in the Sierra Nevada (Gutiérrez and Delehanty 1999). This is not a direct threat within SIEN parks, but could impact park populations of Mountain Quail that migrate beyond park boundaries in winter.

Invasive Species and Disease: Neither invasive species nor disease appear to be major threats to Mountain Quail. However, any replacement of perennial shrubs with invasive annual grasses would be detrimental to the species.

Human Use Impacts: Hunting of Mountain Quail is permitted throughout California, but is not considered a major threat to the species (Gutiérrez and Delehanty 1999). Habitat degradation due to packstock grazing within the parks is a potential concern for this species where grazing is permitted because packstock can damage important perennial shrubs (Gutiérrez and Delehanty 1999). However, because hunting is not permitted within SIEN parks and packstock grazing is limited, these threats are nonexistent or minor as compared to the impact of hunting and commercial livestock grazing elsewhere in the Sierra Nevada.

Management Options and Conservation Opportunities

Mountain Quail have been actively managed as a game bird throughout the west. Where populations have declined outside of California, managers have enacted hunting bans and attempted reintroductions where the species has been lost (Gutiérrez and Delehanty 1999).

Within the SIEN parks, the most important action park managers can do to protect Mountain Quail populations is to maintain early-seral scrub habitats by limiting fire suppression and packstock grazing. The maintenance of high-quality habitat will be especially important if climate change leads to loss or degradation of preferred vegetation. In more arid parts of Mountain Quail's range, wildlife 'guzzlers' have been used to store and provide an accessible water source through dry periods (Gutiérrez and Delehanty 1999).

If climate change results in longer periods of drought in SIEN parks, such supplementary water sources could be considered to aid Mountain Quail and other species. Finally, monitoring of Mountain Quail populations in the parks should continue, to assess how the species is responding to climate change and any other threats.

Mourning Dove – *Zenaida macroura*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Mourning Dove is a fairly common year-round resident at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks. The species is an uncommon possible breeder during the summer months at Devils Postpile (DEPO) National Monument (Table 1).

Table 88. Breeding status and relative abundance of Mourning Doves in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Probable Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Mourning Dove is distributed across much of North America including throughout the Sierra Nevada and SIEN parks. Because the species is primarily found in the foothills and lower elevations, the Sierra Nevada and SIEN parks are relatively unimportant to the species and its California populations (Siegel and DeSante 1999).

Distribution and Habitat Associations
In the mountains Mourning Doves are most often found in open grassy areas interspersed with woodland or scrub habitat (Gaines 1992). Mourning Doves were detected in low densities (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were observed once during the DEPO survey. Park inventories show highest associations with Blue Oak and Ponderosa Pine forests within SEKI and YOSE respectively (Table 2).

Table 89. Number of Mourning Doves recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	11	14	Blue Oak Forest	0.13	0.14 (0.03-0.70)
			Live Oak/California Buckeye	0.05	0.03 (0.00-0.15)
			California Black Oak Forest	0.04	0.01 (0.00-0.08)
Yosemite NP	11	12	Ponderosa Pine	0.07	
			Recent Burn	0.06	
			Black Oak	0.03	
Devils Postpile NM	1	1	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

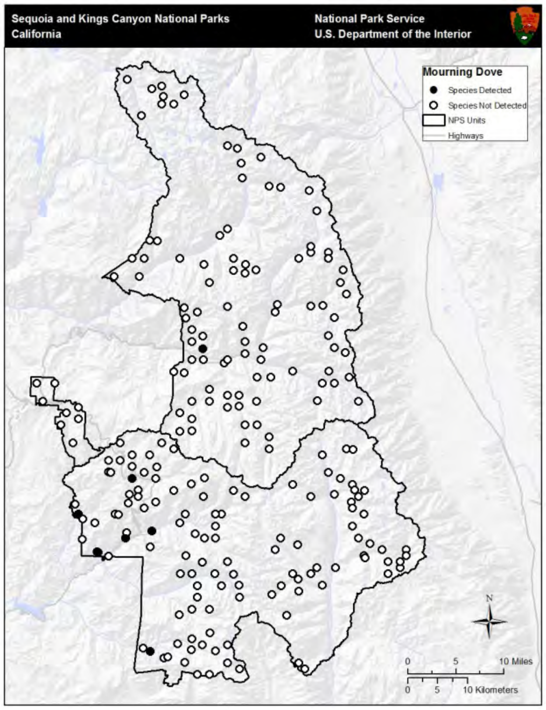

Figure 39. Bird survey transects where Mourning Dove was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

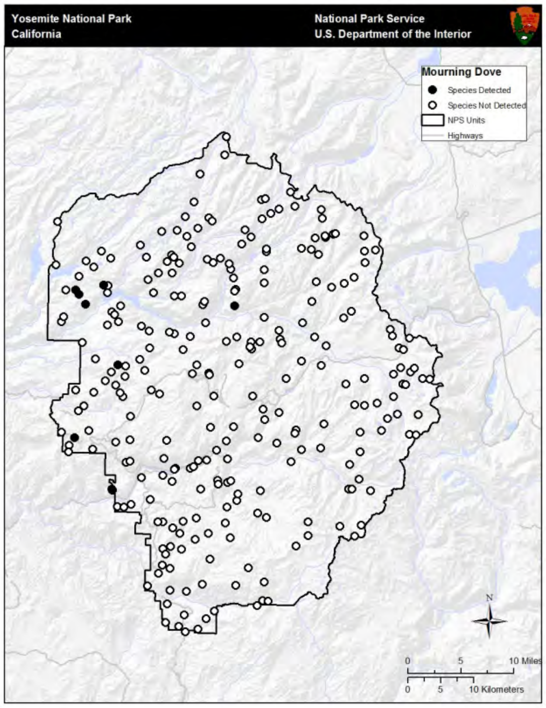

Figure 40. Bird survey transects where Mourning Dove was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Mourning Dove was observed within the lower-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Mourning Dove at SEKI was 1023 m, with 95% of observations occurring between 602 and 2060 m. At YOSE, the mean elevation of observations was 1592 m with 95% of observations falling between 1272 and 1824 m (Siegel et al. 2011).

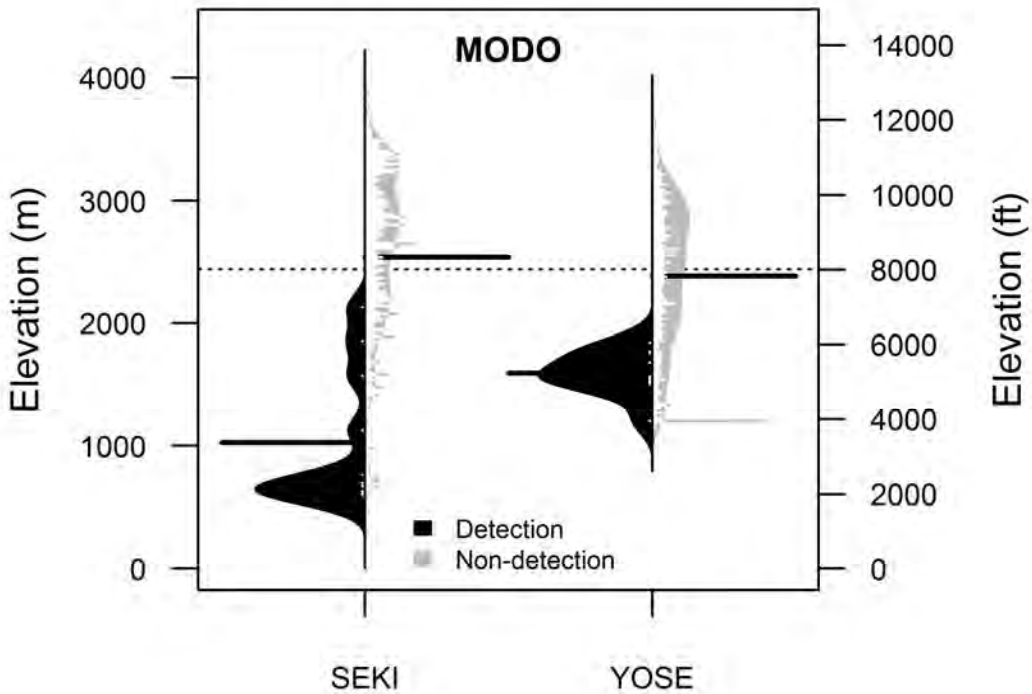

Figure 3. Elevational distributions of sites where Mourning Doves (MODO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Mourning Doves are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in moderate numbers on individual BBS routes at YOSE and SEKI. A significant negative trend was observed across California in the long-term and appears to have continued in recent years, although recent trends are not statistically significant (Table 3).

Table 90. Relative abundance and trends for Mourning Dove according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	225	26.25	-0.9	0.05
	1980-2007			-0.9	0.12
Sierra Nevada (BCR 15)	1966-2007	31	7.33	+1.4	0.19
	1980-2007			+1.8	0.16
Route 14117 – Sequoia NP	1972-2005	1	7.25	+2.6	0.86
Route 14132 – Kings Canyon NP	1974-2005	1	3.20	+0.9	0.87
Route 14156 – Yosemite NP	1974-2007	1	2.77	0.0	1.00

Mourning Doves are infrequently captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The greatest pressure on the Mourning Dove across its range appears to be hunting, which may have contributed to a slight long-term decline in California populations (Table 3). Although hunting does not occur within SIEN parks, park populations may be indirectly affected. Likewise, habitat degradation in Mourning Dove wintering grounds may have some negative impacts on park populations. Other potential threats include displacement by the Eurasian Collared-Dove and increased prevalence of West Nile Virus in California. Mourning Doves appear to be reacting to climate change through shifts their center of abundance, but their broad range implies less vulnerability to the threat than more narrowly distributed species. Finally, any increase in fire frequency in open areas may benefit the species.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Mourning Dove has significantly shifted 147.3 miles to the north and 26.7 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Mourning Dove has already responded to climate change and will likely continue to shift its range in the coming decades.

Despite these observed abundance shifts, the ubiquity of the species across North America and throughout many climate zones indicates that Mourning Doves are not likely to be directly impacted by changing temperatures and precipitation. Furthermore, Mourning doves are currently found in the lower elevations of the SIEN parks (Table 3). If the species' range shifts upslope as is generally expected of most species, there is ample higher-elevation habitat that could accommodate doves within the parks.

Altered Fire Regimes: Studies have found an increase in Mourning Dove abundance in grasslands and montane forests in years following both wild and prescribed fires (Bock and Bock

1992, Kirkpatrick et al. 2002, Kotliar et al. 2007). This increase in doves is likely due to increased seed production and availability in burned fields as compared to unburned fields (Bock and Bock 1992). Although large fires can destroy nesting trees, in general periodic burns appear to benefit Mourning Dove by increasing available forage. If low-intensity fires become more frequent in the future in SIEN parks, either as prescribed burns or wildfires, the species may benefit.

Habitat Fragmentation or Loss: Mourning Dove is vulnerable to loss of riparian and grassland habitat from overgrazing or conversion for agriculture or residential purposes (Siegel and DeSante 1999). However, Mourning Doves tolerate human-altered landscapes to a considerable extent and can benefit from some agriculture that produces food sources such as waste grain and weed seeds (Otis et al. 2008). Although habitat loss is not a problem within the SIEN parks, park populations can be adversely affected by habitat degradation on wintering grounds outside of protected areas. Thus, land conversion outside of SIEN parks likely has mixed effects on doves that migrate beyond park boundaries.

Invasive Species and Disease: There is some concern that the spread of the invasive Eurasian Collared-Dove will have adverse effects on native dove species such as the Mourning Dove. However, decreasing Mourning Dove abundance corresponding with increasing collared-doves has not yet been observed (Bonter et al. 2010). Furthermore, collared-doves are more likely to expand into human-dominated landscapes rather than forested habitats (Bonter et al. 2010) such as those found with the SIEN parks.

The arrival of West Nile Virus (WNV) in California is a concern for many bird species. In a recent study evaluating the risk of California birds to WNV, Mourning Dove received a combined risk score of 1.8 (with a score of 4 indicating the greatest risk), suggesting the species is at moderate to low risk from the disease (Wheeler et al 2009). Additionally, three dead Mourning Doves tested positive for WNV in California during 2009 (CDPH 2010), providing further evidence of low susceptibility to the disease. If the disease becomes prevalent within SIEN parks it could pose a moderate threat to the Mourning Dove.

Human Use Impacts: Hunting pressure is a concern for Mourning Doves outside of SIEN parks and is especially severe in Mexico (Siegel and DeSante 1999). Because hunting is not permitted within the SIEN parks this pressure does not exist within their boundaries. However, hunting can affect individuals that leave protected areas following the breeding season. Likewise, migrating individuals are vulnerable to lead poisoning from lead pellet ingestion as well as mortality from consumption of other contaminants and toxins (Otis et al. 2008).

Management Options and Conservation Opportunities
The Mourning Dove is managed as a game bird throughout much of North America including in California outside of protected areas such as the SIEN parks. Feeding fields are managed for hunting purposes in some areas, but no large-scale Mourning Dove habitat management occurs (Otis et al. 2008). The species is not widely managed other than for hunting purposes.

Within the SIEN parks, the maintenance of breeding and foraging habitat is most important for the Mourning Dove. Periodic low-intensity prescribed burns outside of the breeding season would increase abundance and availability of Mourning Dove forage while maintaining nest trees. Although the Eurasian Collared-Dove, West Nile Virus, and climate change are not currently major threats, their occurrence in and impact on SIEN parks and dove populations remain concerns and should be monitored to inform future management actions.

Nashville Warbler – *Oreothlypis ruficapilla* (AOU 2010)

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Nashville Warbler is a common summer resident at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, but is uncommon in Devils Postpile National Monument (DEPO) (Table 1).

Table 1. Breeding status and relative abundance of Nashville Warblers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Common
Yosemite NP	Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Occasional Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Nashville Warbler is distributed over much of Canada and the mountains of western U.S. including the Sierra Nevada, but is absent from the Great Basin and Rocky Mountains (Williams 1996). The subspecies *ridgwayi* is generally limited to the Pacific Slope. The Sierra Nevada is very important to *ridgwayi*'s range, where the subspecies is very common (Siegel and DeSante 1999).

Distribution and Habitat Associations
Nashville Warblers are found on dry wooded slopes with shrubby understories on the western slope of the Sierra (Gaines 1992). Nashville Warblers were detected frequently (Table 2) along many survey transects (Figures 1 and 2) during avian inventory projects in SEKI and YOSE and were detected infrequently in DEPO. Park inventories show highest associations with California Black Oak and Douglas-fir/Mixed Conifer forests within SEKI and YOSE respectively, but were found in a number of other low- to mid-elevation coniferous and deciduous forest types (Table 2).

Table 2. Number of Nashville Warblers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	196	290	California Black Oak Forest	1.43	1.63 (0.74-3.61)
			Lower Elevation Sparse	0.64	0.98 (0.28-3.46)
			Canyon Live Oak Forest	0.56	0.67 (0.29-1.53)
Yosemite NP	404	674	Douglas-fir/Mixed Conifer	1.00	
			Mixed Chaparral	0.80	
			Black Oak	0.78	
			Ponderosa Pine	0.67	
Devils Postpile NM	2	2	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

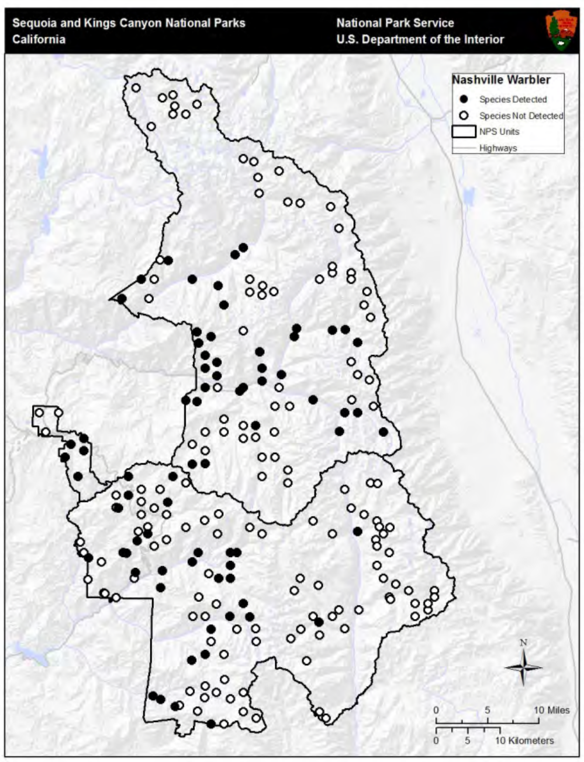

Figure 1. Bird survey transects where Nashville Warbler was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

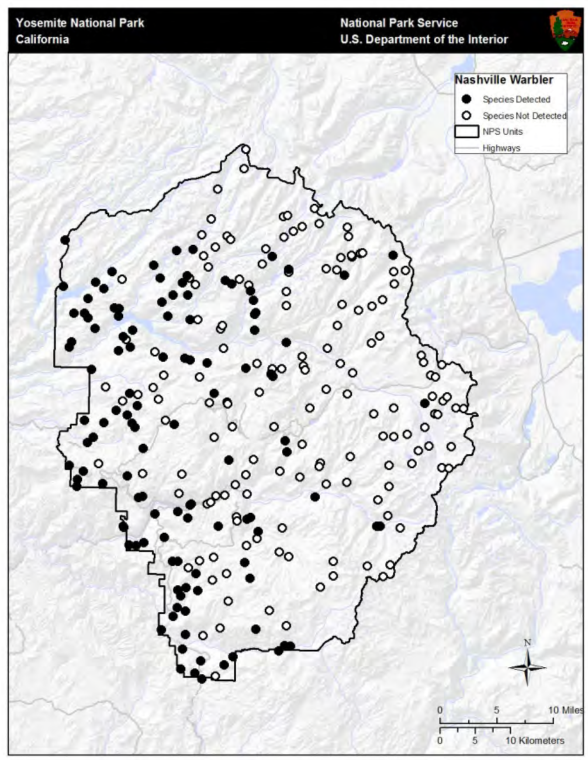

Figure 2. Bird survey transects where Nashville Warbler was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Nashville Warbler was observed within the mid to lower elevations of both SEKI and YOSE during avian inventory projects (Figure 3). The mean elevation of observations of Nashville Warbler made in SEKI was 1962 m, with 95% of observations made between 963 and 2903 m. In YOSE, the mean elevation of observations was 1872 m with 95% of observations falling between 1303 and 2576 m (Siegel et al. 2011).

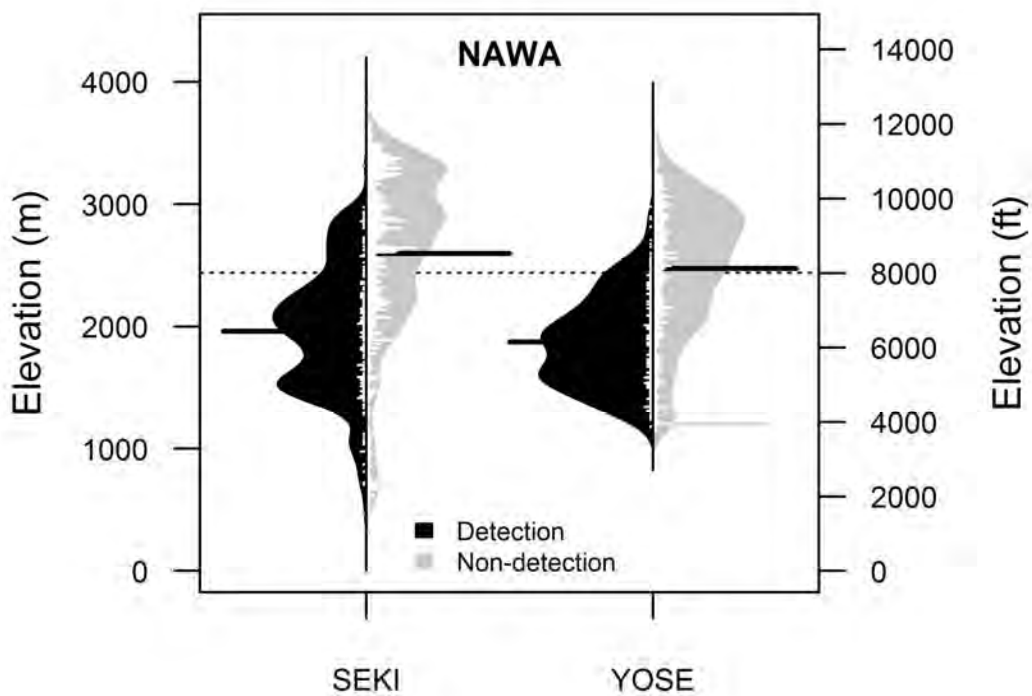

Figure 3. Elevational distributions of sites where Nashville Warblers (NAWA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Nashville Warblers are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at SEKI, but high numbers on a BBS route in YOSE. However, this contrast between the parks' routes appears to be changing, as strong positive trends in SEKI are apparent in recent years. Significant negative trends were observed both across California and in the Sierra Region (Table 3).

Table 3. Relative abundance and trends for Nashville Warbler according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	77	5.08	-1.7	0.02
	1980-2007			-2.1	0.01
Sierra Nevada (BCR 15)	1966-2007	30	8.27	-2.6	0.03
	1980-2007			-3.6	0.00
Route 14117 – Sequoia NP	1972-2005	1	1.63	+67.6	0.40
Route 14132 – Kings Canyon NP	1974-2005	1	1.15	+31.6	0.15
Route 14156 – Yosemite NP	1974-2007	1	25.46	-2.3	0.42

MAPS data from both Kings Canyon and YOSE NPs reveal essentially stable Nashville Warbler populations between 1991 and 2009. However, Nashville Warblers were captured slightly more frequently in YOSE than in Kings Canyon (Table 4), which concurs with indications of relative abundance along BBS routes (Table 3). Furthermore, Nashville Warblers at the Yosemite stations showed a much greater mean reproductive index than at Kings Canyon NP. Reproductive indices appear to be declining at MAPS stations in both parks.

Table 4. Population trends, productivity, trends, and survival estimates of Nashville Warblers at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	2.2	+0.08	0.23	-14.85	NA
Yosemite NP	1993-2009	2.6	-2.54	1.66	-4.44	0.394 (0.184)
Devils Postpile NM	2002-2006	0.0	NA[2]	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Most troubling for Nashville Warblers is a significant California and Sierra-wide decline in recent years (Sauer et al. 2008). Suggested causes of this decline include degradation or loss of montane habitat from forestry practices and/or grazing, and Brown-headed Cowbird parasitism (Siegel and DeSante 1999). Climate change and increased fire frequencies may cause problems for Nashville Warblers as well in the coming decades. However, the likely magnitude of these impacts within SIEN or across the Sierra is unclear.

With the possible exception of some packstock grazing pressure on montane meadows, habitat loss and degradation are not substantial threats within SIEN parks. Likewise, Brown-headed Cowbirds do not appear to be a major problem for Nashville Warbler within the parks (Halterman et al. 1999). Factors threatening Nashville Warbler populations across the Sierra may be less important in protected areas such as the SIEN parks. However, due to apparent declining populations, this species and any likely threats should be monitored closely.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Nashville Warbler has significantly shifted 79.3 miles to the north and 38.7 miles toward the coast over the past 40 years (Audubon 2009). Shifts in these directions have mixed implications because higher latitudes and inland areas generally have cooler winter temperatures than lower latitudes and coastal areas (Audubon 2009). Thus, if Nashville Warbler were responding to climate change in a predictable manner by moving toward cooler areas, we would see movements northward and inland.

Nashville Warblers are rarely found breeding above 2900 m SIEN parks (Figure 3) and are extremely rare breeders in the higher mountains (Gaines 1992). If climate change causes the species' breeding range to shift upward as is generally expected, there is much higher-altitude habitat for new colonization within SEKI as well as YOSE. However, it is important to note that even if Nashville Warblers are able to shift their range in response to climate change, populations may suffer if the habitats they depend upon are not also able to shift upslope or are degraded due to climate warming.

Altered Fire Regimes: Nashville Warblers rely on dense underbrush for nesting habitat (Gaines 1992) and were found significantly more often in unburned vs. burned forests in the northern Sierra (Burnett et al. 2010). Both fires and fire management strategies that remove understory vegetation will reduce reproductive success. Increased frequency of fire and/or management to reduce fires could be somewhat detrimental to this species.

Habitat Fragmentation or Loss: Nashville Warbler is vulnerable to loss or degradation of montane meadow habitat, where adult and young birds tend to congregate in the late summer after the nesting cycle is completed (Siegel and DeSante 1999), but this is not likely to pose a major threat to the species within SIEN parks.

Invasive Species and Disease: Although native to North America, Brown-headed Cowbirds have expanded their range since European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Nashville Warblers are susceptible to brood parasitism by Brown-headed Cowbirds, but cowbird occurrence and parasitism rates within the SIEN parks has been found to be rare (Halterman et al. 1999). For example, during a 1995-96 study at SEKI, only 2-3% of passerine nests monitored were parasitized by cowbirds; however, no Nashville Warbler nests were monitored during the study (Halterman and Laymon 2000). An updated assessment may be warranted.

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for this species, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage riparian shrubs. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Management Options and Conservation Opportunities

The most important thing park managers can do to protect Nashville Warbler populations in the parks is to manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicated that a cowbird trapping program is not warranted (Halterman et al. 1999). However, if future studies show an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

MAPS station operation and other means of monitoring Nashville Warbler populations in the parks should continue to resolve whether population declines are indeed occurring, and if so, to determine their causes.

Northern Flicker – *Colaptes auratus*

Migratory Status

Short distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Northern Flicker is a common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and a common summer resident and regular breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 5. Breeding status and relative abundance of Northern Flickers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Common
Yosemite NP	Summer/Year-round	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Northern Flicker is broadly distributed throughout North America (Wiebe and Moore 2008). Flickers are extremely widespread, thus the Sierra Nevada is not of great importance to the species (Siegel and DeSante 1999).

Distribution and Habitat Associations

Northern Flicker is a ground-foraging species of open woodlands, savannas, and forest edges (Weibe et al. 2008). They were commonly detected (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects throughout SEKI, YOSE, and DEPO. Park inventories show associations with a wide variety of habitat types, including lower-elevation meadow, Ponderosa Pine Woodland, and Giant Sequoia within SEKI, and Foothill Pine, Ponderosa Pine/Mixed Conifer, and White Fir in YOSE (Table 2). Relative abundance was three times greater in Foothill Pine areas of YOSE than in all other habitat types in YOSE or SEKI.

Table 6. Number of Northern Flickers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	164	180	Lower Elevation Meadow	0.08	0.06 (0.02-0.15)
			Ponderosa Pine Woodland	0.08	0.04 (0.01-0.17)
			Giant Sequoia Forest	0.07	0.08 (0.03-0.21)
Yosemite NP	242	271	Foothill Pine	0.27	
			Ponderosa Pine/Mixed Conifer	0.11	
			White Fir	0.10	
Devils Postpile NM	4	5	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

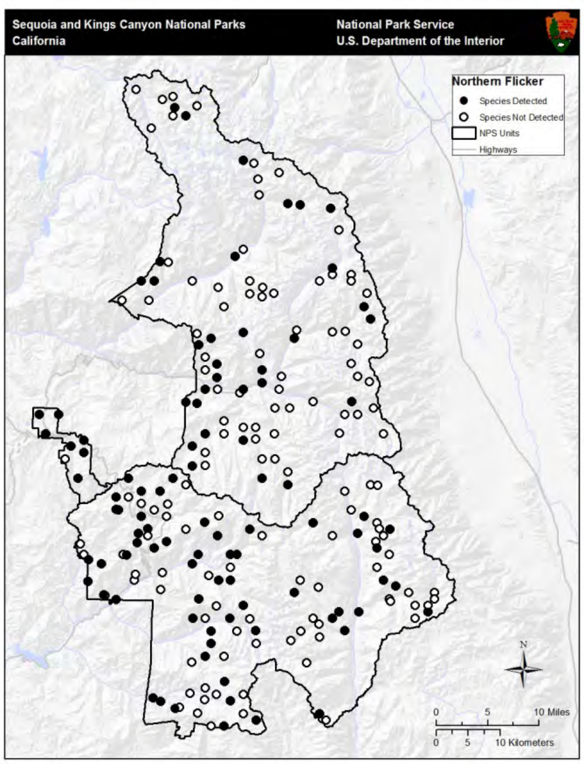

Figure 3. Bird survey transects where Northern Flicker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

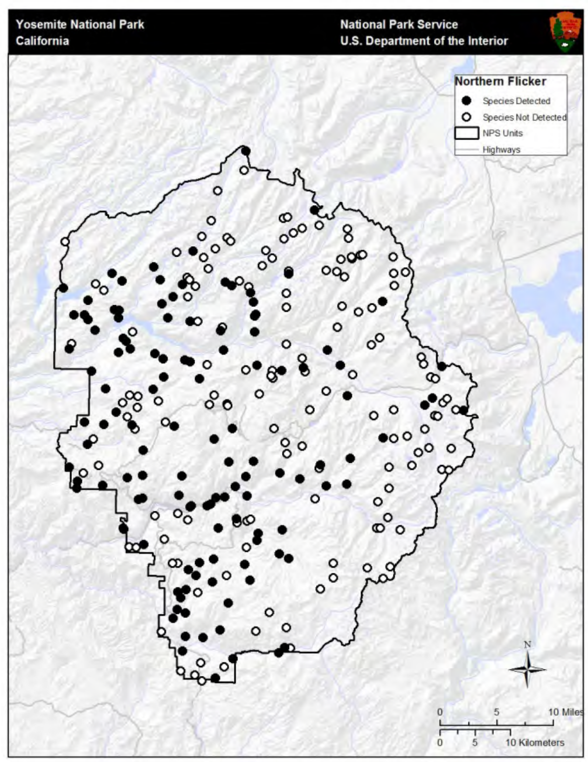

Figure 4. Bird survey transects where Northern Flicker was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Northern Flicker was detected from low to high elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Northern Flicker in SEKI was 2325 m, with 95% of observations occurring between 727 and 3347 m. In YOSE, the mean elevation of observations was 1978 m with 95% of observations falling between 1200 and 2913 m (Siegel et al. 2011).

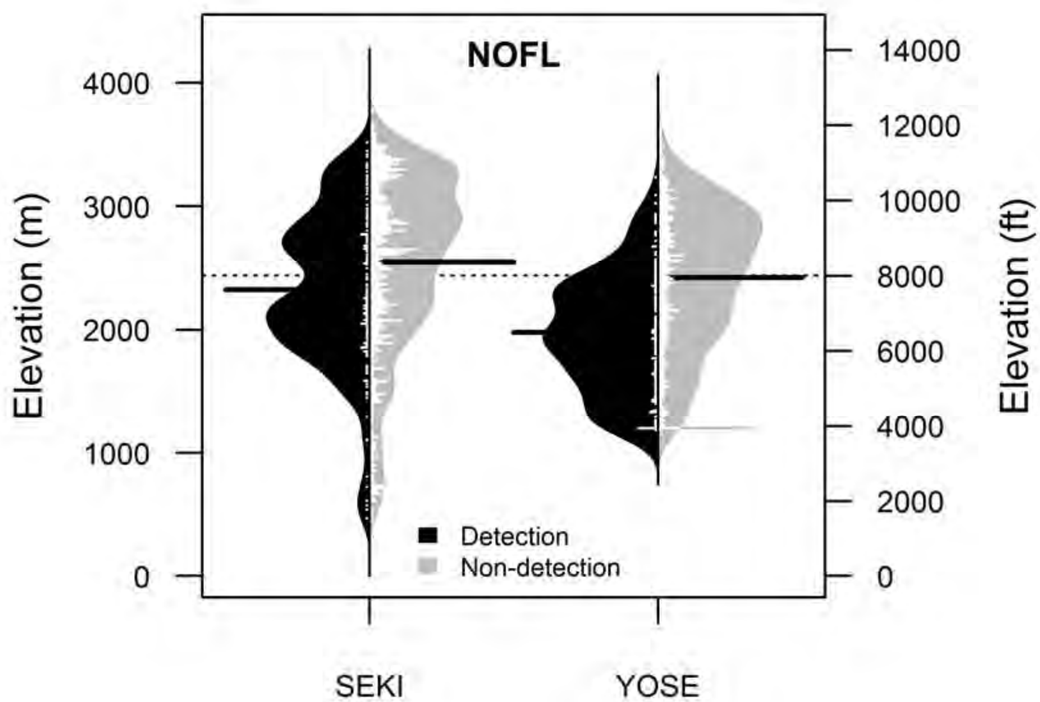

Figure 3. Elevational distributions of sites where Northern Flicker (NOFL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Northern Flickers are twice as abundant along survey routes in the Sierra Region (BCR 15) than in California as a whole (Table 3). Their abundance was relatively high on individual BBS routes at YOSE and SEKI, particularly along the Yosemite route. Northern Flickers have experienced small but significant population declines throughout California. A nearly significant annual population increase of >40% was observed along the Sequoia National Park BBS route from 1972-2005, and a small non-significant increase of almost 4% was documented along the Yosemite route. Conversely, a non-significant negative population trend was evident for the route at Kings Canyon NP (Table 3).

Table 7. Relative abundance and trends for Northern Flicker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	183	3.10	-1.1	0.01
	1980-2007			-1.1	0.02
Sierra Nevada (BCR 15)	1966-2007	35	6.14	-0.8	0.22
	1980-2007			-0.3	0.65
Route 14117 – Sequoia NP	1972-2005	1	1.88	+41.1	0.09
Route 14132 – Kings Canyon NP	1974-2005	1	2.70	-13.8	0.97
Route 14156 – Yosemite NP	1974-2007	1	6.73	+3.9	0.25

Northern Flickers were not captured in sufficiently large numbers at MAPS stations in the SIEN parks to estimate reproductive and survival rates (Table 4). A non-significant negative population trend was estimated at YOSE MAPS stations from 1993-2009, in contrast with BBS results from 1974-2007 described above.

Table 8. Population trends, productivity, trends, and survival estimates of Northern Flicker at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.4	NA[2]	0.20	NA	NA
Yosemite NP	1993-2009	0.8	-6.48	0.25	NA	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Northern Flickers are common and abundant throughout their range. The species is well-adapted to habitats altered by humans, commonly breeding in urban as well as suburban and rural environments, and visiting backyard bird feeders (Wiebe and Moore 2008). Nevertheless, BBS and MAPS data suggest slight but significant declines in abundance throughout the Sierra Nevada and California (Table 3), and potentially in Yosemite and Kings Canyon NPs (Table 4), although an apparent population increase was detected along the route in Sequoia NP (Table 3). In addition, Northern Flickers have significantly shifted their ranges in response to climate change in the Sierra Nevada and throughout their range, but are likely to persist within SIEN parks into the future despite observed shifts.

Although the Northern Flicker remains abundant, declining trends and significant range shifts due to climate change should be viewed with some concern because flickers are keystone species in woodland communities where they excavate many of the cavities later used by other species for nesting (Wiebe and Moore 2008).

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Northern Flicker has shifted significantly northward by nearly 193 miles and 55 miles inland throughout its North American range, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). Similarly, an analysis of shifts between the historical range of Northern Flicker (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to both temperature and precipitation change by shifting its range to follow its climatic niche (Tingley et al. 2009). These observed shifts provide strong evidence that Northern Flickers has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Northern Flicker was observed from low to high elevations of the SIEN parks (Figure 3) and inhabits a wide variety of open forest and woodland types. If climate change causes the species' range to shift upward as is generally expected, there remains higher-altitude habitat for new colonization within Sequoia and Kings Canyon as well as Yosemite NPs, as long as natural disturbances such as fire or windstorms continue to create open areas in conifer forests for flickers to forage. Moreover, the broad range of forest and woodland types and elevations occupied by Northern Flickers suggests that the species is likely to be relatively resilient to climate-driven changes in vegetation composition. Despite this apparent resilience, the significant and relatively large shifts in range already observed warrant continued monitoring of the species and the habitats in which it plays a pivotal role.

Altered Fire Regimes: Northern Flickers require open areas with decayed coarse woody debris for ground-foraging (Warren et al. 2005), and typically respond positively to conditions created by high-intensity fire (Raphael et al. 1987, Hutto 1995, Kotliar et al. 2002, Bock and Block 2005, Smucker et al. 2005, Kennedy and Fontaine 2009). High-intensity fire in the SIEN parks creates forest edges and maintains optimal habitat conditions favored by this species. If such fire increases in frequency and extent in the future, Northern Flickers are likely to benefit.

Habitat Fragmentation or Loss: Removal of snags during logging and urban development may reduce habitat suitability for Northern Flickers (Wiebe and Moore 2008). Flickers adapt quite readily to human-altered areas (Wiebe and Moore 2008) so urban development that retains some natural habitat may not pose a major threat. Development and logging are not prevalent in the SIEN parks. Fire suppression leading to dense, mature forests may represent 'loss' of habitat in the parks.

Invasive Species and Disease: European Starlings were introduced to New York City in 1890 and by the middle of the 20th century had spread across much of North America with the exception of Mexico. Some researchers suggest that Northern Flickers are adversely impacted by European Starling (Wiebe and Moore 2008), but Koenig (2003) found no decline in abundance of flickers after starling invasion.

Human Use Impacts: Anecdotal deaths of Northern Flickers from pesticides have been reported but no evidence that chemicals pose a major risk to populations (Wiebe and Moore 2008). Collisions with vehicles may be an issue but has not been studied.

Management Options and Conservation Opportunities

Northern Flickers have been recognized as ‘keystone’ excavators which may influence the abundance of secondary cavity nesters in forest systems (Wiebe and Moore 2008). While Koenig (2003) found no evidence that flicker populations declined directly after starling invasion, relative density of flickers declined overall throughout the years of study. Furthermore, Wiebe and Moore (2008) report numerous cases where individual flicker nests were usurped by starlings. Thus park managers can help Northern Flicker and other cavity-nesters by monitoring impacts of European Starlings and if necessary establishing a program for their removal.

In SIEN parks, continuing to protect snags, dead limbs, and diseased trees within open woodlands and on forest edges, and retaining snags in burned forests would provide adequate nesting substrate for Northern Flickers (Wiebe and Moore 2008).

Documented shifts in range and abundance of Northern Flickers corresponding with increases in temperature warrant continued monitoring of the species and the habitats in which it plays a key ecological role. The Northern Flicker may be a useful climate indicator species because it appears to be sensitive to climate change, but remains abundant and widespread.

Northern Goshawk – *Accipiter gentilis*

Migratory Status
Partial migrant (Squires and Reynolds 1997)

Residency and Breeding Status
Northern Goshawk is an uncommon year-round resident at Sequoia and Kings Canyon (SEKI), and Yosemite (YOSE) national parks. The species occurs in Devils Postpile (DEPO) National Monument during summer months and is a possible breeder there (Table 1).

Table 9. Breeding status and relative abundance of Northern Goshawks in SIEN national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Uncommon
Yosemite NP	Year-round	Regular Breeder	Uncommon
Devils Postpile NM	Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N4 – Apparently Secure (Uncommon, but not rare)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Species of Special Concern

Range Significance
Northern Goshawks breed throughout Canada and much of the western and midwestern U.S. including the Sierra Nevada, White Mountains, and North Coast Range of California (Squires and Reynolds 1997). SIEN parks comprise an important part of the species' California range.

Distribution and Habitat Associations
Northern Goshawks prefer moderately dense forests, broken by meadows, rivers, lakes, streams or shrub (Gaines 1992). Northern Goshawks were detected only three times (Table 2) along three survey transects (Figure 1) during avian inventory surveys at YOSE. At SEKI and DEPO, the species was detected anecdotally, but not during formal surveys. Northern Goshawks were not observed frequently enough to infer habitat preferences within the SIEN parks. Like most other raptors, they are not well sampled by passive point counts designed to detect singing birds, but are recorded more often in surveys designed specifically for raptors (e.g., Maurer 2000).

Table 10. Number of Northern Goshawks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA	NA
Yosemite NP	3	3	NA[1]	NA	
Devils Postpile NM	0	0	Detected off-survey	NA	

[1]NA - Information not available due to insufficient data.

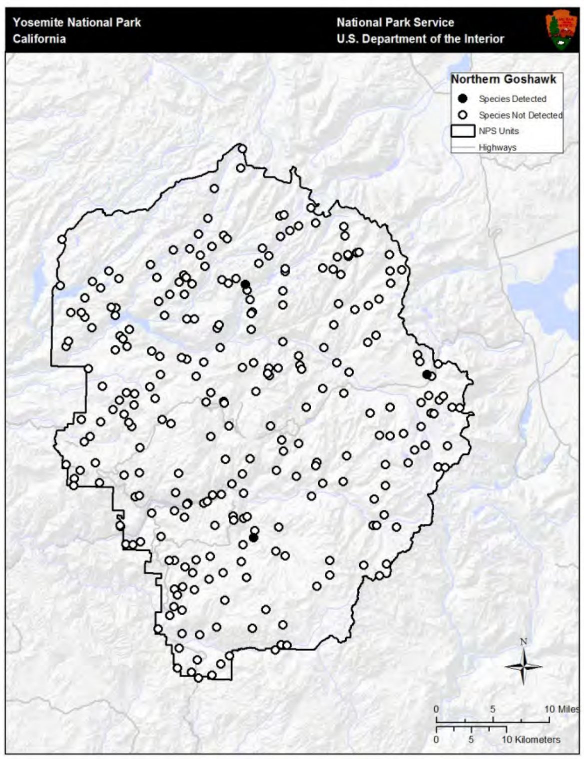

Figure 1. Bird survey transects where Northern Goshawk was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution
Northern Goshawk was observed within the middle elevations of YOSE during avian inventory surveys (Figure 2). Though only three detections were recorded, the mean elevation of observations was 2644 m.

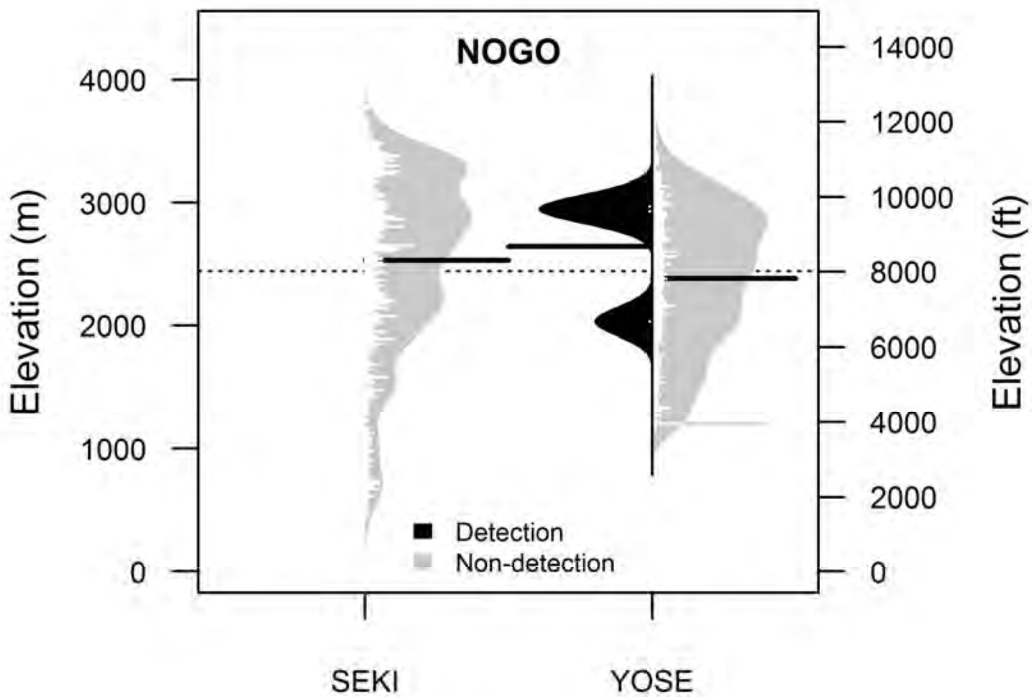

Figure 2. Elevational distributions of sites where Northern Goshawks (NOGO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data
Breeding Bird Survey (BBS) data indicate Northern Goshawks are detected rather rarely in the Sierra Nevada region (BCR 15) and across the whole of California. They were not detected on individual BBS routes at YOSE and SEKI and no significant population trends were observed either in the Sierra or California as a whole (Table 3).

Northern Goshawks are infrequently captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Table 11. Relative abundance and trends for Northern Goshawk according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007[1]	8	0.02	+12.3	0.51
	1980-2007[1]			+0.9	0.86
Sierra Nevada (BCR 15)	1966-2007[1]	3	0.01	-10.1	0.42
	1980-2007[1]			-8.6	0.53
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Stressors

The greatest known threats to Northern Goshawk are habitat loss and degradation due to the alteration of forests through timber harvest and changes in fire regimes (Keane 2008). Although timber harvest is not a concern within SIEN parks, fire suppression and changes in fire frequency due to climate change could have negative impacts on park populations. Other than its implications for fire regimes alteration, climate change is not likely to directly impact Northern Goshawk populations in a substantial way. Likewise, there does not appear to be a legacy of DDT impacts as there are in other hawk species, and harvest of individuals for falconry is not a major threat. Finally, West Nile Virus is a potential concern for this species, but the magnitude of any impact is largely unknown in the Sierra Nevada.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Northern Goshawk has significantly shifted 71.9 miles to the north over the past 40 years, corresponding with increases in temperature (Audubon 2009). This northward shift suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009) and provides evidence that Northern Goshawk has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

However, the species is found from sea level to the alpine zone in a wide variety of forest types across its range (Squires and Reynolds 1997). This use of diverse climate zones and habitat types suggests any effects of climate change on Northern Goshawk are likely to be indirect and in response to local changes in prey species abundance (e.g., Douglas Squirrel, *Tamiasciurus douglasii*; Maurer 2000) or changes in forest structure due to climate-induced fire regime change.

Altered Fire Regimes: Northern Goshawks prefer forest habitats with varied age structure and other characteristics associated with stands that generally have not been subject to large-scale timber harvests and fire suppression (Youtz et al. 2008). Furthermore, a study of breeding goshawks in YOSE found that goshawks nest more frequently in areas recently burned by low-intensity fires than in unburned areas (Maurer 2000). This provides evidence that a century of fire suppression has contributed to a decline in suitable nesting habitat for the species (Maurer 2000). Additionally, large stand-replacing fires, which have become more frequent due to increased fuel loads and perhaps climate change, can destroy nesting sites and reduce hawk habitat extent (Keane 2008). However, Kennedy and Fontaine (2009) reported that Northern Goshawks responded positively to high-intensity fires 4–9 years postfire, and did not respond to the conditions created by moderate or low-intensity fire. Further research is warranted on the impacts of high-intensity fire on this species.

Habitat Fragmentation or Loss: In many areas timber harvest is a major threat to breeding populations of Northern Goshawks both because it removes nest trees and reduces canopy density and because noise disturbance from timber operations can cause nest failures (NatureServe 2009). However, in California habitat loss and fragmentation from timber harvest do not appear to have impacted breeding success as much as in other areas (Squires and Reynolds 1997). In addition, it is not a concern within SIEN parks where commercial logging does not occur. Degradation of habitat due to outbreaks of tree-killing insects or disease can also be detrimental to this species (NatureServe 2009). Because of the lack of logging and heavy grazing within SIEN parks, tree deaths from insects or disease is the only one of these threats with significant potential to degrade Northern Goshawk habitat.

Invasive Species and Disease: West Nile Virus has caused high levels of mortality in some North American hawks and owls, but the prevalence of the disease within Sierra Nevada populations is largely unknown (Hull et al. 2010). Despite this uncertainty and concern, there is no strong evidence indicating any disease is limiting Northern Goshawk populations (Keane 2008). Infections of West Nile Virus could pose a threat to SIEN populations of Northern Goshawks, but a greater understanding of the species' susceptibility to the disease is needed.

Human Use Impacts: Northern Goshawks were not as affected by DDT contamination in the twentieth century as other raptor species and the problem does not persist for this species (Squires and Reynolds 1997).

Northern Goshawks have been used for falconry for centuries. The impact of falconry on wild populations due to captures is thought to be minimal across North America (Squires and Reynolds 1997) and harvest levels in California do not affect statewide populations (Keane 2008). Harvest of individuals for falconry can have negative impacts locally (Keane 2008), but this should not be a concern for SIEN populations. Additionally, disturbances near nesting sites can cause nest failures. This is most prevalent when nests are located near large disturbances such as timber operations, but smaller disturbances such as camping near nesting sites can also be detrimental (Squires and Reynolds 1997).

Management Options and Conservation Opportunities

Management agencies often attempt to protect Northern Goshawk breeding habitat by establishing protected buffers around nest trees (Squires and Reynolds 1997). The amount of habitat set aside varies greatly from a few surrounding shade trees within some private lands to up to 80 hectares of protected forest in some national forests (Keane 2008). Aside from the establishment of protected areas, Northern Goshawk habitat can be maintained or even improved by modifying timber harvest practices (Squires and Reynolds 1997). Prescriptions for such actions can be found in Youtz et al. (2008), but are not directly relevant to management in SIEN parks.

Within SIEN parks the best way to maintain suitable nesting habitat for the Northern Goshawk is to maintain natural fire regimes including some high-intensity fire (Kennedy and Fontaine 2009). This can be accomplished by allowing natural surface fires and/or to use periodic, low-intensity prescribed burns (Maurer 2000). Conservation strategies targeting the Northern Goshawk should also consider habitat needs of its primary prey species, the Douglas Squirrel (Maurer 2000).

Additional research is needed on Northern Goshawk distribution and habitat use, and on the effects of disease and other factors on goshawk demographics (Keane 2008). Specialized surveys for Northern Goshawks in and around SIEN parks similar to those done by Maurer (2000) in YOSE would help to identify important nesting and foraging sites in the central and southern Sierra Nevada. Where nest sites exist, activities should be restricted during critical nesting and fledgling periods (March 1st – August 15th) (Keane 2008). Finally, fire management practices that promote historical forest structure should be implemented when possible in SIEN parks.

Northern Harrier – *Circus cyaneus*

Migratory Status
Short-distance/Neotropical migrant (Macwhirter and Bildstein 1996)

Residency and Breeding Status
Northern Harrier is rarely seen migrating through Yosemite (YOSE) National Park and Sequoia and Kings Canyon (SEKI) National Parks and has not recently been reported in Devils Postpile National Monument (Table 1).

Table 12. Breeding status and relative abundance of Northern Harriers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant	Non-Breeder	Rare
Yosemite NP	Migrant/Summer	Non-Breeder	Rare
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 - Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Northern Harrier occurs across North America, but in California only breeds within the Central Valley and along the coast (Macwhirter and Bildstein 1996). The Sierra Nevada and SIEN parks only provide habitat during migration so are not an important part of the species' range.

Distribution and Habitat Associations
Northern Harriers prefer meadow or marsh habitats in the Sierra Nevada, but are habitat generalists across their range (Gaines 1992, Macwhirter and Bildstein 1996). Northern Harriers were not detected during park inventories of the SEIN parks. However, individuals were observed away from survey transects in SEKI and YOSE.

Table 13. Number of Northern Harriers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA[1]	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Northern Harrier was not observed during park inventories; quantitative data on elevational distribution are not available for this species, but Gaines (1992) reports that transient individuals are observed up to 3353 m.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Northern Harriers are found uncommonly across California during late spring/early summer, but rarely in the Sierra Region (BCR 15). The species was not observed on individual BBS routes that pass through YOSE and SEKI (Table 3).

Table 14. Relative abundance and trends for Northern Harrier according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	58	0.51	+1.8	0.28
	1980-2007			+1.4	0.50
Sierra Nevada (BCR 15)	1966-2007[1]	2	0.01	-1.8	0.33
	1980-2007[1]			-1.8	0.33
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Northern Harriers are generally not captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The greatest threat to Northern Harrier is likely habitat loss due to conversion and degradation of habitat from agricultural practices. Historically, the use of DDT led to reproductive failures, but there does not appear to be any remnant effects in Northern Harrier populations today. Recent climate change is correlated with a shift in the center of abundance of Northern Harrier, but any shifts in range are likely in response to alterations of habitat or prey base rather than a direct response to changing climate. Finally, altered fire regimes in the Sierra Nevada, invasive species, and disease do not appear to be major threats to Northern Harrier, although evidence is lacking.

Climate Change: an analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Northern Harrier has significantly shifted 76.8 miles to the north corresponding with increases in temperature (Audubon 2009). A shift northward suggests the species may be moving toward cooler areas as the climate warms (Audubon 2009). This observed shift provides evidence that Northern Harrier has already responded to climate change and may continue to shift its range in the coming decades. However, a study assessing migration timing of raptors in Pennsylvania found that the Northern Harrier has not significantly shifted its timing of migration since 1946 at least locally (Bildstein 1998).

Due to Northern Harrier's broad range and use of many climate zones, the distribution of the species is likely more closely tied to presence of suitable habitat and prey base than to temperature and precipitation. However, if Northern Harrier continues to shift its range northward with climate change, occurrences of the species in SIEN parks are not likely to change substantially.

Altered Fire Regimes: Little research has been conducted on the effects of fire on Northern Harrier populations. However, since the species is not often found in heavily forested areas, any change in fire regime in Sierra Nevada forests is unlikely to have substantial impacts on the species.

Habitat Fragmentation or Loss: Conversion of estuarine wetlands and native grassland prairies poses a major threat to the Northern Harrier and is likely the greatest threat to the species in some areas (Macwhirter and Bildstein 1996, NatureServe 2009). Due to the lack of habitat conversion in the SIEN this threat is not directly relevant to the parks, but may impact individuals that pass through the parks elsewhere along their range.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Northern Harrier.

Human Use Impacts: Like many other raptor species, Northern Harrier suffered from eggshell thinning and reproductive failures due to the use of DDT in the mid-twentieth century. However, following the cessation of its use in the U.S. the species recovered relatively quickly (Macwhirter and Bildstein 1996). Overgrazing of pastures, reduced use of fencerows, and widespread use of insecticides and rodenticides have reduced prey availability in agricultural landscapes (Macwhirter and Bildstein 1996). Such threats are not directly relevant to the SIEN parks where agriculture is not practiced.

Management Options and Conservation Opportunities

Although the Northern Harrier is a listed species in several states, species-specific conservation measures are generally not taken for this raptor (Macwhirter and Bildstein 1996). Within the SIEN parks, continued preservation of habitat is likely the most important measure managers can take to aid visiting Northern Harriers.

Northern Pygmy-Owl – *Glaucidium gnoma*

Migratory Status

Resident/short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Northern Pygmy-Owl is a fairly common year-round resident and breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, and a probably summer resident and possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 15. Breeding status and relative abundance of Northern Pygmy-Owls in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly common
Yosemite NP	Year-round	Regular Breeder	Fairly common
Devils Postpile NM	Summer (?)	Possible Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G4 – Apparently Secure (Uncommon but not rare)
- National Status: N4/N5 – Apparently Secure (Uncommon but not rare)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Northern Pygmy-Owl occurs in deciduous and coniferous forests of western North America from British Columbia, Canada to Honduras in Central America (Holt et al. 2000). In California the owl is resident in the Cascade Mountains in northern California south throughout the Cascades-Sierra axis, and locally in most mountains of southwestern California (Holt et al. 2000), but is absent in the Central Valley (Johnsgard 1988). During winter, the species often moves to lower elevations within the resident range, or into locations and habitats along the periphery of the resident range (Holt et al. 2000). The relatively broad distribution of the Northern Pygmy-Owl in California means that the SIEN parks are not critically important for this species.

Distribution and Habitat Associations

Northern Pygmy-Owl is found from low-elevation deciduous bottomlands to high-elevation coniferous forests (Holt et al 2000). On the west slope of the Sierra Nevada, the species occurs from Blue Oak savanna habitats in the foothills to mixed montane conifer forests at higher elevations (Johnsgard 1988). In the Sierra Nevada these owls favor open stands of Black Oaks, Ponderosa Pines, Incense-cedars, and White Firs, as well as Sugar Pines, Giant Sequoias, and riparian hardwoods (Siegel and DeSante 1999). Northern Pygmy-Owls prefer forest stands with low to intermediate canopy coverage, and are most common near the edges of meadows, lakes, and other similar clearings (Johnsgard 1988).

Northern Pygmy-Owls hunt during the day and into the evening (Holt et al 2000), and are therefore more likely to be detected during daytime avian surveys than nocturnal forest owls. Northern Pygmy-Owls were detected in low densities (Table 2) along a handful of survey transects during avian inventory surveys at YOSE and SEKI (Figures 1 and 2), and were not observed during the DEPO survey. Park inventories show highest associations with Jeffrey Pine forests within YOSE, but insufficient data were available to derive inferences on habitat associations in SEKI, or to estimate density of owls in both YOSE and SEKI (Table 2).

Table 16. Number of Northern Pygmy-Owls recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections Per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	5	6	NA[1]	NA	NA
Yosemite NP	3	3	Jeffrey Pine Forest	0.01	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data. Note that owls were not surveyed in the same manner as diurnal species and are not well-represented by the above statistics (see Siegel and DeSante 2002, Siegel and Wilkerson 2004, and Siegel and Wilkerson 2005).

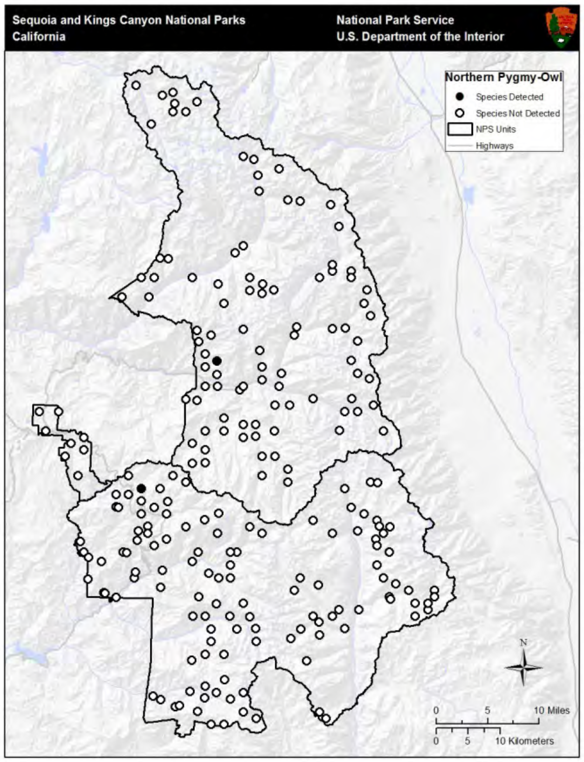

Figure 5. Bird survey transects where Northern Pygmy-Owl was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

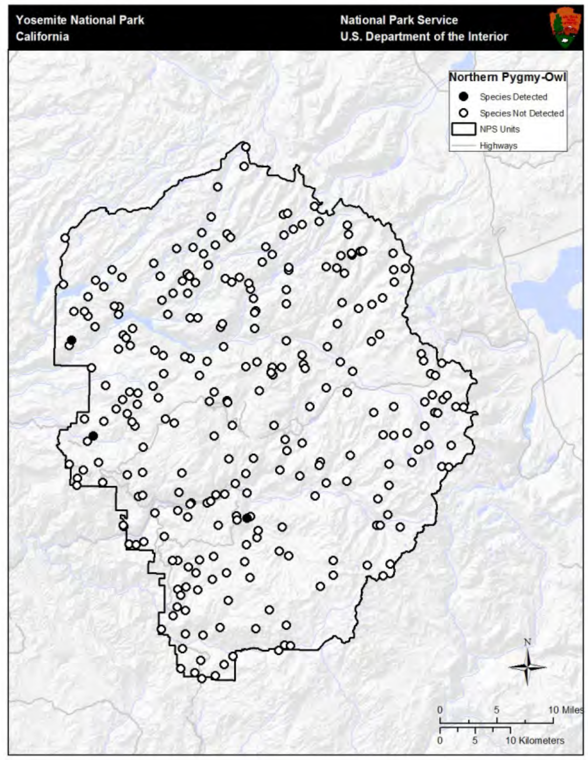

Figure 6. Bird survey transects where Northern Pygmy-Owl was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Northern Pygmy-Owl was observed within the lower- to middle-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Northern Pygmy-Owl in SEKI was 2103 m, with 95% of observations occurring between 1981 and 2191 m. At YOSE, the mean elevation of observations was 1669 m with 95% of observations falling between 1512 and 1852 m (Siegel et al. 2011).

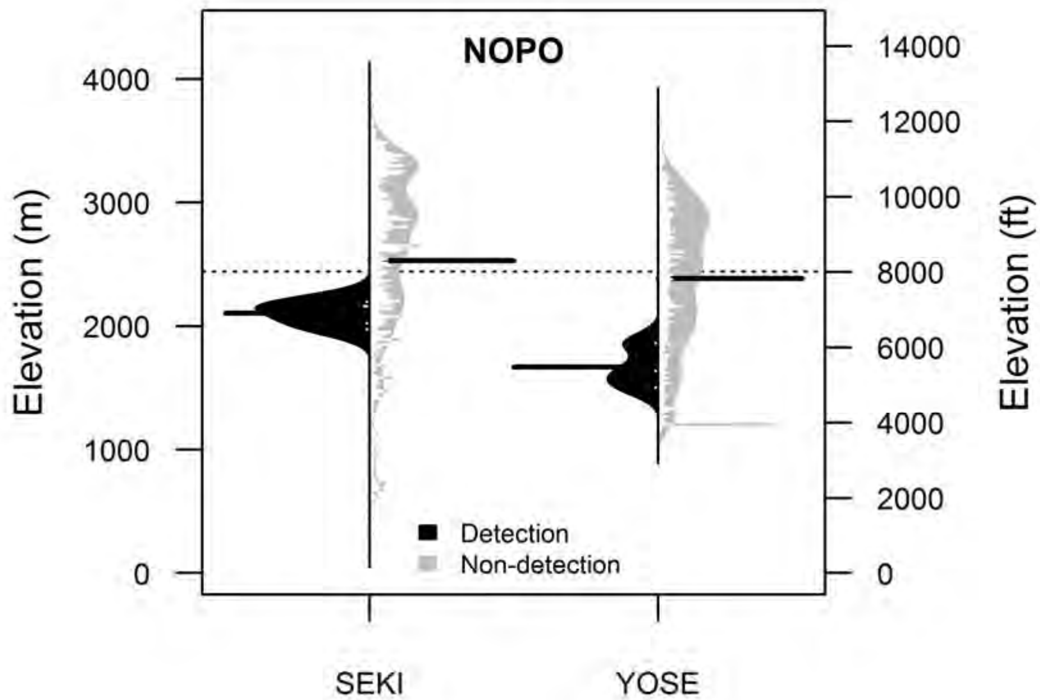

Figure 3. Elevational distributions of sites where Northern Pygmy-Owl (NOPO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Northern Pygmy-Owl populations are thought to be relatively stable although overall status is difficult to assess (Johnsgard 1988) and little research has been conducted on the species (Holt et al. 2000). Breeding Bird Survey (BBS) data throughout the range of the Northern Pygmy-Owl indicate non-significant local increases and decreases (Holt et al. 2000). On a larger geographic scale, however, no significant increases were observed in the western U.S. or the North American continent (Holt et al. 2000). BBS data from California suggest Northern Pygmy-Owls occur in essentially similar abundances in the Sierra Region (BCR 15) and in California as a whole. They were detected in relatively low numbers on individual BBS routes at YOSE and SEKI. No significant population trends were observed for any BBS time periods and routes, though from 1966-2007 a nearly significant positive trend was reported for the California region (Table 3).

Table 17. Relative abundance and trends for Northern Pygmy-Owl according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007[1]	38	0.08	+2.3	0.06
	1980-2007[1]			-2.2	0.29
Sierra Nevada (BCR 15)	1966-2007	11	0.10	+1.6	0.57
	1980-2007			-0.1	0.99
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.35	-2.6	0.80

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Northern Pygmy-Owls are infrequently captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The cavity-nesting Northern Pygmy-Owl is likely harmed by timber harvest practices that eliminate suitable nesting trees, but may benefit from smaller-scale partial forest clearing (Johnsgard 1988). Loss or degradation of habitat, invasive species, and disease do not appear to be major concerns for the Northern Pygmy-Owl within the SIEN parks.

Loss of snags with nesting cavities may pose a risk to Northern Pygmy-Owls, although this is not likely a substantial threat in SIEN parks owing to the lack of commercial logging or fuelwood harvesting. Fire treatments that mimic natural fire regimes – including low to moderate intensity fire to maintain open-forest conditions and some small patches of high-intensity fire to create forest openings – should benefit this species. The lack of data on productivity and survival of Northern Pygmy-Owls in the Sierra Nevada hampers appropriate management (Siegel and DeSante 1999).

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Northern Pygmy-Owl has shifted significantly 164 miles northward throughout its North American range, corresponding with increases in temperature (Audubon 2009).This result provides compelling evidence that the species is shifting its range to cooler regions in response to a warming climate. However, the Northern Pygmy-Owl's broad range of habitat tolerances suggests this species may be able to adapt to climate change.

Altered Fire Regimes: Northern Pygmy-Owls favor open forests with low to moderate canopy cover (Johnsgard 1988, Siegel and DeSante 1999) and are often found near sizable forest openings (Johnsgard 1988). High-intensity fire can eliminate large snags with suitable nesting cavities, but over the longer-term, fire of varying intensities likely maintains open forest conditions and larger open patches for these owls. Elliot (1988) detected a pair of Northern Pygmy-Owls before and after fire in oak-dominated forests in the Los Padres National Forest.

High-intensity fire also attracts large woodpeckers that excavate cavities used by this owl for nesting.

Habitat Fragmentation or Loss: As a forest species and obligate cavity nester, the Northern Pygmy-Owl is likely harmed by forestry practices that adversely affect prey species or woodpeckers—primary nest excavators—and nest cavities. One report (Marshall 1988) suggested that this owl was eliminated from a Giant Sequoia forest in California during a 50-year period because of logging and removal of nesting snags, but remained in an adjacent park where timber was uncut. These activities are not likely to pose a major threat to the species within SIEN parks.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Northern Pygmy-Owl.

Human Use Impacts: Northern Pygmy-Owls are vulnerable to loss of individual nest trees because they cannot create their own cavities and must compete with other cavity-nesting birds and mammals for suitable sites. Management activities such as post-fire salvage logging, hazard-tree removal, fuelwood harvesting, or cutting fire lines during fire suppression could eliminate snags containing potentially suitable nesting cavities, but these are unlikely to be major problems in the SIEN parks

Pesticide drift from the Central Valley may also be a problem for Northern Pygmy-Owls as they occasionally take insects, but effects are unknown (Siegel and DeSante 1999). As with most owls, the Northern Pygmy-Owl is vulnerable to collision with vehicles (Holt et al. 2000).

Management Options and Conservation Opportunities
The most important measures park managers can implement to protect Northern Pygmy-Owls include retaining large snags with suitable nesting cavities, and allowing a patchy mosaic of fire of varying intensities to maintain open-forest habitats and forest clearings. Management for Pileated Woodpeckers, Northern Flickers, sapsuckers, and other large woodpeckers will ensure future nest sites. Speed limits on roads should be strictly obeyed to reduce collisions between owls and vehicles.

As with other small forest owls, the distribution, abundance, and demography of Northern Pygmy-Owls has not been specifically quantified in the SIEN parks. Park managers might consider initiating nocturnal surveys for this and other forest owl species, potentially in conjunction with surveys for Spotted and Great Gray Owls.

Northern Rough-winged Swallow – *Stelgidopteryx serripennis*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Northern Rough-winged Swallow is a locally uncommon breeder at Yosemite National Park (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, and has not been reported at Devils Postpile National Monument (DEPO) (Table 1).

Table 18. Breeding status and relative abundance of Northern Rough-winged Swallows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Locally Uncommon
Yosemite NP	Summer	Regular Breeder	Locally Uncommon
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Northern Rough-winged Swallow breeds across nearly all the continental U.S. as well as southern Canada and much of Mexico (De Jong 1996). The species' broad breeding range and relative scarcity in the Sierra Nevada suggest the Sierra Nevada and SIEN parks are not very important to it (Siegel and DeSante 1999).

Distribution and Habitat Associations

Northern Rough-winged Swallows generally forage over streams and ponds and nest nearby in burrows or crevices (Gaines 1992, De Jong 1996). Northern Rough-winged Swallows were detected in very low numbers (Table 2) along a few survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE and were not observed in DEPO. Habitat associations indicated by inventory results are probably of little meaning, both because of the small sample size and the species' association with smaller-scale habitat features (e.g., streams) rather than major terrestrial habitat types.

Table 19. Number of Northern Rough-winged Swallows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	2	2	Live Oak/California Buckeye	0.1	NA[1]
Yosemite NP	1	1	Black Oak	0.3	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

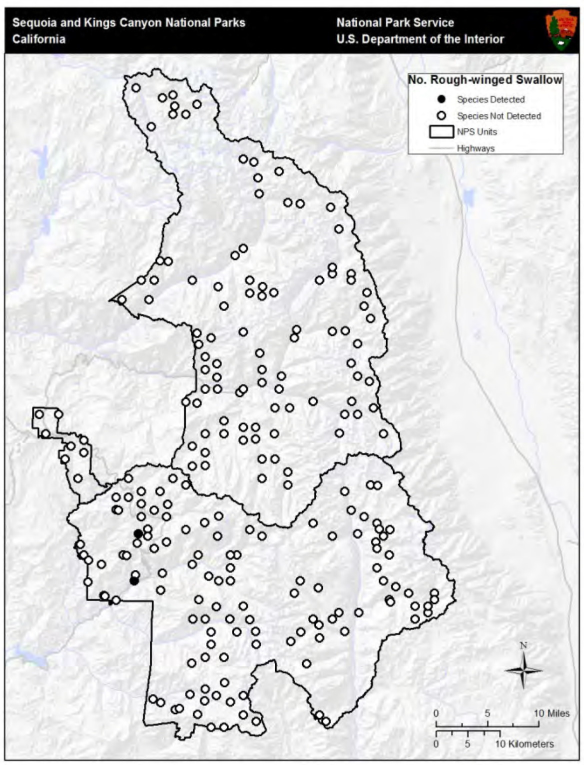

Figure 7. Bird survey transects where Northern Rough-winged Swallow was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

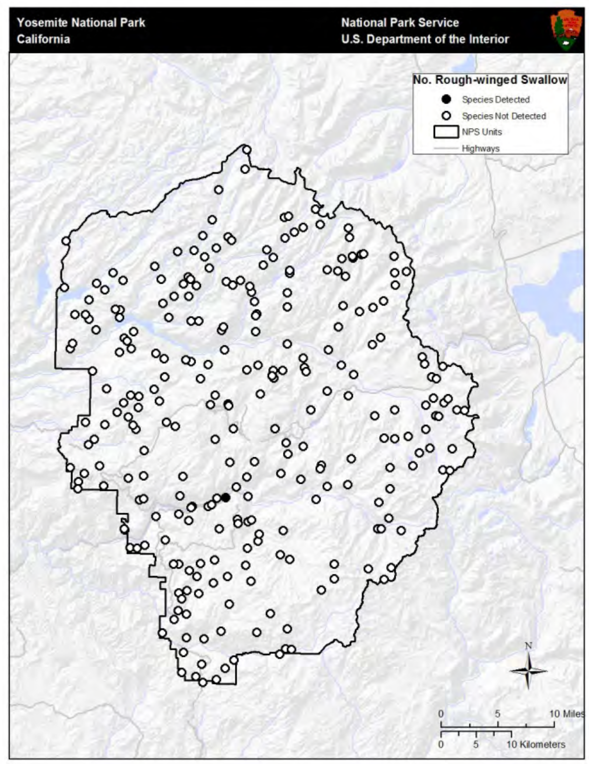

Figure 8. Bird survey transects where Northern Rough-winged Swallow was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Northern Rough-winged Swallows were observed within the lower-elevations of both SEKI and YOSE during avian inventory surveys (Siegel et al. 2011). The two individuals observed at SEKI were seen at 671 m and 1624 m, respectively, and the single individual observed at YOSE was seen at 1200 m (Figure 3).

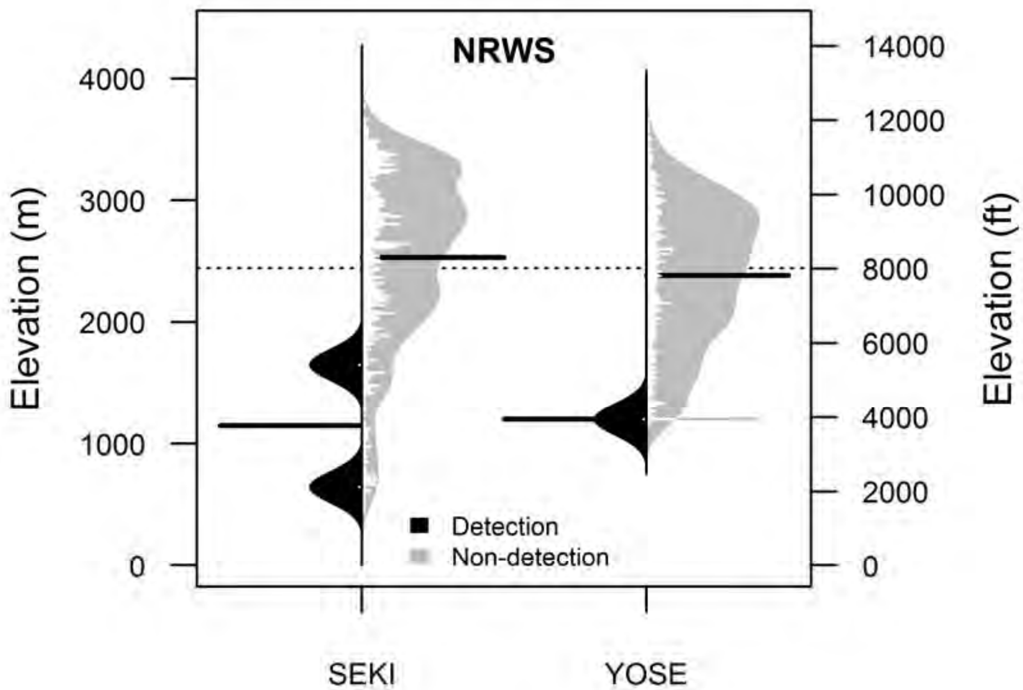

Figure 3. Elevational distributions of sites where Northern Rough-winged Swallows (NRWS) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Northern Rough-winged Swallows are found in lower abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on all three individual BBS routes that intersect YOSE and SEKI. Nearly significant declining trends were observed in California as a whole during 1966-2007 and 1980-2007 (Table 3).

Table 20. Relative abundance and trends for Northern Rough-winged Swallow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	134	3.07	-3.6	0.07
	1980-2007			-4.2	0.11
Sierra Nevada (BCR 15)	1966-2007	13	0.62	+1.3	0.73
	1980-2007			-3.1	0.48
Route 14117 – Sequoia NP	1972-2005	1	0.19	-53.8	0.12
Route 14132 – Kings Canyon NP	1974-2005	1	2.90	+4.5	0.50
Route 14156 – Yosemite NP	1974-2007	1	0.12	-9.5	0.55

Northern Rough-winged Swallows are rarely captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The Northern Rough-winged Swallow nests near rocky gorges, shale banks, stony road cuts, railroad embankments, gravel pits, eroded margins of streams, and other such exposed banks of clay, sand, or gravel as well as holes in walls, wharves, and bridges (De Jong 1996). The species often breeds near open water, but will nest in the absence of water if suitable sites exist (Siegel and DeSante 1999). Availability of nesting crevices apparently limits breeding populations (De Jong 1996). The Northern Rough-winged Swallow's adaptation to human-altered habitats may render it somewhat vulnerable to water pollution, pesticides, elimination of natural and artificially created nesting habitat, and other risks, possibly explaining the nearly significant population decline in California over the past 40 years (Table 3). The species is probably not adversely affected by altered fire regimes or climate change.

Climate Change: The Northern Rough-winged Swallow is found in low-elevation habitats in the Sierra Nevada. If climate change causes the swallow's range to shift upward as is generally expected for a number of species, there are open, rocky habitats and stream banks available at middle- and higher-elevation within the SIEN parks for the species to colonize, although perhaps not as extensive as at lower-elevations.

Altered Fire Regimes: Northern Rough-winged Swallow nesting habitat along earthen banks of streams, washes, and gullies is generally unaffected by fire, as are its open-water foraging grounds. Prey species include flies, bees, and wasps and to a lesser extent true bugs and beetles (De Jong 1996); many of these insects increase following fire (Swengel 2001), potentially enhancing the prey base for the swallow.

Habitat Fragmentation or Loss: Like the Barn and Cliff Swallow, Northern Rough-winged Swallow benefited from expansion of human populations and the creation of artificial nesting sites. Nesting was once limited to natural sites such as erosion banks, naturally occurring crevices, or abandoned burrows of other species, but the species has adapted to using various human structures and disturbances such as road cuts, gravel pits, buildings, and walls (De Jong 1996). Nonetheless, nearly significant population declines have been observed in the Sierra (Table 3), suggesting that habitat loss and water pollution either on the breeding or wintering grounds may adversely impact Northern Rough-winged Swallows (De Jong 1996). Such impacts are not threats in SIEN parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Northern Rough-winged Swallows are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Overall, human activities have had a positive effect on Northern Rough-winged Swallow population by creating alternative nesting sites such as road cuts, gravel pits, and walls. The proximity of nests on road cuts to automobile traffic means that adults and juveniles might be vulnerable to collisions with vehicles (Brown and Brown 1999).

Packstock grazing in SIEN parks is a potential concern for Northern Rough-winged Swallows because it can attract Brown-headed Cowbirds. As compared to the greater Sierra Nevada where cattle grazing is widespread, any negative impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Pesticide use may pose a risk to Northern Rough-winged Swallows by reducing their prey base (Siegel and DeSante 1999).

Management Options and Conservation Opportunities

Northern Rough-winged Swallow populations can be protected in SIEN parks by preserving known naturally occurring and artificial nesting sites and preventing disturbance and harassment of nests. Speed limits on roads should be strictly enforced to reduce collisions between Northern Rough-winged Swallows and vehicles. A previous assessment of cowbird pressure in SIEN parks is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Northern Saw-whet Owl – *Aegolius acadicus*

Migratory Status

Resident/short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Northern Saw-whet Owl is a fairly common year-round resident and regular breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks. The species is not reported from but may occasionally migrate or disperse through Devils Postpile (DEPO) National Monument (Table 1).

Table 21. Breeding status and relative abundance of Northern Saw-whet Owls in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Northern Saw-whet Owl is one of the most common owls in forested habitats across southern Canada and the northern and western U.S. (Rasmussen et al. 2008). Some individuals migrate southwards or to lower elevations during winter, but the range and distribution of the species are not well-understood. The population in the Sierra Nevada is presumably rather small and of relatively little significance to the species (Siegel and DeSante 1999).

Distribution and Habitat Associations

Northern Saw-whet Owl is an obligate cavity nester occurring in a wide variety of forest types, with highest densities in coniferous forests, especially adjacent to riparian habitats. Rasmussen et al. (2008) suggest that the birds generally seem to breed in mixed forest habitats that have dense conifers for roosting and deciduous trees for nesting and foraging. Territories of radio-tagged Northern Saw-whets Owls in Idaho were associated with riparian habitat, and the owls roosted primarily in conifers in stands with relatively high tree density (Hayward and Garton 1984). In the Lake Tahoe Basin, saw-whets were detected more often in areas with more open canopy, higher elevations, greater amounts of Lodgepole Pine or Red Fir, lower amounts of White Fir, and a higher density of snags with cavities (Groce and Morrison 2010). Northern Saw-whet Owls were not detected during avian inventory surveys at any of the SIEN parks, but this is likely due to the low capability of these surveys to detect nocturnal owls.

Elevational Distribution

Northern Saw-whet Owls generally breed at low- to mid-elevations above 1500 m, but are rarely found in sub-alpine forests (Johnsgard 1988, Rasmussen et al. 2008). Groce and Morrison (2010) documented average elevation of Northern Saw-whet Owls detections in the Lake Tahoe Basin of 2292 m.

Abundance, Trends and Demographic Data

Northern Saw-whet Owls were not detected during Breeding Bird Surveys (BBS) throughout California, but these surveys are designed for diurnal species and do not adequately detect most owl species. Similarly, Northern Saw-whet Owls are not frequently captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available. Virtually nothing is known about abundance, population trend, productivity, and survival of Northern Saw-whet Owls in the SIEN parks or throughout California (Siegel and DeSante 1999). Estimates of population size are difficult because of irregular movements in response to variable prey densities, small size, and secretive nature, and local densities vary widely in different geographic regions, but the overall population is believed to be large and widespread (Rasmussen et al. 2008). However, Rasmussen et al. (2008) hypothesize that the “population is probably declining as suitable habitat is being lost.”

Stressors

The Northern Saw-whet Owl is harmed by timber harvest practices that fragment contiguous forest habitat, increase inter-patch distances, and eliminate suitable nesting trees (Rasmussen et al. 2008, Groce and Morrison 2010). These are not likely substantial threats in SIEN parks owing to the lack of commercial logging or fuelwood harvesting. Large-scale loss or fragmentation of habitat, invasive species, and disease do not appear to be major concerns for the Northern Saw-whet Owl within the SIEN parks. Effects of climate change are unknown, but association with riparian habitats may render them vulnerable to climate-induced alteration of hydrology.

The lack of data on population trends or demographic rates of Northern Pygmy-Owls in the Sierra Nevada hampers appropriate management (Siegel and DeSante 1999).

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Northern Saw-whet Owl has shifted significantly northward by almost 170 miles and significantly coastward by 43 miles throughout its North American range, corresponding with increases in temperature (Audubon 2009). A northward shift provides evidence that this species has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades. The species apparently is associated with riparian habitats within conifer forests. Any changes in watershed hydrology due to climate change that result in alteration or loss of riparian vegetation could adversely impact the species.

Altered Fire Regimes: No studies have examined effects of fire on Northern Saw-whet Owls. This species roosted in sites denser than average forest stands (Hayward and Garton 1984), but was detected more often in areas with greater percentage of open canopy (Groce and Morrison 2010). High-intensity fire in the SIEN parks can eliminate large snags with suitable nesting cavities and create large tracts of unforested areas that render saw-whet owls more vulnerable to predation by Long-eared and Great Horned Owls (Hinam and St. Clair 2008). On the other hand, high-intensity fire can increase populations of the owls' preferred prey, deer mice.

Habitat Fragmentation or Loss: Although Northern Saw-whet Owls breed in almost every type of coniferous and mixed forest in their range, they seem to favor mature and old-growth stands for breeding. As a forest species and obligate cavity nester, the Northern Saw-whet Owl is likely harmed by forestry practices that adversely affect prey species or woodpeckers—primary nest excavators—and nest cavities. Degradation of old growth forest and removal of snags reduces the availability of nesting cavities that are essential to reproductive success (Rasmussen et al. 2008). Northern Saw-whet Owls breeding in more contiguous landscapes with a higher proportion of forest cover provisioned chicks more frequently, fledged more offspring, and produced broods with less variation in chick condition than males nesting in more fragmented landscapes in Alberta, Canada (Hinam and St. Clair 2008). Moreover, the owls in areas of low forest cover had greater chronic physiological stress (Hinam and St. Clair 2008). Males in territories with more edge, however, had higher body mass, possible due to an increase in small mammal prey (deer mice) on the forest edge. Large-scale habitat fragmentation is not likely to pose a major threat within SIEN parks.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Northern Saw-whet Owl.

Human Use Impacts: Northern Saw-whet Owls are vulnerable to loss of individual nest trees because they cannot create their own cavities and must compete with other cavity-nesting birds and mammals for suitable sites. Management activities such as post-fire salvage logging, hazard-tree removal, fuelwood harvesting, or cutting fire lines during fire suppression could eliminate snags containing potentially suitable nesting cavities, but these are not likely to be important factors in SIEN parks.

As with most owls, the Northern Saw-whet Owl is vulnerable to collision with vehicles; in fact, saw-whets were one of the most frequently killed owl species along highways in British Columbia (Rasmussen et al. 2008).

Management Options and Conservation Opportunities

Northern Saw-whet Owls will benefit most from management actions that retain large snags with suitable nesting cavities, as well as management for large woodpeckers to insure abundant nest sites in the future. Speed limits on roads should be strictly enforced to reduce collisions between owls and vehicles.

As with other small forest owls, the distribution, abundance, and demography of Northern Saw-whet Owls has not been specifically quantified in the SIEN parks. Park managers might consider initiating nocturnal surveys for this and other forest owl species, potentially in conjunction with surveys for Spotted and Great Gray Owls.

Nuttall’s Woodpecker – *Picoides nuttallii*

Migratory Status

Resident (Siegel and DeSante 1999)

Residency and Breeding Status

Nuttall’s Woodpecker is a locally fairly common regular breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 22. Breeding status and relative abundance of Nuttall's Woodpeckers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Fairly Common
Yosemite NP	Year-round	Regular Breeder	Locally Fairly Common
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Nuttall’s Woodpecker is found only in California and northern Baja California, Mexico (Lowther 2000). The species occurs primarily in the oak forests of lower-elevation foothills and valleys west of the Sierran crest (Lowther 2000), although some individuals move to higher-elevation Mixed Conifer forests from late summer through winter (Siegel and DeSante 1999). The majority of the Nuttall’s Woodpecker’s range is in the lower valleys and foothills, thus the mountain range and SIEN parks are not very important to the species (Siegel and DeSante 1999).

Distribution and Habitat Associations

Nuttall’s Woodpeckers prefer Blue and Live Oak woodlands and riparian forests (Siegel and DeSante 1999). Nuttall’s Woodpeckers were detected in relatively low densities (Table 2) along a handful of survey transects (Figure 1) during avian inventory projects at SEKI. The species was detected only off-survey at YOSE and was not observed in DEPO (Table 2). Park inventories show Blue Oak forests as the most densely occupied habitats (Table 2). The limited number of observations likely reflects the species’ preference for Blue Oaks and riparian forests. Blue Oaks are restricted to lower-elevation portions of the parks; true riparian forests are relatively restricted in the parks and largely concentrated at lower elevations as well.

Table 23. Number of Nuttall's Woodpeckers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	4	7	Blue Oak Forest	0.07	0.17 (0.06-0.48)
Yosemite NP	0	0	Detected off-survey	NA[1]	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

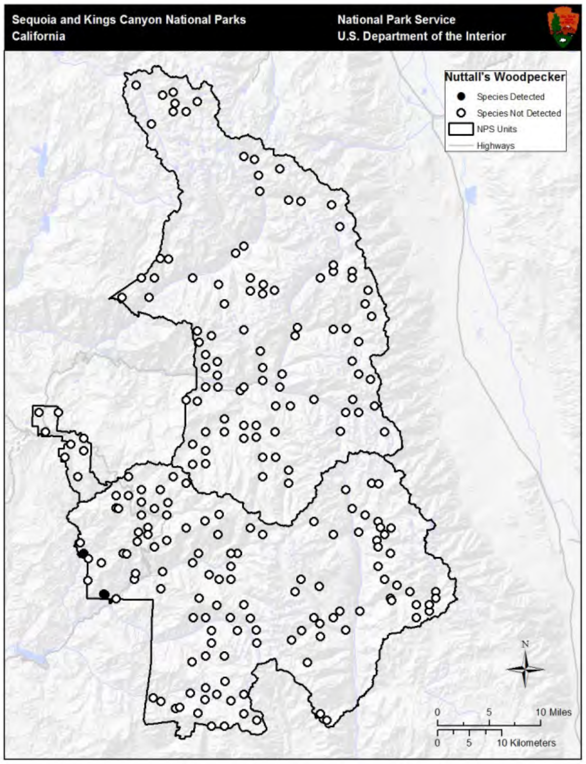

Figure 9. Bird survey transects where Nuttall's Woodpecker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

Nuttall's Woodpecker was detected at lower elevations in SEKI and was not detected in YOSE during recent avian inventory surveys (Figure 2). The mean elevation of observations of Nuttall's Woodpecker in SEKI was 671 m, with 95% of observations occurring between 548 and 773 m (Siegel et al. 2011).

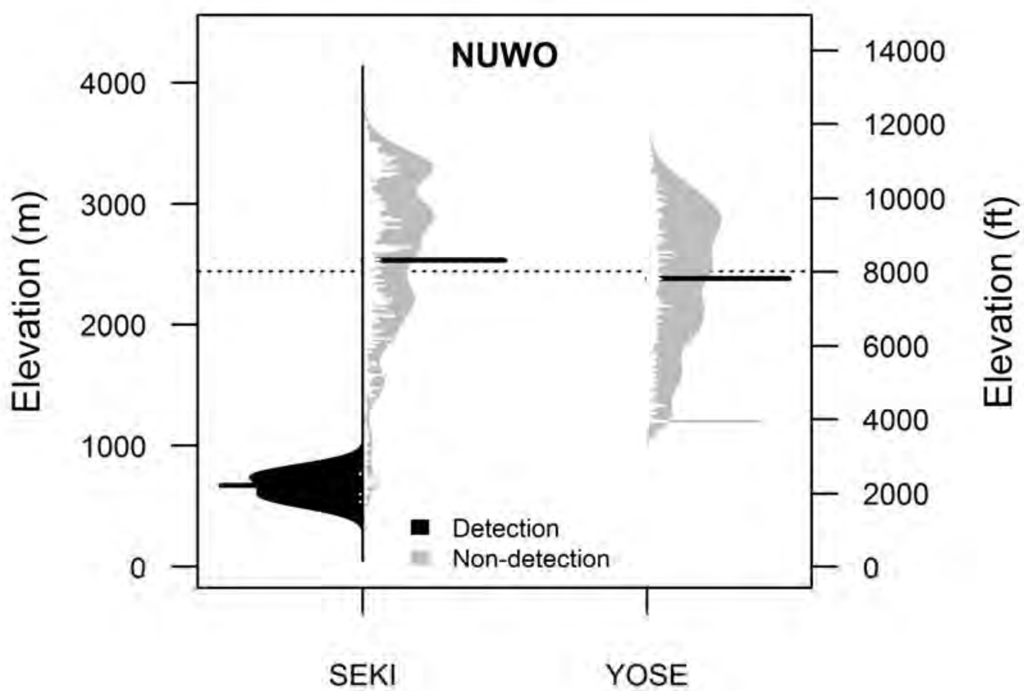

Figure 2. Elevational distributions of sites where Nuttall's Woodpecker (NUWO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Nuttall's Woodpeckers are much less abundant along routes in the Sierra Region (BCR 15) than in California as a whole. They were more abundant on individual BBS routes in Sequoia NP than in Kings Canyon or Yosemite NPs. Rather dramatic (but non-significant because based on low number of detections) positive trends were observed in YOSE and SEKI from the early 1970s to the mid-2000s (Table 3).

Table 24. Relative abundance and trends for Nuttall's Woodpecker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	96	1.38	+0.2	0.82
	1980-2007			-0.1	0.89
Sierra Nevada (BCR 15)	1966-2007	8	0.63	-1.0	0.79
	1980-2007			-3.1	0.52
Route 14117 – Sequoia NP	1972-2005	1	1.75	+33.8	0.22
Route 14132 – Kings Canyon NP	1974-2005	1	0.30	+328.7	0.18
Route 14156 – Yosemite NP	1974-2007	1	0.31	+22.9	0.12

Nuttall's Woodpeckers are generally not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Nuttall's Woodpeckers might be declining in the Sierra as a whole, but increasing in SEKI and YOSE. Poor regeneration of oaks, potentially due to livestock grazing and altered fire regimes, could be adversely affecting Nuttall's Woodpeckers outside protected parks. The species appears to adapt to residential and agricultural areas as long as some natural habitat remains. Climate change may increase the extent of the woodpeckers' oak woodland habitat in the SIEN parks. Loss or degradation of habitat, invasive species, and disease do not appear to be major concerns for Nuttall's Woodpeckers within the SIEN parks.

Climate Change: An analysis of shifts between the historical range of Nuttall's Woodpecker (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species tracked neither temperature nor precipitation components of the climatic niche (Tingley et al. 2009). This result is likely because the species inhabits low elevations and can exploit human-dominated landscapes. Tingley et al. (2009) noted that species like the Nuttall's Woodpecker that can colonize human-dominated landscapes may be able to expand or sustain a range far from their climatic niche and escape negative consequences of climate change.

Modeled distribution shifts of Nuttall's Woodpecker predict a greater probability of occurrence of the species throughout its current range across California, and range expansions along the coast, in northwestern California, and in drainages along the western slope of the Sierra Nevada (Stralberg and Jongsomjit 2008). In the SIEN parks, Nuttall's Woodpeckers may expand to the greatest extent in drainages in YOSE, particularly in portions of Yosemite Valley (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation, precipitation seasonality, and annual mean temperature as well as distance to stream (GAM distribution model), and annual mean temperature, vegetation, and annual precipitation (Maxent distribution model) (Stralberg and Jongsomjit 2008). Nuttall's Woodpecker currently breeds in oak and riparian woodlands at lower elevations of the Sierra Nevada (Gaines 1992) and may colonize higher elevations as these forests expand uphill with climate warming. YOSE may see the largest increases, as this species is currently found only in low numbers there.

Nuttall's Woodpeckers are rare in the higher mountains. If climate change causes the species' range to shift upward as is generally expected, there is higher-altitude riparian habitat for new colonization within SEKI and YOSE, and likely to be adequate oak woodland if these habitats expand uphill with climate warming as predicted (Stromberg and Jongsomjit 2008).

Altered Fire Regimes: Nuttall's Woodpeckers are associated with Blue Oak woodlands in the SIEN parks. Fire, set by lightning or Native Americans, historically has been an important component of oak woodlands in California. The decimation of the Native American population and the introduction of livestock and associated non-native annual grasses by European settlers altered fire regimes of this habitat type (Purcell and Stephens 2005). European settlers burned extensively to convert shrublands and woodlands to grasslands for livestock. Oak recruitment increased in some areas coincident with European settlement due to fire, but many areas of Blue Oak woodlands were entirely cleared and permanently converted to annual grassland (Purcell and Stephens 2005).

Although Blue Oak seedlings may be killed by frequent fire, seedlings and saplings are capable of resprouting after fire (Purcell and Stephens 2005). Nuttall's Woodpecker habitat is likely to benefit from moderately frequent fire in the SIEN parks.

Habitat Fragmentation or Loss: Nuttall's Woodpecker is vulnerable to loss of oak and riparian habitats from urban and agricultural development (Siegel and DeSante 1999) but is capable of colonizing human-dominated landscapes as long as some natural habitat remains. Habitat fragmentation or loss is not likely to pose a major threat to the species within SIEN parks.

Invasive Species and Disease: West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). The virus has caused mortality in many native birds. In 2009, West Nile Virus caused at least one Nuttall's Woodpecker death in California (CDPU 2010).

Human Use Impacts: Nuttall's Woodpeckers were associated with Blue Oak woodlands in SEKI. A major threat to Blue Oak woodlands in California is lack of regeneration over the past century, due to livestock grazing and associated invasion of non-native annual grasses (Standiford et al. 1997, CPIF 2000, Purcell and Stephens 2005). Packstock grazing within the SIEN parks may adversely impact habitat for this species if such grazing is reducing oak recruitment. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, impacts from packstock grazing are likely relatively small and localized.

Oak woodlands in north-central coastal California have been falling victim to Sudden Oak Death (SOD), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SOD was probably introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Nuttall's Woodpeckers and other oak-dependent species if it reaches those regions of the Sierra Nevada.

Pesticide use on forest insect outbreaks outside the parks or drift from the Central Valley could be a risk to Nuttall's Woodpeckers, especially when the species moves into higher elevations.

Management Options and Conservation Opportunities

Continued protection of riparian and oak woodlands should benefit Nuttall's Woodpeckers in SIEN parks. Managers should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SOD, and preventative measures including quarantine of the area should be considered if SOD is identified. Management guidelines and regulations pertaining to SOD can be found at the California Oak Mortality Task Force website (http://www.suddenoakdeath.org/). Park staff should collect and test any bird carcasses for West Nile Virus.

Oak Titmouse – *Baeolophus inornatus*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Oak Titmouse is a locally common breeder at Sequoia and Kings Canyon (SEKI) National Parks and a locally fairly common breeder Yosemite (YOSE) National Park. The species has not been reported at Devils Postpile National Monument (Table 1).

Table 25. Breeding status and relative abundance of Oak Titmice in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Common
Yosemite NP	Year-round	Regular Breeder	Locally Fairly Common
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3? – Vulnerable (Moderate risk of extinction or elimination) but inexact numeric rank

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Oak Titmouse, recently split from Juniper Titmouse (together formerly known as Plain Titmouse) is nearly endemic to California, with a range extending just into southern Oregon and northern Baja California (Cicero 2000). In the Sierra Nevada the species is restricted to foothill habitats (Siegel and DeSante 1999), making the SIEN parks, except for low-elevation portions of SEKI, not very important to its range.

Distribution and Habitat Associations
Oak Titmice in the Sierra occupy areas dominated by Foothill Pine and oak species (Gaines 1992). Oak Titmice were detected in high densities (Table 2) along a small number of survey transects (Figure 1) during the avian inventory project at SEKI, but were only detected once during the inventory project at YOSE (unfortunately coordinates are not available) and never at DEPO. The SEKI inventory shows highest associations with Blue Oak Forest, Live Oak/California Buckeye, and Mixed Chaparral (Table 2).

Table 26. Number of Oak Titmice recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	28	36	Blue Oak Forest	0.94	0.89 (0.51-1.55)
			Live Oak/California Buckeye	0.47	0.38 (0.17-0.83)
			Mixed Chaparral	0.17	0.11 (0.05-0.25)
Yosemite NP	1	1	NA[1]	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

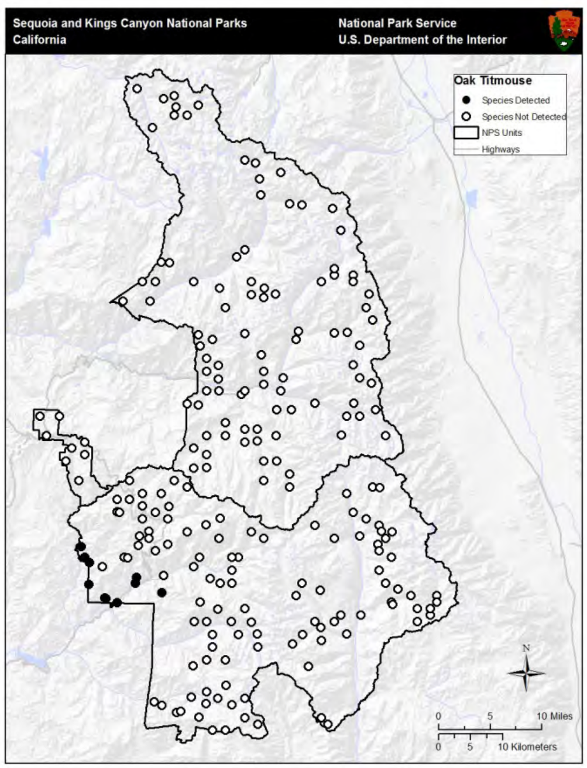

Figure 10. Bird survey transects where Oak Titmouse was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

Oak Titmouse was observed within low-elevation areas of both SEKI and YOSE during avian inventory surveys (Figure 2). The mean elevation of observations of Oak Titmouse in SEKI was 725 m, with 95% of observations occurring between 435 and 1242 m; at YOSE, the sole observation was at 1413 m (Siegel et al. 2011).

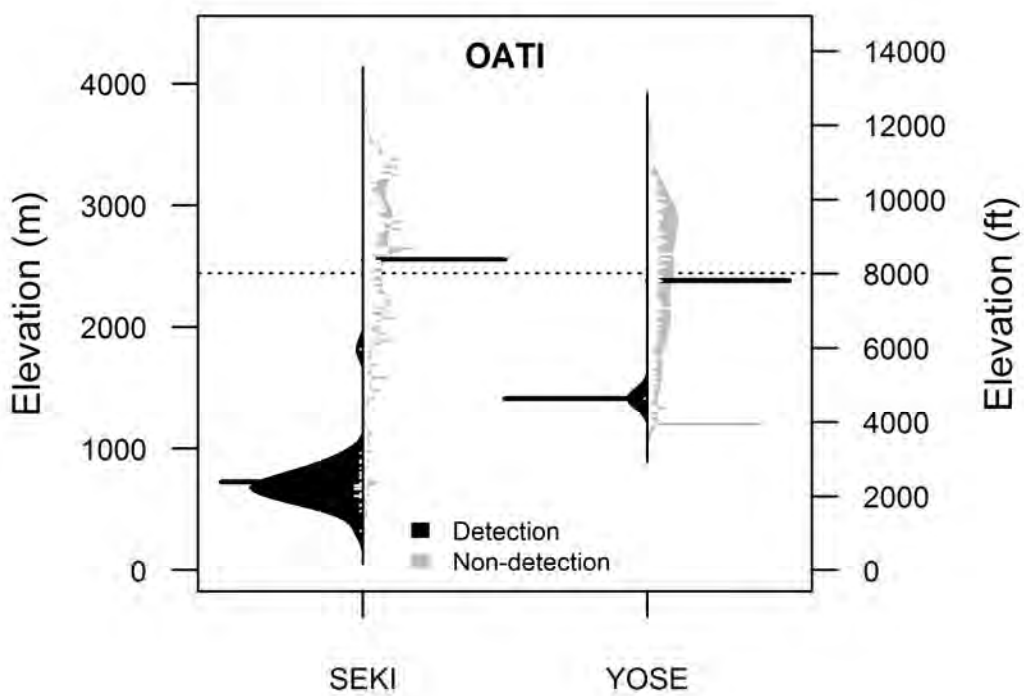

Figure 2. Elevational distributions of sites where Oak Titmouse (OATI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Oak Titmice are found in lower abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in high numbers on the BBS route that intersects Sequoia NP and in much lower numbers on the routes at Kings Canyon NP and YOSE. A nearly significant negative trend was observed in California as a whole during 1966-2007 (Table 3).

Table 27. Relative abundance and trends for Oak Titmouse according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	110	5.27	-1.4	0.07
	1980-2007			-1.3	0.20
Sierra Nevada (BCR 15)	1966-2007	12	3.45	-0.7	0.75
	1980-2007			-2.0	0.55
Route 14117 – Sequoia NP	1972-2005	1	17.38	-3.8	0.68
Route 14132 – Kings Canyon NP	1974-2005	1	0.55	-9.7	0.51
Route 14156 – Yosemite NP	1974-2007	1	2.58	-6.9	0.18

Oak Titmice are not regularly captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Oak Titmice are common residents of warm, dry woodlands in the western U.S., and thus are likely to benefit from predicted climate changes. Climate change may increase the extent of the titmouse's oak woodland and chaparral habitat in the SIEN parks. Oak woodlands in California are under threat from various human activities, including clearing for agriculture, rangeland, and urbanization, as well as harvesting dead oaks for fuelwood, which may be contributing to apparent population declines of the Oak Titmouse (Table 3). A restoration of moderately frequent fires in oak woodlands is likely to benefit this species.

Climate Change: An analysis of shifts between the historical range of Oak Titmouse (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Oak Titmouse has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades. Modeled distribution shifts of Oak Titmouse predict a greater probability of occurrence of the species within its current range across California (including in the SIEN parks), with localized range expansions in northern coastal and inland regions of the state (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation and annual precipitation (Maxent distribution model), and mean diurnal range (GAM distribution model) (Stralberg and Jongsomjit 2008).

Oak Titmouse currently breeds in oak and chaparral habitats at low elevations in the Sierra. These habitats are predicted to expand upslope, thus the Oak Titmouse is likely to colonize higher elevations and benefit overall from a warmer, drier climate.

Altered Fire Regimes: The Oak Titmouse may be adapting to – or at least is capable of utilizing – oak and chaparral vegetation that is favored by more frequent fire. The species was equally abundant in burned and unburned habitats in the southern Sierra (Siegel and Wilkerson 2005). Oak Titmouse was most strongly associated with Blue Oak habitat in SEKI, with additional detections in Live Oak and Mixed Chaparral (Table 2). Although Blue Oak seedlings may be killed by frequent fire, seedlings and saplings are capable of resprouting after fire, and fire increases acorn and leaf production by reducing competition with understory vegetation (Purcell and Stephens 2005). Mixed Chaparral habitats are also well-adapted to fire; some shrub species resprout after fire while others regenerate from seed banks (Riggan et al. 1994), but with overly frequent fire can type-convert to annual grasslands. Oak Titmice are likely to benefit from moderately frequent fire in their preferred habitats in SIEN parks.

Habitat Fragmentation or Loss: The majority of oak woodlands in California are privately owned and receive little management or regulatory protection. Urban and agricultural development is undoubtedly eliminating Oak Titmouse habitat in lower-elevation foothills of the Sierra, but this is not likely to pose a major threat to the species within SIEN parks.

Invasive Species and Disease: European Starlings were introduced to New York City in 1890 and by the middle of the 20th century had spread across much of North America with the exception of Mexico. As a cavity-nester in California's oak woodlands, the Oak Titmouse may be vulnerable to nest usurpation by European Starlings in SIEN parks.

Human Use Impacts: Oak Titmouse nests in natural tree holes or in woodpecker-excavated cavities typically in oaks but also in other deciduous trees such as sycamores, cottonwoods, willows, and maples (Cicero 2000). Fuelwood and timber harvesting can adversely impact Oak Titmice by eliminating potential nesting cavities.

A major threat to Blue Oak woodlands in California is the lack of regeneration over the past century, due to livestock grazing and associated invasion of non-native annual grasses (Standiford et al. 1997, CPIF 2000, Purcell and Stephens 2005). Packstock grazing within the SIEN parks could adversely impact habitat for Oak Titmice if such grazing were reducing oak recruitment. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, impacts from packstock grazing are likely relatively small and localized.

Oak woodlands in north-central coastal California have been falling victim to Sudden Oak Death (SOD), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SOD was probably introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Oak Titmice and other oak-dependent species if it reaches those regions of the Sierra Nevada.

Management Options and Conservation Opportunities

Protection of dead standing and live diseased oak trees, especially live trees with dead limbs and diseased trees in which the heartwood decays, is one of the most important actions park managers can take to benefit Oak Titmouse populations in SIEN parks. Managers should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SOD, and preventative measures including quarantine of the area could be immediately implemented if SOD is identified. Management guidelines and regulations pertaining to SOD can be found at the California Oak Mortality Task Force website (http://www.suddenoakdeath.org/). Potential impact of European Starlings could also be quantified and ameliorated.

Olive-sided Flycatcher – *Contopus cooperi*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Olive-sided Flycatcher is a fairly common summer resident at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, and Devils Postpile National Monument (DEPO) (Table 1).

Table 28. Breeding status and relative abundance of Olive-sided Flycatchers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Widdowson (2008), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G4 – Apparently Secure (Uncommon, but not rare)
- National Status: N4 – Apparently Secure (Uncommon, but not rare)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State (CDFG 2010, Shuford and Gardali 2008, USFWS)

- US Fish and Wildlife Service Status: Species of Concern
- CA Department of Fish and Game Status: Species of Special Concern

Range Significance

The species is distributed over much of Canada and the mountains of western U.S. including the Sierra Nevada, but absent from eastern U.S. (Altman and Sallabanks 2000). SIEN parks are somewhat important for the species' conservation.

Distribution and Habitat Associations

Olive-sided Flycatchers occur in virtually every forest type in the Sierra Nevada as long as tall trees provide high perches (Gaines 1992). The species was detected frequently
), across many transects (Figures 1 and 2) during avian inventory projects in all SIEN parks. Park inventories show highest associations with Western Juniper Woodland at SEKI and Montane Chaparral as well as Ponderosa Pine forests at YOSE (Table 2). However, when adjusted for detectability, densities of Olive-sided Flycatchers in SEKI appeared greatest in Aspen Forests. The diversity of habitat types where Olive-sided Flycatcher was observed reflects its wide preference of forest types for breeding and foraging, as well as the species' very loud song, which can often be heard from many hundreds of meters away. The species' loud song means that in many cases during the avian inventory projects, Olive-sided Flycatchers may have been

perched in habitats quite different from where the observer was standing, yielding flawed descriptions of habitat relationships for the species.

Table 29. Number of Olive-sided Flycatchers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	175	192	Western Juniper Woodland	0.30	0.13
			Aspen Forest	0.23	0.25
			Undifferentiated Post-fire	0.21	0.08
Yosemite NP	249	285	Quaking Aspen	0.19	
			Jeffrey Pine	0.11	
			Western Juniper	0.10	
			Montane Chaparral	0.70	
			Ponderosa Pine	0.70	
Devils Postpile NM	13	14	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

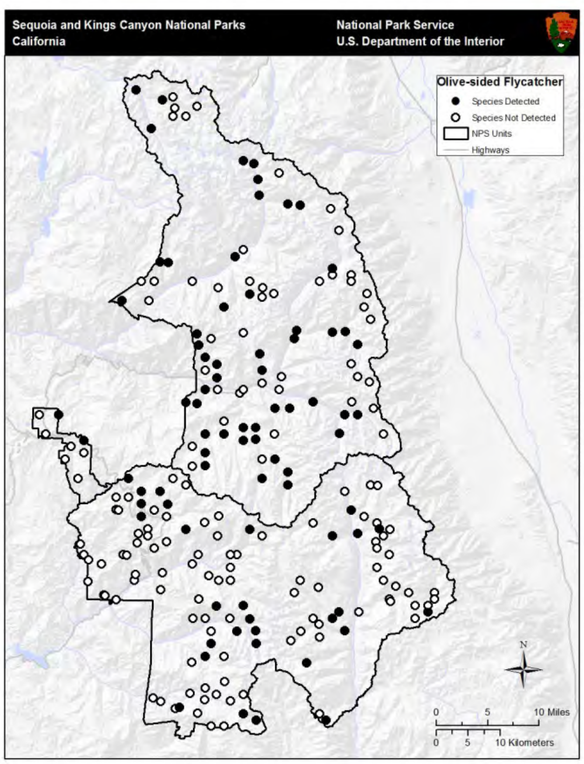

Figure 11. Bird survey transects where Olive-sided Flycatcher was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventor y at SEKI (Siegel and Wilkerson 2005).

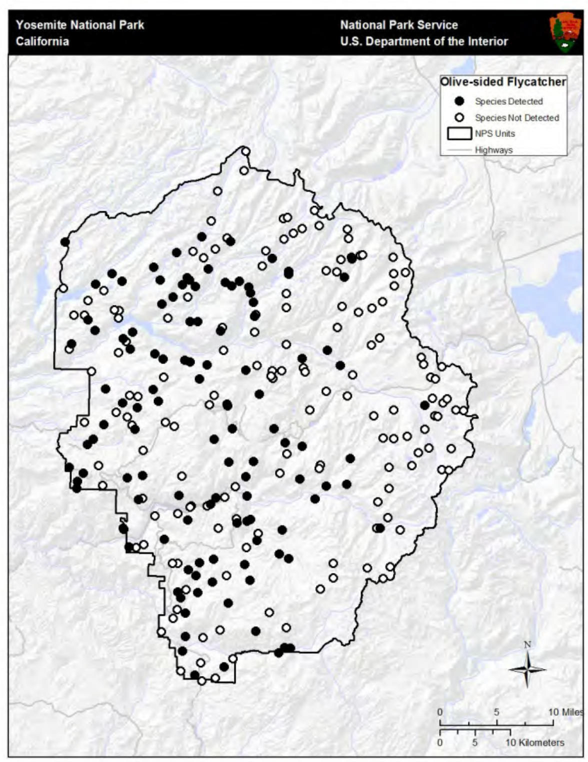

Figure 12. Bird survey transects where Olive-sided Flycatcher was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Olive-sided Flycatcher was observed within the middle to high elevations in SEKI and mid to low elevations in YOSE during recent avian inventory projects (Figure 3). The mean elevation of observations of Olive-sided Flycatchers made in SEKI was 2558 m, with 95% of observations made between 1895 and 3050 m. In YOSE, the mean elevation of observations was 2133 m with 95% of observations falling between 1251 and 2719 m (Siegel et al. 2011).

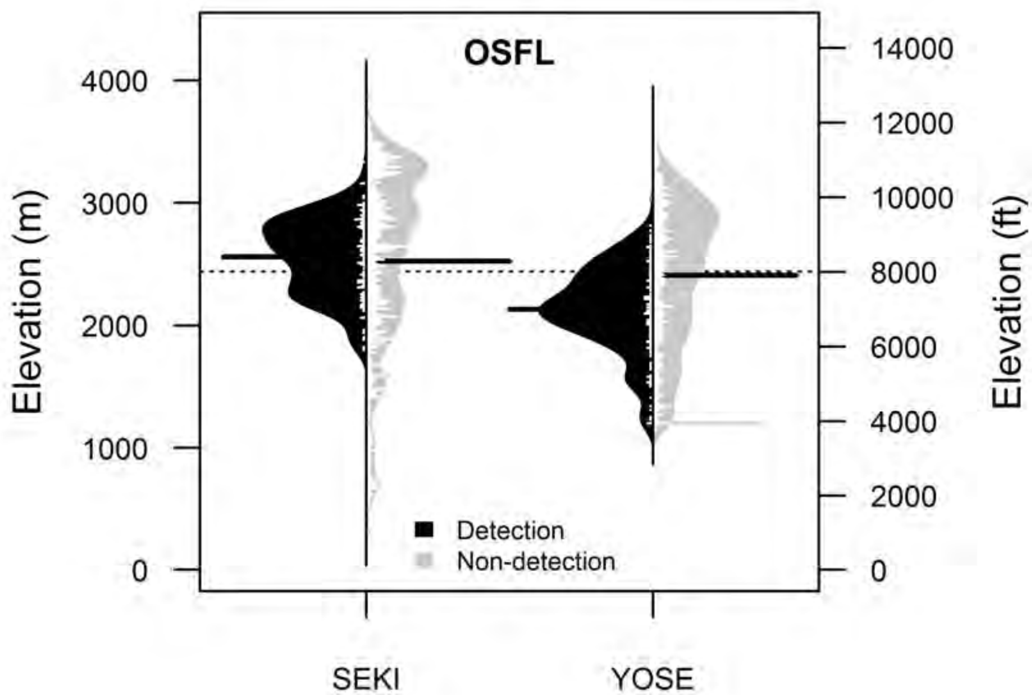

Figure 3. Elevational distributions of sites where Olive-sided Flycatchers (OSFL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Olive-sided Flycatchers are found in greater abundance across California than in the Sierra Region (BCR 15) (**Error! Reference source not found.**). They were detected in high numbers on an individual BBS route in YOSE, but in low numbers on two BBS routes through SEKI. Significant negative trends were observed across California and the Sierra Nevada over the past half century, over the long-term and the short-term, and at YOSE during 1974-2007.

Table 30. Relative abundance and trends for Olive-sided Flycatcher according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	120	3.63	-3.5	0.00
	1980-2007			-3.5	0.00
Sierra Nevada (BCR 15)	1966-2007	35	7.62	-2.9	0.00
	1980-2007			-2.6	0.00
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	1.55	-9.9	0.12
Route 14156 – Yosemite NP	1974-2007	1	12.04	-6.0	0.00

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Olive-sided Flycatchers are not often captured at MAPS stations, so data on productivity and survival are not available.

Olive-sided Flycatchers are currently abundant throughout SIEN parks. However, negative population trends observed along BBS routes indicate that populations in the Sierra and within SIEN may not be stable in the long-term. Suggested causes for these declines include loss of wintering habitat in Central and South America and alteration of mature forest structure in North America (Siegel and DeSante 1999). MAPS data are insufficient for this species so other monitoring efforts are needed to gain a better picture of population trends and causes of possible declines within SIEN parks.

Stressors

Declines in California populations of Olive-sided Flycatchers are troubling especially given that the cause of this decline is not well understood. Logging of mature forests appears to provide attractive habitat to the species when it yields a more open-canopied forest structure akin to post-fire forest stands, but may contribute to long-term declines (CalPIF 2002) if reproductive success in such places is low (Altman and Sallabanks 2000). One likely, but poorly studied threat is the loss of wintering habitat in Central and South American forests (Widdowson 2008, Siegel and DeSante 1999).

Olive-sided Flycatchers are particularly partial to post-fire forest stands, and to the generally patchy, open-canopied forests that tend to result from frequent fires across the landscape. Fire suppression over the past 50 to 100 years appears to have hurt Olive-sided Flycatcher populations (Widdowson 2008). However, increases in fire frequency in the future may enhance habitat for the species. Other threats such as climate change, invasive species, disease, and human activities (other than forest and fire management) appear to pose only minor threats to Olive-sided Flycatchers when compared to timber harvest and fire suppression on the breeding grounds, and other forms of habitat alteration on the wintering grounds.

Climate Change: Given the species' use of virtually all forest types across a wide elevational range (1251 to 3050 m, Figure 3) in SIEN parks, it is likely that Olive-sided Flycatchers have the capacity to adapt to climate change given the persistence of mature forests with varied canopy structure. Increased fire frequency due to climate warming may benefit this species by creating more suitable habitat.

Altered Fire Regimes: Historically, Olive-sided Flycatchers were dependent on fire and other natural disturbances to create patchy habitats. Therefore, fire suppression over the past 50 to 100 years has reduced habitat quality (Widdowson 2008). Increasing fire frequency related to climate warning could benefit this species.

Habitat Fragmentation or Loss: Habitat degradation and loss is most likely the greatest threat to Olive-sided Flycatchers. Reduced abundance of the species has been linked to increased development in the Tahoe Basin (Widdowson 2008), but destruction of wintering grounds in Central and South American forests may be a more significant problem (Widdowson 2008, Siegel and DeSante 1999). Timber harvest outside of SIEN parks likely has mixed impacts on the species, providing short-term benefits, but likely long-term harm (CalPIF 2002).

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Olive-sided Flycatchers are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Exurban development and timber harvest outside of SIEN parks that result in habitat alteration are the most detrimental human impacts on Olive-sided Flycatchers.

Management Options and Conservation Opportunities

Olive-sided Flycatchers appear to have been substantially affected by 20th century forest management practices in the Sierra, which reduced the extent of stands with large, old trees and widely suppressed fire. Although timber harvest is not a major concern within SIEN parks, park habitats still carry a legacy of fire suppression. A more natural fire regime would be best for maintaining patchy forest habitat for Olive-sided Flycatchers (Widdowson 2008). However, where suppression is necessary, controlled burns to decrease fuel loads may provide an appropriate alternative, as these low-intensity burns may mimic natural disturbance in some respects (CalPIF 2002). Finally, alteration and loss of wintering habitat in Central and South America needs to be better understood, but cannot be directly addressed by managers at SIEN parks.

Further monitoring of Olive-sided Flycatcher populations within and surrounding SIEN parks may help to clarify causes of population declines, and in particular to assess how different forest and fire management regimes have affected the species.

Orange-crowned Warbler – *Vermivora celata*

Migratory Status

Short-distance/Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Orange-crowned Warbler is a common summer resident and occasional breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and a common non-breeder at Devils Postpile (DEPO) National Monument (Table 1). This species visits the Sierra commonly in summer to molt after breeding, but only rarely breeds above the foothill zone.

Table 31. Breeding status and relative abundance of Orange-crowned Warblers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Occasional Breeder	Common
Yosemite NP	Summer	Occasional Breeder	Common
Devils Postpile NM	Summer	Non-Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

The Orange-crowned Warbler breeds from western Alaska and central Yukon east over most of Canada and south throughout the western U.S. from the Pacific coast to the Rocky Mountains to southern California and northern Baja California (Gilbert et al. 2010). *V. c. lutescens* occurs on the west slope and *orestera* on the east slope (Siegel and DeSante 1999). While a common breeder at low elevations on the west slope, Sierran breeding populations are small compared to Coast Range populations (Siegel and DeSante 1999). However, the species is extremely abundant as a summer visitor to higher elevations in the Sierra, so the mountain range may be critically importance for molting and pre-migratory maintenance (Siegel and DeSante 1999).

Distribution and Habitat Associations

Orange-crowned Warbler prefers habitats with shrubs and low vegetation, often in patchy oak or aspen forest, or in riparian areas or chaparral (Gilbert et al. 2010). In the Sierra, this species is limited to somewhat open to moderately dense, shrubby oak woodlands at lower elevations for breeding and is most abundant in montane meadows and riparian vegetation during post-breeding/post-fledging up-mountain drift (Siegel and DeSante 1999). Orange-crowned Warblers were detected at low numbers (Table 2) along transects in SEKI and YOSE but not DEPO (Figures 1 and 2) during avian inventory surveys at SIEN parks. The species was most strongly associated with Live Oak/California Buckeye habitats in SEKI (Table 2) and was relatively rare in other habitats and in YOSE. The limited number of detections in SIEN parks for this common warbler was not surprising because it breeds at lower elevations, and post-breeding individuals can be difficult to detect during point counts since they may not vocalize.

Table 32. Number of Orange-crowned Warblers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	30	37	Live Oak/California Buckeye	0.57	0.99 (0.54-1.81)
			Undifferentiated Riparian	0.13	0.18 (0.03-1.17)
			Mixed Chaparral	0.11	0.18 (0.08-0.40)
Yosemite NP	5	6	Mixed Chaparral	0.06	
			Ponderosa Pine/Mixed Conifer	0.01	
			Montane Meadow	0.01	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

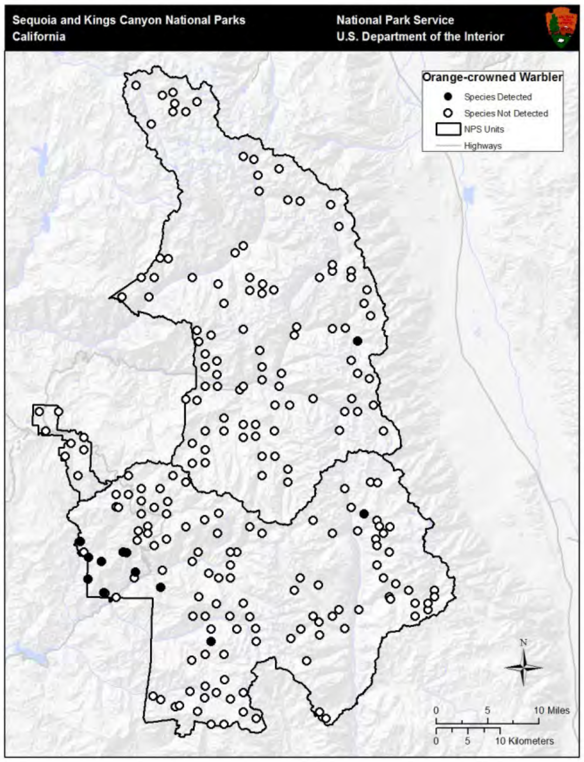

Figure 13. Bird survey transects where Orange-crowned Warbler was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

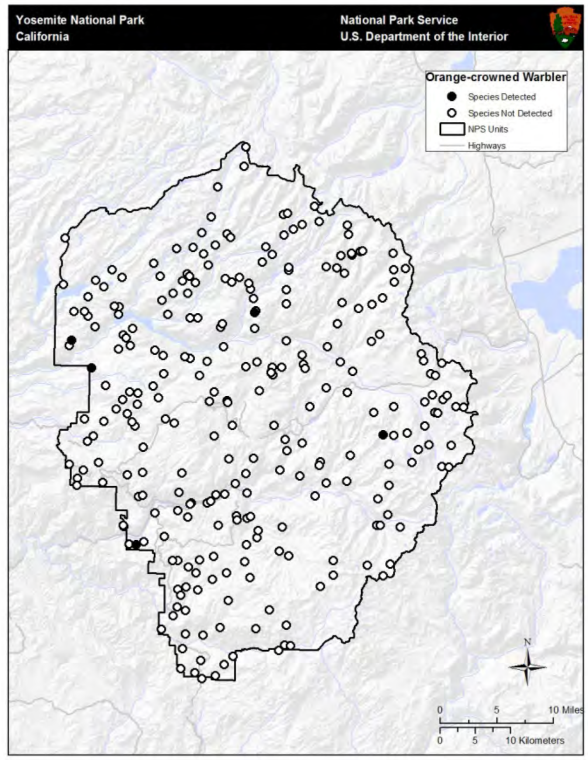

Figure 14. Bird survey transects where Orange-crowned Warbler was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Orange-crowned Warbler was detected at low to mid elevations in SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Orange-crowned Warbler at SEKI was 1150 m, with 95% of observations occurring between 646 and 3001 m. In YOSE, the mean elevation of observations was 1992 m with 95% of observations falling between 1328 and 3018 m (Siegel et al. 2011).

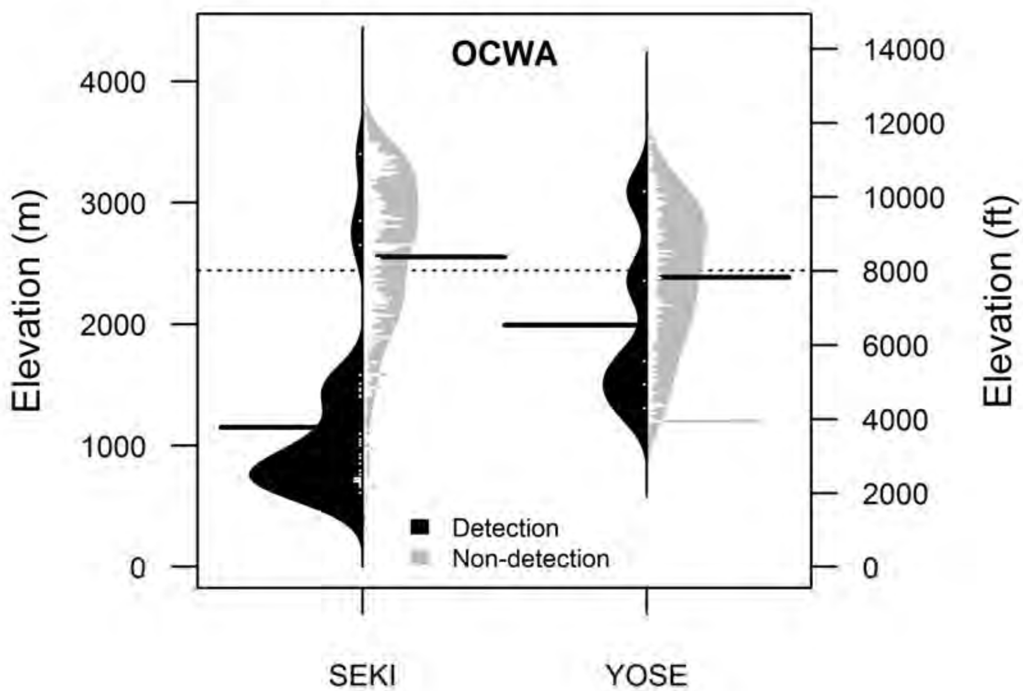

Figure 3. Elevational distributions of sites where Orange-crowned Warbler (OCWA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) data indicate Orange-crowned Warblers are half as abundant in the Sierra Region (BCR 15) than in California as a whole, and are more abundant along individual survey routes in SEKI than in YOSE (Table 3). Populations of Orange-crowned Warblers exhibited a negative trend in the Sierra Nevada region from 1966-2007(Table 3).

Table 33. Relative abundance and trends for Orange-crowned Warbler according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	115	4.50	-0.2	0.82
	1980-2007			-0.9	0.18
Sierra Nevada (BCR 15)	1966-2007	24	1.95	-3.5	0.00
	1980-2007			-2.7	0.10
Route 14117 – Sequoia NP	1972-2005	1	1.44	+16.6	0.65
Route 14132 – Kings Canyon NP	1974-2005	1	1.70	-0.7	0.94
Route 14156 – Yosemite NP	1974-2007	1	0.19	-25.1	0.02

Orange-crowned Warblers do not generally breed in the montane Sierra, thus data on productivity and survival at the SIEN parks are not available.

Stressors

BBS data indicate significant survey-wide population declines of Orange-crowned Warblers throughout their North American range between 1966 and 2006 (Gilbert et al. 2010). Similar declines were reported for the subspecies occurring in the Sierra Nevada (Table 3), suggesting substantial cause for concern about this species. Packstock grazing may adversely impact this species by altering woodland and meadow habitats and by attracting Brown-headed Cowbirds. The species may be resilient to climate change on the breeding grounds in California, but post-molting montane meadow and riparian habitats may be at risk. Restoration of natural fire regimes may benefit this species of shrubby woodlands.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Orange-crowned Warblers has shifted significantly northward by 32 miles and coastward by 21 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). Other data on potential climate impacts on the Orange-crowned Warbler are lacking, but in SIEN parks this species was detected from low to mid elevations (Figure 3). If climate change causes the warbler's range to move upslope in the Sierra Nevada as is generally expected, the species should expand its breeding range into the SIEN parks as long as oak and chaparral habitats expand uphill as well. However, montane meadows and riparian zones are important to this species for post-breeding molt and pre-migration maintenance (Siegel and DeSante 1999). While particular habitat conditions favored by Orange-crowned Warblers during this critical life-stage are not well known, if a general drying trend lowers habitat suitability in meadows and riparian vegetation, this species may be adversely impacted.

Altered Fire Regimes: Fire may not adversely impact the Orange-crowned Warbler which utilizes shrubby habitats. Orange-crowned Warblers were found in older burned as well as repeat-burned forest in Oregon (Fontaine et al. 2009), and fire did not affect relative abundance of these birds in Montana (Smucker et al. 2005). Several studies reported the species in mid-successional burns and clearcuts (Hutto 1995). A future increase in extent and frequency of fire that rejuvenates shrub growth should enhance breeding habitat for Orange-crowned Warblers, while post-fire management activities that eliminate shrubs that are regenerating after fire would threaten this species. Policies that allow lightning-ignited and prescribed fire likely benefit this species in SIEN parks.

Habitat Fragmentation or Loss: The varied and fragmented nature of the Orange-crowned Warbler's preferred breeding and wintering habitat may make at least some populations of this species less vulnerable to habitat loss than some other Neotropical migrant species (Gilbert et al. 2010). However, logging that damages forest understory in coastal Alaska reduced local *V. c. lutescens* populations (Gilbert et al. 2010). Loss of oak woodlands and chaparral habitats to urban and agricultural development also poses a significant risk to the Orange-crowned Warbler's lower-elevation breeding habitat (Siegel and DeSante 1999), but does not impact this species in the protected SIEN parks.

Invasive Species and Disease: Orange-crowned Warblers are vulnerable to brood parasitism by Brown-headed Cowbirds. Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Disease does not appear to limit populations of Orange-crowned Warblers in California (Gilbert et al. 2010).

Human Use Impacts: Livestock grazing that reduces the amount and diversity of undergrowth in oak woodlands may reduce the number of breeding *lutescens* in California. Moreover, during the post-breeding season Orange-crowned Warblers are most abundant in montane meadows and riparian situations (Siegel and DeSante 1999) which are highly vulnerable to grazing impacts. Habitat degradation due to packstock grazing within the parks is therefore a potential concern for this species, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock might damage oak, chaparral, and especially meadow and riparian habitat. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks (Siegel and DeSante 1999).

Management Options and Conservation Opportunities

Park managers can protect Orange-crowned Warbler populations in the parks by maintaining oak woodland habitats at lower elevations and montane meadow and riparian habitats at higher elevations, restoring the natural fire cycle (including high-intensity fire), and eliminating or managing cowbird feeding sites such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicated that a cowbird trapping program was not warranted (Halterman et al. 1999). However, this assessment is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Osprey – *Pandion haliaetus*

Migratory Status

Short-distance/Neotropical migrant (Poole et al. 2002)

Residency and Breeding Status

Osprey is seen migrating through Devils Postpile (DEPO) National Monument and Sequoia and Kings Canyon (SEKI) National Parks rarely. The species is an uncommon visitor to Yosemite (YOSE) National Park (Table 1).

Table 34. Breeding status and relative abundance of Ospreys in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant	Non-Breeder	Rare
Yosemite NP	Migrant/Summer	Non-Breeder	Uncommon
Devils Postpile NM	Migrant	Non-Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 - Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Osprey breeds throughout much of Canada and the Northwestern U.S., including Northern California. Breeding populations are scattered throughout other parts of the U.S., but do not include the southern Sierra Nevada Mountains (Poole et al. 2002). Because Osprey is only a rare or uncommon visitor to SIEN parks, the parks are not an important part of the species' range.

Distribution and Habitat Associations

Ospreys prefer freshwater lakes, reservoirs, and rivers, but migrate over all habitat types (Gaines 1992). Ospreys were not detected during park inventories of the SEIN parks. However, individuals were observed away from survey transects in SEKI and YOSE. Ospreys are not common in SIEN parks due to the limited number of large water bodies containing adequate fish populations.

Table 35. Number of Ospreys recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA[1]	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Osprey was not observed during park inventories; quantitative data on elevational distribution are not available for this species.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Ospreys are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were not detected on any individual BBS routes that pass through SEKI or YOSE. There is a significant positive trend throughout California in both the long and short-term and an apparent positive trend in the Sierra Nevada during the same time period, but low detection rates make these results questionable (Table 3).

Table 36. Relative abundance and trends for Osprey according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	34	0.19	+6.8	0.00
	1980-2007			+8.0	0.00
Sierra Nevada (BCR 15)	1966-2007[1]	7	0.14	+19.9	0.10
	1980-2007[1]			+16.9	0.19
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Ospreys are generally not captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Osprey has historically suffered from shooting and, more importantly, reproductive failures due to the use of DDT. Both threats have declined in recent decades and Osprey populations in California are on the rise (Table 3). Other threats include collisions with motor vehicles and habitat degradation on South American wintering grounds. Climate change may be influencing the Osprey's breeding range, but this has limited relevance to SIEN parks. Finally, altered fire regimes, invasive species, and disease may not be substantial threats, but little information is available.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Osprey has significantly shifted 10.7 miles to the north and 30.2 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Osprey has already responded to climate change and may continue to shift its range in the coming decades.

SIEN parks are located below the greater part of Osprey's breeding range. Whether or not climate change leads to a northward shift in breeding range, SIEN parks are not likely to begin harboring resident populations of the species due to an altered climate.

Altered Fire Regimes: Little research has been conducted on the effects of fire on the Osprey. An increase in fire frequency may lead to more frequent loss of perching and nesting trees, but this is not likely a major threat to the species.

Habitat Fragmentation or Loss: Osprey is generally tolerant of land development and will sometimes use human infrastructure for nesting sites. However, exceptions exist where increased lumber and agricultural development has led to declines in Osprey populations (Poole et al. 2002). Likely of greater concern are deforestation and mining activities on Osprey wintering grounds that lead to degradation of aquatic systems, which provide prey for the Osprey (Poole et al. 2002).

Invasive Species and Disease: To our knowledge there are no major threats of invasive species or disease for the Osprey.

Human Use Impacts: Ospreys were shot historically in North America. However, shooting pressure was not as great as for other diurnal raptors and has been reduced significantly since the early 1970s (Poole et al. 2002). Shooting pressure in some areas on South American wintering grounds appears to have increased since the 1970s, coinciding with development of aquaculture facilities at which Osprey are viewed as pests (Bechard and Marquez-Reyes 2003).

The use of DDT and exposure of Osprey to its metabolite DDE, led to eggshell thinning and reduced reproductive success in the 1950s through 1970s. Although some exposure to DDE on wintering grounds remains (NatureServe 2009), levels of DDE found in Ospreys has declined greatly leading to rapid populations increases (Poole et al. 2002). Other environmental contaminants have been found in Osprey eggs including polychlorinated biphenyls (PCBs), heptachlor, dioxins, dieldrin, chlorodanes, lead, and mercury (Poole et al. 2002, Elliott et al.

2005). However, none of these contaminants can be linked to reductions in Osprey productivity (Poole et al. 2002).

Osprey adults and fledglings are vulnerable to collisions with motor vehicles especially where nests are located near highways. Collisions with power lines and subsequent electrocutions are possible, but do not appear to be a prominent threat. In fact electricity infrastructures such as power poles are used as perching and nesting sites by the species (Poole et al. 2002).

Management Options and Conservation Opportunities
The creation of artificial nest sites has become the most important tool for Osprey conservation and has led to dramatic population increases in some areas (Poole et al. 2002, NatureServe 2009). Fisheries management at the regional scale leading to increases in prey populations would also benefit Ospreys and reintroductions of Ospreys into areas where they were previously extirpated have been successful (Poole et al. 2002). Although Ospreys respond well to management, their natural rarity in SIEN parks makes direct management of the species within the parks unnecessary.

Pacific Wren – *Troglodytes pacificus*

Migratory Status

Resident/short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Pacific Wren is a fairly common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks but has not been recorded at Devils Postpile National Monument (Table 1).

Table 37. Breeding status and relative abundance of Pacific Wrens in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

The Pacific Wren breeds from southern coastal Alaska along the Pacific Coast through forested habitats of western Washington and Oregon, and northwestern California to Marin County, and in suitable wet forests and along forested streamsides of the Cascades-Sierra axis to the southern Sierra Nevada (Hejl et al. 2002). The Pacific Wren is generally uncommon in the Sierra, which is not an extremely important part of the species' range even in California (Siegel and DeSante 1999).

Distribution and Habitat Associations

The Pacific Wren favors the moist, shady interior of dense old-growth forests, especially along streams (Siegel and DeSante 1999) and uses old-growth structures such as snags, downed logs, and large trees for nesting, roosting, and foraging (Hejl et al. 2002). Pacific Wrens were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2) in SEKI and YOSE but not DEPO during avian inventory surveys. Park inventories show greatest densities of these birds in Giant Sequoia forest in both SEKI and YOSE, but these birds were also detected in other Mixed Conifer and true fir forests (Table 2).

Table 38. Number of Pacific Wrens recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	64	68	Giant Sequoia Forest	0.17	0.20 (0.12-0.35)
			White Pine/Sugar Pine Forest	0.10	0.10 (0.05-0.18)
			Red Fir/White Fir Forest	0.08	0.08 (0.04-0.17)
			Red Fir Forest	0.07	0.08 (0.04-0.15)
Yosemite NP	80	87	Giant Sequoia	0.32	
			White Fir/Mixed Conifer	0.09	
			Douglas-fir/Mixed Conifer	0.08	
			Ponderosa Pine	0.07	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

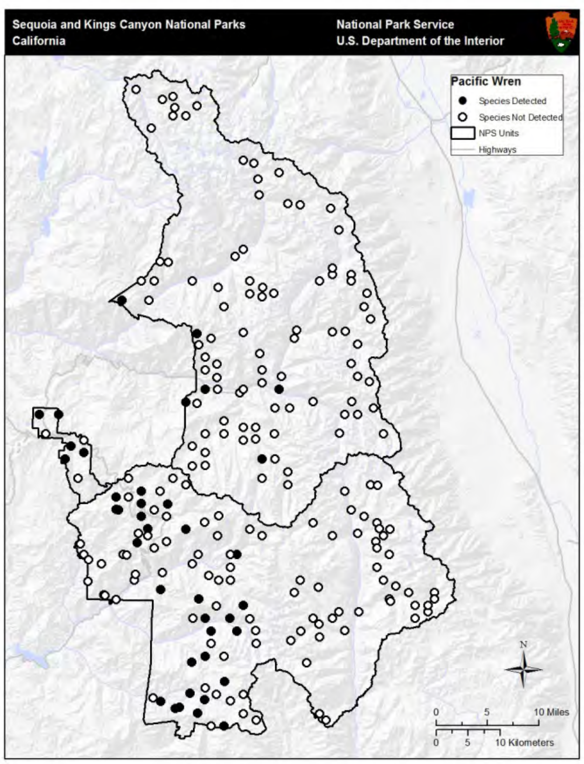

Figure 15. Bird survey transects where Pacific Wren was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

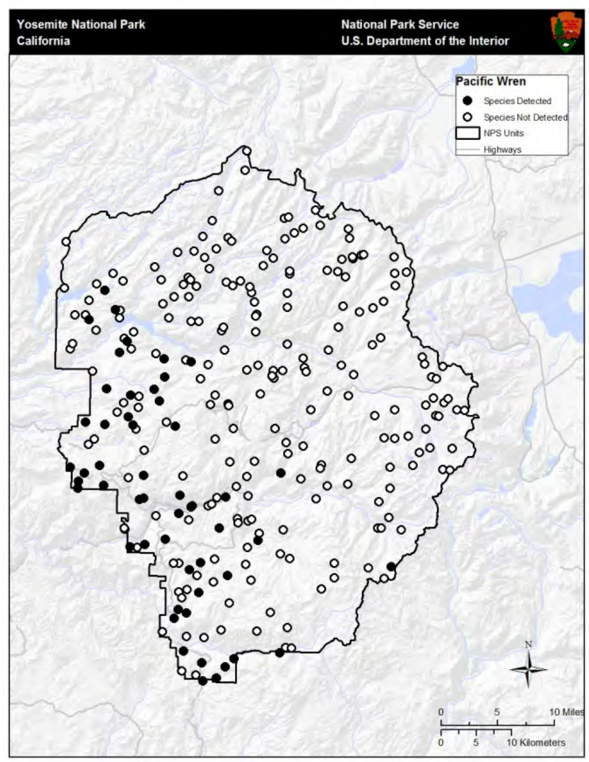

Figure 16. Bird survey transects where Pacific Wren was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Pacific Wren was detected at middle elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Pacific Wren in SEKI was 2096 m, with 95% of observations occurring between 1533 and 2743 m. In YOSE, the mean elevation of observations was 1790 m with 95% of observations falling between 1200 and 2351 m (Siegel et al. 2011).

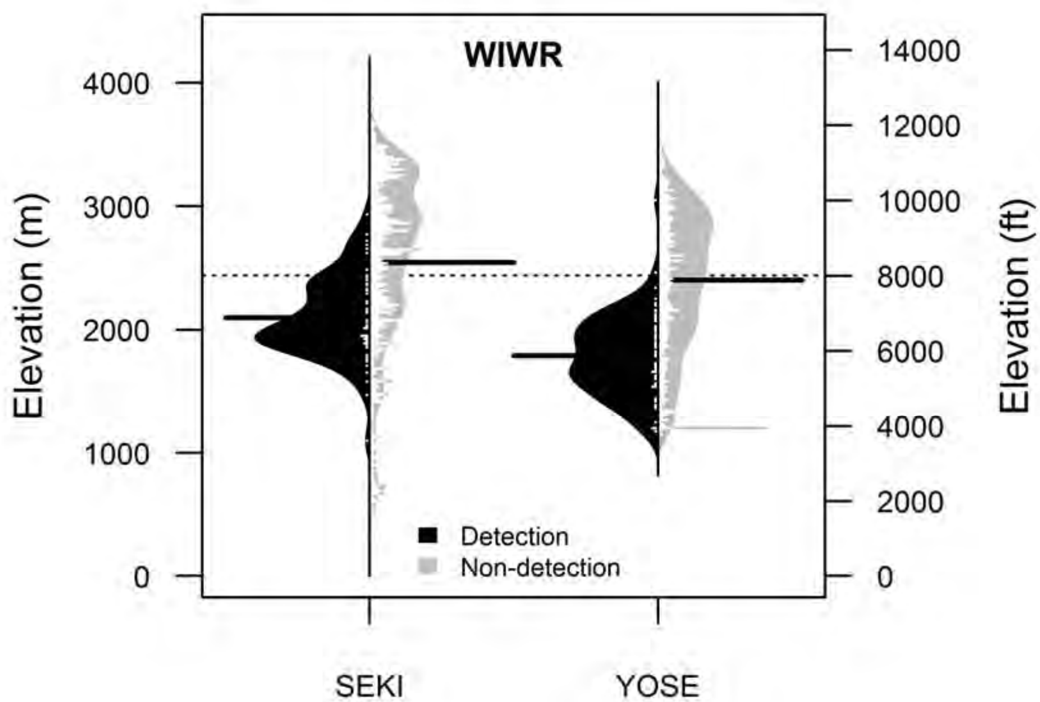

Figure 3. Elevational distributions of sites where Pacific Wren (formerly Winter Wren - WIWR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Pacific Wrens are half as abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). No significant population trends were observed during any time periods, but a nearly significant ($P = 0.10$) positive trend was observed in California from 1980-2007.

Table 39. Relative abundance and trends for Pacific Wren according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	36	0.95	+1.0	0.43
	1980-2007			+1.8	0.10
Sierra Nevada (BCR 15)	1966-2007	13	0.50	-2.1	0.32
	1980-2007			-4.3	0.13
Route 14117 – Sequoia NP	1972-2005	1	0.25	+90.4	0.12
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	2.27	-4.7	0.29

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Too few Pacific Wrens were captured in mist nets at SIEN MAPS stations to estimate population and reproductive trends within the parks. Reproductive index was greater at Yosemite than Kings Canyon NP.

Table 40. Population trends, productivity, trends, and survival estimates of Pacific Wren at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.5	NA[2]	0.17	NA	NA
Yosemite NP	1993-2009	0.2	NA	1.01	NA	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Pacific Wren populations appear to be stable in the Sierra Nevada, in contrast to earlier BBS analyses (see Siegel and DeSante 1999), but remain relatively scarce. Hejl et al. (2002) noted that "current broadscale population trends indicate stable or increasing populations, but these trend estimates might not capture changes due to forest-management practices for this interior-forest bird, particularly in western forests." Major threats include logging practices such as clearcutting, and possibly high-intensity fire, when they eliminate or reduce the density and canopy of mature and old forests. The species is also susceptible to nest parasitism by Brown-headed Cowbirds.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Pacific Wren has significantly shifted in latitude nearly 138 miles northwards over the past 40 years throughout its range, corresponding with increases in temperature (Audubon

2009). This observed shift provides evidence that this species has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades. Pacific Wren currently occurs in coniferous forests at mid-elevations in SIEN parks (Figure 3) and may colonize higher elevations with climate warming – but the species can persist only as long as dense, old fir and Mixed Conifer forests are available at higher elevations.

Altered Fire Regimes: Pacific Wrens may be adversely impacted by high-intensity fire. The species declined in relative abundance after fire in Montana (Smucker et al. 2005) and was only detected in mature forests and not in recent, old, or repeatedly burned forests in Oregon (Fontaine et al. 2009). Pacific Wrens exhibited higher densities of Pacific Wrens on postfire stands than post-harvest stands (Hobson and Shieck 1999), but this study did not compare densities between burned or logged stands and undisturbed sites. No published data are available on effects of fire on Pacific Wrens in the Sierra Nevada. However, results from other regions suggest than an increase in future extent and frequency of high-intensity fire is likely to adversely affect Pacific Wrens.

Habitat Fragmentation or Loss: Logging and resulting forest fragmentation poses one of the largest threats to the Pacific Wren (see numerous references in Hejl et la. 2002). This species favors true fir and Mixed Conifer forests (Table 2) which are often subjected to timber harvest in the Sierra Nevada. Pacific Wrens declined significantly in stands of boreal forest in Canada after partial clearcutting (Norton and Hannon 1997). Post-harvested stands in boreal forests in Canada had fewer Pacific Wrens than burned stands (Hobson and Shieck 1999). Thinning may pose less of a threat to this species than clearcutting: detections did not decline with increasing levels of thinning in Douglas-fir forests in Oregon (Hayes et al. 2003). Clearcutting is widespread in the Sierra Nevada, but less so in the SIEN parks, thus the parks may represent important habitat refugia for Pacific Wrens.

Invasive Species and Disease: Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Pacific Wrens are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for Pacific Wren, at least locally where grazing is permitted, because it can attract Brown-headed Cowbirds. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Management Options and Conservation Opportunities

Pacific Wren will benefit from management in the SIEN parks that protects and maintains unlogged mature and old-growth true fir and mixed conifer forests, particularly those adjacent to streams and with adequate numbers of downed logs and snags (Hejl et al. 2002). The restoration of fire regimes that include all fire intensities but that retain substantial amounts of green forest may not cause significant declines of this species. Park managers can also manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. Guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Pacific-slope Flycatcher – *Empidonax difficilis*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Pacific-slope Flycatcher is a fairly common breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks. The species is not known to occur at Devils Postpile (DEPO) National Monument (Table 1).

Table 41. Breeding status and relative abundance of Pacific-slope Flycatchers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Pacific-slope Flycatcher is generally limited to the pacific slope of western North America and occurs more frequently along the coast of California than in the Sierra Nevada making the mountain range (Siegel and DeSante 1999) and SIEN parks less important to the species than other regions.

Distribution and Habitat Associations

Pacific-slope Flycatchers are most often found in shady forests, particularly where habitat contains running water (Gaines 1992). Pacific-slope Flycatchers were detected in low densities (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were not observed during the DEPO survey. Park inventories show highest associations with Canyon Live Oak and Western Fir/Mixed Conifer forests within SEKI and YOSE respectively (Table 2). However, when adjusted for detectability, densities of Pacific-slope Flycatchers in SEKI were highest within Giant Sequoia forests.

Table 42. Number of Pacific-slope Flycatchers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	42	45	Canyon Live Oak Forest	0.20	0.16 (0.07-0.37)
			Giant Sequoia Forest	0.15	0.17 (0.07-0.40)
			California Black Oak Forest	0.12	0.08 (0.02-0.29)
Yosemite NP	27	31	White Fir/Mixed Conifer	0.07	
			Western White Pine	0.03	
			White Fir	0.03	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

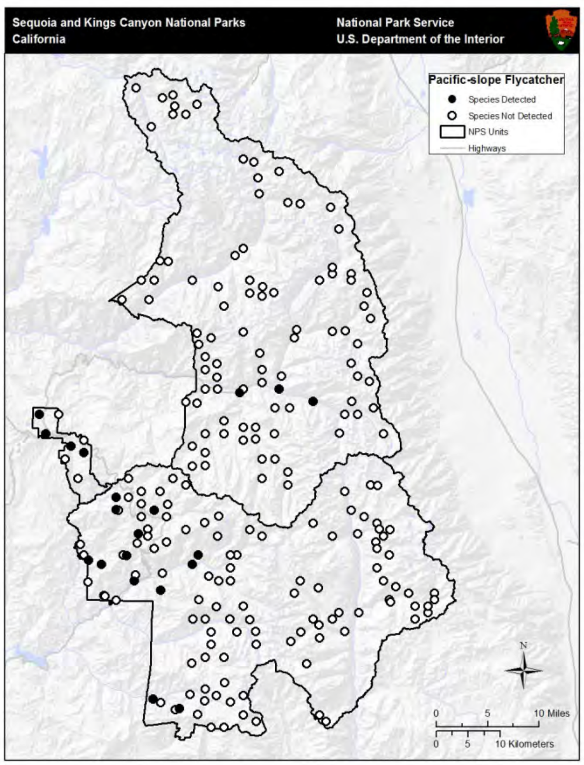

Figure 17. Bird survey transects where Pacific-slope Flycatcher was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

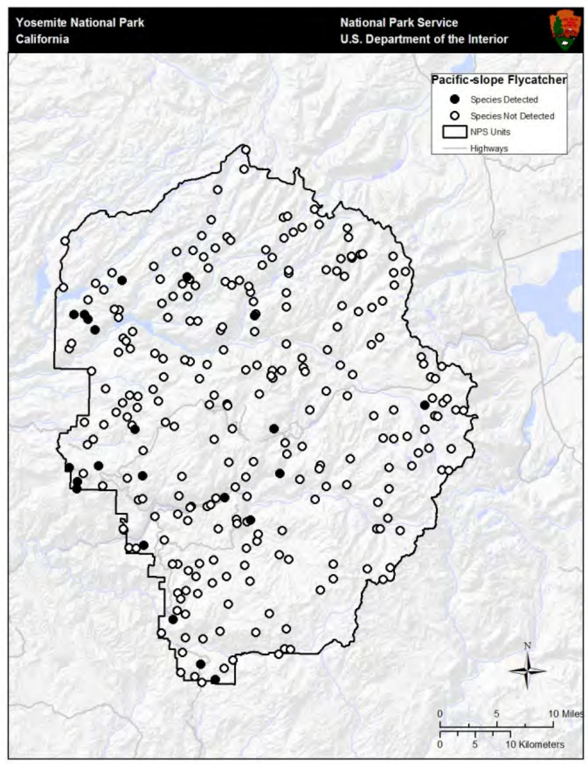

Figure 18. Bird survey transects where Pacific-slope Flycatcher was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Pacific-slope Flycatcher was observed within the lower- and mid-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Pacific-slope Flycatcher in SEKI was 1513 m, with 95% of observations occurring between 707 and 2135 m. At YOSE, the mean elevation of observations was 1744 m with 95% of observations falling between 1260 and 2446 m (Siegel et al. 2011).

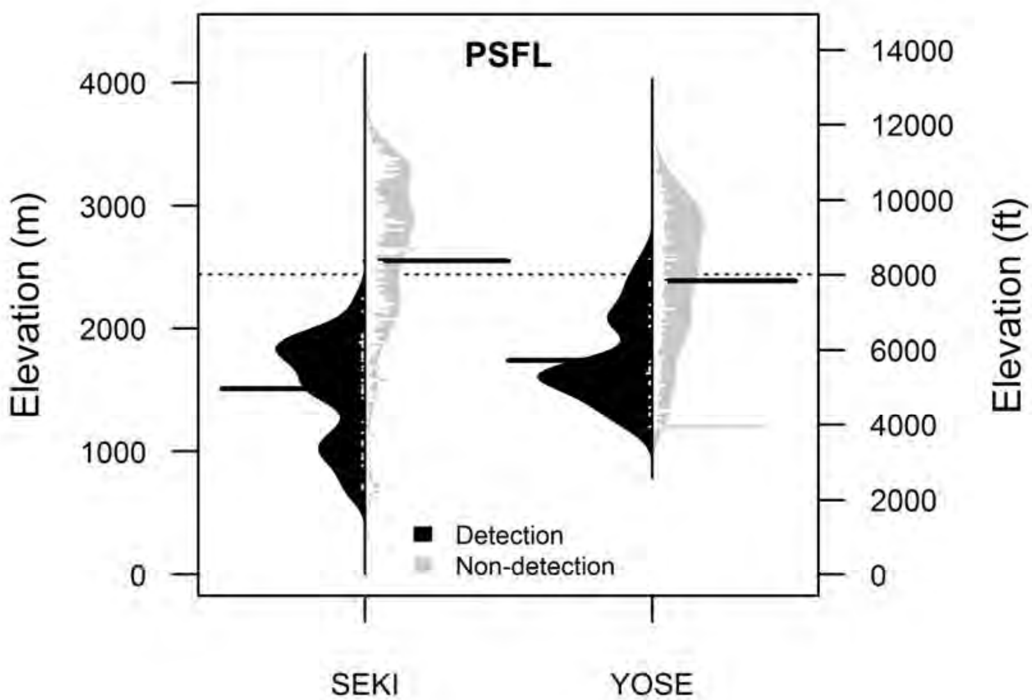

Figure 3. Elevational distributions of sites where Pacific-slope Flycatchers (PSFL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Pacific-slope Flycatchers are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at YOSE and SEKI. A significant negative trend was observed along the Sequoia NP route during 1974-2007 (Table 3). Pacific-slope Flycatchers are difficult to distinguish from the closely related Cordilleran Flycatcher and BBS observations of Pacific-slope Flycatchers likely include some Cordilleran individuals passing through California, especially for routes east of the Sierra crest.

Table 43. Relative abundance and trends for Pacific-slope Flycatcher according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	110	3.23	-0.6	0.31
	1980-2007			-0.7	0.30
Sierra Nevada (BCR 15)	1966-2007	19	1.38	+2.1	0.25
	1980-2007			0.7	0.79
Route 14117 – Sequoia NP	1972-2005	1	1.25	-33.0	0.05
Route 14132 – Kings Canyon NP	1974-2005	1	1.00	+3.3	0.75
Route 14156 – Yosemite NP	1974-2007	1	1.31	+4.4	0.55

MAPS stations at SEKI and YOSE do not show any significant demographic trends for Pacific-slope Flycatchers, but suggest healthy populations. MAPS data are not available for Pacific Flycatchers at DEPO (Table 4).

Table 44. Population trends, productivity, trends, and survival estimates of Pacific-slope Flycatcher at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	6.3	+5.84	0.36	+8.36	0.645 (0.128)
Yosemite NP	1993-2009	2.7	+2.65	0.79	+0.51	NA
Devils Postpile NM	2002-2006	0.0	NA[2]	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

There are no apparent major threats to the Pacific-slope Flycatcher (NatureServe 2009). However, habitat loss and fragmentation due to timber harvest and possibly fire are detrimental to the species. Pacific-slope Flycatcher appears to already be responding to climate change through range shifts and reduced productivity in warmer years, although the species is likely to continue breeding within the SIEN parks despite changing conditions. Finally, invasive species, disease, and human use impacts do not appear to be major concerns for the Pacific-slope Flycatcher.

Climate Change: An analysis of shifts between the historical range of Pacific-slope Flycatcher (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Pacific-slope Flycatcher has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades. Data from the YOSE MAPS stations appear to corroborate ongoing range shift in this species; populations pooled across all stations have increased non-significantly, but examination of station-specific trends reveals that populations have declined non-significantly at the lower elevation stations (Big Meadow and Hodgdon Meadow where the species has historically occurred in greater abundance than at the higher stations), but increased significantly at the three mid- and higher-elevation stations (Crane Flat, Gin Flat East, and White Wolf) (Siegel et al. 2007).

MAPS data from Kings Canyon suggest that during La Niña years (characterized by mild winters and early springs) Pacific-slope Flycatcher is one of several species that tends to exhibit reduced capture rates of young birds and/or depressed productivity rates (Siegel et al. 2009). La Niña conditions are expected to become more frequent in the coming years (Siegel et al. 2009), which may therefore reduce adult populations over time.

Pacific-slope Flycatchers are found breeding in the lower elevations of SEKI and YOSE. If climate change causes the species' range to shift upward as is generally expected, there is much higher-altitude habitat for new colonization within SEKI as well as YOSE. However, it is important to note that even if Pacific-slope Flycatcher are able shift their range in response to climate change, populations may suffer if the habitats they depend upon are not also able to shift upslope or are degraded due to climate warming.

Altered Fire Regimes: The effects of fire on Pacific-slope Flycatchers are poorly studied. However, where large-scale fires create more fragmented forests, the species may be negatively affected (see below).

Habitat Fragmentation or Loss: Pacific-slope Flycatcher favors old forests over younger stands (NatureServe 2009) and has been shown to avoid forest edges in favor of unfragmented forest interiors (George and Brand 2002). Furthermore, deforestation and forest fragmentation on the species' wintering grounds may pose risks for the Pacific-slope Flycatcher (Siegel and DeSante 1999). Although deforestation and forest fragmentation (except potentially due to fire) are not concerns within SIEN parks, their effects on this neotropical migrant elsewhere within the species' range could affect park populations.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Pacific-slope Flycatcher.

Human Use Impacts: Pacific-slope Flycatchers are known to use buildings and other structures as nesting sites (Lowther 2000), indicating a tolerance of human presence. Pesticide use may also be a concern for the Pacific-slope Flycatcher (Siegel and DeSante 1999), but would only impact park populations indirectly.

Management Options and Conservation Opportunities

Apparent healthy populations across California (Table 3), coupled with a lack of major threats suggest no special management actions are required for the Pacific-slope Flycatcher. Thus, continued protection of riparian and forest habitat where the species breeds is most important within SIEN parks. Fire management actions that reduce large-scale fires and forest fragmentation may also benefit this species.

Peregrine Falcon – *Falco peregrinus*

Migratory Status
Partial migrant (White et al. 2002)

Residency and Breeding Status
Peregrine Falcon is a rare but regular breeder at Yosemite (YOSE) National Park, a rare occasional (at least) breeder at Sequoia and Kings Canyon (SEKI) National Parks, and has not been reported in recent years at Devils Postpile National Monument (Table 1).

Table 45. Breeding status and relative abundance of Peregrine Falcons in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Occasional Breeder	Rare
Yosemite NP	Summer/Year-round	Regular Breeder	Rare
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G4 – Apparently Secure (Uncommon, but not rare)
- National Status: N3 – Apparently Secure (Uncommon, but not rare)
- California Status: S2 – Imperiled (High risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Bird of Conservation Concern (Delisted 8-25-99)
- CA Department of Fish and Game Status: Not listed (Delisted 11-04-09)

Range Significance
Peregrine Falcons were historically found across North America, but were lost from many areas during the mid-twentieth century (Wheeler 2003). In recent decades, recovery programs have helped the species re-expand its range (White et al. 2002). Of the three subspecies found in western North America, only *F. p. anatum* is found in California (NatureServe 2009). Peregrine falcons continue to breed within SIEN parks (Maurer et al. 2010, 2011) and given the species' imperiled past, any suitable nesting sites within the parks should be considered important to the falcon.

Distribution and Habitat Associations
Peregrine Falcons will hunt in a wide variety of habitats including meadows, woodlands, marshes, and mudflats, but typically nest on cliff ledges with expansive views (Gaines 1992). Peregrine Falcons were not detected during park inventories of the SIEN parks, but were detected anecdotally off-survey in SEKI and YOSE (Table 2). However, like many other raptor species, Peregrine Falcons are not well sampled during surveys designed for singing species.

A Peregrine-specific survey of YOSE in 2009-2010 found 12 pairs in 2009 and 11 pairs in 2010, with a total of nine pairs confirmed to attempt breeding in at least one year (Maurer et al. 2010, 2011). Observers were able to confirm 21 fledglings in 2009 and 17 in 2011(Maurer et al. 2010, 2011). These results indicate a more than two-fold increase in YOSE's population of Peregrine Falcons since a previous survey in 1995.

Table 46. Number of Peregrine Falcons recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA[1]	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Peregrine Falcons are found infrequently across California as a whole, but rarely or not at all in the Sierra Nevada. Across the state, the survey has observed a nearly significant positive population trend during 1966-2007 (Table 3). Although Peregrine Falcons are not well sampled by BBS routes, the species is known to breed in SIEN parks and at least the YOSE population has increased over the past 15 years (Maurer et al. 2010). The apparently increasing population trend (Table 3) is likely not reliable because it is based on a very small sample size.

Table 47. Relative abundance and trends for Peregrine Falcon according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007[1]	6	0.01	+12.8	0.08
	1980-2007[1]			+7.1	0.22
Sierra Nevada (BCR 15)	1966-2007	NA[1]	NA	NA	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Peregrine Falcons are not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The use of the pesticide DDT has been linked to dramatic declines in Peregrine Falcon populations during the mid-twentieth century. The species has largely recovered from this threat, but DDT's metabolites persistence in North America and its continued use in Latin American may continue to affect the falcon to some degree. Likewise, shooting of Peregrine Falcons and take for falconry threatened the species historically, but has been greatly diminished following government protection. Other potential, but minor threats include collisions with human structures, electrocution, and conflicts between nesting falcons and rock climbers. Climate change, altered fire regimes, habitat fragmentation or loss, invasive species, and disease do not appear to threaten Peregrine Falcon at the population level.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Peregrine Falcon has significantly shifted 189.6 miles to the south and 58.3 miles toward the coast over the past 40 years (Audubon 2009). Shifts in both these directions are opposite of what would be expected of species responding to climate change by moving toward cooler areas as the climate warms (Audubon 2009). Furthermore, these observed shifts in abundance are likely influenced by the large-scale reintroduction and recovery efforts across the species' North American range over the past half-century.

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Peregrine Falcon received a sensitivity score of 18.37 (UW 2010), suggesting low sensitivity to the threat. Certainty of results was listed as 35.00 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Peregrine Falcon's sensitivity to climate change was its relatively low annual productivity (UW 2010).

Altered Fire Regimes: The effects of fire on Peregrine Falcon are poorly known. However, given the species' broad use of habitat types for foraging, and that cliffs used for nest sites are not susceptible to fire, increased fire frequency or intensity is unlikely to have a great impact on the Peregrine Falcon.

Habitat Fragmentation or Loss: Peregrine Falcons are largely tolerant of human agricultural and urban development and can be found nesting on towers or buildings within cities. Of most concern for the species is any loss of established nesting sites (White et al. 2010).

Invasive Species and Disease: Peregrine Falcons are known to be susceptible to a number of diseases, parasites, and natural predators (e.g., Great Horned Owl and Golden Eagle). There is no apparent threat from invasive species, and diseases and natural predation do not appear to have population-level effects (Mesta 1999).

Human Use Impacts: Peregrine Falcons were shot and juveniles were taken for falconry before the species was given legal protection in the 1970s. Some illegal persecution continues, but likely without substantial impact on populations and eyrie (nesting site) occupancy (White et al. 2002).

Starting in the 1940s, the widespread use of the pesticide DDT led to eggshell thinning and rapid population declines of the Peregrine Falcon across the United States (Maurer et al. 2010). Following the ban on DDT and the federal listing of Peregrine Falcon, the species has continued to recover across its range (White et al. 2002). While DDT is no longer used in the United States, its effects on reproductive success were still being seen at least into the 1990s (Maurer et al. 2010) and exposure in some areas of Latin America continues (Mesta 1999). Furthermore, other contaminants such as PCBs, mercury, and lead remain in the environment and are likely detrimental to Peregrine falcon - although any population effects on the species are unknown (White et al. 2002).

Collisions with motor vehicles and human structures can cause mortality and injury of individuals, especially for urban-dwelling Peregrines. For individuals found outside of urban areas, electrocution is a more common source of conflict with human structures (White et al. 2010). Neither collisions nor electrocutions are likely a great concern within SIEN parks.

Peregrine Falcon eyries on the canyon walls of Yosemite Valley and elsewhere at YOSE are vulnerable to disturbance by helicopters involved with medivac and rescue operations; ongoing efforts to develop and refine a program of airspace closures around vulnerable eyries appear to be effective (Maurer et al. 2011).

Finally, rock climbing can disturb breeding Peregrine Falcons where climbing routes approach nest sites (Maurer et al. 2011). This appears to be a greater issue in eastern North America than western, where fewer and smaller cliffs limit alternative routes for climbers (Mesta 1999). At YOSE, park staff have developed an effective program for locating eyries and implement seasonal closures of nearby rock climbing routes (Maurer et al. 2011). In Sequoia National Park, a known eyrie at Moro Rock is protected by closing climbing routes during nesting season, and the neighboring Sequoia National Forest closes climbing routes near the eyrie on Chimney Rocks, located not far off the road between Sequoia and Kings Canyon National Parks.

Management Options and Conservation Opportunities

Peregrine Falcons have been heavily managed following federal protection in the 1970s. The most significant step to conserve the Peregrine Falcon came in 1972 with the ban of the use of DDT in the U.S. (Mesta 1999). Beginning in the 1970s an aggressive captive breeding and reintroduction program led to the release of approximately 6,000 individuals throughout the species' historical North American range (Mesta 1999).

Within SIEN parks, monitoring and protection of eyries is likely the greatest way to ensure recovery of park populations. If climbing routes approach nest sites, restriction of route use is an effective strategy for protecting falcon nesting attempts; similarly, airspace closures around vulnerable eyries is also an effective tool.

Phainopepla – *Phainopepla nitens*

Migratory Status
Resident/short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Phainopepla is a rare, non-breeding migrant in Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks and has not been reported at Devils Postpile National Monument (Table 1).

Table 48. Breeding status and relative abundance of Phainopeplas in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant	Non-Breeder	Rare
Yosemite NP	Migrant	Non-Breeder	Rare
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Phainopepla is limited to the southwestern U.S. and Mexico, including much of southern California and the foothills of the Sierra and Coast ranges (Chu and Walsberg 1999, Siegel and DeSante 1999). The Sierra Nevada is not a critical part of the species' overall breeding range, but the foothills are important for its northern California range (Siegel and DeSante 1999).

Distribution and Habitat Associations
In a pattern unusual among North American passerines, Phainopeplas occupy desert habitats during fall, winter, and spring, breeding from February to April, and move to oak and sycamore woodland habitats during the hot summer months, breeding again from May to July (Chu and Walsberg 1999). It is currently unknown whether these birds are truly itinerant breeders where the same individuals breed twice in a year, or whether different populations or individuals or failed breeders then nest in another geographical area. Phainopeplas were not detected during avian inventory projects at SIEN parks. Elsewhere in the Sierra during late spring and summer this species requires open Live and Blue Oak woodlands or scattered groves of small trees and riparian woodland (Siegel and DeSante 1999), and feeds on a variety of berries and flying insects

(Chu and Walsberg 1999). On the winter desert breeding range this bird is closely associated with desert mistletoe, which parasitizes arborescent legumes such as acacias, mesquite, Palo Verde, smoke tree, and ironwood (Chu and Walsberg 1999).

Elevational Distribution

Phainopeplas breed to approximately 1800 m in the in the Lower and Upper Sonoran (Small 1994).

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Phainopeplas are found in much lower abundance in the Sierra Region (BCR 15) than in California as a whole (Table 2). They were detected in moderate numbers on the individual BBS route at Sequoia NP but were not detected at Kings Canyon or Yosemite (Table 2). No significant population trends were observed during any of the time periods investigated by Sauer et al. (2008).

Table 2. Relative abundance and trends for Phainopepla according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	71	1.31	+2.3	0.19
	1980-2007			-0.7	0.60
Sierra Nevada (BCR 15)	1966-2007[1]	3	0.14	+11.8	0.82
	1980-2007[1]			-25.7	0.31
Route 14117 – Sequoia NP	1972-2005	1	1.63	+11.4	0.58
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Phainopeplas are rare migrants in SIEN parks and are not captured in MAPS station mist nets; data on productivity and survival within the parks are therefore not available.

Stressors

Phainopeplas are possible itinerant breeders (Chu and Walsberg 1999) that are important dispersers of desert mistletoe seeds (Aukema 2004). These birds are adversely impacted by urban and agricultural development and livestock grazing in lower-elevation oak woodlands and riparian habitats used for breeding. Phainopeplas are rare, non-breeding migrants in SIEN parks, thus park management is unlikely to affect individuals or populations. If a warming climate results in the uphill expansion of oak woodlands, Phainopeplas might become a more familiar sight in the SIEN parks.

Climate Change: A recent report to the California Energy Commission used historical egg and nest collections from 1895 to 1971 to demonstrate that Phainopepla showed the largest shift to an earlier laying date of all studied species (Bruzgul and Root 2009). If availability of important berry resources fails to coincide with the Phainopepla's nesting phenology, this bird may experience reduced breeding success.

Phainopepla currently breeds in oak woodlands and riparian habitats at lower elevations along the western slope of the Sierra Nevada and may colonize higher elevations if oak woodlands expand uphill with climate warming as predicted in some models (Stralberg and Jongsomjit 2008). If climate change causes the species' range to shift upslope as is generally expected, there is likely to be adequate oak woodlands habitats in SEKI and YOSE and the species may begin breeding in the parks. However, if a drying climate reduces habitat suitability in riparian zones the Phainopepla may be adversely impacted. Further research is warranted on the effects of climate change on this interesting species.

Altered Fire Regimes: Fire, set by lightning or Native Americans, historically has been an important component of oak woodlands in California. Although Blue Oak seedlings may be killed by frequent fire, seedlings and saplings are capable of resprouting after fire (Purcell and Stephens 2005). Phainopepla are associated with open Blue Oak woodlands in lower elevation foothills, and thus are likely to benefit from moderately frequent fire in these areas. Phainopepla is rare in SIEN parks, however, so fire management is not likely to impact the species either positively or negatively.

Habitat Fragmentation or Loss: Phainopepla are associated with Blue and Live Oak woodlands in the Sierra foothills. The majority of oak woodlands in California are privately owned and receive little management or regulatory protection, and urban and agricultural development have historically and currently decimated this habitat. Phainopepla also is vulnerable to loss of riparian vegetation. Extensive clearing of oak woodlands and riparian vegetation is a major threat to this bird in lower-elevation foothill habitats, but is not likely to pose a risk to the species within protected SIEN parks (although some localized impacts from packstock grazing may occur).

Invasive Species and Disease: To our knowledge there are no major threats to Phainopepla from invasive species and disease in SIEN parks.

Human Use Impacts: A major threat to Blue Oak woodlands in California is the lack of regeneration over the past century, due to livestock grazing and associated invasion of non-native annual grasses (Standiford et al. 1997, CPIF 2000, Purcell and Stephens 2005). Packstock grazing within the SIEN parks could adversely impact habitat for Phainopepla if such grazing were reducing oak recruitment. Packstock grazing within the parks could also threaten Phainopepla because it alters riparian and meadow habitats. Phainopeplas increased (albeit non-significantly) after removal of cattle from the San Pedro River in Arizona (Krueper et al. 2003). However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Oak woodlands in north-central coastal California have been falling victim to Sudden Oak Death (SOD), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SOD was probably introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Phainopepla if it reaches their foothill breeding habitats in the Sierra Nevada.

Management Options and Conservation Opportunities

The Phainopepla does not breed in, and is only a rare migrant through the SIEN parks, thus there are few management actions that would directly affect these birds. However, this species may expand into the parks as a result of climate change. Park managers should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats and riparian vegetation should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SOD, and preventative measures including quarantine of the area could be immediately implemented if SOD is identified. Management guidelines and regulations pertaining to SOD can be found at the California Oak Mortality Task Force website (http://www.suddenoakdeath.org/).

Pileated Woodpecker – *Dryocopus pileatus*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Pileated Woodpecker is an uncommon year-round resident and breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, but was not detected at Devils Postpile National Monument (DEPO) by Siegel and Wilkerson (2004) or Richardson and Moss (2010) (Table 1).

Table 49. Breeding status and relative abundance of Pileated Woodpeckers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Uncommon
Yosemite NP	Year-round	Regular Breeder	Uncommon
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Species of Concern
- CA Department of Fish and Game Status: Not listed

Range Significance
Pileated Woodpecker is absent from most of the Southwest except along the pacific coast and the Sierra Nevada. The Sierra and Sierra Nevada Network (SIEN) parks are an important part of the species' California range (Siegel and DeSante 1999).

Distribution and Habitat Associations
Pileated Woodpeckers are uncommon residents of old growth forest within the western slope of the Sierra Nevada. The presence of large and dead timber is more important for their presence than forest type (Gaines 1992). Pileated Woodpeckers are found within the western, lower- and mid-elevation areas of SEKI (Figure 1) and YOSE (Figure 2), but were not detected during survey efforts in DEPO (Table 2). Characteristic of the species, Pileated Woodpecker was found in low densities within a variety of coniferous forests in SEKI and YOSE. Park inventories show highest associations with Giant Sequoia and Ponderosa Pine/Mixed Conifer forests within SEKI and YOSE respectively (Table 2).

Table 50. Number of Pileated Woodpeckers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	17	18	Giant Sequoia Forest	0.03	0.03 (0.01-0.07)
			Red Fir/White Fir Forest	0.01	0.02 (0.01-0.05)
			White Fir/Sugar Pine Forest	0.01	0.01 (0.00-0.03)
Yosemite NP	55	58	Ponderosa Pine/Mixed Conifer	0.03	
			White Fir/Mixed Conifer	0.02	
			Red Fir	0.01	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

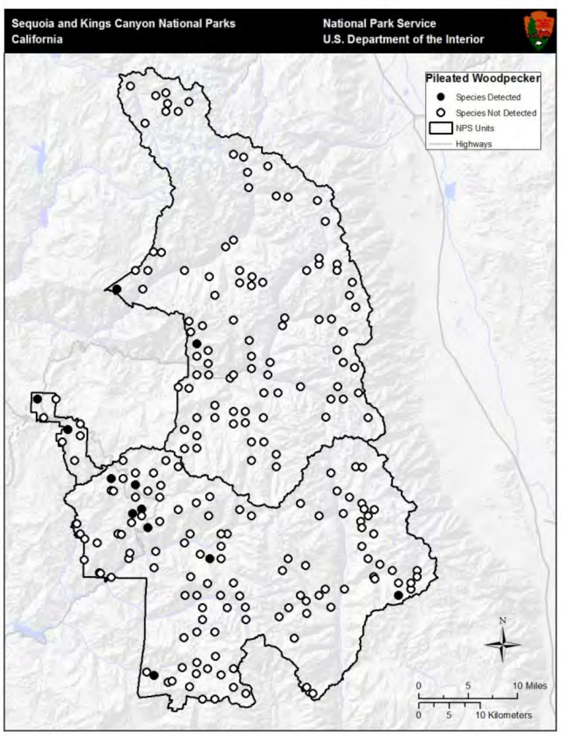

Figure 19. Bird survey transects where Pileated Woodpecker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

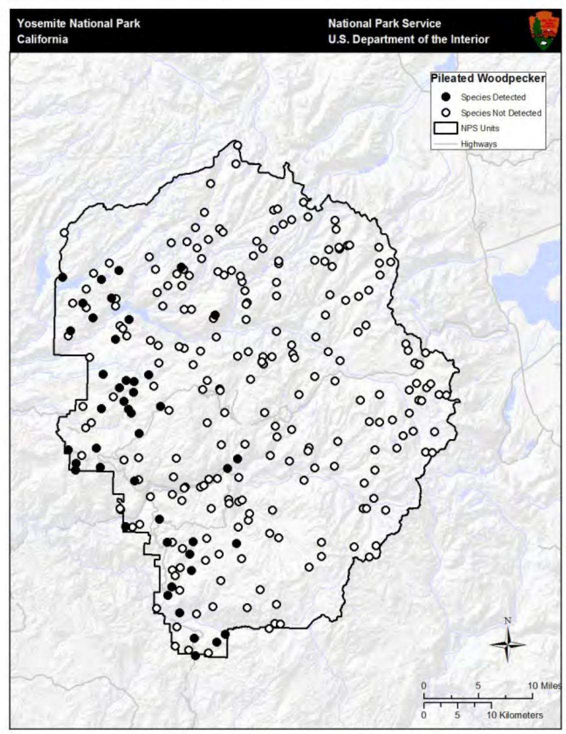

Figure 20. Bird survey transects where Pileated Woodpecker was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Pileated Woodpecker was observed within the mid-elevations at SEKI and lower elevations at YOSE during recent avian inventory projects (Figure 3). The mean elevation of observations of Pileated Woodpecker made in SEKI was 2018 m, with 95% of observations made between 1528 and 2850 m. In YOSE, the mean elevation of observations was 1845 m with 95% of observations falling between 1369 and 2295 m (Siegel et al. 2011).

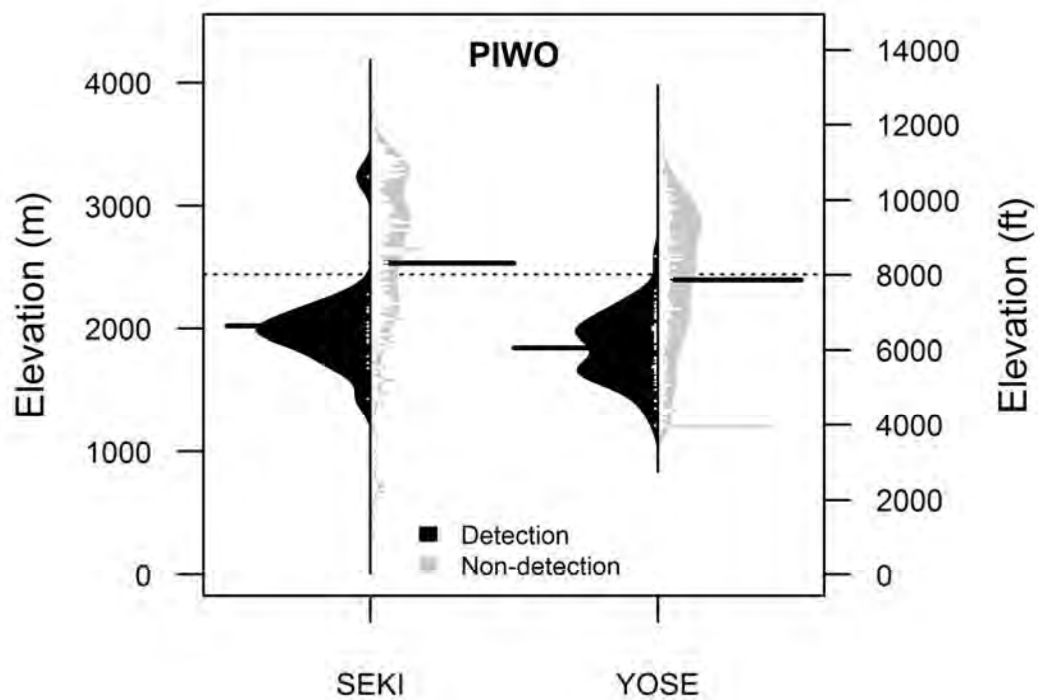

Figure 3. Elevational distributions of sites where Pileated Woodpeckers (PIWO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Pileated Woodpeckers are found in approximately the same density in the Sierra Region (BCR 15) as in California as a whole (**Error! Reference source not found.**). On individual BBS routes that intersect the parks, they were detected only within YOSE. No significant population trends are evident within the Sierra Nevada region or California as a whole (Table 3). However, statistical power may be low due to the natural uncommonness of the species.

Table 51. Relative abundance and trends for Pileated Woodpecker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	62	0.55	+1.3	0.35
	1980-2007			+0.1	0.95
Sierra Nevada (BCR 15)	1966-2007	22	0.51	-1.5	0.44
	1980-2007			-2.2	0.21
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	1.31	-4.7	0.47

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Pileated Woodpeckers have not been captured in sufficient numbers at MAPS stations to make inferences regarding population trends, reproductive rates, or adult survivorship. Low capture rates can be attributed both to the species' large territory size and to the fact that SIEN MAPS stations are located in meadows rather than the species' preferred mature forest habitats.

Stressors

The greatest threat to Pileated Woodpecker across the Sierra Nevada is the loss or reduction in size of old growth forest tracts. Timber harvest is not an issue within SIEN parks, but Pileated Woodpecker's relatively large territory size suggests that logging adjacent to park boundaries could affect birds within the parks. A greater concern within protected areas is the effect of fire management practices on forest structure. Removal of snags and downed logs to reduce fuel levels and prevent wildfires could reduce the quality of nesting and foraging habitat for the species.

Observed abundance shifts, modeled range shifts, and vulnerability assessments suggest that climate change will be somewhat detrimental to Pileated Woodpecker. However, mid-elevation forests such as those found in SEKI and YOSE may act as climate refugia and see an increase in Pileated Woodpecker density in the future. Finally, human use impacts (other than timber harvest and fire management), invasive species, and disease do not appear to be major threats to the species. In fact tree die-off from disease or insect infestation could enhance habitat for Pileated Woodpeckers.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Pileated Woodpecker has significantly shifted 125.3 miles to the north and 39.0 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Pileated Woodpecker has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Modeled distribution shifts of Pileated Woodpecker predict range contractions across California (Stralberg and Jongsomjit 2008). The most prominent decreases in occurrence are shown along the north coast, while Pileated Woodpeckers are expected to increase in density in the southern Sierra. The most important variables influencing current and projected distribution were vegetation, annual precipitation (Maxent distribution model), and precipitation seasonality (GAM distribution model) (Stralberg and Jongsomjit 2008). Pileated Woodpeckers currently occur between 2850 and 1528 m along the SIEN parks (Siegel et al. in review) and may colonize higher elevations as suitable forest types move upslope with climate warming.

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Pileated Woodpecker received a sensitivity score of 43.88 (UW 2010), suggesting moderate sensitivity to the threat. Certainty of results was listed as 42.50 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Pileated Woodpecker's sensitivity to climate change was its need for specialized habitat (UW 2010).

Due to the large extent of high-elevation land mass they comprise, the SIEN parks may provide important refugia for the Pileated Woodpecker in a warmer future. However, it is important to note that if the species persists in high elevation 'islands' within the southern Sierra Nevada, isolation of these populations from the greater range of the Pileated Woodpecker could lead to a loss in genetic diversity.

Altered Fire Regimes: Wildfire can enhance habitat for Pileated Woodpecker by producing snags and hollow trees for nesting, roosting, and foraging. At least one study has shown that the combination of prescribed burns and mechanical fuel reduction decreases foraging habitat and prey for the species, whereas fuel reduction without burning and no treatments of any kind result in significantly more foraging (Bull et al. 2005). Natural fire regimes are important for the maintenance of Pileated Woodpecker habitat. On the other hand, an increase in large, high-severity fires and aggressive fire suppression, neither of which tend to leave a mix of snags and live trees, can reduce habitat quality.

Habitat Fragmentation or Loss: Past logging of old growth forests and removal of snags has reduced populations of Pileated Woodpeckers locally in the southern Sierra (Marshall 1988). However, because logging does not occur within SIEN parks, destruction of Pileated Woodpecker habitat is not a major concern. Pileated Woodpeckers require large patches of suitable forest (at least 20-70 ha) for persistence (NatureServe 2009). Therefore, habitat loss or degradations in the areas surrounding SIEN parks could have negative impacts on park populations.

Invasive Species and Disease: Insect outbreaks that cause extensive tree mortality provide important nesting and foraging habitat for Pileated Woodpeckers (Bull et al. 2007). Therefore, increased tree die-off from insects or disease may be beneficial to Pileated Woodpeckers, provided sufficient mature live trees remain.

Human Use Impacts: Pileated Woodpeckers may be sensitive to chronic disturbances such as noise from timber harvest operations during the breeding season (Burnett et al. 2008). However, they are known to be fairly tolerant of other human activity near nests and roosts (Bull et al. 1995). Without timber harvest within the SIEN parks, disturbance from human activities is not a major concern.

Management Options and Conservation Opportunities

The maintenance of old-growth forest and natural fire regimes within SIEN parks is likely the best way to maintain healthy populations of Pileated Woodpeckers. Specifically, a high density of snags and downed logs should be maintained for nesting and foraging (Bull and Holthausen 1993). Where fire prevention is necessary, mechanical fuel reduction without accompanied prescribed burns will leave better foraging habitat for the species than a combination of prescribed burning in addition to fuel reduction (Bull et al. 2005). Fire treatments that maximize snag and downed woody debris retention will also benefit Pileated Woodpeckers (Burnett et al. 2008). Finally, coordination with land managers of forests adjacent to the SIEN parks, in order to maintain large contiguous tracts of late-seral forest, would benefit Pileated Woodpeckers within the parks.

Pine Grosbeak – *Pinicola enucleator*

Migratory Status

Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Pine Grosbeak is an uncommon summer or year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and an uncommon migrant or summer resident and occasional breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 52. Breeding status and relative abundance of Pine Grosbeaks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Uncommon
Yosemite NP	Year-round	Regular Breeder	Uncommon
Devils Postpile NM	Year-round	Occasional Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

The Pine Grosbeak ranges throughout boreal and montane forests of Canada, the western and northern U.S., and Eurasia (Adkisson 1999). An endemic subspecies of Pine Grosbeak, *P.e. californicus*, is found only in the Sierra Nevada (Gaines 1992). Its entire California breeding population is restricted to and isolated in the Sierra Nevada, thus the mountain range is critical to the persistence of this subspecies (Siegel and DeSante 1999).

Distribution and Habitat Associations

Pine Grosbeaks inhabit high-elevation, open, mixed coniferous forests dominated by Red Fir and/or Lodgepole Pine (Adkisson 1999). Pine Grosbeak were detected at low to moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects in SEKI and YOSE but not DEPO. Abundances of Pine Grosbeaks were relatively similar in high-elevation Lodgepole, Foxtail, and Western Whitebark Pine forests, as well as Mountain Hemlock, Red Fir, and alpine meadows (Table 2).

Table 53. Number of Pine Grosbeaks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	8	12	Lodgepole Pine Forest	0.02	0.01 (0.00-0.04)
			Foxtail Pine	0.01	0.02 (0.00-0.08)
Yosemite NP	26	39	Subalpine/Alpine Meadow	0.06	
			Mountain Hemlock	0.04	
			Western White Pine	0.03	
			Lodgepole Pine	0.03	
			Red Fir	0.02	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

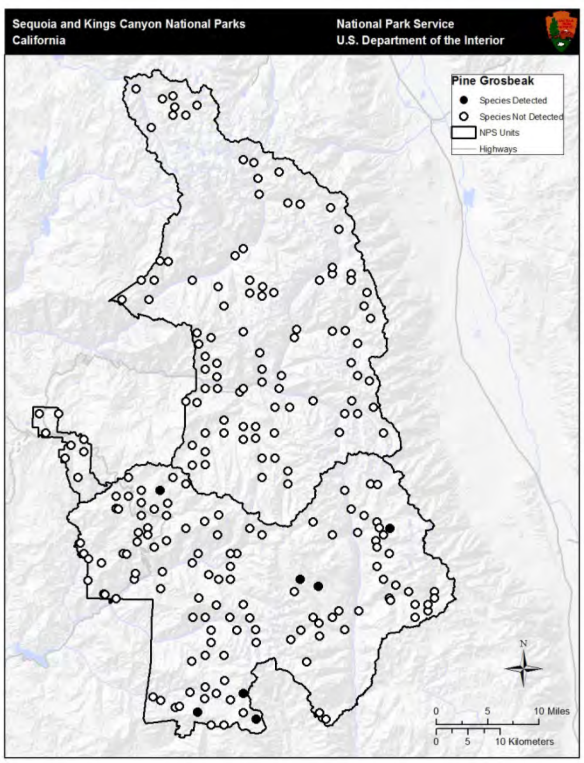

Figure 21. Bird survey transects where Pine Grosbeak was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

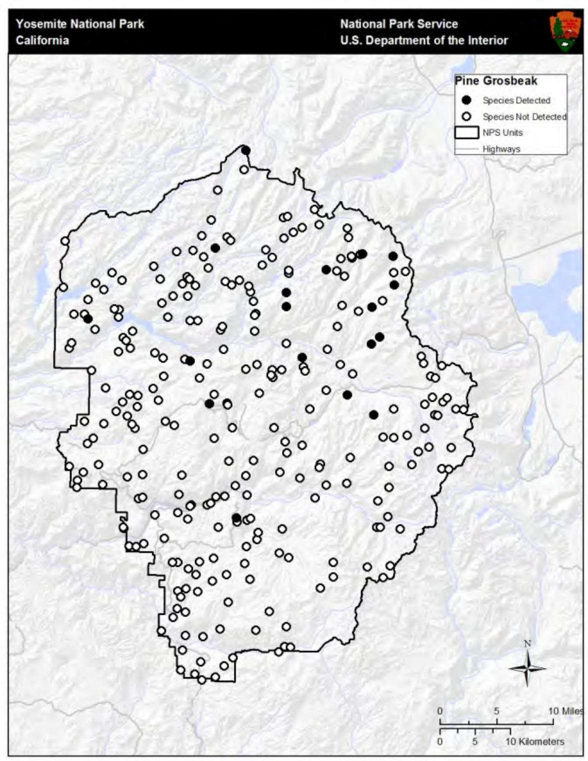

Figure 22. Bird survey transects where Pine Grosbeak was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Pine Grosbeak was detected at high elevations in SEKI and mid to high elevations at YOSE during avian inventory surveys (Figure 3). The mean elevation of observations for Pine Grosbeak at SEKI was 2939 m, with 95% of observations occurring between 2502 and 3388 m. In YOSE, the mean elevation of observations was 2772 m with 95% of observations falling between 1920 and 3191 m (Siegel et al. 2011).

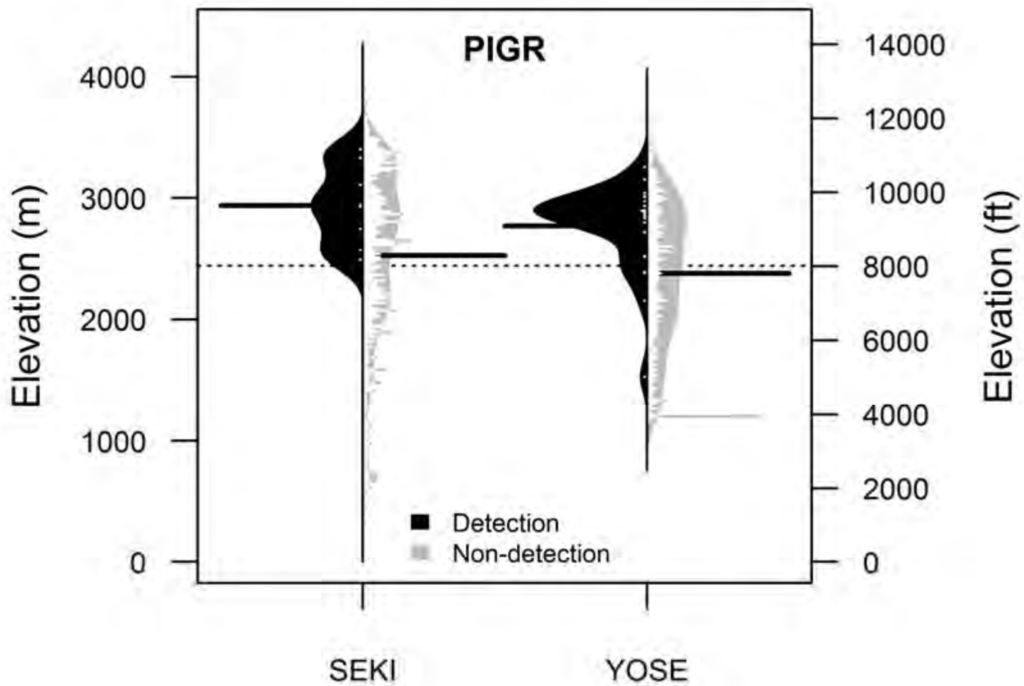

Figure 3. Elevational distributions of sites where Pine Grosbeak (PIGR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Very few Pine Grosbeaks were detected along Breeding Bird Survey (BBS) routes in either the Sierra Nevada Region (BCR 15) or California as a whole, and no birds were observed in the SIEN parks (Table 3). Low detections reflect how poorly high-elevation habitats are covered in BBS surveys in the Sierra, as well as the relative uncommonness of the species. Thus, sample sizes may not have been adequate to detect population trends, although non-significant population declines were evident for California and the Sierra Nevada (Table 3).

Table 54. Relative abundance and trends for Pine Grosbeak according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007[1]	2	0.02	-8.5	0.21
	1980-2007[1]			-8.9	0.21
Sierra Nevada (BCR 15)	1966-2007[1]	2	0.02	-8.5	0.21
	1980-2007[1]			-8.9	0.21
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Too few Pine Grosbeaks were captured in mist nets at SIEN MAPS stations to estimate demographic rates (Table 4).

Table 55. Population trends, productivity, trends, and survival estimates of Pine Grosbeak at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.0	NA[2]	NA	NA	NA
Yosemite NP	1993-2009	0.7	NA	0.02	NA	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Pine Grosbeaks are most abundant in open, high-elevation montane forests near treeline, and near natural and human-made openings elsewhere (Adkisson 1999). Some coniferous habitats utilized by Pine Grosbeaks may have been degraded as a result of forestry practices, fire management, and perhaps exurban development, but the species' favored higher-elevation forest types have likely been less affected by these factors than have lower-elevation forest types.

Natural or controlled burning likely benefits Pine Grosbeaks by maintaining open conditions in conifer forests and high-alpine meadows. Climatic changes that tend towards xeric conditions also may threaten Pine Grosbeaks.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Pine Grosbeak in North America has significantly shifted northward by over 148 miles and towards the coast by over 127 miles over the past 40 years, corresponding with increases in temperature (Audubon 2009). These shifts provide evidence that the Pine Grosbeak has already responded to climate change and will likely continue to shift its range in the coming decades.

Pine Grosbeak was observed in pine, hemlock, and fir forests at higher elevations of the SIEN parks (Table 2, Figure 3). If climate change causes the species' range to move upslope in the Sierra Nevada as is generally expected, there may not be extensive coniferous forests to support large populations of this species in the parks, especially if its preferred forest habitats do not expand uphill as well. Furthermore, Pine Grosbeak abundance is apparently correlated with water, such as wet, high drainages (Adkisson 1999) and the species was detected at greatest abundances in alpine meadows in Yosemite (Table 2). If climate change results in more xeric conditions, the Pine Grosbeak is likely to suffer. The northward shift in center of abundance already observed suggests that the species may be moving into cooler, wetter regions as the climate warms.

Altered Fire Regimes: Pine Grosbeaks increased in abundance following fire of varying intensities in the Rocky Mountains, but also increased in similar numbers on unburned controls (Smucker et al. 2005). These results suggest that fire does not adversely impact this species. Pine Grosbeaks prefer more open forest conditions at high elevations, thus fire may enhance habitat, especially by maintaining high-alpine meadows. Natural or controlled fire in high-elevation forests in the SIEN parks may be beneficial for Pine Grosbeaks, but responses should be closely monitored due to lack of data.

Habitat Fragmentation or Loss: Deforestation has drastically decreased populations of Pine Grosbeaks and other taiga species in Finland (Adkisson 1999). While no specific information is available from North America, similar effects could be expected where clearcutting is occurring on a large scale, such as on private lands in the Sierra Nevada. However, Pine Grosbeaks favor higher-elevation pine, Mountain Hemlock, and Red Fir stands that probably have escaped extensive clearcutting. Deforestation does not pose a threat to Pine Grosbeaks in protected areas like the SIEN parks.

Invasive Species and Disease: To our knowledge, invasive species and disease do not pose a significant threat to Pine Grosbeaks in SIEN parks.

Human Use Impacts: Collisions with moving cars can be a common source of mortality for Pine Grosbeaks in winter, because they are attracted to roads by sand and salt, especially when ground is covered by snow (Adkisson 1999). Otherwise, human impacts are not likely to be a major threat to this species.

Management Options and Conservation Opportunities

Management activities such as prescribed controlled burning that maintains open conditions in high-elevation pine associations, mountain hemlock, and red fir forests would benefit Pine Grosbeaks. Collisions between Pine Grosbeaks and cars as a potential source of mortality should be investigated in the SIEN parks.

Pine Siskin – *Carduelis pinus*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Pine Siskin is a common to fairly common summer or year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and at Devils Postpile (DEPO) National Monument (Table 1).

Table 56. Breeding status and relative abundance of Pine Siskins in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Common
Yosemite NP	Summer/Year-round	Regular Breeder	Common
Devils Postpile NM	Summer/Year-round	Probable Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Pine Siskin occurs in coniferous or mixed coniferous-deciduous forests of northern (Canada) and western North America south to Guatemala (Dawson 1997). The Sierra Nevada is relatively important to the species' California population (Siegel and DeSante 1999).

Distribution and Habitat Associations
Pine Siskin in the Sierra Nevada breeds in most types of forest as long as conifers are present (Siegel and DeSante 1999). They are most abundant around forest-meadow edges, but also forage in arborescent riparian hardwoods, particularly alders, as well as in conifers (Siegel and DeSante 1999). These birds were detected in very high numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE, and in lower numbers at DEPO. Park inventories show the strongest associations with Western White Pine woodlands in SEKI and YOSE, but Pine Siskin also was commonly detected in a variety of conifer forest types as well as Aspen and mid-elevation meadow habitats (Table 2).

Table 57. Number of Pine Siskins recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	102	154	Western White Pine Woodland	0.64	1.45 (0.48-3.23)
			Lodgepole Pine Forest	0.20	0.38 (0.24-0.60)
			Aspen Forest	0.17	0.16 (0.03-0.92)
			Mid Elevation Meadow	0.16	0.15 (0.04-0.59)
			Red Fir Forest	0.12	0.21 (0.11-0.43)
Yosemite NP	384	691	Western White Pine	0.37	
			Mountain Hemlock	0.36	
			Whitebark Pine/Lodgepole Pine	0.34	
			Lodgepole Pine	0.26	
Devils Postpile NM	2	3	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

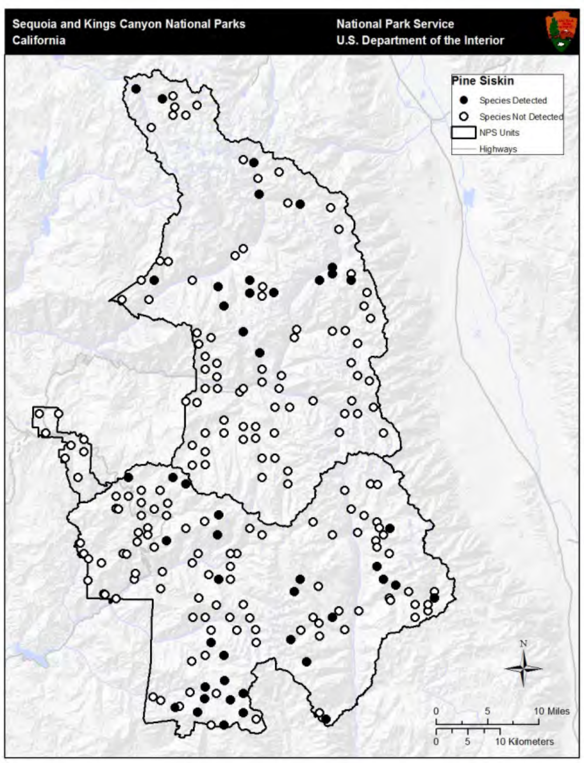

Figure 23. Bird survey transects where Pine Siskin was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

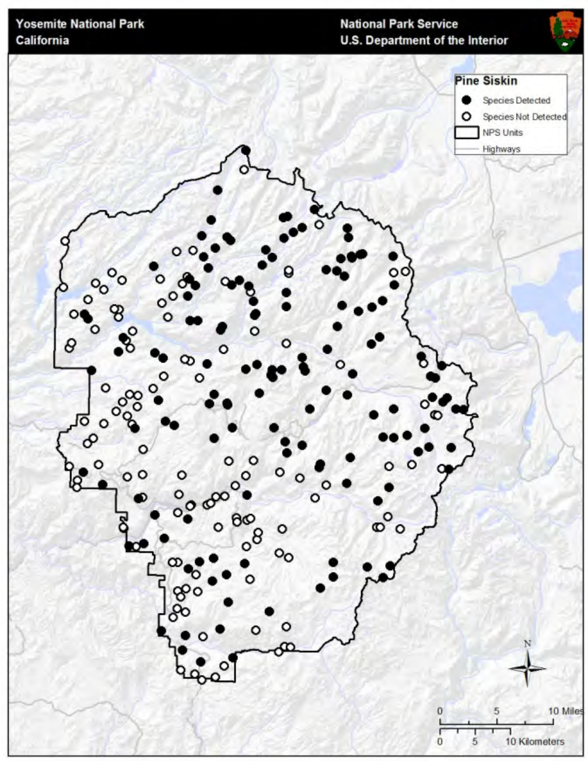

Figure 24. Bird survey transects where Pine Siskin was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Pine Siskin was detected at mid- to high-elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 2875 m, with 95% of observations occurring between 2014 and 3340 m. In YOSE, the mean elevation of observations was 2715 m with 95% of observations falling between 1459 and 3255 m (Siegel et al. 2011).

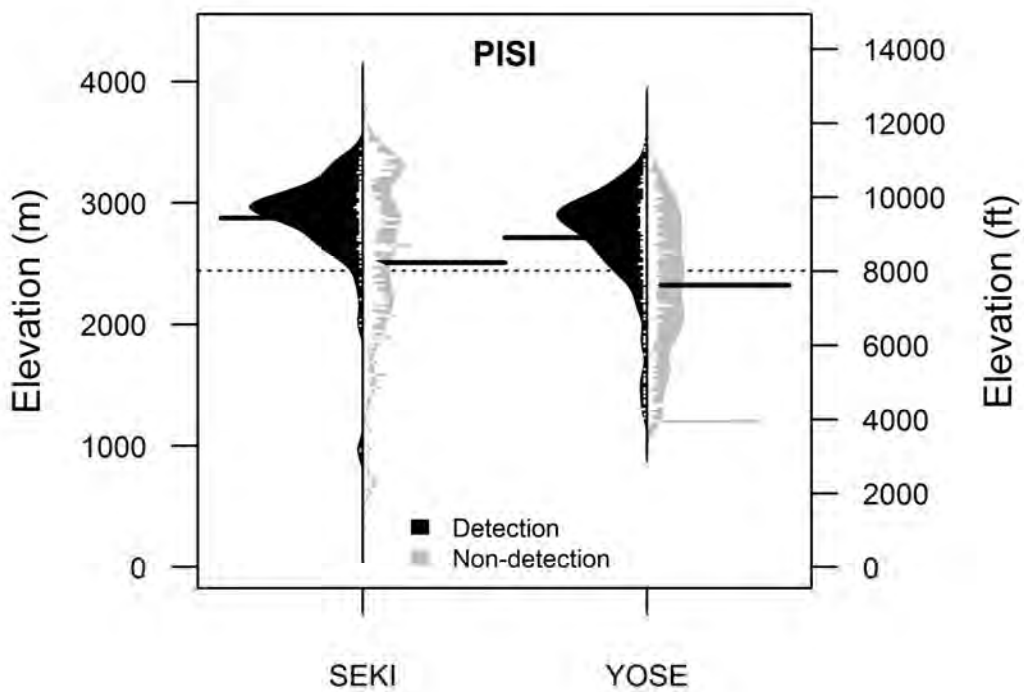

Figure 3. Elevational distributions of sites where Pine Siskin (PISI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate that Pine Siskin were equally abundant in the Sierra Region (BCR 15) and California as a whole (Table 3). The species exhibited significant negative annual population trends of 7% throughout California from 1966-2007 and 10% from 1980-2007, suggesting worsening declines over time (Siegel and DeSante 1999). No significant population trends were observed in the Sierra Nevada or the along the routes in the SIEN parks, although a non-significant increasing trend was observed along the route in Sequoia NP (Table 3).

Table 58. Relative abundance and trends for Pine Siskin according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	70	1.63	-6.9	0.00
	1980-2007			-10.2	0.00
Sierra Nevada (BCR 15)	1966-2007[1]	23	1.37	-0.4	0.94
	1980-2007[1]			-6.0	0.23
Route 14117 – Sequoia NP	1972-2005	1	3.75	+13.3	0.23
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	1.88	+1.3	0.87

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

SIEN MAPS data reveal no significant population or reproductive trends for Pine Siskin in any of the parks. These data suggest an increasing reproductive but decreasing population trend from 1993-2009 in Yosemite National Park, but results were not statistically significant (Table 4).

Table 59. Population trends, productivity, trends, and survival estimates of Pine Siskin at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.4	NA[2]	0.00	NA	NA
Yosemite NP	1993-2009	3.7	-1.31	0.54	+4.88	NA
Devils Postpile NM	2002-2006	3.0	NA	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Pine Siskins are significantly declining in California and may be declining in the Sierra Nevada region as well (Tables 3 and 4). Reliance on cone crops and seeds of mast-fruiting trees renders Pine Siskins vulnerable to periodic failures of food supply, and leading to irruptions that may increase mortality risks (Dawson 1997). These irruptive tendencies result in large annual fluctuations in numbers of birds at particular sites, which complicates overall population estimates (Dawson 1997). BBS trends should therefore be viewed with caution (Siegel and DeSante 1999).

Pine Siskins occur at higher-elevations and may face serious challenges adapting to climate change in SIEN parks. Pine Siskins also are susceptible to disease outbreaks. Some timber harvest that creates small forest openings may benefit Pine Siskins, but larger-scale clearcutting eliminates habitat. Fire treatments that create small openings and increase edge in conifer forests should benefit this species.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Pine Siskin in North America has significantly shifted northward by more than 288 miles over the past 40 years. This observed shift provides evidence that this species has already responded to climate change and will likely continue to shift its range in the coming decades.

Pine Siskin was most abundant at relatively high elevations in SIEN parks (2875 m in SEKI and 2715 m at YOSE; Figure 3) and are already shifting its range in response to climate change. If climate change also causes the species' range to move upslope in the Sierra Nevada as is generally expected, there may not be sufficient amounts of coniferous forest at higher altitudes to support such large populations of birds within the parks.

Altered Fire Regimes: Pine Siskins often are abundant along forest edges (Keller and Anderson 1992, Siegel and DeSante 1999) and thus may benefit from moderate- to high-intensity fire. This species was significantly more abundant in burned than unburned forests in a variety of habitat types and including stands subjected to high-intensity fire (Dieni and Anderson 1999, Siegel and Wilkerson 2005, Smucker et al. 2005, Fontaine et al. 2009). Pine Siskins may respond to the short-term increase in availability of seeds after fire (Smucker et al. 2005). Fire suppression may pose a risk to this species throughout the Sierra Nevada.

Habitat Fragmentation or Loss: Large-scale clearcut harvesting of coniferous and mixed coniferous-deciduous forests has eliminated and fragmented habitat for Pine Siskin (Dawson 1997). However, one study found Pine Siskins more abundant in sites containing small clear-cuts, which increase forest edge and open spaces, than uncut sites (Keller and Anderson 1992). Loss of natural habitat may be ameliorated by planting of ornamental conifers in urban areas, which are readily used by Pine Siskins for breeding, and by increased availability of food at bird feeders (Dawson 1997). Owing to the lack of commercial logging in SIEN parks, habitat fragmentation and loss from large-scale clearcutting does not pose a significant threat to this species.

Invasive Species and Disease: West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). The virus has caused mortality in many native birds. In 2009, West Nile Virus caused at least one Pine Siskin death in California (CDPU 2010).

Tens of thousands of Pine Siskins died in a widespread salmonellosis outbreak in the early 1990s, attributed to use of artificial feeding stations (Dawson 1997). Pine Siskin was the primary species affected, although other cardueline finches, Evening Grosbeaks, and House Sparrows were also involved. Cleaning and disinfecting feeders and reducing risk of birds' contacting avian feces was suggested to prevent transmission of pathogens.

Human Use Impacts: Aside from human activities that lead to a reduction in suitable habitat (see above), human use impacts do not appear to be a major threat to Pine Siskin especially in protected areas such as the SIEN parks.

Management Options and Conservation Opportunities

Perhaps the management action that would most benefit Pine Siskins in the parks is allowing a patchy mosaic of fire of varying intensities to maintain forest openings and edge habitats. MAPS station operation and other means of monitoring Pine Siskin populations in the parks should continue, to determine potential causes of declines. Park staff should collect and test any bird carcasses for West Nile Virus.

Prairie Falcon – *Falco mexicanus*

Migratory Status
Resident/Short-distance migrant (Steenhof 1998)

Residency and Breeding Status
Prairie Falcon is observed rarely at Yosemite (YOSE) National Park or Sequoia and Kings Canyon (SEKI) National Parks and has not been reported at Devils Postpile (DEPO) National Monument in recent years. The species breeds occasionally in YOSE and may breed in SEKI (Table 1).

Table 60. Breeding status and relative abundance of Prairie Falcons in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Summer	Possible Breeder	Rare
Yosemite NP	Migrant/Summer	Occasional Breeder	Rare
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Prairie Falcon is distributed over much of western United States including throughout California (Steenhof 1998). Because the species is widely distributed and is rarely found within SIEN parks (Table 1), the parks are not of great importance to the Prairie Falcon.

Distribution and Habitat Associations
Prairie Falcons breed in the low foothills of the western Sierra Nevada. In July and August they move to the higher elevations and hunt in open areas such as meadows, fields and along ridges (Gaines 1992). Prairie Falcons were not detected during park inventories of the SIEN parks (Table 2). However, like many other raptor species, Prairie Falcons are not well sampled during surveys designed for singing birds.

Table 61. Number of Prairie Falcons recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Not detected	NA[1]	NA
Yosemite NP	0	0	Not detected	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Prairie Falcons are detected infrequently across California as a whole, and only rarely in the Sierra Nevada. The species has not been observed along BBS routes that intersect SEKI or YOSE. Across the state there appears to be a non-significant, but slightly positive population trend (Table 3).

Table 62. Relative abundance and trends for Prairie Falcon according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007[1]	26	0.05	+2.4	0.11
	1980-2007[1]			+2.6	0.17
Sierra Nevada (BCR 15)	1966-2007	NA[1]	NA	NA	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Prairie Falcons are not captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Historically Prairie Falcon has suffered from hunting, harvest of nestlings for falconry and reduced reproductive success due to exposure to the pesticide DDT. While human persecution continues in some areas and detrimental environmental contaminants other than DDT are still in use, these reduced threats are not of great concern within SIEN parks. Likewise, land-use changes resulting from increased agriculture and grazing have mixed effects on the species outside of protected areas. Increases in fire frequency and intensity within shrub-steppe habitats may have negative impacts on local populations due to increased variability of inter-annual prey abundance. Finally, climate change, new diseases and invasive species do not appear to be major threats to Prairie Falcon within or beyond SEIN parks.

Climate Change: An analysis of Christmas Bird Count data suggests that the center of abundance of Prairie Falcon has not significantly shifted over the past 40 years throughout its North American Range, a time of documented climate warming (Audubon 2009). The absence of observed shifts suggest that Prairie Falcon is not responding to climate change as greatly as many other bird species.

Prairie Falcons are found breeding in the lower foothills of the Sierra Nevada (Gaines 1992). If climate change causes the species' range to shift upward as is generally expected of most species, there is much higher-altitude habitat within Sequoia and Kings Canyon as well as Yosemite. However, it is important to note that even if Prairie Falcon shifts its range in response to climate change, populations may suffer if prey species they depend upon are not also able to shift upslope or foraging habitat is degraded due to climate warming.

Altered Fire Regimes: Extensive wildfires in shrub-steppe habitats have lead to increased variability of falcon prey abundance and subsequently the variability of year-to-year productivity of Prairie Falcon has increased in some areas (Steenhof 1998, Steenhof et al. 1999). If fire frequency and intensity increases in the Sierra foothills, similar fluctuations of falcon productivity might occur.

Habitat Fragmentation or Loss: Prairie Falcon is vulnerable to loss of foraging habitat within breeding areas due to the limited number of cliff nest sites. Without alternative nest sites, individuals cannot easily move to undisturbed areas. Large-scale agricultural development that results in reduced ground squirrel (a favorite food source) abundance is especially problematic for the Prairie Falcon (Steenhof 1998). However, Small-scale agriculture can have a positive effect on the species where agricultural boarders maintain quality habitat for prey species and irrigated fields provide forage. Likewise agricultural lands on wintering grounds can provide habitat for important prey species of the falcon (Steenhof 1998). The expansion of grazed areas may be negative for Prairie Falcon, but its impact on the species is not well understood (Steenhof 1998). Agriculture and other forms of land conversion have mixed effects on Prairie Falcon outside of SIEN parks, but do not occur within park boundaries.

Invasive Species and Disease: Like all bird species, Prairie Falcon is susceptible to natural parasites and disease (e.g., Morishita et al. 1998, Hawkins et al. 2001). However, there does not appear to be any emerging diseases that are affecting Prairie Falcon populations in a significant way.

Human Use Impacts: Illegal shooting of Prairie Falcon may still be a problem in some areas and legal harvest of nestlings for falconry is an additional minor source of population reduction (Steenhof 1998). Neither threat is a likely concern within SIEN parks.

Prairie Falcon is more susceptible to the effects of DDE (a key metabolite of DDT) than Peregrine Falcon and Merlin, but did not experience severe population declines because its diet and lower trophic position resulted in lower levels of exposure (Jarman et al. 1996). While DDT is not longer used in the United States, other environmental contaminants such as mercury and lead may continue to negatively affect the falcon (Steenhof 1998).

Prairie Falcon collisions with fences, telephone wires and motor vehicles have been reported, but do not appear to be major threats to the species (Steenhof 1998). Finally, disturbance from rock climbers and other human activities near nesting sites can reduce reproductive success of Prairie Falcon (Boyce et al. 1986, Steenhof 1998). However, Prairie Falcon is also known to use buildings and towers as nesting sites on occasion, indicating at least some tolerance of human presence (Steenhof 1998).

Management Options and Conservation Opportunities

Past and current management of Prairie Falcon has primarily focuses on maintaining nest sites, managing foraging areas for prey, reducing human disturbance and restoring populations to areas where they were previously reduced or extirpated (Steenhof 19998). Beyond the current protection of Prairie Falcon habitat within SIEN parks, there appears to be little park managers can do to further conserve the species. However, if rock climbing or other human disturbances become a problem near known nesting sites, restriction of visitor use could help reproductive success.

Purple Finch – *Carpodacus purpureus*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Purple Finch is a fairly common summer or year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and an uncommon migrant or summer resident and non-breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 63. Breeding status and relative abundance of Purple Finches in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Migrant/Summer	Non-Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Purple Finch occurs across the northern U.S., southern and central Canada, and the west coast of North America (Wootton 1996). Purple Finch inhabits montane habitats, thus the Sierra Nevada is of considerable importance to the species in California (Siegel and DeSante 1999).

Distribution and Habitat Associations
Purple Finch prefers relatively dense and moist mixed oak-conifer, Douglas-fir, and Mixed Conifer forests, and forest edges and meadows (Siegel and DeSante 1999). When found in Ponderosa Pine or Red Fir types, stands are usually dense and moist. Purple Finch were detected at moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventories in all SIEN parks. Park inventories suggest highest density in lower elevation rock or sparse vegetation, but this result was an artifact of the very small sample size in that restricted habitat type. Otherwise, the species also was found more reliably in a variety of woodland and forest types, riparian vegetation, and Mixed Chaparral (Table 2).

Table 64. Number of Purple Finches recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	52	59	Lower Elev. Rock/Sparse Veg.	0.21	0.20 (0.02-1.70)
			Blue Oak Forest	0.13	0.08 (0.02-0.32)
			Undifferentiated Riparian	0.13	0.07 (0.01-0.52)
			Giant Sequoia Forest	0.10	0.11 (0.05-0.28)
			Ponderosa Pine Woodland	0.08	0.09 (0.02-0.39)
Yosemite NP	66	84	Ponderosa Pine	0.07	
			Ponderosa Pine/Mixed Conifer	0.05	
			Douglas-fir/Mixed Conifer	0.04	
			Mixed Chaparral	0.04	
Devils Postpile NM	1	1	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

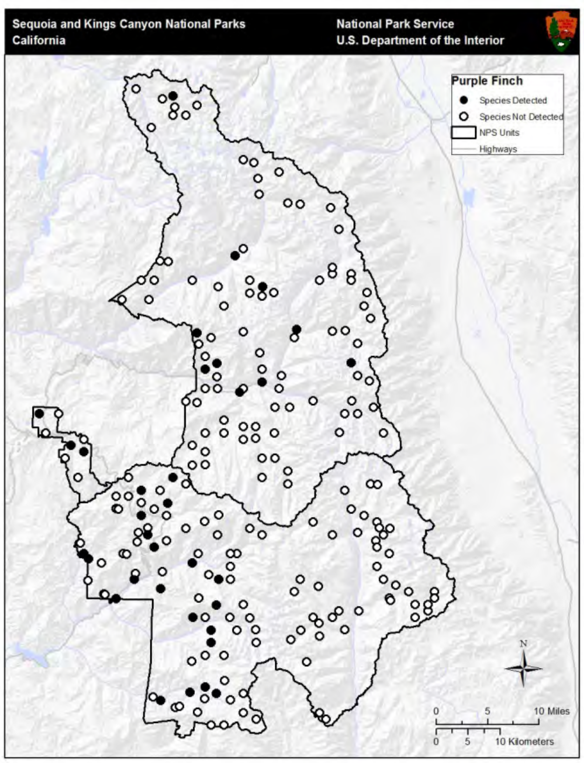

Figure 25. Bird survey transects where Purple Finch was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

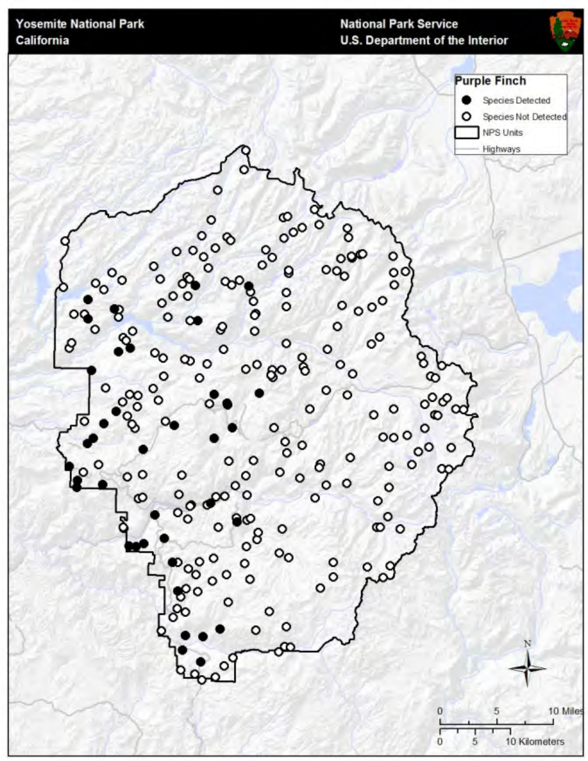

Figure 26. Bird survey transects where Purple Finch was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Purple Finch was detected from low to high elevations in SEKI and mid-elevations at YOSE during avian inventory surveys (Figure 3). The mean elevation of observations for Purple Finch at SEKI was 1952 m, with 95% of observations occurring between 633 and 3298 m. In YOSE, the mean elevation of observations was 1930 m with 95% of observations falling between 1263 and 2911 m (Siegel et al. 2011).

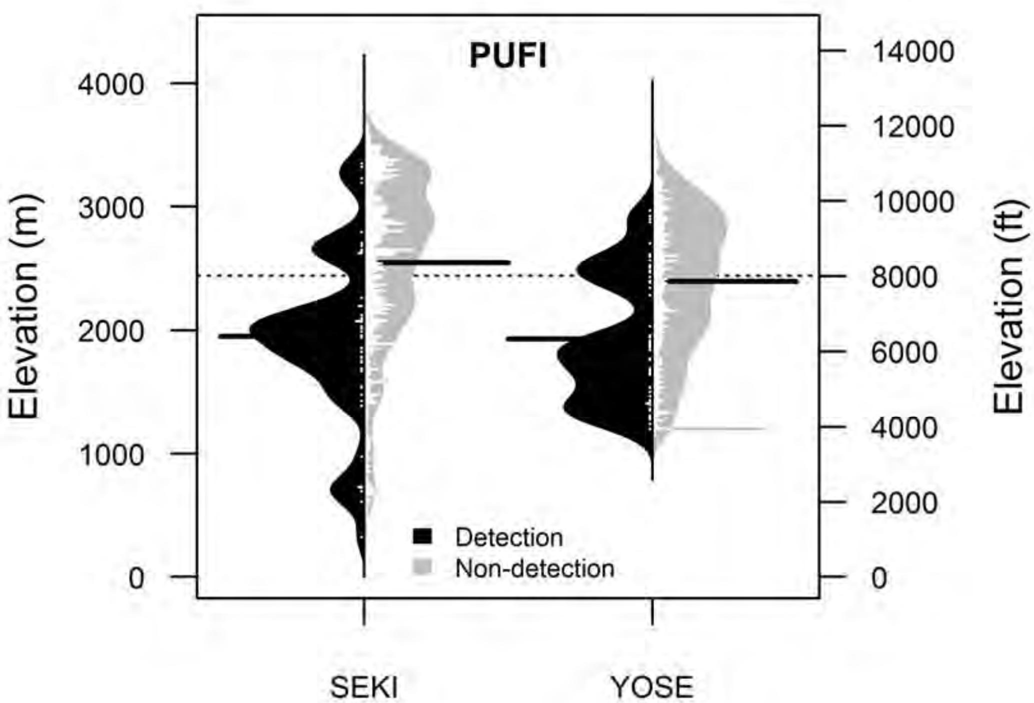

Figure 3. Elevational distributions of sites where Purple Finch (PUFI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Purple Finches are more abundant in the Sierra Nevada Region (BCR 15) than California as a whole (Table 3). The survey data reveal significant population declines throughout the Sierra Nevada from 1966-2007 and 1980-2007 (Table 3). Conversely, a significant large annual population increase was observed along the BBS route in Sequoia National Park from 1972-2005 (Table 3).

Table 65. Relative abundance and trends for Purple Finch according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	121	2.38	-1.3	0.05
	1980-2007			+0.6	0.85
Sierra Nevada (BCR 15)	1966-2007	30	3.99	-2.5	0.00
	1980-2007			-2.1	0.01
Route 14117 – Sequoia NP	1972-2005	1	2.13	+92.1	0.01
Route 14132 – Kings Canyon NP	1974-2005	1	2.75	+3.9	0.60
Route 14156 – Yosemite NP	1974-2007	1	10.31	-0.2	0.95

SIEN MAPS data document strongly significant population declines of Purple Finch at MAPS stations in both Kings Canyon (1991-2009) and Yosemite (1993-2009) NPs. These data also suggest a significant increasing reproductive trend during the same time period at Yosemite NP, and a non-significant trend at Kings Canyon NP (Table 4).

Table 66. Population trends, productivity, trends, and survival estimates of Purple Finch at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	12.6	-15.08**	0.04	+30.75	0.599 (0.112)
Yosemite NP	1993-2009	6.3	-7.76***	1.01	+12.73*	0.249 (0.078)
Devils Postpile NM	2002-2006	0.0	NA[2]	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Purple Finches are declining significantly in California and in the Sierra Nevada (Table 3), with large negative population trends observed at MAPS stations in Kings Canyon and Yosemite NPs (Table 4), although an increasing population trends was observed along the BBS route in Sequoia NP. The Purple Finch is noted for irruptions across portions of its winter range, thought to be associated with year-to-year variation in the production of northern conifer cones (Wootton 1996).

Logging that opens up the forest, reduces diversity of tree species, or reduces complexity of forest structure are likely risks to Purple Finch (Siegel and DeSante 1999). However, Purple Finches have been observed using forests burned by high-intensity fire, so this disturbance may be neutral or beneficial to the species. Climatic changes that tend towards xeric conditions also may threaten Purple Finches (Siegel and DeSante 1999).

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Purple Finch in North America has significantly shifted northward by 433 miles and inland by nearly 230 miles over the past 40 years, corresponding with increases in temperature (Audubon 2009). In addition, modeled distribution shifts of Purple Finch predict a lower probability of occurrence in the southern and central-coast portion of its range in California upwards through Sonoma County; a range expansion in northern California; and range shifts upslope in the Sierra Nevada (Stralberg and Jongsomjit 2008), in agreement with data from Audubon (2009). The most important variables influencing current and projected distribution were vegetation, annual precipitation (Maxent distribution model), and mean diurnal range (GAM distribution model). These observed shifts in abundance and range provide evidence that Purple Finch has already responded to climate change and will likely continue to shift its range in the coming decades.

Purple Finch was observed from low to high elevations of the SIEN parks (Figure 3) and inhabits a wide variety of habitat types (Table 2). If climate change causes the species' range to shift upslope as is generally expected, there remains much higher-altitude habitat for new colonization within SEKI and YOSE. Moreover, the broad range of forest types and elevations occupied by this species suggests that it is likely to be relatively resilient to climate-driven changes in vegetation composition. However, the Purple Finch generally prefers moister and denser areas of the forests in which it resides. If climate change results in more xeric forest conditions, the Purple Finch is likely to suffer. The significant and relatively large shifts in center of abundance already observed (several hundred miles) could indicate that the species is moving into cooler, wetter regions as the climate warms, although these results also could also be an artifact of the species' irruptive tendencies. Regardless, continued monitoring of the species is warranted.

Altered Fire Regimes: Despite the association of Purple Finch with denser coniferous forests, one study documented the species was a significant indicator of forests repeat-burned at high intensity (Fontaine et al. 2009). Few other data are available on effects of fire on Purple Finch. Fire treatments that mimic natural regimes in conifer forests of the SIEN parks, incorporating patches of high-intensity burns, should benefit Purple Finches. However, the general lack of data on fire effects suggests that close monitoring of populations after fire is warranted.

Habitat Fragmentation or Loss: Large-scale clearcut harvesting of coniferous forests likely eliminates and fragments habitat for Purple Finch (Siegel and DeSante 1999). Commercial logging is not a threat to the species in SIEN parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Purple Finches are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

To our knowledge, disease is not a significant threat to Purple Finch in the SIEN parks. The congeneric House Finch, however, is highly susceptible to West Nile Virus (Wheeler 2009). Purple Finches should be monitored for potential flavivirus infection to determine possible impacts to populations.

Human Use Impacts: Aside from human activities that lead to a reduction in suitable habitat (see above), human use impacts do not appear to be a major threat to Purple Finches, especially in protected areas such as the SIEN parks.

Management Options and Conservation Opportunities
Purple Finches may benefit by fire management that allows a patchy mosaic of fire of varying intensities, but response should be closely monitored as little data are currently available on the effects of fire on this species. MAPS station operation and other means of monitoring Purple Finch populations in the parks should continue, to determine potential causes of declines in Yosemite and Kings Canyon NPs, and perhaps increases in Sequoia NP. Park staff should collect and test any bird carcasses for West Nile Virus.

Pygmy Nuthatch – *Sitta pygmaea*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Pygmy Nuthatch is rare in all SIEN parks, and is a probable breeder at Sequoia and Kings Canyon (SEKI) National Parks and a regular breeder at Yosemite National Park (YOSE) and Devils Postpile National Monument (DEPO) (Table 1).

Table 67. Breeding status and relative abundance of Pygmy Nuthatches in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Probable Breeder	Rare
Yosemite NP	Year-round	Regular Breeder	Rare
Devils Postpile NM	Year-round	Regular Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Pygmy Nuthatch is patchily distributed in areas primarily dominated by yellow pines throughout the western U.S., southern British Columbia, and much of Mexico (Kingery and Ghalambor 2001). The Sierra Nevada is of moderate importance to the species' overall range (Siegel and DeSante 1999).

Distribution and Habitat Associations
In the Sierra Nevada Pygmy Nuthatches forage almost exclusively in forest stands of Jeffrey Pine or Ponderosa Pine; they nest in decaying pines as well as cottonwoods and aspens (Gaines 1992). Pygmy Nuthatches were not detected during formal surveys associated with avian inventory projects in SIEN parks, but were detected anecdotally by the inventory crew at YOSE (Table 2).

Table 68. Number of Pygmy Nuthatches recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Not detected	NA[1]	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Empirical data on elevation distributions of Pygmy Nuthatches in SIEN parks are unavailable, but Gaines (1992) reported that the birds nest from 900 to 2100 m in the Yosemite area, and occur as transients up to 3000 m.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Pygmy Nuthatches are found in lower abundance in the Sierra Region (BCR 15) than in California as a whole. On BBS routes that intersect SIEN parks, they were detected only along the route in Kings Canyon NP, and only very rarely. No significant population trends are evident for the species in the Sierra Nevada or California as a whole (Table 3).

Table 69. Relative abundance and trends for Pygmy Nuthatch according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	51	1.21	-0.4	0.71
	1980-2007			-2.0	0.19
Sierra Nevada (BCR 15)	1966-2007	13	0.87	-2.3	0.25
	1980-2007			-5.0	0.18
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Pygmy Nuthatches are generally not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors
The cooperatively breeding Pygmy Nuthatch is nearly restricted to long-needled pine forests, such as Jeffrey and Ponderosa Pine in the Sierra Nevada, where it nests in cavities in dead trees or dead portions of live trees (Kingery et al. 2001). The Pygmy Nuthatch reaches highest densities in mature pine forests that are undisturbed by salvage logging and firewood collection, which pose the most significant threats. The association between this species and yellow pine forests at mid-elevations suggests that the future availability of higher-elevation pine forests is important for resilience to climate change. Brown-headed Cowbirds are known to parasitize Pygmy Nuthatch nests.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Pygmy Nuthatch has shifted significantly northward by nearly 266 miles and coastward by nearly 65 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). These shifts suggest that the species may be responding to climate change by moving towards cooler northern regions (Audubon 2009). The Pygmy Nuthatch apparently has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Altered Fire Regimes: Pygmy Nuthatch favors open forests of Ponderosa and Jeffrey pines in Sierra Nevada that are maintained by relatively frequent fire (Kingery et al. 2001), and forages upon bark beetles which are known to increase following fire (Pope et al. 2009). Pygmy Nuthatches only bred on burned plots in the eastern Sierra over a period of 25 years (Bock and Lynch 1978, Rafael et al. 1987), and the species was detected only in a burned landscape in the northern Sierra (Burnett et al. 2010). Conversely, Pygmy Nuthatches were more abundant in unburned forests in northern Arizona one year after fire (Dwyer and Block 2000) and in the southern Sierra several years post-fire (Siegel and Wilkerson 2005). Pygmy Nuthatches were detected at similar densities in prescribe-burned and unburned plots during winter in Arizona, but specifically selected for trees with signs of bark-beetle activity in unburned plots (Pope et al. 2009). More frequent fire and bark beetle activity in the Sierra Nevada might benefit Pygmy Nuthatches depending upon fire characteristics and as long the extent of salvage logging does not increase concomitantly.

Habitat Fragmentation or Loss: Pygmy Nuthatches are less abundant in intensively logged forests than areas with lower-impact management (Kingery et al. 2001). Old-growth Ponderosa Pine forests supported significantly more Pygmy Nuthatches than second-growth forest in northeastern California (George et al. 2005). Since the Pygmy Nuthatch nests in dead pines and live trees with dead sections, it prefers old-growth, mature, undisturbed forests, and is regarded as one of best indicator species for overall health of bird communities in yellow pine forests (Szaro and Balda 1982). Intensive commercial logging, especially involving removal of dead trees, may have decreased habitat for this bird throughout the Sierra Nevada but is not a threat to the species in SIEN parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Pygmy Nuthatches are vulnerable to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Management activities such as post-fire salvage logging, hazard-tree removal, fuelwood harvesting, or cutting fire lines during fire suppression could eliminate snags containing potentially suitable nesting cavities, but none of these are likely to be important factors in the SIEN parks.

Habitat degradation due to packstock grazing within the parks is a potential concern for Pygmy Nuthatch, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can alter the structure of open pine forests. Grazing introduced and spread invasive grass species which compete with pine seedlings and increase fire frequency, thus altering natural fire regimes in many pine-dominated forests (Belsky and Gelbard 2000). As compared to the greater Sierra Nevada where cattle grazing is widespread, however, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Management Options and Conservation Opportunities

Management actions that would most benefit Pygmy Nuthatches in the parks include ecosystem management that favors the retention of large Ponderosa Pine and Jeffrey Pine snags with suitable nesting cavities, and allowing a patchy mosaic of fire of varying intensities to maintain open-forest habitats. Park managers also can protect Pygmy Nuthatches by carefully managing or eliminating of cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE should be updated.

Red Crossbill – *Loxia curvirostra*

Migratory Status
Resident/Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Red Crossbill is an uncommon year-round resident and irregular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and a possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 70. Breeding status and relative abundance of Red Crossbills in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Irregular Breeder	Uncommon
Yosemite NP	Year-round	Irregular Breeder	Uncommon
Devils Postpile NM	Year-round	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Red Crossbill occurs in southern taiga forests from Alaska to Newfoundland, and montane coniferous forests south to Georgia in the Appalachians, Arizona, New Mexico, northern Mexico, and the Sierra Nevada of California (Adkisson 1996). Although only fairly common in the Sierra Nevada, the mountain range represents a very important part of the range of *L. c. Grinnell*, the subspecies inhabiting California and Nevada, and an extremely important part of the range of the Red Crossbill in California (Siegel and DeSante 1999).

Distribution and Habitat Associations
Red Crossbill is found most predictably in Lodgepole Pine forests in the Sierra Nevada, where it presumably breeds, although some foraging also occurs in Pinyon, Ponderosa, and Jeffrey Pines (Siegel and DeSante 1999). These birds were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects in SEKI and YOSE, but not in DEPO. Park inventories show the strongest associations with Lodgepole Pine forests in SEKI, and Whitebark Pine/Mountain Hemlock and Whitebark Pine/Lodgepole Pine forest in YOSE. Red Crossbill also was detected in Foxtail Pine, Red Fir, and Ponderosa Pine/Mixed Conifer forests (Table 2).

Table 71. Number of Red Crossbills recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	34	46	Lodgepole Pine Forest	0.02	0.03 (0.01-0.06)
			Foxtail Pine	0.02	0.02 (0.01-0.09)
			Red Fir Forest	0.02	0.01 (0.00-0.06)
Yosemite NP	38	81	Whitebark Pine/Mt. Hemlock	0.13	
			Whitebark Pine/Lodgepole Pine	0.12	
			Ponderosa Pine/Mixed Conifer	0.05	
			Red Fir	0.04	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

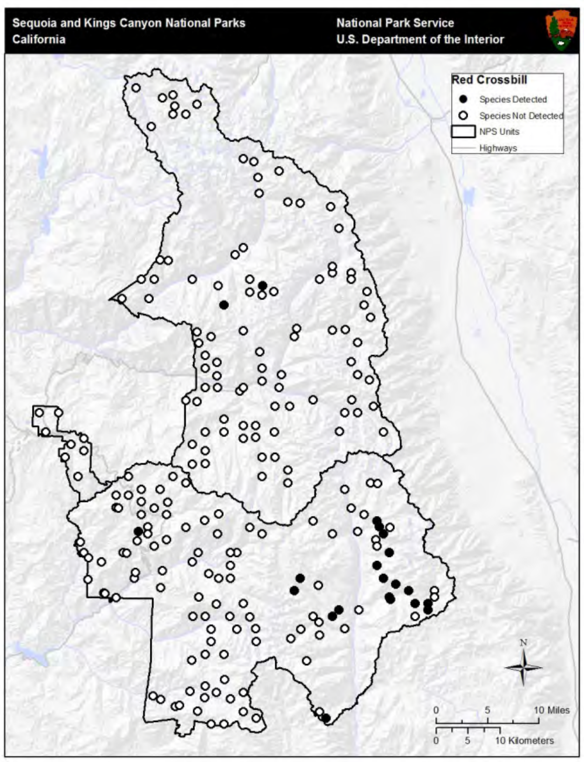

Figure 27. Bird survey transects where Red Crossbill was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

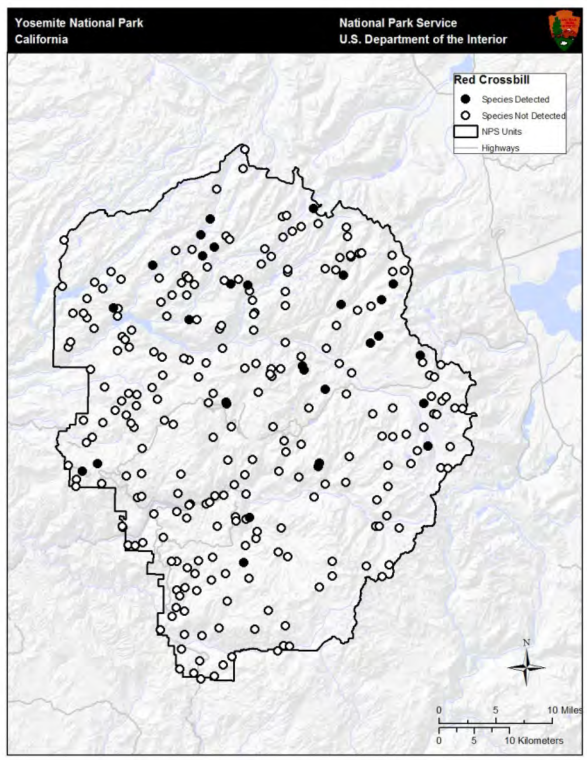

Figure 28. Bird survey transects where Red Crossbill was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Red Crossbill was detected at mid to high elevations at both SEKI and YOSE during avian inventory projects (Figure 3). The mean elevation of observations in SEKI was 2987 m, with 95% of observations occurring between 1488 and 3355 m. In YOSE, the mean elevation of observations was 2638 m with 95% of observations falling between 1687 and 3210 m (Siegel et al. 2011).

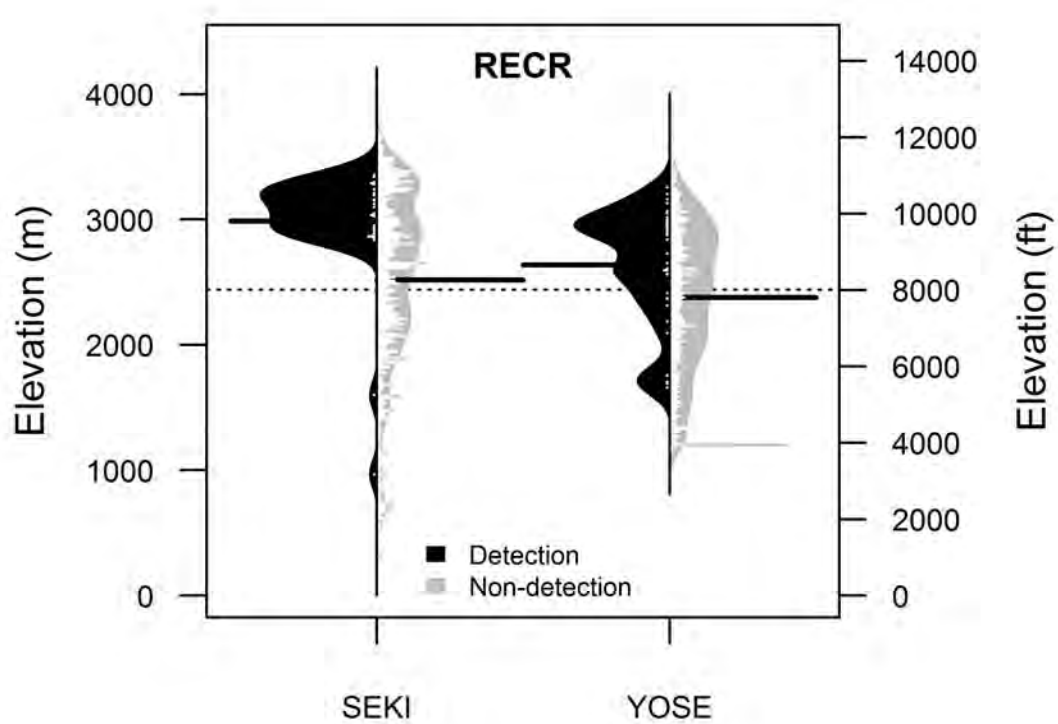

Figure 3. Elevational distributions of sites where Red Crossbill (RECR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate that Red Crossbills are more abundant in the Sierra Region (BCR 15) than California as a whole (Table 3). From 1966-2007, Red Crossbill populations exhibited a significant positive annual increase of 8.9% throughout California and a nearly significant annual increase of 8.9% in the Sierra Nevada during the same time period. No significant population trends were observed in the SIEN parks, although a non-significant increasing trend was observed along the route in Yosemite NP from 1974-2007 (Table 3). Extreme variability of food supply and nomadism of whole populations mean crossbills are sometimes the most abundant bird in a habitat, but are often absent (Adkisson 1996).

Table 72. Relative abundance and trends for Red Crossbill according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	47	0.76	+8.9	0.03
	1980-2007			+1.6	0.52
Sierra Nevada (BCR 15)	1966-2007	18	1.08	+8.9	0.09
	1980-2007			+2.6	0.51
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	2.54	+22.3	0.19

[1]NA – No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Red Crossbills were not captured in sufficient numbers at SIEN MAPS stations to determine demographic trends; no productivity or survival data are available.

Stressors

In western North America, at least 5 different species of Red Crossbills have been distinguished, each of which specializes in foraging on a different species or even a single variety of conifer (Benkman 1993). Every crossbill species is specifically adapted in body and bill size and palate structure for most efficient feeding on one species of ‘key conifer,’ which produces good cone crops somewhere in its range every year, holds its seeds in cones through late winter, and is protected from depletion by other potential seed predators (Adkisson 1996).

Red Crossbills are significantly increasing in California according to BBS survey results (Table 3). However, reliance on specialized conifer cone crops renders Red Crossbills vulnerable to periodic failures of food supply, leading to large annual fluctuations in numbers of birds at particular sites, which in turn complicates overall population estimates. Thus BBS trends should be viewed with caution (Siegel and DeSante 1999).

Red Crossbills are associated with mature coniferous forests because older trees produce the largest cone crops (Benkman 1993). Logging mature forests reduces food supply and likely adversely impacts the species, although this is not a threat in SIEN parks. Red Crossbills occur at higher-elevations and depend upon reliable pine seed crops, and thus may face serious challenges adapting to climate change.

Climate Change: No studies have been conducted examining the impacts of climate change on Red Crossbills. Red Crossbills were most abundant at relatively high elevations in SIEN parks (average of 2987 m in SEKI and 2638 m at YOSE; Figure 3) If climate change causes the species’ range to move upslope in the Sierra Nevada as is generally expected, there may not be sufficient amounts of favored Lodgepole Pine forest at higher altitudes to support current population sizes of birds within the parks. Moreover, if weather and climate conditions negatively impact pine seed crops, especially Lodgepole Pines, Red Crossbills may suffer.

Altered Fire Regimes: Red Crossbills are associated with mature conifer forests and seeds produced by conifer trees. Loss of large, old cone-producing trees due to high-intensity fire may have adverse affects on Red Crossbills, but crossbills have been observed in burned forests. The species was most prevalent and abundant in 15 year-old burned forests in southwestern Oregon, and was also found in more recently burned forest (Fontaine et al. 2009). Other studies have detected Red Crossbills in both burned and unburned forests elsewhere in its range (Sierra Nevada; Siegel and Wilkerson 2005, Rocky Mountains; Smucker et al. 2005). Rafael et al. (1987) only detected crossbills in unburned forests in the Sierra Nevada, but abundances were very low. Many species of crossbills restricted to islands depend upon fire-adapted conifer species (Benkman 1989). Fire-adapted conifers are characterized by low annual variation in cone-crop sizes and that they hold seeds in their cones for extended periods. Red Crossbills may respond to the short-term increase in availability of seeds after fire (*sensu* Pine Siskins; Smucker et al. 2005). Increased extent and frequency of high-intensity fire may both benefit and adversely affect Red Crossbills, possibly depending upon the number of large conifers killed. Further research on the relationships between Red Crossbill and fire is warranted.

Habitat Fragmentation or Loss: Red Crossbill is associated with mature conifer forests, and is highly specialized to feed upon conifer seeds. Benkman (1993) noted that conifers produce their largest cone crops after about 60 years of age. Thus, large-scale clearcut harvesting of coniferous forests and selective logging of the oldest trees has eliminated and fragmented habitat for Red Crossbill, at least in the lower-elevation portions of its range. Favored higher-elevation Lodgepole Pine stands have likely been somewhat freer of these problems. Reliance on a single food source makes crossbills extremely vulnerable to habitat loss and fragmentation. Indeed, Red Crossbills were more abundant in older than in younger forests, particularly during years of poor seed crops where mature forests produced the only available conifer seed crops (Benkman 1993). Owing to the lack of commercial logging in SIEN parks, habitat fragmentation and loss from large-scale clearcutting does not pose a significant threat to this species, and in fact the parks may represent important refugia for Red Crossbills.

Invasive Species and Disease: To our knowledge, Red Crossbills are not facing significant problems with invasive species or disease.

Human Use Impacts: Aside from human activities that lead to a reduction in suitable habitat (see above), human use impacts do not appear to be a major threat to Red Crossbills especially in protected areas such as the SIEN parks.

Management Options and Conservation Opportunities

Management actions that would most benefit Red Crossbills in the parks include ecosystem management that maintains contiguous patches of large, old conifer trees as a food source. Further research on the effects of higher-intensity fire on cone production by remnant large, old trees and response by Red Crossbills would aid in management.

Red-breasted Nuthatch – *Sitta canadensis*

Migratory Status
Resident/Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Red-breasted Nuthatch is a common year-round resident and regular breeder at Devils Postpile National Monument (DEPO) as well as Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks (Table 1).

Table 73. Breeding status and relative abundance of Red-breasted Nuthatches in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Common
Devils Postpile NM	Year-round	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Red-breasted Nuthatch is distributed over much of the western U.S., portions of the Midwest and eastern U.S., southern Alaska, and much of Canada (Ghalambor and Martin 1999). In the context of the species' extensive range, the Sierra Nevada does not seem particularly important, however densities are particularly high in the Sierra, perhaps elevating its relative importance to the species (Siegel and DeSante 1999).

Distribution and Habitat Associations
Red-breasted Nuthatches prefer shady, mid-elevation forests in the Sierra Nevada (Gaines 1992). The species was detected in relatively high densities (Table 2) along numerous survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and at numerous survey stations at DEPO. Park inventories show rather uniformly high densities in numerous mid-elevation forest types within SEKI and YOSE (Table 2). When adjusted for detectability, densities of Red-breasted Nuthatch at SEKI were highest in Giant Sequoia Forest.

Table 74. Number of Red-breasted Nuthatches recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	384	525	White Fir/Sugar Pine	0.27	0.26 (0.06-1.05)
			Giant Sequoia Forest	0.25	0.40 (0.10-1.61)
			Western White Pine Woodland	0.25	0.10 (0.02-0.47)
			Red Fir Forest	0.24	0.24 (0.06-0.97)
			Red Fir/White Fir Forest	0.22	0.28 (0.07-1.14)
Yosemite NP	591	791	Western White Pine	0.27	
			Red Fir	0.21	
			Ponderosa Pine/Mixed Conifer	0.20	
Devils Postpile NM	11	13	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

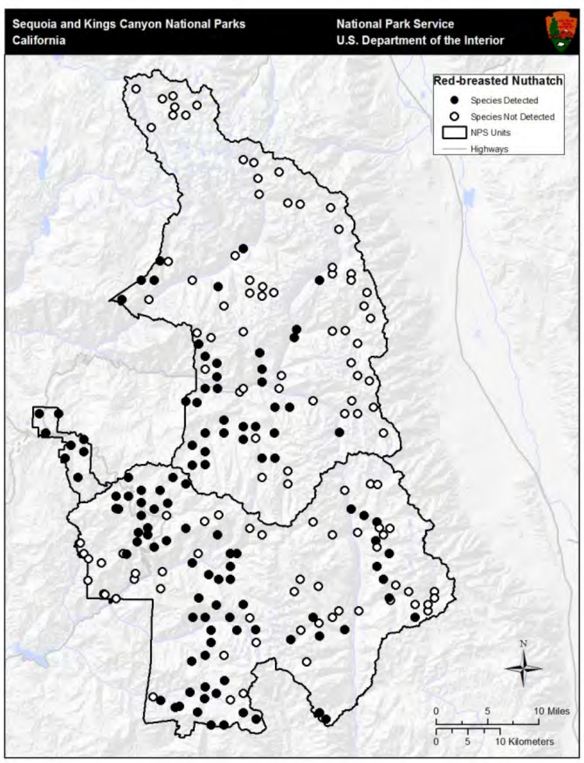

Figure 29. Bird survey transects where Red-breasted Nuthatch was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

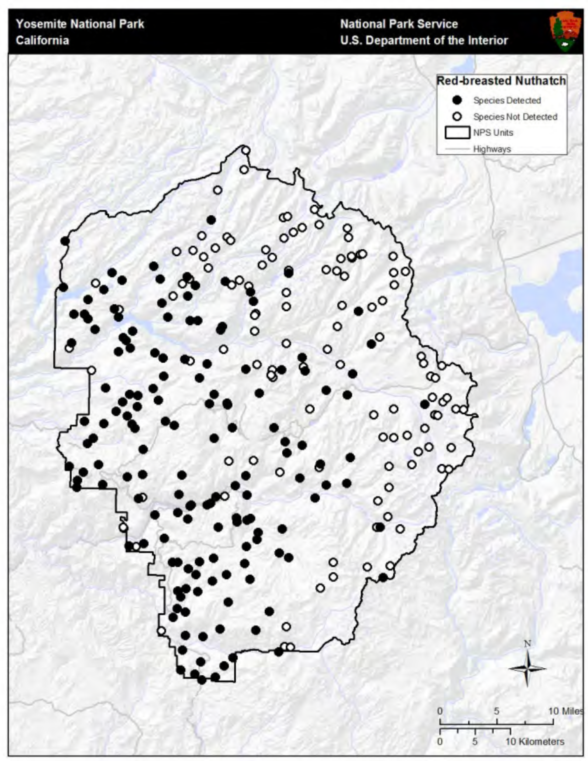

Figure 30. Bird survey transects where Red-breasted Nuthatch was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Red-breasted Nuthatch was observed most commonly within the middle-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Red-breasted Nuthatch in SEKI was 2316 m, with 95% of observations occurring between 1624 and 3115 m. At YOSE, the mean elevation of observations was 2093 m with 95% of observations falling between 1364 and 2759 m (Siegel et al. 2011).

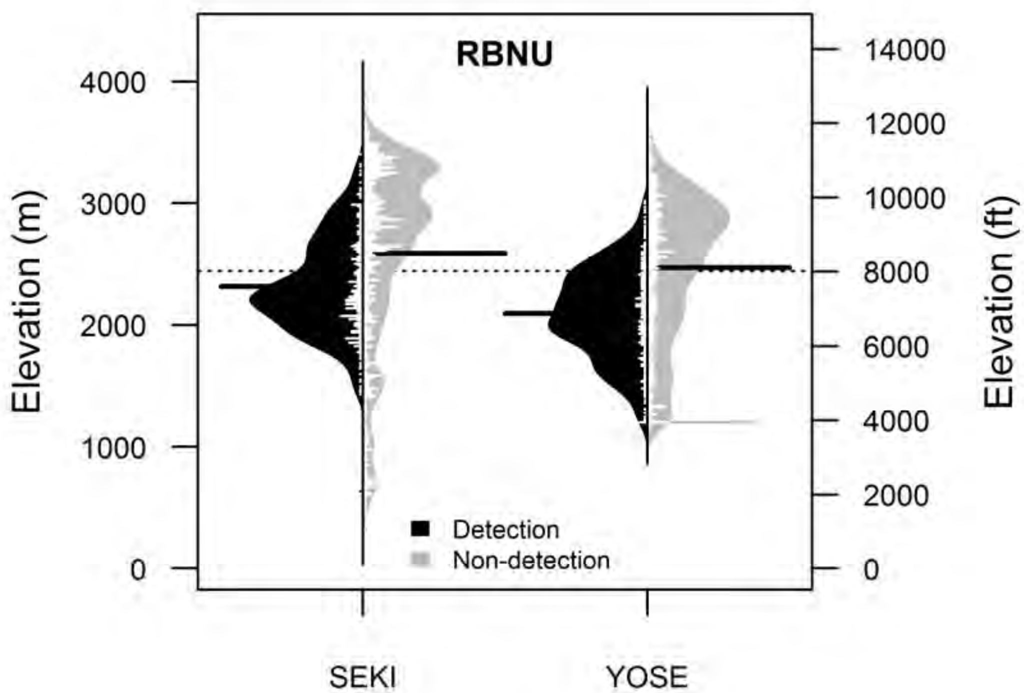

Figure 3. Elevational distributions of sites where Red-breasted Nuthatches (RNBU) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Red-breasted Nuthatches are detected more often in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at YOSE and SEKI. A nearly significant negative trend was observed in California as a whole during 1980-2007 (Table 3). The species was detected in low numbers along the BBS routes that intersect SEKI, and in high numbers along the route that intersects YOSE (Table 3).

Table 75. Relative abundance and trends for Red-breasted Nuthatch according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	104	6.83	+0.4	0.57
	1980-2007			+1.2	0.07
Sierra Nevada (BCR 15)	1966-2007	35	14.13	+0.5	0.51
	1980-2007			+1.2	0.15
Route 14117 – Sequoia NP	1972-2005	1	1.94	+38.2	0.04
Route 14132 – Kings Canyon NP	1974-2005	1	2.60	+5.6	0.36
Route 14156 – Yosemite NP	1974-2007	1	19.08	+2.1	0.38

MAPS data from SIEN parks show a significant positive population trends between 1993 and 2009 at the YOSE stations (Table 4).

Table 76. Population trends, productivity, trends, and survival estimates of Red-breasted Nuthatch at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.9	NA[2]	0.33	NA	NA
Yosemite NP	1993-2009	2.3	+7.91*	2.11	-0.67	0.414 (0.145)
Devils Postpile NM	2002-2006	0.3	NA	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

The Red-breasted Nuthatch is unique among North American nuthatches in that it undergoes regular irruptions into uncharacteristic habitats possibly driven by food shortages; these irruptions make it difficult to study some aspects of the species' biology (Ghalambor and Martin 1999). This coniferous forest species is most impacted by logging large trees and replanting with monotypic Ponderosa Pine stands (CalPIF 2002) as well as by salvage logging of burned forests and localized elimination of nesting trees (Hutto and Gallo 2006).

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Red-breasted Nuthatch throughout its range has significantly shifted more than 244 miles to the north and 52 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that the Red-breasted Nuthatch has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades. Indeed, modeled distribution shifts of Red-breasted Nuthatch predict a range shift upslope in the central and southern Sierra Nevada (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation and annual precipitation (Maxent distribution model), and precipitation seasonality (GAM distribution model) (Stralberg and Jongsomjit 2008).

The Red-breasted Nuthatch occurs in a variety of middle-elevation coniferous forests in SIEN parks (Table 2). If climate change causes the species' range to shift upslope as is generally expected, there is likely to be sufficient higher-elevation forest habitat for the nuthatch to colonize.

Altered Fire Regimes: Results from research examining the effects of fire on Red-breasted Nuthatches are somewhat equivocal. Most studies detected the Red-breasted Nuthatch in unburned conifer forests, but 74% and 60% of studies found this species in early successional and mid-successional postfire stands, respectively (Hutto 1995). The species declined at unburned and high-intensity burned sites and increased at low and moderately burned sites after fire in Montana (Smucker et al. 2005) and was detected in high-intensity burned forest but was most abundant in a low to moderately burned forest in the northern Sierra (Burnett et al. 2010). Conversely, the Red-breasted Nuthatch only nested on unburned plots in the eastern Sierra Nevada during 3 sampling periods conducted over a 25-year post-fire period (Raphael et al. 1987) and exhibited a preference for unburned forests in the southern Sierra (Siegel and Wilkerson 2005). The species was a significant indicator of unburned mature forest in Oregon, although it was detected in recent, old, and repeat burns as well (Fontaine et al. 2009). The Red-breasted Nuthatch is likely to persist in burned landscapes in the SIEN parks as long as sufficient green, mature forest remains that has not been recently burned.

Habitat Fragmentation or Loss: The Red-breasted Nuthatch prefers dense, shady, mature middle-elevation forests (Ghalambor and Martin 1999, Siegel and DeSante 1999, CalPIF 2002) with the presence of old, diseased, and dead trees for excavating nesting cavities (CalPIF 2002). These forests are most vulnerable to logging impacts in the Sierra Nevada. Ghalambor and Martin (1999) noted that typical snag retention policies have historically focused on larger woodpecker species that are capable of excavating nests in a variety of snags, whereas weak excavating species like nuthatches that prefer soft and decayed trees may be more limited in their ability to excavate nests in hard snags. A variety of soft snags of varying diameters within mature coniferous forests should be maintained for the Red-breasted Nuthatch, and special attention should be given to retaining trees that exhibit evidence of root disease.

Populations in the Cascade Mountains of Oregon and Washington were most abundant in old-growth and mature Douglas-fir forests with standing dead trees, and least common in younger forests (Ghalambor and Martin 1999). Loss of snags in this bird's preferred habitat may pose a substantial threat; no nests were found in salvage-logged burned forests in Montana (Hutto and Gallo 2006). In unburned forests, densities of Red-breasted Nuthatches did not differ in thinned relative to control stands in Oregon (Hayes et al. 2003), but the species occurred at lower densities in thinned than untreated stands of Ponderosa Pine in the northern Cascades (Gaines et al. 2007). Clearcutting and thinning are widespread in the Sierra Nevada, but absent from SIEN parks, thus the parks may represent important habitat refugia for the nuthatch in the mountain range.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Red-breasted Nuthatch.

Human Use Impacts: Aside from human activities that lead to a reduction in suitable habitat (see above), human use impacts do not appear to be a major threat to Red-breasted Nuthatches especially in protected areas such as the SIEN parks.

Management Options and Conservation Opportunities
Red-breasted Nuthatches will benefit from ecosystem management in the SIEN parks that protects and maintains mature and old coniferous forests containing dead and dying trees for nesting sites. The Red-breasted Nuthatch probably can persist in burned landscapes as long as enough green forest remains; thus the species would likely be resilient to restoration of fire regimes that include all fire intensities.

MAPS station operation and other means of monitoring Red-breasted Nuthatch populations in the parks should continue.

Red-breasted Sapsucker – *Sphyrapicus ruber*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Red-breasted Sapsucker is a fairly common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and a fairly common summer resident and regular breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 77. Breeding status and relative abundance of Red-breasted Sapsuckers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Red-breasted Sapsucker breeds from southeast Alaska along the eastern slope of the Pacific and Cascade ranges, throughout the Cascades-Sierra axis south to the mountain ranges of southern California (Walters et al. 2002). Northern populations migrate south, and the species winters throughout California west of the Sierra Nevada. *S.r. ruber* occurs in the Sierra Nevada, which forms the majority of its range and thus is of extreme importance to the subspecies (Siegel and DeSante 1999).

Distribution and Habitat Associations
Red-breasted Sapsucker requires hardwoods for sap and often for nesting, but commonly occurs in mixed or even pure coniferous forests as long as willow thickets are available (Siegel and DeSante 1999). In coniferous forests they depend upon small willows that occur in montane meadows. On the west slope of the Sierra Nevada, these birds generally breed only where conifers are present, but on the eastern slope they often nest in aspen or riparian woodland (Siegel and DeSante 1999). Red-breasted Sapsuckers were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects at all SIEN parks. Detections were scattered throughout the parks (though not at high elevations) and not

concentrated in any particular region. After accounting for detection probability, park inventories show highest associations with Giant Sequoia Forests and riparian areas, and to a lesser extent Aspen Forest, within SEKI. The species occurred but was less abundant in Red Fir and White Fir/Mixed Conifer in YOSE (Table 2). Habitat associations could not be determined at DEPO.

Table 78. Number of Red-breasted Sapsuckers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	29	31	Undifferentiated Riparian	0.13	0.07 (0.01-0.48)
			Aspen Forest	0.06	0.02 (0.00-0.16)
			Giant Sequoia Forest	0.05	0.08 (0.03-0.17)
Yosemite NP	15	15	Red Fir	0.01	
			White Fir/Mixed Conifer	0.01	
Devils Postpile NM	2	2	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

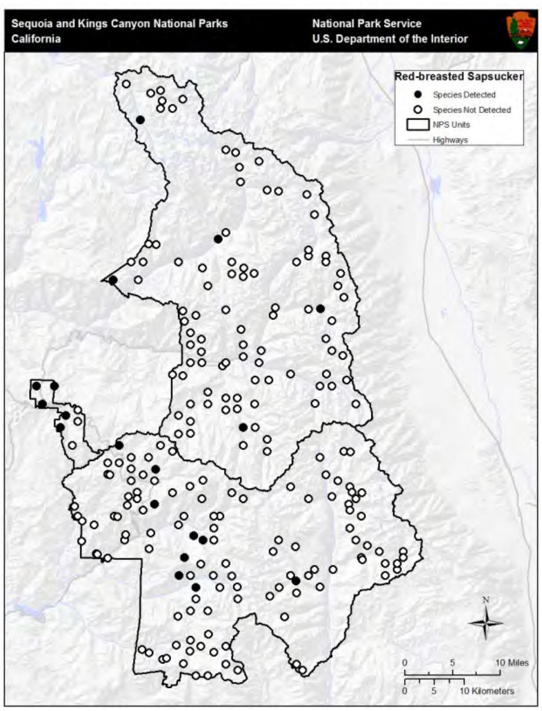

Figure 31. Bird survey transects where Red-breasted Sapsucker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

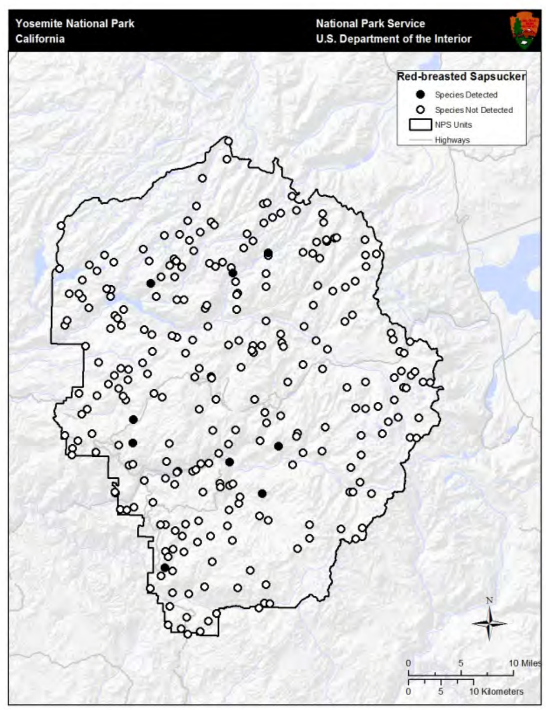

Figure 32. Bird survey transects where Red-breasted Sapsucker was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Red-breasted Sapsucker was detected at mid-elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Red-breasted Sapsucker in SEKI was 2143 m, with 95% of observations occurring between 1763 and 2640 m. In YOSE, the mean elevation of observations was 2245 m with 95% of observations falling between 1776 and 2493 m (Siegel et al. 2011).

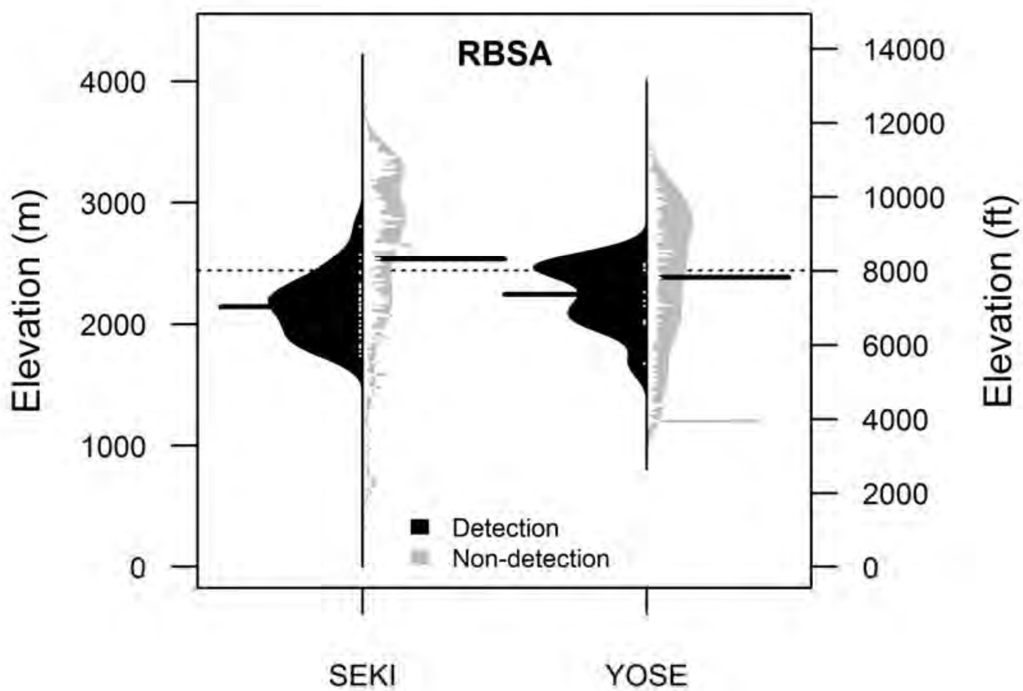

Figure 3. Elevational distributions of sites where Red-breasted Sapsucker (RBSA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) combines all species and subspecies of "yellow-bellied" sapsucker for some analyses due to hybridization in contact areas. In California, Red-naped and Red-breasted Sapsuckers intersect in areas east of the Sierra; thus there is a possibility that some of the detections include Red-naped as well as Red-breasted Sapsuckers. BBS data indicate sapsuckers are much more abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were detected in moderate numbers on individual BBS routes at Yosemite and Sequoia NPs, although rarely in Kings Canyon NP. No significant population trends were observed, although a non-significant negative trend was reported for the route in Sequoia NP (Table 3).

Table 79. Relative abundance and trends for Red-breasted Sapsucker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	76	0.54	-0.9	0.60
	1980-2007			+1.7	0.55
Sierra Nevada (BCR 15)	1966-2007	29	1.23	+0.1	0.80
	1980-2007			+2.9	0.49
Route 14117 – Sequoia NP	1972-2005	1	0.44	-12.6	0.64
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	0.58	-1.7	0.86

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Sufficient data from MAPS stations were available to estimate demographic trends for MAPS stations at YOSE, DEPO, and SEKI. Data from YOSE reveal a significant positive annual population trend of 5.13% from 1993-2009, whereas MAPS data from both Kings Canyon and DEPO show slight non-significant negative trends from 1991-2009 (Kings Canyon) and 2002-2006 (DEPO). Red-breasted Sapsuckers show non-significant increasing reproductive trends in Yosemite and Kings Canyon but a mildly significant decreasing reproductive trend in DEPO. Reproductive trends appear to be consistent with population trends (Table 4).

Table 80. Population trends, productivity, trends, and survival estimates of Red-breasted Sapsucker at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.0	-1.43	0.50	+6.67	NA[2]
Yosemite NP	1993-2009	3.9	+5.13***	0.56	+4.02	0.487 (0.073)
Devils Postpile NM	2002-2006	8.8	-0.58	0.82	-10.05*	0.730 (0.274)

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Red-breasted Sapsuckers are associated with riparian habitats, particularly meadows, and nest in large-diameter trees within coniferous forests. Elimination of large snags and overgrazing of meadows in the Sierra Nevada likely pose significant threats to the species, but no significant population trends have yet been observed in the mountain range (Table 3). The species, however, increased significantly at MAPS stations in Yosemite NP over the past 15 years.

Red-breasted Sapsuckers are negatively affected by non-native European Starlings (Koenig 2003) which may threaten the species in SIEN parks. Sapsuckers do not benefit from high-intensity fire as do most other woodpecker species.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of "yellow-bellied" sapsuckers (including Red-breasted) has significantly shifted over 50 miles north and over 13 miles inland throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest these birds may be moving toward cooler areas as the climate warms (Audubon 2009). Similarly, an analysis of shifts between the historical range of Red-breasted Sapsucker (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). These observed shifts provide strong evidence that this species of sapsucker has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Red-breasted Sapsuckers were relatively restricted to the mid-elevation zones of SEKI and YOSE (Figure 3). If climate change causes the species' range to shift upward as is generally expected, there is some higher-altitude coniferous and meadow habitat for new colonization within the parks. However, even if Red-breasted Sapsuckers are able shift their range in response to climate change, populations may suffer if the habitats they depend upon are not also able to shift upslope or are degraded due to climate warming. For example, if climate change results in drier meadows which in turn affects distribution of willows, Red-breasted Sapsuckers will be adversely affected.

Altered Fire Regimes: Red-breasted Sapsuckers are known to use burned forests but do not respond as positively to fire as do other woodpeckers. Red-breasted Sapsuckers nested in burned forest but were more abundant breeders on unburned plots in the Sierra Nevada (Raphael et al. 1987) and were detected more often in unburned or previously burned forests than in recently burned stands in Oregon (Fontaine et al. 2009). A future increase in high-intensity fire may reduce habitat suitability for Red-breasted Sapsuckers.

Habitat Fragmentation or Loss: Red-breasted Sapsucker nest in large-diameter conifer snags (Joy 2000) and abundance was positively correlated with density of snags in suburban areas (Blewett and Marzluff 2005). Large-diameter snags needed by Red-breasted Sapsuckers for nesting appear to be declining throughout the Sierra Nevada. Historical timber-harvesting practices, especially clearcutting, undoubtedly has had severe negative impacts on this species, but this is not likely to pose a major threat to the species within SIEN parks. In fact, protected status makes these parks important refugia for Red-breasted Sapsuckers from widespread logging occurring elsewhere in the Sierra.

Invasive Species and Disease: European Starlings were introduced to New York City in 1890 and by the middle of the 20th century had spread across much of North America with the exception of Mexico. Red-breasted Sapsucker population declines were correlated with invasion by starlings (Koenig 2003). Extent of sapsucker competition with starling in SIEN parks is unknown.

Human Use Impacts: Grazing of mid-elevation meadows is a likely threat to Red-breasted Sapsuckers. Grazing tends to denude willows of their lower foliage and could decrease the quantity or quality of sap produced, although further research is needed (Siegel and DeSante

1999). Packstock grazing within the parks is a potential concern for Red-breasted Sapsuckers, at least locally where grazing is permitted. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized (Siegel and DeSante 1999).

Management Options and Conservation Opportunities

Sapsuckers are important primary cavity excavators, but unfortunately are understudied in the Sierra Nevada. Park managers can implement a number of important measures to protect Red-breasted Sapsucker populations in the SIEN parks. These include monitoring the effects of European Starlings, and implementing a removal program for starlings if monitoring indicates substantial conflict with sapsuckers. Impacts of packstock grazing on willows in montane meadows should also be assessed and, if necessary, ameliorated.

Another longer-term priority for protecting Red-breasted Sapsucker populations in SIEN parks is to maintain wet and moist meadow habitats and larger-diameter snags in surrounding coniferous forest. If climate change leads to substantial meadow desiccation, restoration of meadow hydrology could benefit this species. Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites would likely benefit Red-breasted Sapsuckers and other meadow-dependent bird species.

Red-shouldered Hawk – *Buteo lineatus*

Migratory Status

Resident/Partial migrant (Dykstra et al. 2008)

Residency and Breeding Status

Red-shouldered Hawk is a rare visitor in all Sierra Nevada Network (SIEN) parks and the monument (Table 1).

Table 81. Breeding status and relative abundance of Red-shouldered Hawks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Summer	Non-Breeder	Rare
Yosemite NP	Migrant/Summer	Non-Breeder	Rare
Devils Postpile NM	Migrant/Summer	Non-Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Red-shouldered Hawk is found throughout much of the eastern U.S. and in some parts of California including along the coast and Central Valley (Dykstra et al. 2008). Because the Sierra Nevada is not part of Red-shouldered Hawk's normal range, SIEN parks are not an important part of its greater distribution.

Distribution and Habitat Associations

Red-shouldered Hawks are found most often along wooded river bottoms and oak woodlands (Beedy 1985, Dykstra et al. 2008). Red-shouldered Hawks were not detected during park inventory surveys of the SIEN parks. However, the species was observed anecdotally by IBP biologists off-survey at SEKI. Thus, park-specific habitat associations are not available for Red-shouldered Hawk from inventory projects.

Table 82. Number of Red-shouldered Hawks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-census	NA[1]	NA
Yosemite NP	0	0	Not detected	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Red-shouldered Hawk was not observed during park inventories; quantitative data on elevational distribution are not available for this species.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Red-shouldered Hawks are found primarily outside of the Sierra Nevada in California. They were detected in low numbers on individual BBS routes that intersect YOSE and Sequoia NP. A significant positive trend was observed across California during both 1966-2007 and 1980-2007 (Table 3).

Table 83. Relative abundance and trends for Red-shouldered Hawk according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	72	0.52	+9.7	0.00
	1980-2007			+8.2	0.00
Sierra Nevada (BCR 15)	1966-2007	NA[1]	NA	NA	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	1	1.00	+10.7	0.64
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.04	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Red-shouldered Hawks are not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Historically Red-shouldered Hawk populations were affected by shootings and exposure to DDT, but neither threat appears to be of major concern today. Habitat loss and fragmentation as well as the subsequent increased competition from Red-tailed Hawks appear to be the greatest current threats to Red-shouldered Hawks. Habitat loss and fragmentation are largely associated with agriculture and timber harvest practices that do not occur within SIEN parks. Also of concern is the apparent susceptibility of Red-shouldered Hawk to West Nile Virus and climate change, the latter potentially leading to further degradation of habitat. Finally, increased fire frequency or intensity in Red-shouldered Hawk habitat is likely to be detrimental to the species, but more research is needed. While habitat fragmentation and loss is not directly relevant to SIEN parks, the threats of disease, climate change, and altered fire regimes may impact Red-shouldered Hawk across its range, including within protected areas.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Red-shouldered Hawk has significantly shifted 76.2 miles to the north and 25.7 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Red-shouldered Hawk has already responded to climate change and will likely continue to shift its range in the coming decades.

Modeled distribution shifts of Red-shouldered Hawk do not predict a substantial change in the species' range in California, but show a general reduction in the probability of occurrence, suggesting that current habitats will become less suitable into the future. The most important variables influencing current and projected distribution were vegetation (both distribution models), annual precipitation (Maxent distribution model) and distance to stream (GAM distribution model) (Stralberg and Jongsomjit 2008).

Red-shouldered Hawks are found breeding below 1000 m in the Sierra Nevada (Beedy 1985). If climate change causes the species' range to shift upward as is generally expected, there is much higher-altitude riparian habitat for new colonization within SEKI and YOSE. Red-shouldered Hawk is more likely to respond indirectly to climate change by reacting to changes in habitat and prey base rather than altered temperature and precipitation.

Altered Fire Regimes: Little research has been conducted on the impacts of fire on Red-shouldered Hawk. However, given the hawk's affinity to mature, contiguous forests and woodlands (Dykstra et al. 2008), increased fire frequency or intensity that leads to younger and more fragmented habitat would be detrimental to the species.

Habitat Fragmentation or Loss: Forest fragmentation and loss due to agricultural development and timber harvest is thought to have led to declines of Red-shouldered Hawk in some areas. In addition to direct loss of habitat, forest fragmentation leads to increased competition from Red-tailed Hawks and Great Horned Owls, which prefer less contiguous habitats (Dykstra et al. 2008).

Invasive Species and Disease: During the winter of 2004-2005, 19 Red-shouldered Hawks were tested for West Nile Virus (WNV) antibodies. Twenty percent of migrating and 58% of wintering hawks tested positive for the disease (Hull et al. 2006). These tests, plus the fact that 3 dead Red-shouldered Hawks tested positive for WNV in 2009 in California (CDPH 2010), show that the species is susceptible to the disease.

Human Use Impacts: Historical threats from human activities include shooting of Red-shouldered Hawks and exposure to contaminants such as DDT. Shooting of Red-shouldered Hawks has largely been eliminated due to regulations and changes in public sentiments and DDT does not appear to have reduced reproductive success of the species as greatly as many other raptor species (Dykstra et al. 2008). While DDT is no longer used in the U.S., Red-shouldered Hawk likely continues to be exposed to other contaminants with some detrimental effects.

Accounts are mixed regarding the response of Red-shouldered Hawk to disturbance near nesting sites with some reported nest failures due to nearby activities such as timber harvest, while other accounts report tolerance of such activities. In some areas young have been removed from nests for purposes of falconry (Dykstra et al. 2008).

Management Options and Conservation Opportunities

Management recommendations for Red-shouldered Hawk largely suggest that mature, contiguous tracts of forests be preserved to provide habitat and discourage competition with Red-tailed hawks that utilize more fragmented habitats (Dykstra et al. 2008, NatureServe 2009). Minimizing human activities and passage near nesting sites during the breeding season would also benefit Red-shouldered Hawks where they breed (NatureServe 2009). Continued protection of riparian areas preferred by Red-shouldered Hawks is likely the best option for conserving hawk populations (which are tangential in any case) within SIEN parks. Testing of live and especially diseased Red-shouldered Hawks for infection of West Nile Virus would help track the prevalence of the disease.

Red-tailed Hawk – *Buteo jamaicensis*

Migratory Status
Partial short/medium-distance migrant (Preston and Beane 2009)

Residency and Breeding Status
Red-tailed Hawk is a fairly common breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks and an uncommon visitor to Devils Postpile National Monument (Table 1).

Table 84. Breeding status and relative abundance of Red-tailed Hawks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Migrant/Summer	Non-Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Red-tailed Hawk is distributed over much of North America including the entire continental U.S. (Preston and Beane 2009). SIEN parks do not comprise a significant portion of the species' range.

Distribution and Habitat Associations
Red-tailed Hawks prefer open terrain to dense forest for spotting prey from the air (Gaines 1992). Red-tailed Hawks were detected rarely (Table 2) along few survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE and were observed only anecdotally in DEPO. Due to the limited number of observations, the habitat association information from the inventory surveys is not particularly meaningful. Like most raptors, Red-tailed Hawk is not well-sampled by passive point counts designed for detecting singing birds.

Table 85. Number of Red-tailed Hawks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	4	4	NA[1]	NA	NA
Yosemite NP	4	4	Red Fir	0.01	
Devils Postpile NM	0	0	Detected off-survey	NA	

[1]NA - Information not available due to insufficient data.

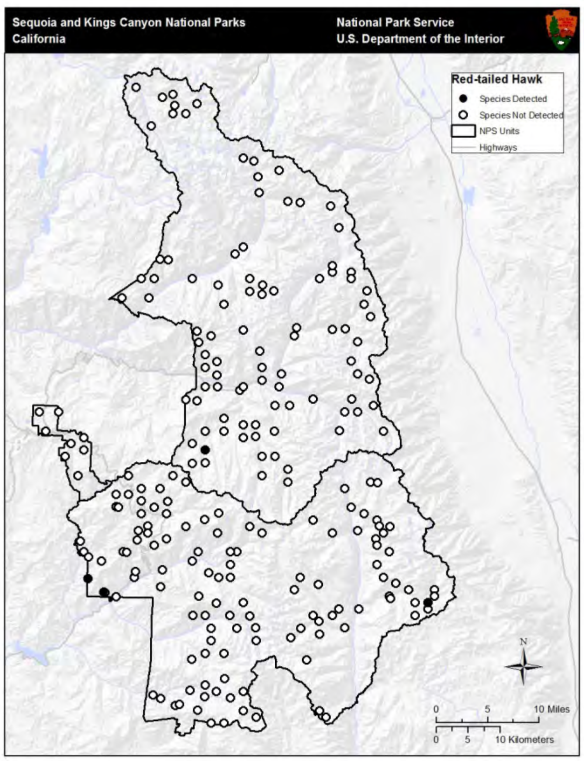

Figure 33. Bird survey transects where Red-tailed Hawk was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

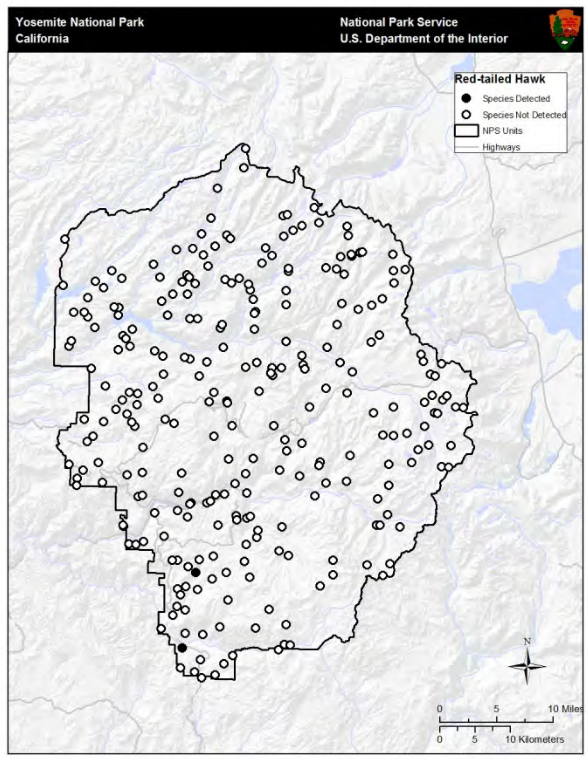

Figure 34. Bird survey transects where Red-tailed Hawk was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Though infrequently detected, Red-tailed Hawk was observed across a wide elevation range in both SEKI and YOSE during recent avian inventory projects (Figure 3). The mean elevation of observations of Red-tailed Hawk made in SEKI was 1777 m, compared with 1791 m at SEKI (Siegel et al. 2011).

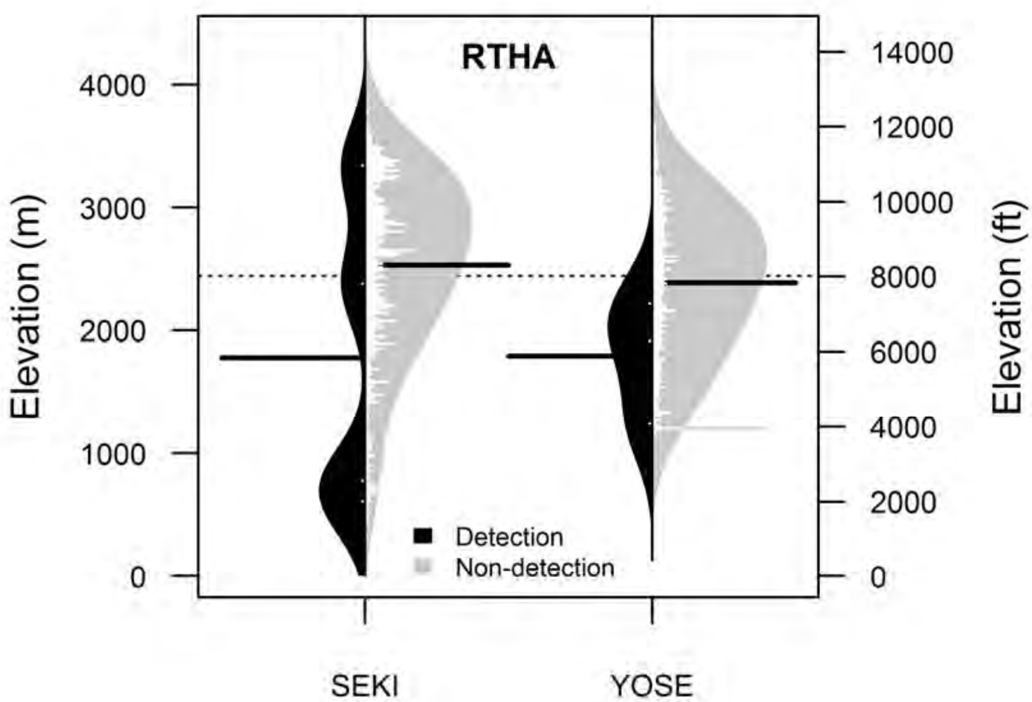

Figure 3. Elevational distributions of sites where Red-tailed Hawks (RTHA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Red-tailed Hawks are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at YOSE and SEKI. A significant positive populations trend was observed across California both in the short and long-term (Table 3).

Table 86. Relative abundance and trends for Red-tailed Hawk according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	207	2.55	+1.6	0.00
	1980-2007			+1.9	0.00
Sierra Nevada (BCR 15)	1966-2007	28	0.99	+1.2	0.48
	1980-2007			+0.3	0.83
Route 14117 – Sequoia NP	1972-2005	1	1.63	-8.5	0.65
Route 14132 – Kings Canyon NP	1974-2005	1	0.75	+11.5	0.23
Route 14156 – Yosemite NP	1974-2007	1	0.27	-12.6	0.26

Red-tailed Hawks are generally not captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Populations of Red-tailed Hawks are largely healthy across the U.S. and California. The species has benefited from human land-use change and fire suppression, at the expense of other hawk species. The greatest historical threat is persecution by humans. However, this threat may have been usurped in recent years by frequent mortalities of individuals resulting from collisions with human structures and vehicles. The arrival of new diseases to California such as West Nile Virus is a potential concern and prevalence of infections should be monitored. Finally, climate change does not appear to be a major threat to the species across its range, but is likely to have local effects where the phenomenon results in habitat changes.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Red-tailed Hawk has significantly shifted 82.4 miles to the north and 60.5 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Red-tailed Hawk has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Despite evidence of ongoing range shifts the ubiquity of Red-tailed Hawks across many climate zones and habitat types suggests tolerance for climate change. Additionally, the species may benefit from prolonged droughts that cause shifts from conifer forests to open woodlands (Preston and Beane 2009). If climate change results in greater incidences of extended drought in the Sierra Nevada, Red-tailed Hawks could become more prevalent in SIEN parks where dense forests are currently less favorable for the species.

Altered Fire Regimes: Fire suppression in U.S. grasslands and shrub-steppe habitats has lead to an expansion of patchworks of wooded and open areas and subsequent increases in Red-tailed

Hawk populations, at the expense of competing hawk species (Preston and Beane 2009). An increase in frequency of high-intensity fires in the Sierra Nevada may have a similar affect where dense forests are replaced by sparser post-fire habitat.

Habitat Fragmentation or Loss: Red-tailed Hawks have benefited from fragmentation of forest habitat replacing other hawk species less tolerant of patchy landscapes across the U.S. However, either reforestation or complete deforestation could decrease Red-tailed Hawk numbers (Preston and Beane 2009).

Invasive Species and Disease: The recent emergence of West Nile Virus in California in 2003 (Reisen et al. 2004) has raised concerns about its impact on raptor species in the state (Hull et al. 2010). Like many other raptor species, Red-tailed Hawks can be infected and die from this disease (Ellis et al. 2006) and one documented case of a dead Red-tailed Hawk testing positive to West Nile Virus in California in 2009 (CDPH 2010) indicates at least minor susceptibility. If West Nile Virus spreads to SIEN parks, it is a potentially threat to this and other species.

Human Use Impacts: Red-tailed Hawks are tolerant of human activities and thrive in patchily wooded habitat created by urban and exurban sprawl (Preston and Beane 2009). However despite tolerance of most human activities, the greatest threat to Red-tailed Hawks historically has been persecution in the form of shooting or nest disturbance. This threat has declined since the mid-twentieth century (Preston and Beane 2009) and is not a concern within SIEN parks.

Collisions with human-made objects are common and potentially the greatest modern threat to the species. The types of structures known to frequently contribute to Red-tailed Hawk fatalities include automobiles, airplanes, trains, fences, wires, and wind turbines (Preston and Beane 2009). Such collisions may occasionally occur within SIEN parks, but are minor as compared to more developed areas.

Management Options and Conservation Opportunities

Like other raptor species, Red-tailed Hawks are protected from hunting and trapping. Due to their adaptability to human-dominated landscapes and tolerance of human activities, additional broad-scale protection and management is not necessary. Of course specific exceptions exist, including the need for proper planning of new wind turbines (outside SIEN parks) in order to reduce collision mortalities of foraging and migrating hawks. The relative uncommonness of the species within the montane zone of the Sierra Nevada and SIEN parks should not be a concern, as the species is more abundant in the foothills and lower-elevation areas of California. However, testing of deceased individuals found within the parks for West Nile Virus and other diseases would help increase knowledge of this potential threat to the species within and beyond the parks.

Red-winged Blackbird – *Agelaius phoeniceus*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Red-winged Blackbird is a fairly common summer and year-round resident and regular breeder at Yosemite (YOSE) National Park; an uncommon summer and year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) National Parks; and an uncommon summer resident and non-breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 87. Breeding status and relative abundance of Red-winged Blackbirds in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Uncommon
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Migrant/Summer	Non-Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Red-winged Blackbird breeds in marshes and uplands throughout the entire U.S., most of Canada, and much of Mexico (Yasukawa and Searcy 1995). Red-winged Blackbirds are abundant and widely distributed throughout California, thus the Sierra Nevada does not comprise an important part of the species' range (Siegel and DeSante 1999).

Distribution and Habitat Associations
Red-winged Blackbirds are widely distributed along the west slope in wet meadows and marshes (Siegel and DeSante 1999). The race *nevadensis* is nearly restricted in the Sierra to marshes and wet meadows for breeding, and forages in campgrounds and other centers of human activity, while the race *californicus* breeds in grassy or marshy habitats in the western Sierra foothills, including agricultural lands and pasturelands (Siegel and DeSante 1999). During avian inventory projects, Red-winged Blackbirds were detected in moderate numbers at YOSE and rarely at SEKI and DEPO (Table 2) along survey transects (Figures 1 and 2). The strongest habitat associations were in recent burns and Ponderosa Pine (Table 2), although anecdotal evidence indicates the species is most tied to montane meadows in SIEN parks.

Table 88. Number of Red-winged Blackbirds recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings	4	4	NA[1]	NA	NA
Yosemite NP	40	78	Recent Burn	0.17	
			Ponderosa Pine	0.13	
			Montane Meadow	0.05	
Devils Postpile NM	1	1	NA	NA	

[1]NA - Information not available due to insufficient data.

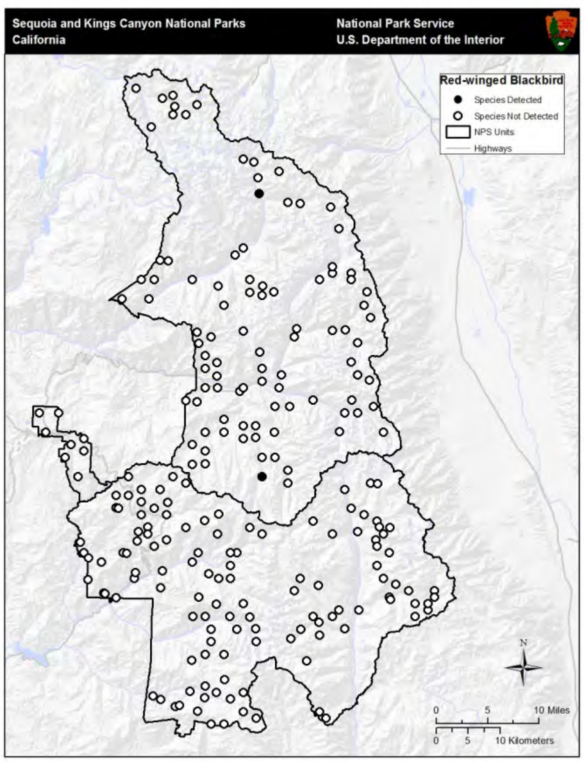

Figure 35. Bird survey transects where Red-winged Blackbird was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

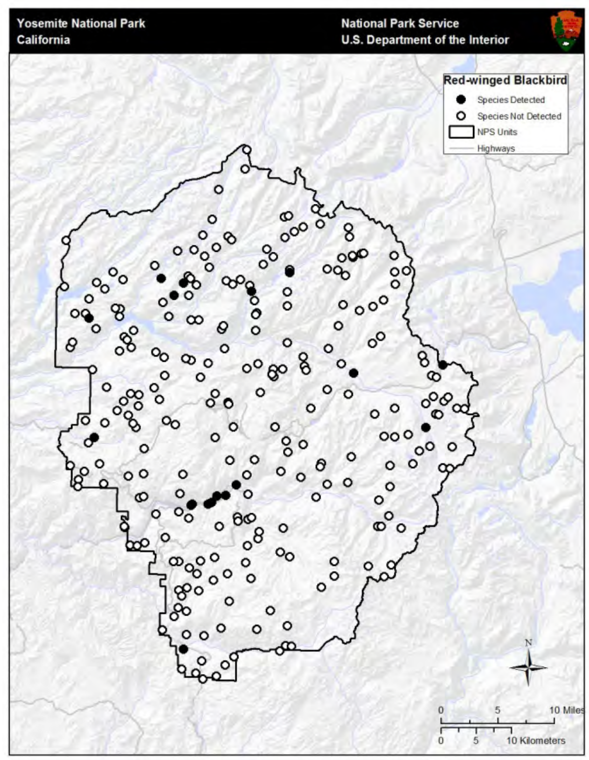

Figure 36. Bird survey transects where Red-winged Blackbird was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Red-winged Blackbird was detected at mid elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 2685 m, with 95% of observations occurring between 2525 and 2800 m. In YOSE, the mean elevation of observations was 1722 m with 95% of observations falling between 1200 and 2794 m (Siegel et al. 2011).

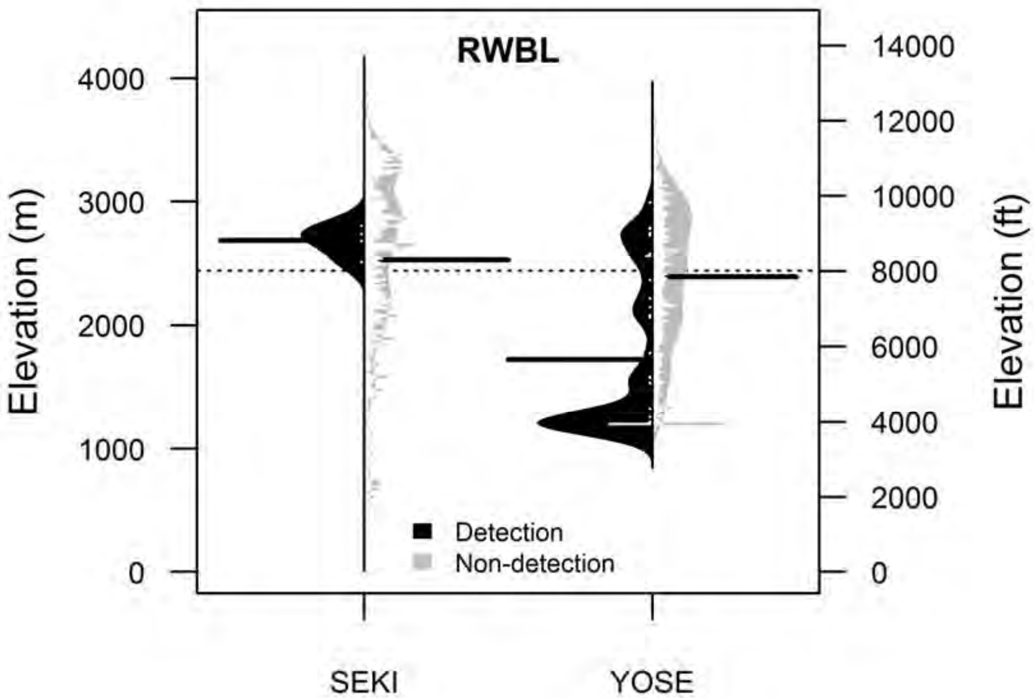

Figure 3. Elevational distributions of sites where Red-winged Blackbird (RWBL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) survey data indicate Red-winged Blackbirds were extremely abundant along routes in California as a whole, compared with the Sierra Region (BCR15; Table 3). No significant population trends were documented during the past half-century, although a non-significant annual increase of more than 38% was observed along the Sequoia NP route (Table 3).

Table 89. Relative abundance and trends for Red-winged Blackbird according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	171	83.92	+1.1	0.49
	1980-2007			-0.2	0.74
Sierra Nevada (BCR 15)	1966-2007	22	6.68	+0.3	0.82
	1980-2007			+0.4	0.81
Route 14117 – Sequoia NP	1972-2005	1	0.88	+38.2	0.53
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	4.58	+6.7	0.15

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

No significant population trends were recorded at SIEN MAPS stations, although a non-significant increase was observed at Kings Canyon NP (Table 4). Sample sizes of captured birds were insufficient to determine reproductive trends.

Table 90. Population trends, productivity, trends, and survival estimates of Red-winged Blackbird at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.3	+10.00	0.05	NA	NA
Yosemite NP	1993-2009	1.1	NA[2]	0.05	NA	0.458 (0.174)
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

The Red-winged Blackbird may be the most abundant and most commonly studied bird in North America. This blackbird is known for its membership in very large, mixed-species roosts that form during the nonbreeding season and for its ability to damage important crops such as corn, sunflower, and rice (Yasukawa and Searcy 1995). Considerable effort, time, and money have been spent attempting to control blackbirds and to reduce crop damage. As a result, humans are now one of the major sources of adult mortality in this species (Yasukawa and Searcy 1995).

Red-winged Blackbirds in the Sierra Nevada may be threatened by future drying of wet meadow and marshland habitats due to climate change. The species is also susceptible to brood parasitism from Brown-headed Cowbirds. Habitat alteration from urbanization and agriculture is likely to benefit Red-winged Blackbirds due to their ability to forage in these human-impacted areas, as long as nesting habitat is available.

Climate Change: An analysis of Christmas Bird Count (CBC) data indicates the center of abundance of Red-winged Blackbird has shifted significantly northward by nearly 100 miles and inland by nearly 119 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Red-winged Blackbirds have already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Red-winged Blackbird is tied to wet meadows and marshes (Siegel and DeSante 1999) and is already shifting its center of abundance northwards and inland in tandem with climate change. If the species expands upslope in the Sierra Nevada as generally expected, there is sufficient wet meadow habitat for colonization in SIEN parks. However, if climate change results in drier conditions in its preferred habitats, this species is likely to suffer.

Altered Fire Regimes: In YOSE, Red-winged Blackbirds were detected most often in recently burned forest, but this is an artifact of the very small number of survey points in burned areas; the species was actually detected at only one survey point in burned forest. Red-winged Blackbird was only found in unburned forests during surveys in burned landscapes in the northern Sierra Nevada (Burnett et al. 2010). In the southern Sierra Nevada, Red-winged Blackbirds were only detected in forests burned 50 years prior to surveys (Siegel and Wilkerson 2005) but were absent from unburned and recently burned survey areas. Thus, research results on the impacts of fire on blackbirds in the Sierra Nevada are equivocal. The effects of an increase in frequency and intensity of fire in the SIEN parks on this species remain unknown.

Habitat Fragmentation or Loss: Human alteration of habitats such as campgrounds and other developments in SIEN parks is likely to benefit Red-winged Blackbirds, who forage readily in these areas.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Red-winged Blackbirds are susceptible to brood parasitism by Brown-headed Cowbirds; one study in Colorado and Wyoming found 7.5% of Red-winged Blackbird nests were parasitized. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI.

Human Use Impacts: Red-winged Blackbird can be killed in absence of a federal permit when birds are in the act or about to commit crop depredation. Red-winged Blackbirds are subject to shooting, poisoning, hazing, netting, trapping, and other pest-control practices directed toward marauding target pests (Yasukawa and Searcy 1995). Substantial mortality has resulted from this persecution. For example, use of surfactants have killed hundreds of thousands of Red-winged Blackbirds along with millions of Common Grackles and European Starlings at winter roosts, Red-winged Blackbirds are associated with agricultural operations, rendering them susceptible to

indirect poisoning by agrochemicals (Martin 2002). These activities are not threats in SIEN parks.
Packstock grazing within the parks could threaten Red-winged Blackbirds because it can attract Brown-headed Cowbirds and alter riparian and meadow habitats. As compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks. However, Red-winged Blackbirds are highly vulnerable to cowbird parasitism and cowbird control in SIEN parks may be warranted.

Management Options and Conservation Opportunities

The most important things park managers can do to protect Red-winged Blackbird populations in the parks are to maintain montane meadow and marsh habitats and to manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE should be updated.

If climate change leads to substantial meadow desiccation and reproductive success declines, restoration of meadow hydrology could benefit breeding Red-winged Blackbirds. Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites, perhaps along with active restoration of riparian deciduous vegetation, would likely benefit Red-winged Blackbirds and other meadow-dependent bird species.

Rock Wren – *Salpinctes obsoletus*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Rock Wren is a fairly common breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks and Devils Postpile (DEPO) National Monument (Table 1).

Table 91. Breeding status and relative abundance of Rock Wrens in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Rock Wren occurs in appropriate habitat across most of the western U.S., as well as portions of southwestern Canada and much of Mexico (Lowther et al. 2000). The Sierra Nevada is an important component of the range of the *obsoletus* subspecies (Siegel and DeSante 1999).

Distribution and Habitat Associations
Rock Wrens inhabit rock outcroppings, rock slides, talus slopes, and fractured cliff faces from the foothills to above treeline (Gaines 1992). They were detected at low to moderate densities (Table 2) along numerous survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE and at four survey stations at DEPO (Table 2). Park inventories show highest associations with Rock/Sparsely Vegetated areas and subalpine forest types within SEKI and YOSE (Table 2), and with Foothill Pine at YOSE (Table 2).

Table 92. Number of Rock Wrens recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	54	64	Mid-Elevation Rock/Sparse Veg.	0.11	0.30 (0.15-0.60)
			High-Elevation Rock/Sparse Veg.	0.11	0.15 (0.05-0.46)
			Foxtail Pine	0.06	0.06 (0.02-0.19)
Yosemite NP	45	53	Foothill Pine	0.27	
			Whitebark Pine	0.06	
			Whitebark Pine/Mt. Hemlock	0.03	
			Western Juniper	0.03	
Devils Postpile NM	4	4	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

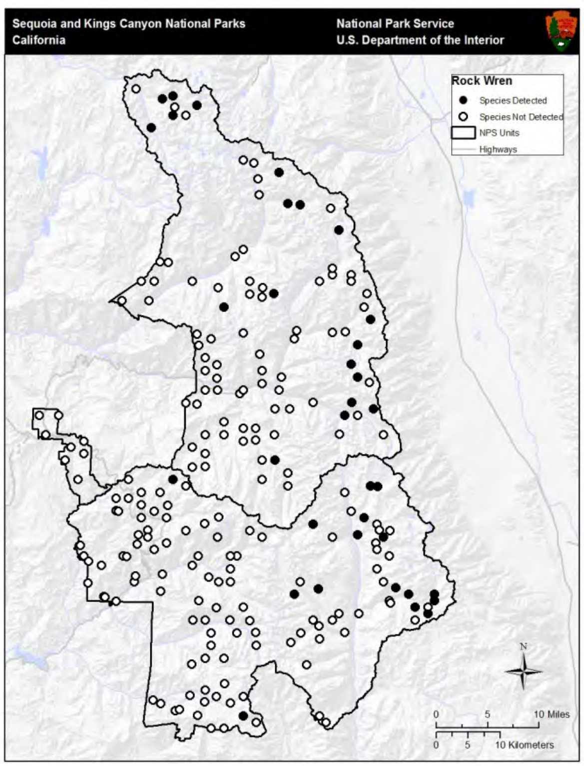

Figure 37. Bird survey transects where Rock Wren was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

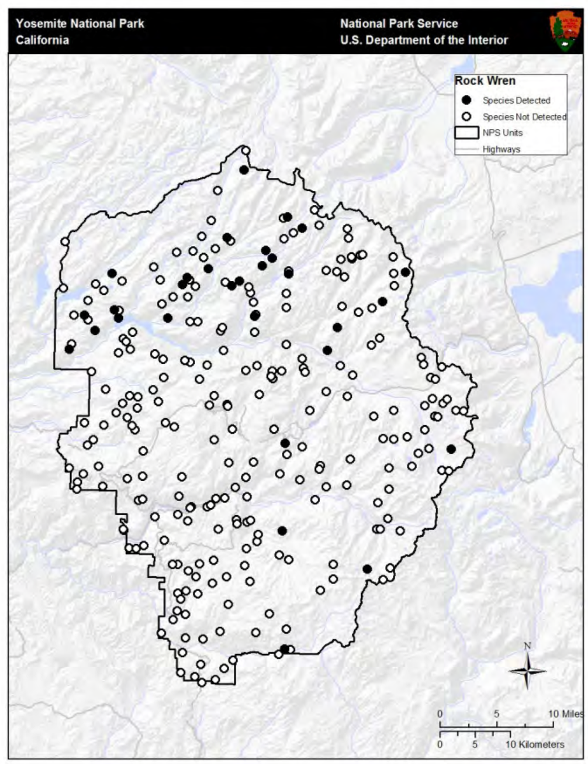

Figure 38. Bird survey transects where Rock Wren was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution
Rock Wren was detected from middle to high elevations at SEKI and from low to high elevations at YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 3232 m, with 95% of observations occurring between 2613 and 3578 m. In YOSE, the mean elevation of observations was 2692 m with 95% of observations falling between 1581 and 3376 m (Siegel et al. 2011).

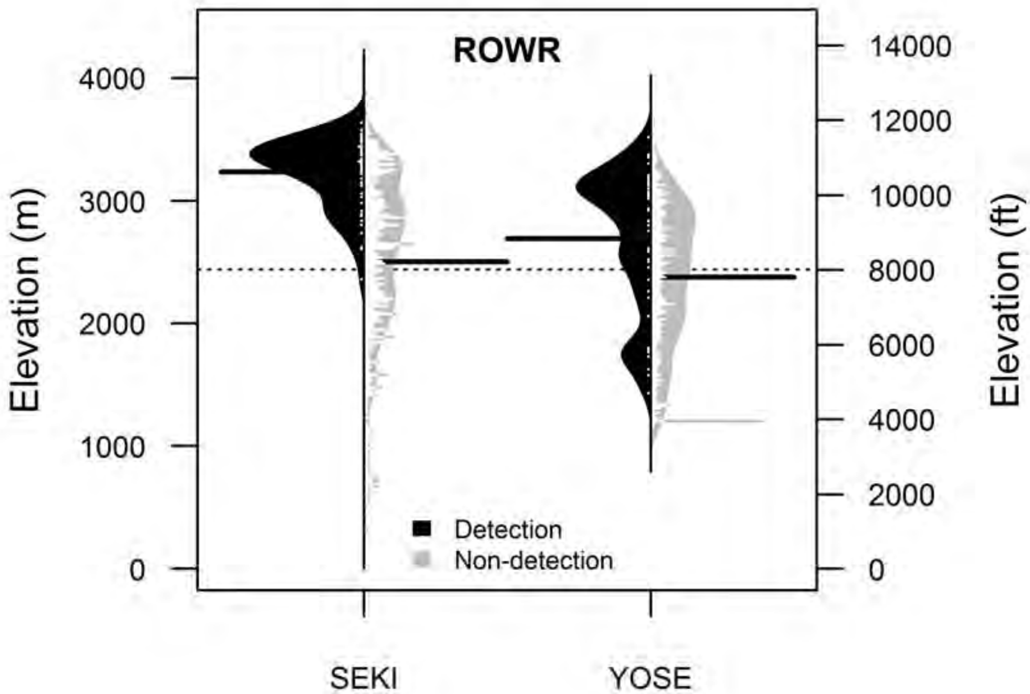

Figure 3. Elevational distributions of sites where Rock Wrens (ROWR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data
Breeding Bird Survey (BBS) data indicate Rock Wrens are found in lower abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at YOSE and Kings Canyon NP, and were not detected on the BBS route in Sequoia NP. A significant negative trend was observed across California during 1980-2007 (Table 3).

Table 93. Relative abundance and trends for Rock Wren according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	105	1.03	-1.2	0.20
	1980-2007			-2.9	0.02
Sierra Nevada (BCR 15)	1966-2007	13	0.36	+4.6	0.34
	1980-2007			+0.3	0.95
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.55	-16.8	0.16
Route 14156 – Yosemite NP	1974-2007	1	0.85	+5.2	0.38

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Rock Wrens are not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

In California, the Rock Wren is widely distributed along ocean cliffs and bluffs, breakwaters, and dry rocky coastal reefs, cliff faces, talus slopes and scree, alpine fell-fields, deep-cut arroyos, rocky outcroppings, and dry gravely washes (Lowther et al. 2000). Most habitats used for nesting are not substantially impacted by human activities. Despite its broad distribution in the state and its relatively undisturbed habitat, the Rock Wren declined significantly in California over the past 30 years. A warming climate may adversely affect the availability of subalpine forests in the Sierra Nevada, but this species may be able to use other open habitat types, as long as crevices and burrows are available.

Climate Change: An analysis of shifts between the historical range of Rock Wren (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Rock Wren has shifted significantly northward by 11 miles and inland by 32 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be responding to climate change by moving towards cooler regions (Audubon 2009). These observed shifts provide evidence that the Rock Wren has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Rock Wrens breed in rocky, sparsely vegetated habitats and subalpine pine forests at middle to higher elevations in SIEN parks (Figure 3). If climate change causes the species' range to shift upward as is generally expected, there is likely sufficient higher-altitude rocky habitat for new colonization in SEKI and YOSE, but subalpine forests may contract in the face of a warming climate. However, Rock Wrens inhabit a wide variety of open, rocky habitats throughout their range in California and may be somewhat flexible in their use of broader types– as long as crevices or small animal burrows are available for foraging, shelter, and breeding.

Altered Fire Regimes: Given its proclivity for open habitats, high-intensity fire may enhance conditions for the Rock Wren. Rock Wrens exhibited a preference for burned forests in the southern Sierra Nevada (Siegel and Wilkerson 2005) and were only detected post-fire in New Mexico (Kotliar et al. 2007). Rock Wrens in the Rocky Mountains also responded favorably to fire (Smucker et al. 2005) and were often detected on mid-successional burned sites (Hutto 1995). Restoration of natural fire regimes, including high-intensity fire, will likely benefit this species in SIEN parks and throughout the Sierra Nevada.

Habitat Fragmentation or Loss: Rock Wren prefers dry, open, rocky habitats, and is thus not vulnerable to habitat fragmentation or loss from logging or development in the Sierra Nevada as are many other bird species.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Rock Wren.

Human Use Impacts: Human-use impacts are not likely to threaten the Rock Wren in SIEN parks. Localized disturbance from recreational rock climbers and hikers may adversely impact nesting Rock Wrens, but this has not been quantified.

Management Options and Conservation Opportunities
The only obvious thing park managers could do to protect Rock Wren populations in the parks would be to protect nesting birds from disturbance due to recreational rock climbing, perhaps through educational efforts aimed at rock climbers.

Ruby-crowned Kinglet – *Regulus calendula*

Migratory Status

Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Ruby-crowned Kinglet is a fairly common year-round resident (with breeding birds found at higher elevations, and wintering birds present in the foothills) and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and an uncommon migrant or summer resident and possible breeder at Devils Postpile National Monument (Table 1).

Table 94. Breeding status and relative abundance of Ruby-crowned Kinglets in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Winter/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Winter/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Migrant/Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

The breeding range of the Ruby-crowned Kinglet encompasses the spruce-fir forests of the northern and mountainous western U.S. and Canada (Swanson et al. 2008). The bird may have been extirpated as a breeding species from some of the mountains of Southern California (Swanson et al. 2008). This species is likely less numerous in the Sierra than in other mountain ranges, thus the Sierra may not be very important to *cineraceus*, the western subspecies (Siegel and DeSante 1999).

Distribution and Habitat Associations

Ruby-crowned Kinglets prefer open canopied conditions and edges of meadows in Lodgepole Pine and Mountain Hemlock forests (Siegel and DeSante 1999). Ruby-crowned Kinglets were detected in moderate numbers (Table 2) along survey transects (Figure 1) in SEKI and lower numbers along transects in YOSE (Figure 2) during avian inventory surveys, and were not observed at all during the inventory in DEPO. Park inventories show highest associations with Lodgepole Pine Forest within both SEKI and YOSE (Table 2).

Table 95. Number of Ruby-crowned Kinglets recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	96	117	Lodgepole Pine Forest	0.13	0.12 (0.08-0.17)
			Foxtail Pine	0.06	0.08 (0.10-0.38)
			Western White Pine Woodland	0.06	0.07 (0.02-0.25)
Yosemite NP	19	25	Lodgepole Pine	0.03	
			Mountain Hemlock	0.01	
			Montane Meadow	0.01	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

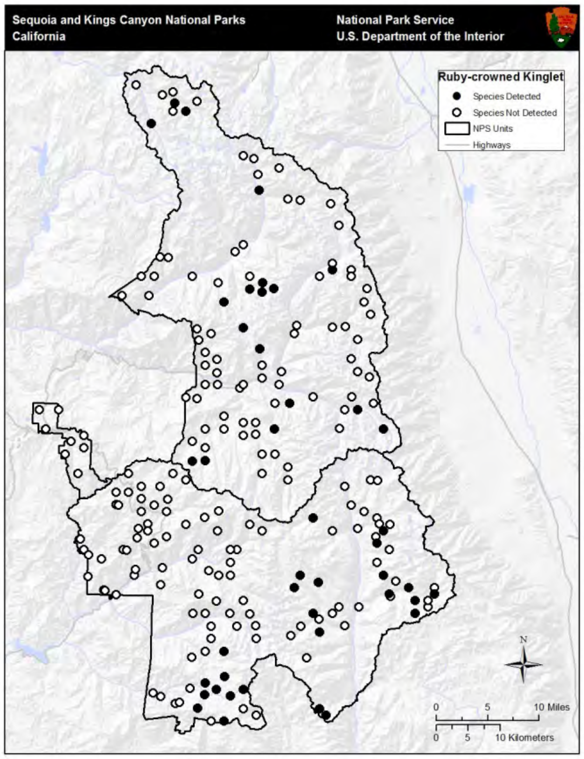

Figure 39. Bird survey transects where Ruby-crowned Kinglet was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

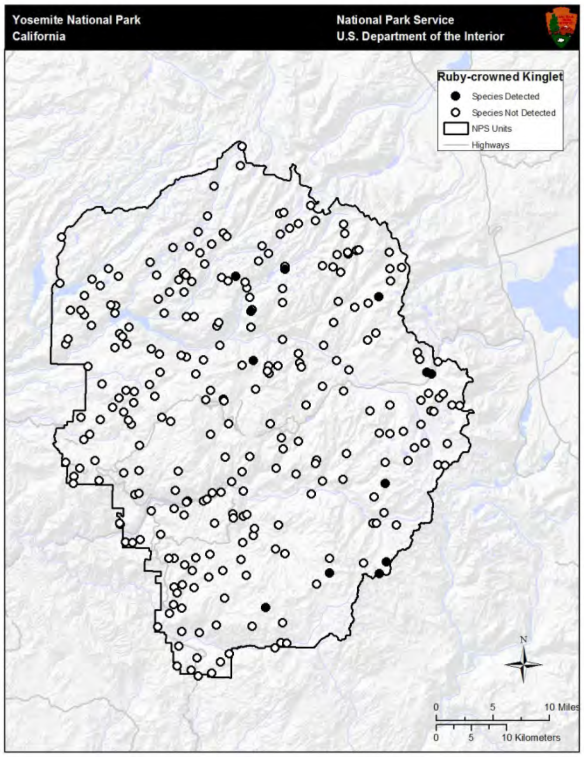

Figure 40. Bird survey transects where Ruby-crowned Kinglet was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Ruby-crowned Kinglet was detected at middle- to higher-elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Ruby-crowned Kinglet in SEKI was 2963 m, with 95% of observations occurring between 2529 and 3393 m. In YOSE, the mean elevation of observations was 2838 m with 95% of observations falling between 2331 and 3124 m (Siegel et al. 2011).

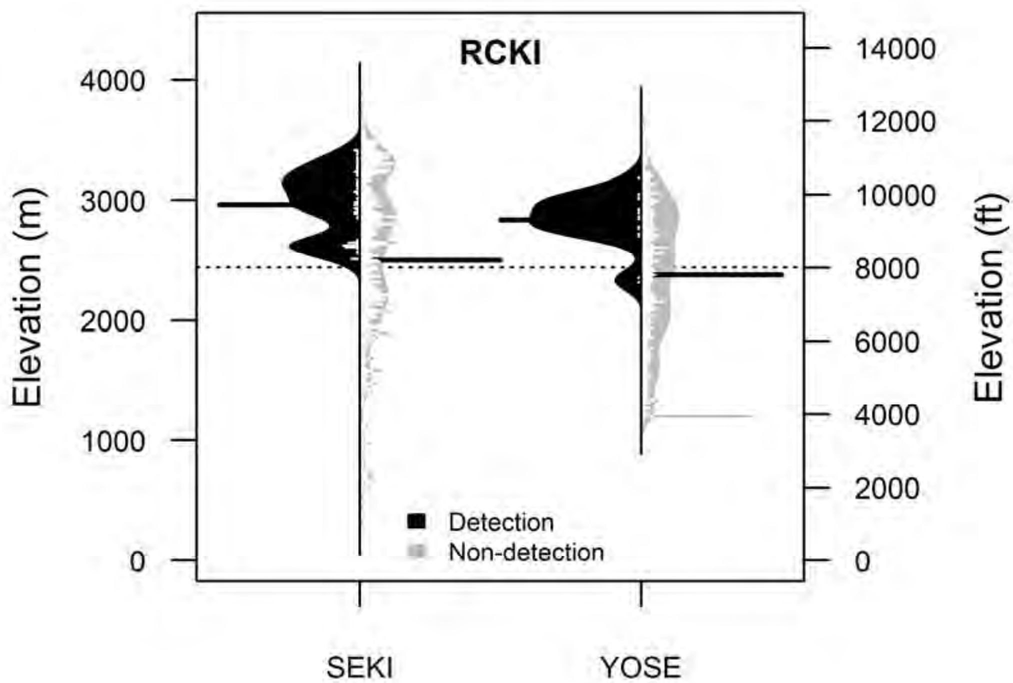

Figure 3. Elevational distributions of sites where Ruby-crowned Kinglet (RCKI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Ruby-crowned Kinglets are not abundant along survey routes either in the Sierra Region (BCR 15) or in California as a whole (Table 3); in the Sierra the species is rather wedded to high-elevation forests that are not well sampled by the BBS. The highest abundance of Ruby-crowned Kinglets per route was in Sequoia NP, but overall it was not abundant there and was undetected along the route in Yosemite NP. No significant population trends were observed during any time periods (Table 3).

Table 96. Relative abundance and trends for Ruby-crowned Kinglet according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	17	0.11	-5.7	0.16
	1980-2007			-3.1	0.70
Sierra Nevada (BCR 15)	1966-2007	9	0.24	-7.6	0.09
	1980-2007			-5.2	0.40
Route 14117 – Sequoia NP	1972-2005	1	0.69	-16.0	0.54
Route 14132 – Kings Canyon NP	1974-2005	1	0.10	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Few Ruby-crowned Kinglets were captured in mist nets at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

No significant population trends were documented for Ruby-crowned Kinglets in California, but all non-significant trends were negative for the Sequoia NP, the Sierra region, and the entire state (Table 3). The species is known to be declining in eastern North America (Swanson et al. 2008). Factors associated with these declines are unknown, but logging and high-intensity fire appear to be the major threats.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Ruby-crowned Kinglets has significantly shifted 45 miles northward and 14 miles inland throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). A study assessing migration timing between 1975 and 2000 (a period of recent climate change), showed that the Ruby-crowned Kinglet has significantly shifted toward earlier spring arrival and earlier autumn departure from the area (Mills 2005). These observations suggest that this kinglet may be responding to climate change through range shifts towards cooler areas and migration timing, and will continue to do so in the future.

Ruby-crowned Kinglet is a higher-elevation montane species and as such is likely to be relatively vulnerable to climate change. If the Ruby-crowned Kinglet responds to a warming climate by moving upslope, as is generally expected, then this species will persist only if high-elevation pine forests are readily available.

Altered Fire Regimes: Ruby-crowned Kinglet appears to be more tolerant of fire than its congener, the Golden-crowned Kinglet. Approximately half of the studies examined by Hutto (1995) in the Rocky Mountain region detected the Ruby-crowned Kinglet using early and mid-successional burned forests. However, high-intensity fire may be detrimental: the Ruby-crowned decreased significantly with increasing burn intensity in Montana’s forests (Smucker et al. 2005). A future increase in extent and frequency of high-intensity fire in SIEN parks may adversely impact this species, but more moderate-intensity fire may enhance habitat, as these birds prefer open-canopied forest conditions.

Habitat Fragmentation or Loss: Swanson et al. (2008) note that logging reduces abundance of Ruby-crowned Kinglets. This kinglet's association with Lodgepole Pine and other high-elevation types such as Western White and Foxtail Pine may render it less vulnerable to logging impacts in the Sierra as these trees are not as desirable to timber companies as many other Sierran trees. Regardless, logging is not a significant threat in SIEN parks.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Ruby-crowned Kinglet.

Human Use Impacts: Human use impacts do not appear to be a major threat to Ruby-crowned Kinglets especially in protected areas such as the SIEN parks.

Management Options and Conservation Opportunities

Factors implicated in the decline of Ruby-crowned Kinglets are unknown but may include logging and high-intensity fire, both of which are not major threats in SIEN parks. Monitoring Ruby-crowned Kinglet populations in the parks could resolve whether population declines are indeed occurring, and if so, to determine their causes. Monitoring may currently be the most important action park managers can take for Ruby-crowned Kinglets.

Rufous Hummingbird – *Selasphorus rufus*

Migratory Status
Neotropical migrant (Healy and Calder 2006)

Residency and Breeding Status
Rufous Hummingbird is a common visitor at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and Devils Postpile National Monument (Table 1). Rufous Hummingbird migrates uncommonly early, visiting the Sierra Nevada in the summer months on its way south to its fall and wintering grounds (Gaines 1992).

Table 97. Breeding status and relative abundance of Rufous Hummingbirds in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer Migrant	Non-Breeder	Common
Yosemite NP	Summer Migrant	Non-Breeder	Common
Devils Postpile NM	Summer Migrant	Non-Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S1S2 – Critically imperiled / Imperiled (High to very high risk of extinction of elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Rufous Hummingbird breeds from Alaska as far south as the Oregon/California boarder and winters primarily in Mexico (Healy and Calder 2006). The Sierra Nevada and SIEN parks are important feeding grounds during migration (Gaines 1992), but are not used for either breeding or wintering habitat.

Distribution and Habitat Associations
In the Sierra Nevada, Rufous Hummingbirds can be found along meadows and slopes where paintbrush, penstemon, scarlet gilia or other ‘hummingbird flowers’ are located (Gaines 1992). Rufous Hummingbirds were detected more often (Figures 1 and 2) and in greater densities (Table 2) during avian inventory projects at SEKI than YOSE and were not observed during the avian inventory at DEPO. Park inventories show highest associations with Western Juniper Woodland and Whitebark/Lodgepole Pine forests within SEKI and YOSE respectively (Table 2). These associations likely reflect presence of flowering plants rather than the habitat-defining tree

species. Estimated densities are not available from surveys; the birds' attraction to flagging used for marking survey points invalidated density estimation using distance sampling.

Table 98. Number of Rufous Hummingbirds recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	56	66	Western Juniper Woodland	0.22	NA[1]
			Western White Pine Woodland	0.19	NA
			Montane Chaparral	0.18	
Yosemite NP	33	43	Whitebark/Lodgepole Pine	0.05	
			Barren	0.05	
			Mountain Hemlock	0.04	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data. Habitat densities at Sequoia and Kings Canyon not available due to atypical behavior of this species (see Siegel and Wilkerson 2005).

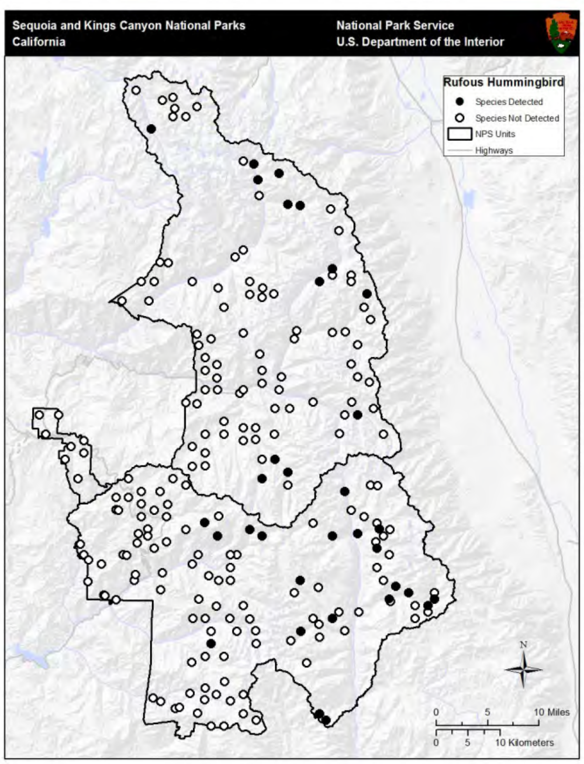

Figure 41. Bird survey transects where Rufous Hummingbird was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

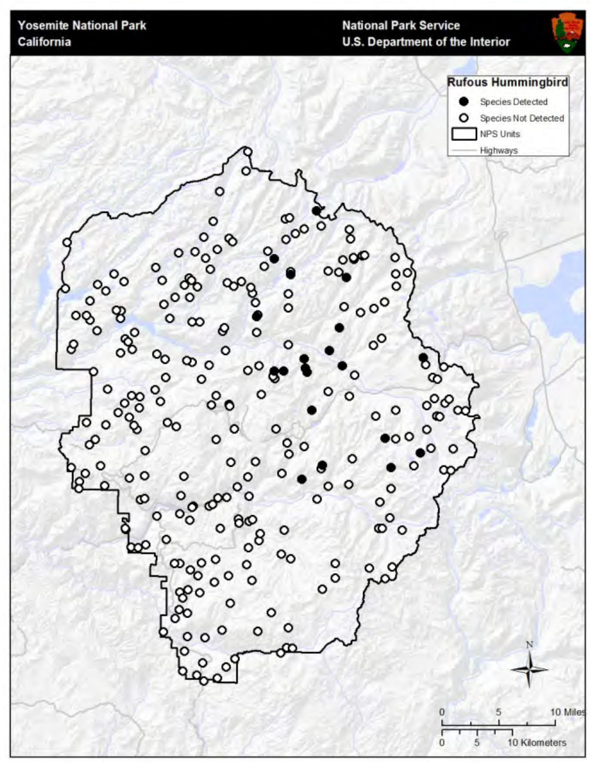

Figure 42. Bird survey transects where Rufous Hummingbird was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Rufous Hummingbird was observed within the middle to higher-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Rufous Hummingbird in SEKI was 2977 m, with 95% of observations occurring between 1239 and 3168 m. At YOSE, the mean elevation of observations was 2822 m with 95% of observations falling between 2367 and 3238 m (Siegel et al. 2011).

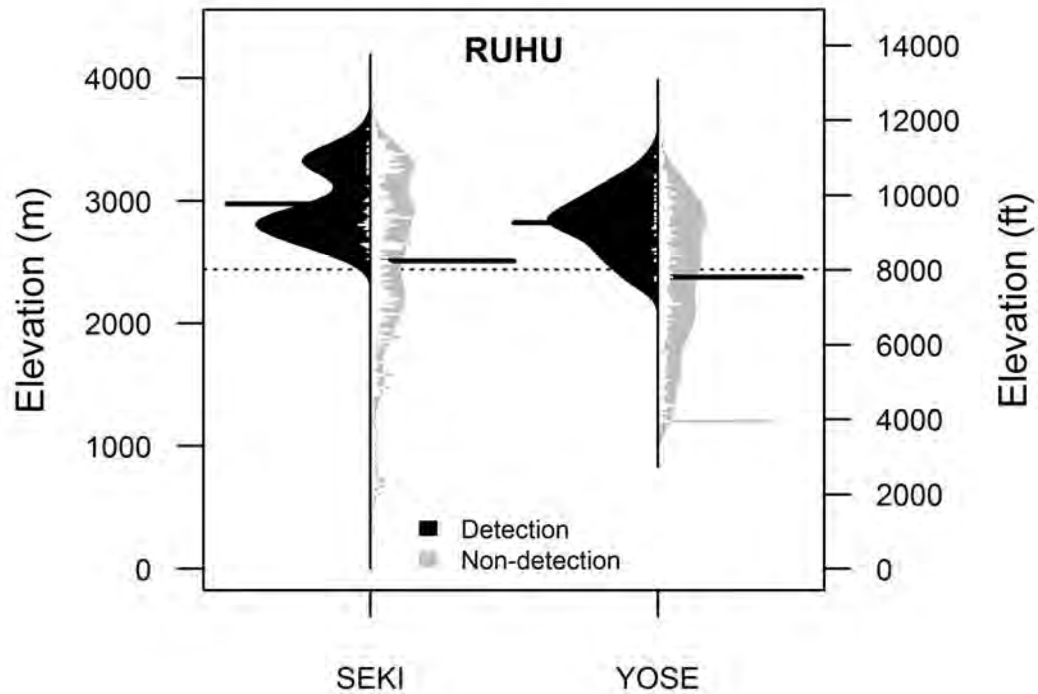

Figure 3. Elevational distributions of sites where Rufous Hummingbird (RUHU) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Rufous Hummingbirds are detected in low numbers along few survey routes in both the Sierra Region (BCR 15) and across California as a whole. Of the routes that pass through SIEN parks, the species was detected only along the Sequoia NP route and in low numbers. No significant population trends were observed along any routes or regions relevant to SIEN parks (Table 3). Note that BBS data reflect observations of migrant Rufous Hummingbirds - not locally breeding birds.

Table 99. Relative abundance and trends for Rufous Hummingbird according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007[1]	9	0.05	+11.2	0.37
	1980-2007[1]			+15.6	0.29
Sierra Nevada (BCR 15)	1966-2007[1]	2	0.02	+19.0	0.66
	1980-2007[1]			NA[1]	NA
Route 14117 – Sequoia NP	1972-2005	1	0.13	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Rufous Hummingbirds are captured in low numbers at MAPS banding stations in SEKI and YOSE, but are not banded. For this reason demographic and survivorship data are not available from MAPS stations.

Stressors

Most troubling for Rufous Hummingbird are BBS results for 1968-2007 that shows a survey-wide (continental) decline (NatureServe 2009), although this trend is not reflected in California or Sierra Nevada results, where low detection rates would make interpretation difficult in an case (Table 3). Despite this apparent decline, there are no apparent major threats to the species. Habitat degradation may harm populations in some areas, but appears to be offset by habitat alterations beneficial to hummingbird species. Rufous Hummingbird has likely benefited from the introduction of non-native flowering plants and artificial feeders. Altered fire regimes and disease do not appear to be major concerns for the species and the impacts of climate change are largely unknown.

Climate Change: The impact of climate change on Rufous Hummingbird is largely unknown. Any effects on the species will likely be tied to changes to timing and abundance of flowering plants. Within SIEN parks, Rufous Hummingbird will likely be most susceptible to any changes within subalpine meadows and other areas where summer flowers are currently used during migration.

Altered Fire Regimes: Although fire can impact Rufous Hummingbird populations locally through temporary loss of habitat, it does not appear to be a major concern for the species and may be beneficial where fires create more early-seral habitat and potential for abundant flowering plants.

Habitat Fragmentation or Loss: Alterations of habitat in the Sierra Nevada due to human activities such as the construction of roads and expansion of livestock grazing has led to changes in vegetation structure and species composition in habitats used by the species (Bunn et al 2007; Kattelman and Embury 1996). However, Rufous Hummingbird’s ability to utilize a variety of habitat types (Gass 1979; Russell et al 1994) may reduce the impact of habitat degradation. Conversely, timber harvest practices may benefit Rufous Hummingbird where logging creates forest openings and allow for greater abundance of early-seral flowers (Healy and Calder 2006). With the possible minor exception of packstock grazing in park meadows habitat alterations would have only indirect impacts on Rufous Hummingbirds passing through SIEN parks where habitat degradation is minimal.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the Rufous Hummingbird. The species likely benefits from the introduction of non-native flowering plants in urban and suburban areas similarly to other hummingbird species.

Human Use Impacts: Artificial feeders provide supplementary food sources for Rufous Hummingbirds which may have helped elevate populations above natural levels (Healy and Calder 2006). Other human activities that lead to changes in habitat have mixed effects on the species (see above). Such human activities may affect individuals who pass through SIEN parks elsewhere along their migration route.

Management Options and Conservation Opportunities

Rufous Hummingbird is not a heavily managed species. Efforts to maintain mountain meadows and other areas with abundant wildflowers would be most beneficial to the species within SIEN parks. Artificial feeders could be considered to provide supplementary food to Rufous Hummingbirds during summer months if natural food sources become scarce. Finally, monitoring programs should continue in and around SIEN parks to better understand population trends and help understand any emerging threats such as climate change.

Rufous-crowned Sparrow – *Aimophila ruficeps*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Rufous-crowned Sparrow is a locally fairly common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) National Parks and locally uncommon year-round resident and possible breeder at Yosemite (YOSE) National Park, but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 100. Breeding status and relative abundance of Rufous-crowned Sparrows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Possible Breeder	Locally Fairly Common
Yosemite NP	Year-round	Possible Breeder	Locally Uncommon
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Southern California Rufous-Crowned Sparrow (*Aimophila ruficeps canescens*) subspecies is a Species of Concern
- CA Department of Fish and Game Status: Santa Cruz Island Rufous-crowned Sparrow subspecies (*Aimophila ruficeps obscura)* is a California Bird Species of Special Concern

Range Significance
The Rufous-crowned Sparrow occurs throughout much of the southwestern U.S. and Mexico, but its range is often discontinuous, with numerous small, isolated populations (Collins 1999). The subspecies *A. r. ruficeps* is found only marginally on the lower foothills of the west slope of the Sierra Nevada, but is restricted to Central California, thus the Sierra represents a very important part of this subspecies' range (Siegel and DeSante 1999).

Distribution and Habitat Associations

Rufous-crowned Sparrows inhabit semiarid grassy shrublands and open woodlands on moderate to steep grassy and rocky hillsides and canyons (Collins 1999). *A. r. ruficeps* is restricted to dry, sunny, grassy slopes with scattered small shrubs and rocky outcrops, avoiding dense chaparral and woodlands of all types (Siegel and DeSante 1999). Rufous-crowned Sparrows were detected at very low numbers (Table 2) along transects at the lower-elevation westernmost portion of SEKI (Figure 1) during avian inventory surveys. The species was found in Mixed Chaparral and Blue Oak forest (Table 2). This sparrow's secretive nature and proclivity for inaccessible, rocky, shrub-covered slopes make it difficult to observe (Collins 1999).

Table 101. Number of Rufous-crowned Sparrows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	10	10	Mixed Chaparral	0.17	0.19 (0.09-0.41)
			Blue Oak Forest	0.07	0.16 (0.04-0.61)
Yosemite NP	0	0	Not detected	NA[1]	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

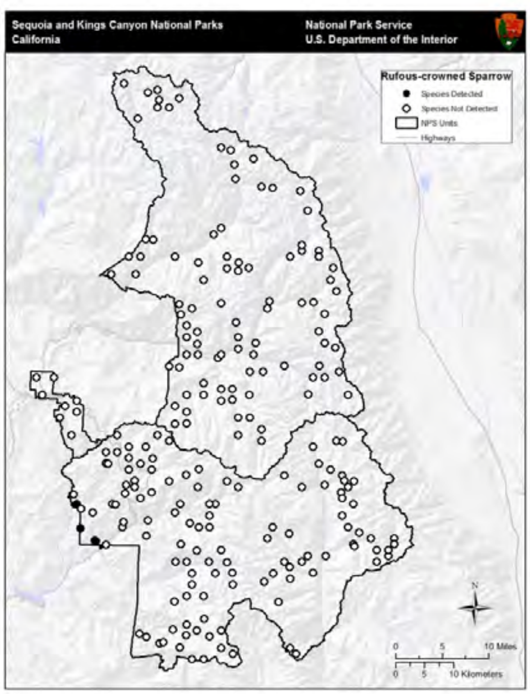

Figure 43. Bird survey transects where Rufous-crowned Sparrow was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution

Rufous-crowned Sparrow was detected at low elevations in SEKI during avian inventory surveys (Figure 2). The mean elevation of observations of Rufous-crowned Sparrow was 851 m, with 95% of observations occurring between 491 and 1617 m (Siegel et al. 2011).

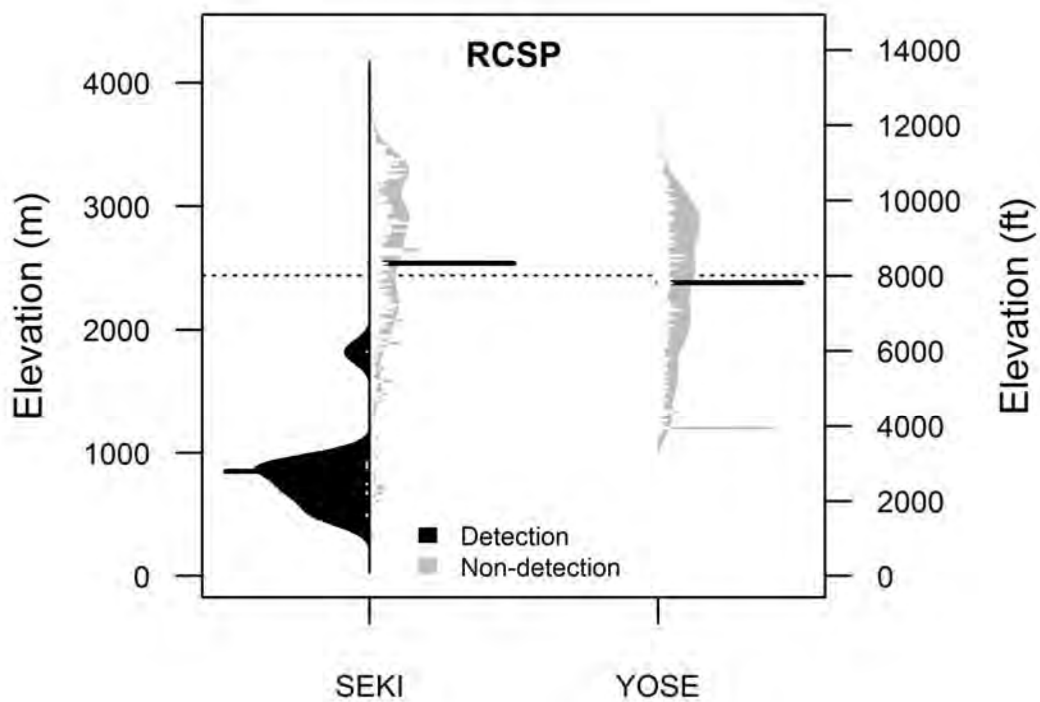

Figure 2. Elevational distributions of sites where Rufous-crowned Sparrow (RCSP) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) indicate Rufous-crowned Sparrows are less abundant in the Sierra Region (BCR 15) than in California as a whole, but are generally not abundant anywhere (Table 3). A statistically significant declining population trend was observed for the Sierra Nevada since 1980, but the very small sample size make the result unreliable (Table 3).

Table 102. Relative abundance and trends for Rufous-crowned Sparrow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	36	0.31	-0.1	0.97
	1980-2007			-1.7	0.36
Sierra Nevada (BCR 15)	1966-2007[1]	4	0.09	-10.5	0.23
	1980-2007[1]			-14.9	0.01
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Rufous-crowned Sparrows were not captured in mist nets at SIEN MAPS stations, thus data on productivity and survival at the parks are not available.

Stressors

Population trends and other demographic data are generally lacking for the Rufous-crowned Sparrow in the Sierra Nevada and SIEN parks. Siegel and DeSante (1999) suggest that the Rufous-crowned Sparrow may have expanded its range northward in recent years to include the foothills of the northern west slope of the Sierra, but also posited that the species may have been previously overlooked in this part of the range. However, a recent assessment of CBC data from throughout the range of the Rufous-crowned Sparrow documented significant population declines over the past 40 years (Audubon 2009).

The Rufous-crowned Sparrow has fairly specialized habitat requirements; it often abandons chaparral and coastal sage scrub habitats when shrubs become too dense or uniform (Collins 1999). Thus, these sparrows may suffer from fire suppression in shrublands. Restoration of natural fire regimes, including increased frequency and extent of high-intensity fire and allowing regeneration of chaparral will certainly benefit this species. Urban development in the Sierra foothills undoubtedly poses a great risk to Rufous-crowned Sparrow (Siegel and DeSante 1999, Bolger 2002). Brown-headed Cowbird parasitism, exacerbated by presence of packstock, is also a significant problem for Rufous-crowned Sparrows, as are grazing activities that reduce shrub cover required for nesting and foraging.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Rufous-crowned Sparrows has shifted significantly northward by 64 miles and coastward by 49 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). These shifts suggest the species may have already responded to climate change and will likely continue to shift its range in the coming decades (Audubon 2009). Modeled distribution shifts of Rufous-crowned Sparrows predict an increasing probability of occurrence throughout its current range, and a slight increase in distribution along coastal California (Stralberg and Jongsomjit 2008), suggesting a positive response to a warming climate. The most important variables influencing current and projected distribution were vegetation, precipitation seasonality (Maxent distribution model) as well as annual mean temperature (GAM distribution model).

In SIEN parks, the Rufous-crowned Sparrow was found only at low elevation portions of SEKI (Figure 2). If climate change causes the sparrow's range to move upslope in the Sierra Nevada as is generally expected, the species should persist and thrive in the SIEN parks as long as Mixed Chaparral habitats expand uphill as well.

Altered Fire Regimes: Widespread fire suppression has adversely impacted Rufous-crowned Sparrows by allowing chaparral and coastal sage scrub habitats to grow into dense, decadent stands (Collins 1999). Mixed Chaparral habitats are well-adapted to fire; some shrub species resprout after fire while others regenerate from seed banks (Riggan et al. 1994) and this sparrow has been observed occupying areas regrowing after fire (Collins 1999). A future increase in extent and frequency of fire that creates open shrub stands will increase habitat for Rufous-crowned Sparrows, at least in the short-term, while post-fire management activities that eliminate shrubs that are regenerating after fire would threaten this species. Policies that include management of prescribed and lightning-ignited fire likely strongly benefit this species in SIEN parks.

Habitat Fragmentation or Loss: Chaparral shrubs provide little nourishment for domestic livestock, thus range managers historically removed chaparral by controlled burning and reseeding with non-native annual grasses; in 1950 alone, ranchers in 30 California counties cleared about 97,000 acres of chaparral (Lawrence 1966). Over the past century, loss, degradation, and fragmentation of suitable open scrub habitats even on moderate to steep slopes as result of urban and agricultural development have restricted the range of A. r. *canescens* in southern California (Collins 1999) and undoubtedly adversely affected the Sierran subspecies as well. Urban and agricultural development do not pose a significant threat to the species in SIEN parks, but as this species occurs primarily at low elevations outside these protected parks, some type of landscape-scale protection of chaparral habitat in the Sierra Nevada is sorely needed.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Rufous-crowned Sparrows are vulnerable to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Low-level livestock grazing may be beneficial to Rufous-crowned Sparrows by opening up chaparral habitats, but intense grazing can reduce cover needed by this species to breed (Collins 1999). Habitat degradation due to packstock grazing within the parks is therefore a potential concern for this species, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because overgrazing might damage chaparral habitat. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock are likely relatively small and localized in SIEN park).

Management Options and Conservation Opportunities

Park managers can protect Rufous-crowned Sparrow populations in the parks by maintaining open chaparral habitats on moderate to steep slopes, restoring the fire cycle (including high-intensity fire), and managing or eliminating cowbird feeding sites such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicated that a cowbird trapping program was not warranted (Halterman et al. 1999). However, this assessment is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Say's Phoebe – *Sayornis saya*

Migratory Status

Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Say's Phoebe does not breed at Sequoia and Kings Canyon (SEKI) National Parks, Yosemite (YOSE) National Park, or Devils Postpile (DEPO) National Monument. The species occurs rarely at SEKI and YOSE (Table 1).

Table 1. Breeding status and relative abundance of Say's Phoebes in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Summer	Non-Breeder	Rare
Yosemite NP	Migrant/Summer	Non-Breeder	Rare
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Say's Phoebe breeds throughout much of western North America including Southern California (Schukman and Wolf 1998), but is rare in the Sierra Nevada (Siegel and DeSante 1999) making SIEN parks a relatively unimportant part of the species' range.

Distribution and Habitat Associations

Say's Phoebes are more often found in desolate habitat lacking dense vegetation than in dense sagebrush or forest (Gaines 1992). Say's Phoebes were not detected during inventory projects at any of the SIEN parks. However, the species was detected anecdotally away from survey transects at SEKI. Due to a lack observational data, habitat associations are not available from these surveys.

Table 2. Number of Say's Phoebes recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings	0	0	Detected off-survey	NA[1]	NA
Yosemite NP	0	0	Not detected	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Say's Phoebe was not observed during inventory surveys of the SIEN parks; thus, elevational distribution data are not available.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Say's Phoebes are rarely observed within the Sierra Nevada, but are observed in low numbers along routes elsewhere in California. Of the individual BBS routes that intersect SIEN parks, Say's Phoebe was detected along only the Sequoia NP route, but in very low numbers. No population trends for the areas of interest are discernable from the limited data on this species (Table 3).

Table 3. Relative abundance and trends for Say's Phoebe according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	55	0.60	+0.3	0.74
	1980-2007			-1.3	0.27
Sierra Nevada (BCR 15)	1966-2007	NA[1]	NA	NA	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Due to the rarity of Say's Phoebe in Kings Canyon NP and Yosemite NP, no MAPS data are available for this species.

Stressors

Say's Phoebe is a largely understudied species, but is not considered threatened at either the state or national level. There are no known major threats to the species and much human development is likely beneficial to Say's Phoebe. Due to the species' association with dry environments, climate change could pose a threat where it leads to increased aridification in already extreme environments, although this has not yet been studied. If unstudied threats exist they are not likely a major concern in SIEN parks where the Say's Phoebe is naturally rare.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Say's Phoebe has significantly shifted 29.9 miles to the north and 24.4 miles toward the coast over the past 40 years (Audubon 2009). Shifts in these directions have mixed implications because higher latitudes and inland areas generally have cooler winter temperatures than lower latitudes and coastal areas (Audubon 2009). Thus, if Say's Phoebe were responding to climate change in a predictable manner by moving toward cooler areas we would see movements northward and inland.

Due to the species' association with dry habitats containing sparse resources, any additional aridification of such extreme environments could be detrimental to Say's Phoebe at least locally. However, the response of Say's Phoebe to such potential changes has not been examined.

Altered Fire Regimes: The effects of fire on Say's Phoebe have not been studied. However, any destruction of habitat due to large-scale fire is likely to be detrimental at least in the short-term.

Habitat Fragmentation or Loss: Say's Phoebe does not appear to suffer from habitat loss or fragmentation and has likely benefited from human development (See below).

Invasive Species and Disease: Like all bird species, Say's Phoebe hosts some diseases and parasites (e.g. nasal mites; Brooks and Strandtmann 1960). However, to our knowledge, there are no major threats of invasive species or disease to the Say's Phoebe.

Human Use Impacts: Like other phoebe species, Say's Phoebe uses human structures as nest sites and has likely benefited from human development (Schukman and Wolf 1998). The effects of many human activities have not been studied for Say's Phoebe, but livestock grazing does not appear to negatively impact the species (Schukman and Wolf 1998).

Management Options and Conservation Opportunities

Say's Phoebes are not managed across their range (Schukman and Wolf 1998) and due to their natural scarcity in the southern Sierra, management is not warranted in SIEN parks.

Sharp-shinned Hawk – *Accipiter striatus*

Migratory Status

Partial long-distance migrant (Bildstein and Meyer 2000)

Residency and Breeding Status

Sharp-shinned Hawk occurs as a migrant and summer resident at Devils Postpile (DEPO) National Monument as well as Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks (Table 1). The species breeds at YOSE and SEKI, possibly at DEPO as well (Table 1).

Table 4. Breeding status and relative abundance of Sharp-shinned Hawks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Summer	Breeder	Uncommon
Yosemite NP	Migrant/Summer	Breeder	Uncommon
Devils Postpile NM	Migrant/Summer	Possible Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 - Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Sharp-shinned Hawk breeds across much of Canada and parts of the U.S. and Mexico, including the Sierra Nevada and north coast of California (Bildstein et al. 2000). The SIEN parks are not largely important for the species, but represent much of the southern extent of the California range.

Distribution and Habitat Associations

During summers in the western Sierra Nevada, Sharp-shinned Hawks prefer open coniferous forests and the edges of meadows or clearings (Gaines 1992). Sharp-shinned Hawks were detected only one and two times in SEKI and YOSE respectively during park inventories (Table 2, Figures 1 and 2). Like many other raptors, Sharp-shinned Hawks are not well-sampled by passive point counts designed for detecting singing birds. Habitat associations for the species are not available from inventory data.

Table 5. Number of Sharp-shinned Hawks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	1	1	NA[1]	NA	NA
Yosemite NP	2	2	NA	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

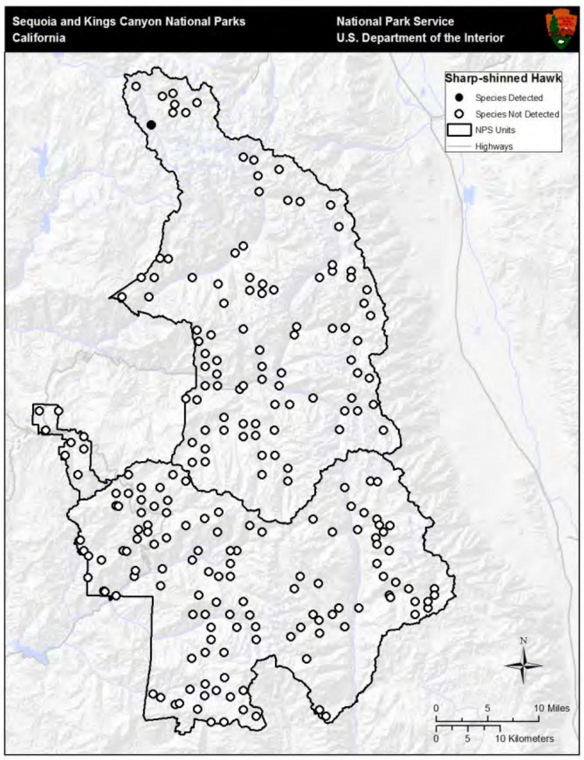

Figure 1. Bird survey transects where Sharp-shinned Hawk was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

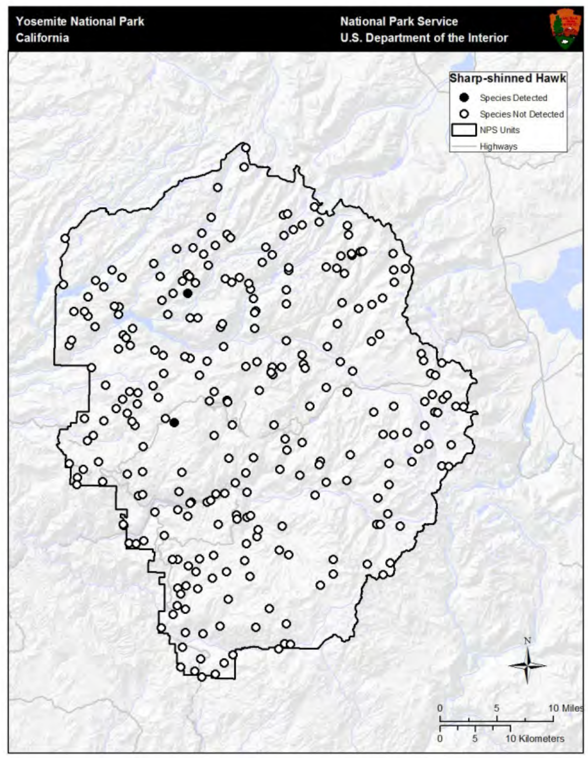

Figure 2. Bird survey transects where Sharp-shinned Hawk was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Sharp-shinned Hawk was observed within the middle elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of the two observations at YOSE was 2011 m; the sole observation at SEKI occurred at 2805 m (Siegel et al. 2011).

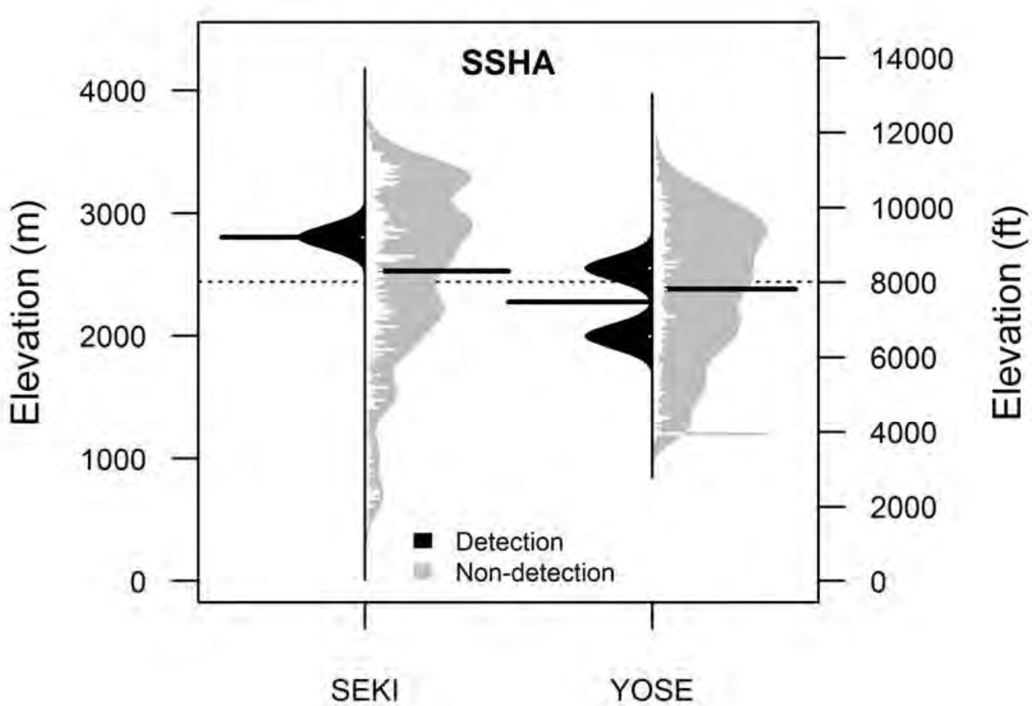

Figure 3. Elevational distributions of sites where Sharp-shinned Hawk (SSHA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Sharp-shinned Hawks are detected rarely on routes in California as a whole and in the Sierra Region (BCR 15). The species was observed rarely on the individual BBS route through YOSE, but not on routes through SEKI. In recent years (1980-2007) Sharp-shinned Hawk has shown a significant negative trend across the state, with abundance data being insufficient in the Sierra Nevada and SIEN parks to infer trends (Table 3).

Table 6. Relative abundance and trends for Sharp-shinned Hawk according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007[1]	18	0.01	-9.1	0.27
	1980-2007[1]			-17.2	0.00
Sierra Nevada (BCR 15)	1966-2007	NA[1]	NA	NA[1]	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.04	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Sharp-shinned Hawks are infrequently captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The Sharp-shinned Hawk has not been studied as thoroughly as many other avian species and current threats to the hawk appear to be poorly understood. This is troubling given the recent declines of the species in California (Table 3). Like many other raptors, the use of DDT in the early and mid-twentieth century resulted in poor reproductive success and declines in populations. Although it is now illegal to use DDT in the U.S., pesticide use in Central America may remain the greatest barrier to Sharp-shinned Hawk population growth.

Collisions with automobiles and building windows are known to cause Sharp-shinned Hawk deaths. The species is also known to carry a number of diseases including West Nile Virus, which may have negative impacts at the population level. The impact of habitat loss or degradation either due to human land-use change, altered fire regimes, or climate change is poorly understood. Finally, climate change appears to be affecting Sharp-shinned Hawk somewhat through range shifts, but will likely affect the hawk more indirectly as prey species respond in the coming decades.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Sharp-shinned Hawk has significantly shifted 37.6 miles to the north and 57.0 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Sharp-shinned Hawk has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

One analysis of migration records found that the species has not shown any significant long-term (since 1946) shifts in autumn migration timing in response to recent climate change (Bildstein 1998). Responses to climate change are likely to be indirect and will depend on changes in prey species abundance and range. However, if the species' range shifts northward as is generally expected across taxa, the Sharp-shinned Hawk could cease to breed within SIEN parks, particularly SEKI in the southern Sierra.

Altered Fire Regimes: Fires at nesting sites are likely to have negative, but short-term impacts on Sharp-shinned Hawk populations. However, this does not appear to be a major threat to the species or individual populations in the long-term.

Habitat Fragmentation or Loss: Habitat loss is likely a problem where human populations are large and the extent of suitable habitat is small (NatureServe 2009). However, it is largely unknown how Sharp-shinned Hawks have responded to changing land-use and fragmentation. This uncertainty can be attributed to a lack of accurate estimates of the species' abundance at any level (Bildstein et al. 2000), which makes population-level assessments difficult. It has been suggested that loss of neotropical forests may have contributed to declines in Sharp-shinned Hawk observations at migration watchsites (Bildstein et al. 2000).

Invasive Species and Disease: Sharp-shinned Hawks elsewhere in the species' range have been found to carry West Nile Virus (Ellis et al. 2007) and a number of parasites (Smith et al. 2010). These ailments may affect individuals in the SIEN parks as well, but do not appear to be a major threat to the species.

Human Use Impacts: Like many other raptors, Sharp-shinned Hawk suffered from DDT contamination in the mid-twentieth century, which led to egg thinning and declines in reproductive success. The species does not appear to have rebounded substantially following U.S. regulation of DDT in the 1970s, which may be attributed to continued heavy use of pesticides on Central American wintering grounds (NatureServe 2009).

Sharp-shinned Hawks may be susceptible to human disturbance at nesting sites, but population-level impacts have not been quantified (Bildstein et al. 2000). The species is frequently hit by cars and flies into windows near bird feeders (Bildstein et al. 2000, Hager 2009). Sharp-shinned Hawks may suffer some mortality within SIEN parks along roadways due to collisions with vehicles, but this threat is likely minor.

Management Options and Conservation Opportunities

Sharp-shinned Hawks are a relatively under-studied species. In order to better manage for this species, better information is needed on abundance, habitat needs, and the effects of forestry and other land-use practices on the species. Additionally, any accounts of mortalities due to collisions with human-made objects, continued nest failures due to contamination, and evidence of disease within the species should be recorded to determine if these threats warrant any management actions.

Song Sparrow – *Melospiza melodia*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Song Sparrow is a fairly common summer or year-round resident at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and Devils Postpile (DEPO) National Monument (Table 1).

Table 7. Breeding status and relative abundance of Song Sparrows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Song Sparrow is one of the most diverse and widespread songbirds in North America, with 24 subspecies (52 named) breeding from Newfoundland to the Aleutian islands of Alaska and south to central Mexico (Arcese et al. 2002). In the Sierra Nevada, *M. m. fisherella* occurs along the east slope and northernmost portion of the west slope; *M. m. mailliardi* is found in the northern half of the west slope (except northernmost); and *M. m. heermanni* inhabits the southern half of the west slope from YOSE south. The Sierra represents an important part of the breeding range of *M. m. mailliardi* and *M. m. heermanni* in California, as they formerly were limited to the Central Valley and have recently expanded up the west slope during the past century (Siegel and DeSante 1999).

Distribution and Habitat Associations
Song Sparrow inhabits a wide range of forest, shrub, and riparian habitats, but in arid environments is generally limited to those adjacent to fresh water (Arcese et al. 2002). In the Sierra, Song Sparrows prefer dense, shrubby vegetation, including willow thickets, in wet meadows and along the margins of ponds, streams, and lakes (Siegel and DeSante 1999). Song Sparrows were detected in moderate numbers (Table 2) along survey transects (Figures 1 and 2)

during avian inventory surveys at all SIEN parks. After accounting for detection probability, park inventories show highest associations with lower-elevation meadows within SEKI. The species was most abundant in montane meadows in YOSE (Table 2). Habitat associations could not be determined at DEPO.

Table 8. Number of Song Sparrows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	21	24	Lower Elevation Meadow	0.17	0.27 (0.12-0.61)
			Ponderosa Pine/Incense-cedar	0.02	0.02 (0.00-0.08)
			White Fir/Sugar Pine Forest	0.01	0.01 (0.00-0.04)
			Red Fir Forest	0.01	0.01 (0.00-0.03)
Yosemite NP	44	67	Montane Meadow	0.21	
			Subalpine/Alpine Meadow	0.08	
			Black Oak	0.07	
Devils Postpile NM	6	7	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

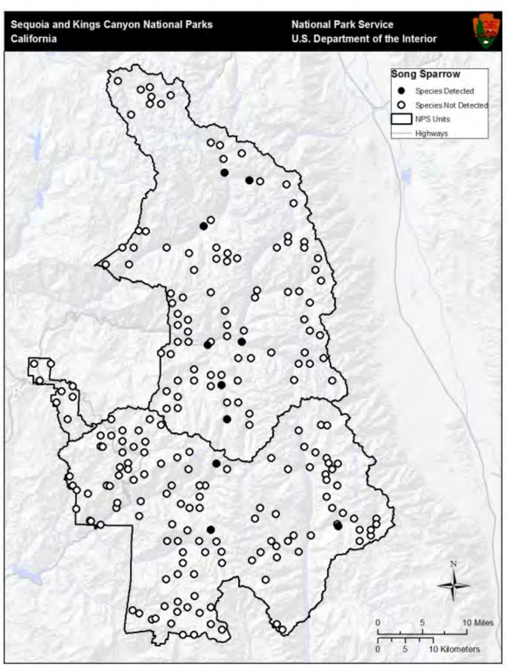

Figure 3. Bird survey transects where Song Sparrow was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

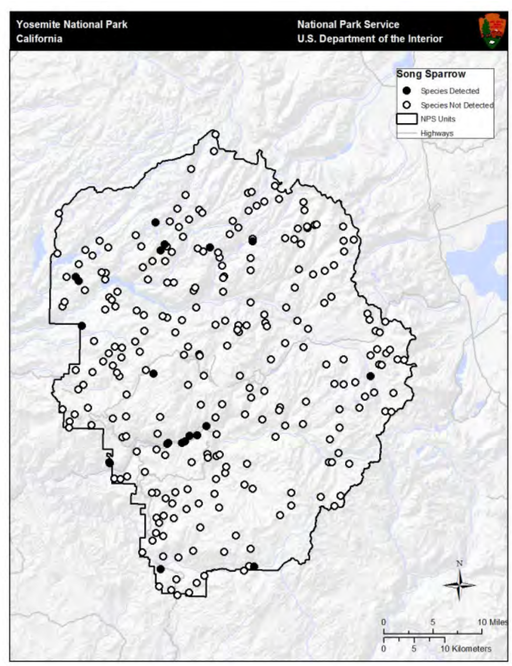

Figure 4. Bird survey transects where Song Sparrow was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Song Sparrow was detected at mid- to high-elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Song Sparrow in SEKI was 2564 m, with 95% of observations occurring between 1889 and 3101 m. In YOSE, the mean elevation of observations was 2281 m with 95% of observations falling between 1851 and 3232 m (Siegel et al. 2011).

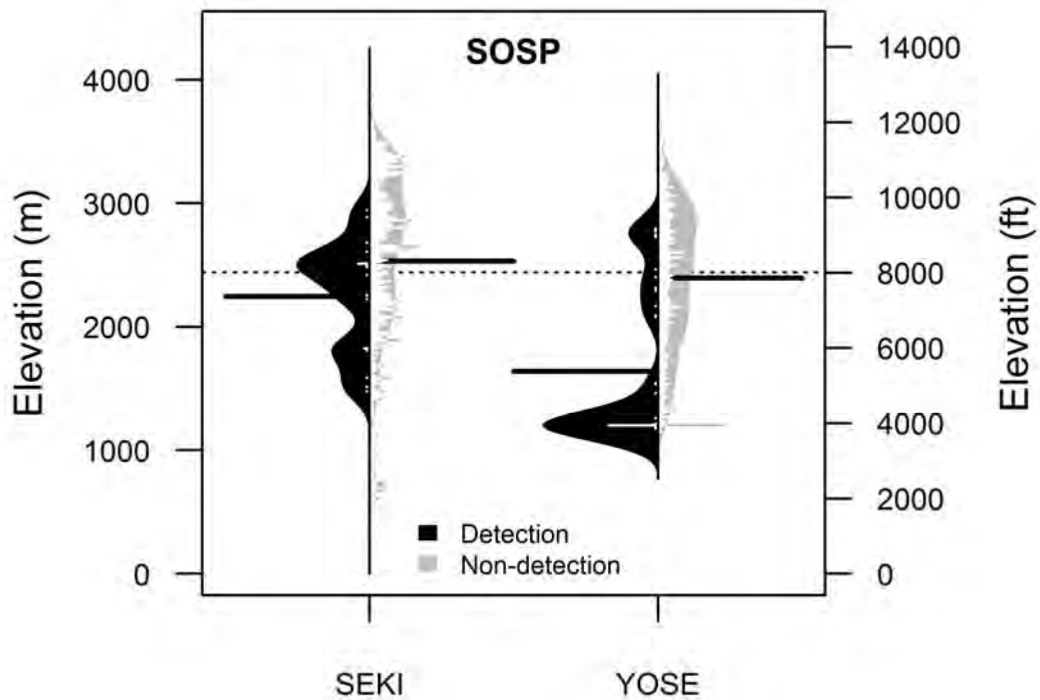

Figure 3. Elevational distributions of sites where Song Sparrow (SOSP) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) suggests Song Sparrows are less abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were detected in relatively low numbers on individual BBS routes at SEKI and YOSE. No significant annual population trends were reported for California, although a relatively large (>15%) non-significant negative trend along the Sequoia NP route was observed (Table 3).

Table 9. Relative abundance and trends for Song Sparrow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	155	4.87	-0.3	0.51
	1980-2007			-0.9	0.35
Sierra Nevada (BCR 15)	1966-2007	25	2.51	+1.5	0.30
	1980-2007			+0.9	0.40
Route 14117 – Sequoia NP	1972-2005	1	1.44	-15.3	0.48
Route 14132 – Kings Canyon NP	1974-2005	1	1.00	+0.6	0.96
Route 14156 – Yosemite NP	1974-2007	1	1.00	+0.7	0.91

SIEN MAPS station mark-recapture data reveal a large, strongly significant annual population and reproductive decline at DEPO from 2002-2006 (Table 4). No significant trends were reported for the other SIEN parks.

Table 10. Population trends, productivity, trends, and survival estimates of Song Sparrow at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	6.6	+2.77	0.78	-6.45	0.475 (0.091)
Yosemite NP	1993-2009	8.4	-1.08	1.16	+2.10	0.471 (0.025)
Devils Postpile NM	2002-2006	12.2	-76.09***	1.84	-44.00**	0.465 (0.157)

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.

Stressors

Song Sparrows are widely distributed in North America, but particular subspecies may be more vulnerable to threats than others. The species is apparently experiencing significant population declines in a least one SIEN park (DEPO; Table 4). Any factor that degrades meadow and riparian habitats is a threat to Song Sparrows. Most troubling concerns for the species are loss of riparian habitats due to urban and exurban development, drying of meadows due to climate change, and the risk of degradation due to packstock grazing. Brown-headed Cowbird parasitism, exacerbated by presence of packstock, is also a significant concern for Song Sparrows. Increased frequency and extent of high-intensity fire may benefit this species.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Song Sparrows has significantly shifted almost 75 miles north and 10 miles towards the coast throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). The assertion that Song Sparrow is already showing responses to climate change is corroborated by recent findings that the species has adjusted its migration timing, arriving significantly earlier on its non-breeding grounds as regional temperature increases (MacMynowski and

Root 2007). These observed shifts provide evidence that this sparrow has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Modeled distribution shifts of Song Sparrows predict a dramatic range contraction throughout much of California; most of the lower-elevation Sierra Nevada and coastal range populations would disappear and the species would remain only in the lowest elevations of the Central Valley and southern deserts, the northern coast, and the highest elevations of the Sierra Nevada (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were distance to stream and vegetation (Maxent and GAM distribution models).

The Song Sparrow has recently expanded its breeding range up the west slope of the Sierra, possibly due to climate warming (Siegel and DeSante 1999). This breeding range expansion may have favored Song Sparrows at the expense of Lincoln's Sparrows. Song Sparrows currently occur mostly at mid elevations in SIEN parks (Figure 3), and there is likely sufficient higher-elevation meadow and riparian habitat for this species to colonize as the climate warms. However, if a warming climate leads to drier meadow and riparian conditions, the species may suffer.

Altered Fire Regimes: Song Sparrow was a highly significant indicator of repeat-burned forests in a study in Oregon, where it was not detected in mature forests, and was found only rarely in recent or older once-burned forests (Fontaine et al. 2009). Numerous studies documented Song Sparrows in recent burns but not early-seral clearcuts, although the birds were often found in mid-successional clearcuts (Hutto 1995). A future increase in high-intensity fire may increase habitat suitability for this species.

Habitat Fragmentation or Loss: The Song Sparrow is widely distributed, including in urban and suburban areas, but loss of riparian vegetation has been implicated in local population declines and even extirpation (Arcese et al. 2002). Loss of riparian habitat due to development is not likely a major threat in SIEN parks. Song Sparrow is vulnerable to loss and degradation of meadow habitats and appears to be particularly vulnerable to habitat degradation resulting from heavy livestock grazing (Popotnik and Guiliano 2000). Because livestock grazing (other than localized packstock grazing) is less intensive inside compared with outside SIEN parks, this should not be a significant problem. Nonetheless, grazing could impact local breeding populations, and as such meadow restoration efforts both within the SIEN parks and on adjacent lands would benefit Song Sparrow populations.

Logging may increase abundance of Song Sparrows, particularly when post-harvested stands support dense shrubs with complex foliage (Arcese et al. 2002).

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Song Sparrows are especially susceptible to brood parasitism by Brown-headed Cowbirds. Arcese et al. (2002) reported nest mortality of Song Sparrows was 25-60% with cowbirds present and 15-22% with cowbirds absent. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Damage to riparian and meadow habitats – especially willows – from livestock grazing may negatively impact Song Sparrows (Cicero 1997). Grazing tends to denude willows of their lower foliage (Siegel and DeSante 1999), and Song Sparrows were significantly more abundant in ungrazed than grazed riparian zones in Pennsylvania (Popotnik and Guiliano 2000). Habitat degradation due to packstock grazing within the parks is therefore a potential concern for this species, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage riparian shrubs. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks (Siegel and DeSante 1999).

Domestic and feral cats prey on Song Sparrow adults and young, and the species may be vulnerable when nesting near homes and using ground-level bird feeders. This is not a significant problem in SIEN parks.

Management Options and Conservation Opportunities

The most important things park managers can do currently to protect Song Sparrow populations in the parks are to maintain and restore meadow habitats and riparian zones, and to manage or consider eliminating cowbird feeding sites such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicated that a cowbird trapping program was not warranted (Halterman et al. 1999). However, this assessment is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Meadow desiccation has been implicated in reduced nesting success of Willow Flycatchers and Yellow Warblers, by granting easier access to mammalian predators (Cain et al. 2003). The same process may also affect Song Sparrow, which nests in similar dense riparian habitats. If climate change leads to substantial meadow desiccation and reduces reproductive success, restoration of meadow hydrology could benefit breeding Song Sparrows. Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites, perhaps along with active restoration of riparian deciduous vegetation, would likely benefit this sparrow and other riparian and meadow-dwelling bird species.

MAPS station operation and any other opportunities to survey Song Sparrow populations in the parks should continue, to assess how the species is responding to climate change and any other threats.

Sooty Grouse – *Dendragapus fuliginosus*

Note: Blue Grouse was recently split into two species, Sooty Grouse (Dendragapus fuliginosus) and Dusky Grouse (D. obscurus), due to new genetic evidence and differences in voice, behavior, and plumage (Banks et al. 2006). Breeding Bird Survey (BBS) and inventory data reported in this account refer to the formerly combined Blue Grouse species, but only the Sooty Grouse occurs in SIEN parks.

Migratory Status

Short-distance migrant (Zwickel and Bendell 2005)

Residency and Breeding Status

Sooty Grouse is a fairly common year-round resident at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, but has not been recorded at Devils Postpile (DEPO) National Monument during systematic survey efforts (Table 1).

Table 11. Breeding status and relative abundance of Sooty Grouse in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed (Mount Pinos subpecies (*howardi*) is a Subspecies of Special Concern)

Range Significance

Sooty Grouse is endemic to western North America. It is found on the western slopes of mountain ranges from southeastern Alaska down to the central Sierra Nevada (Bland 2008). Three of the four subspecies of Sooty Grouse are found in California including the Mount Pinos subspecies (*howardi*), which is endemic to the southern Sierra including SEKI (Bland 2008). The SIEN parks are an important part of the southern edge of the Sooty Grouse range, with SEKI being essential to the Mount Pinos subspecies' range.

Distribution and Habitat Associations

In the western Sierra, Sooty Grouse can be found among conifers, shrub-covered slopes, or at the edges of meadows and clearings (Gaines 1992). Sooty Grouse were detected in low densities (Table 2) but fairly frequently (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE, but were not detected during the inventory survey at DEPO. Park inventories show highest associations with shrubby and sparsely vegetated habitats, as well as Red Fir Forest at SEKI, and Western Juniper and Black Oak in YOSE (Table 2). When adjusted for detectability, densities of Sooty Grouse in SEKI appear highest in Red Fir Forests.

Table 12. Number of Sooty Grouse recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	55	56	Sagebrush/Alpine, Subalp. Shrub	0.05	0.01 (0.00-0.06)
			Red Fir Forest	0.04	0.03 (0.00-0.31)
			Mid-elevation Sparse Vegetation	0.04	0.01 (0.00-0.08)
Yosemite NP	50	53	Western Juniper	0.07	
			Black Oak	0.07	
			Quaking Aspen	0.05	
Devils Postpile NM	0	0	Not detected[1]	NA[1]	

[1]NA - Information not available due to insufficient data.

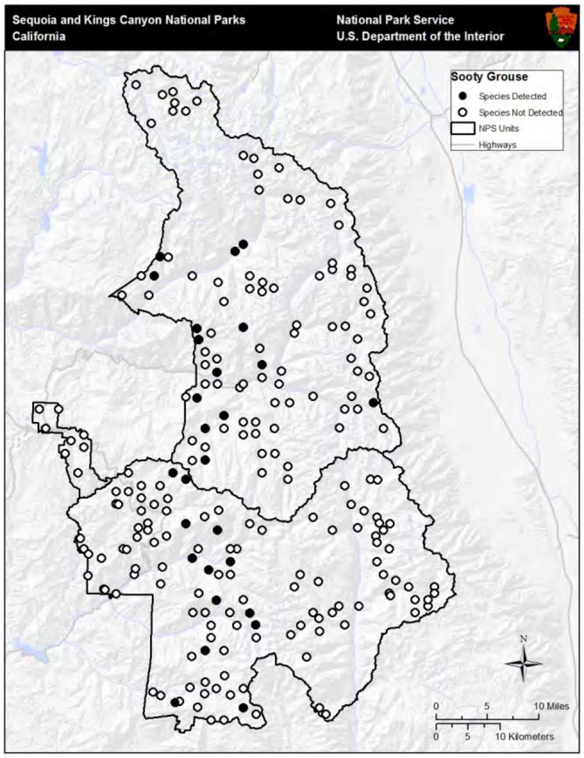

Figure 5. Bird survey transects where Sooty Grouse was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

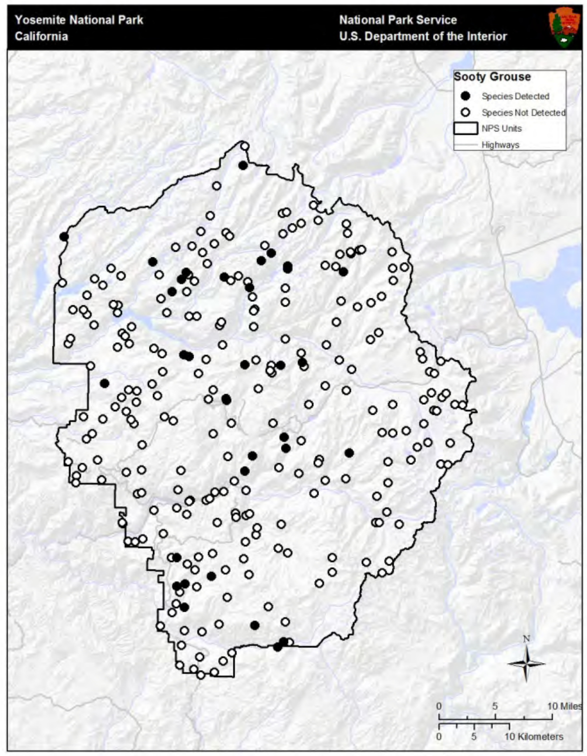

Figure 6. Bird survey transects where Sooty Grouse was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Sooty Grouse was observed within the mid-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Sooty Grouse in SEKI was 2523 m, with 95% of observations occurring between 1795 and 3155 m. At YOSE, the mean elevation of observations was 2404 m with 95% of observations falling between 1950 and 2925 m (Siegel et al. 2011).

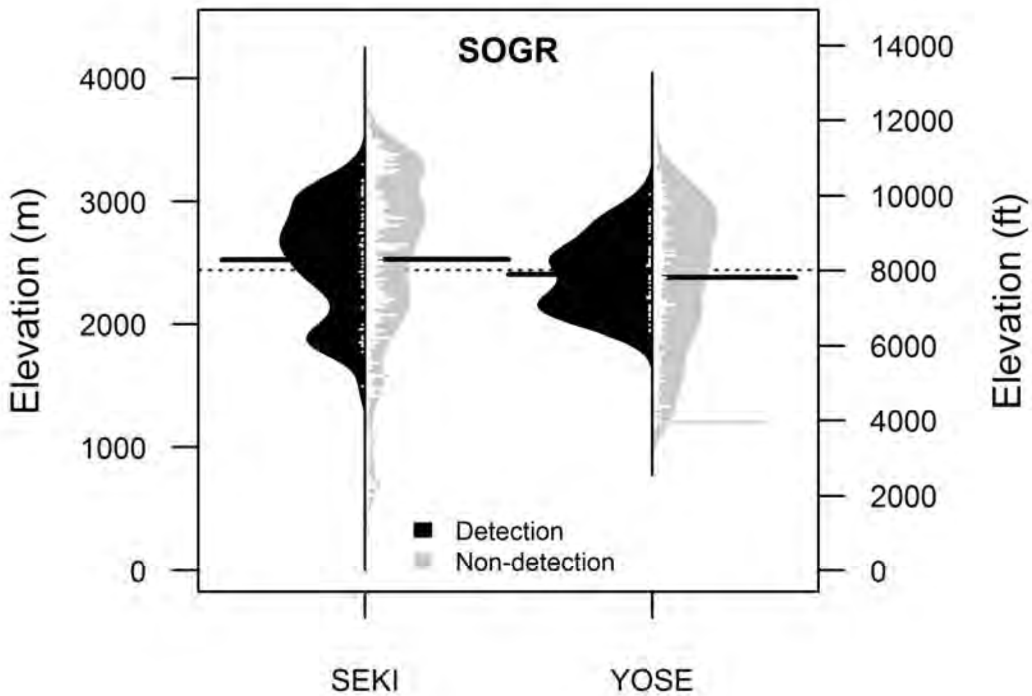

Figure 3. Elevational distributions of sites where Sooty Grouse (SOGR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Sooty Grouse are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on an individual BBS route at YOSE, but not observed on routes at SEKI. A significant positive trend was observed across California both in the short- and long-term, but small sample sizes call the reliability of the result into question (Table 3).

Table 13. Relative abundance and trends for Sooty Grouse according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007[1]	16	0.10	+13.9	0.03
	1980-2007[1]			+12.5	0.08
Sierra Nevada (BCR 15)	1966-2007[1]	7	0.06	+14.9	0.13
	1980-2007[1]			+17.2	0.06
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.04	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Sooty Grouse are generally not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Possibly the greatest threat to Sooty Grouse and the Mount Pinos subspecies is habitat degradation due to timber harvest, fire suppression, and livestock grazing (Bland 2008). Development and land-use change has also been implicated in the decline of local populations elsewhere in the Sooty Grouse range (Zwickel and Bendell 2005). Of these threats, altered fire regimes and to a lesser extent packstock grazing are relevant to the SIEN parks. Climate change does not appear to be a major threat to the species as a whole, but could pose a problem for the Mount Pinos subspecies. Threats from invasive species, disease, and hunting are not major concerns to Sooty Grouse in the SIEN parks.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Sooty Grouse (lumped as Blue Grouse) has shifted slightly, but significantly 4.7 miles to the north and 71.4 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009).

As a species, Sooty Grouse occupies a broad range of climates that vary in both temperature and precipitation (Zwickel and Bendell 2005). This tolerance for a variety of climates bodes well for the species as conditions change. However, the location of SIEN parks (particularly SEKI) and the Mount Pinos subspecies at the southern edge of the species' range is somewhat troubling. If there is contraction at the southern edge of the Sooty Grouse range as is generally expected for most species, the Mount Pinos Sooty Grouse could be threatened by climate change. Recent loss of Mount Pinos populations south of Tulare County may be at least partially due to loss of fir forest habitat due to historical climate change (Bland 2008).

Altered Fire Regimes: Altered fire regimes that degrade Sooty Grouse breeding habitat are a concern for the species. Fire suppression can lead to fir stands with overly dense breeding habitat, while unusually frequent fires can leave the understory lacking shrubs needed for cover (Bland 2008).

Habitat Fragmentation or Loss: Although there is evidence of population increases immediately following clearcuts (Zwickel and Bendell 2005), long-term effects of timber harvest that results in even-aged stands are negative (Bland 2008). Additionally, human development has negatively impacted the species in other areas and may have contributed to the loss of the southern part of the Mount Pinos subspecies' range (Zwickel and Bendell 2005). Resort and recreation development could become a greater problem in the central and southern Sierra in the future (Bland 2008). Neither timber harvest nor additional human development is a problem within SIEN parks, but such activities surrounding the parks could indirectly affect park populations.

Invasive Species and Disease: Although historically there have been reports of problems of disease in Blue Grouse (e.g. Buss et al. 1958, Fowle 1940), invasive species and disease do not appear to be major issues for the Sooty Grouse at the present time.

Human Use Impacts: Heavy spring livestock grazing in meadows can reduce food and cover for breeding Sooty Grouse. Additionally, hunting is a minor threat to the species north of Tulare County where hunting is still permitted (Bland 2008). Hunting is not permitted within SIEN parks, but habitat degradation due to packstock grazing is a potential concern, at least locally where grazing is permitted.

Management Options and Conservation Opportunities

The most important thing park managers can do to protect Sooty Grouse populations in the parks is to maintain quality breeding habitat. This could be done by limiting spring packstock grazing in meadows where Sooty Grouse forage (if negative impacts of grazing are detected) and by managing for natural fire regimes that maintain moderate amounts of understory vegetation. Interagency cooperation that limits the negative effects of timber harvest, grazing and development would also benefit Sooty Grouse in the central and southern Sierra (Bland 2008). Such measures would be especially important within SEKI, which comprises an important part of the Mount Pinos subspecies' range.

Targeted surveys that identify active nesting sites would aid efforts to promote reproductive success and survival of Sooty Grouse populations (Bland 2008).

Spotted Owl – *Strix occidentalis*

Migratory Status

Resident (Siegel and DeSante 1999)

Residency and Breeding Status

Spotted Owl is an uncommon year-round resident and regular breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, but has also been reported anecdotally at Devils Postpile (DEPO) National Monument (Table 1). Some Spotted Owls migrate outside their breeding-season ranges during the winter, although the reasons for this are generally unknown (Zabel et al. 1992, Bond et al. 2010).

Table 14. Breeding status and relative abundance of Spotted Owls in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Uncommon
Yosemite NP	Year-round	Regular Breeder	Uncommon
Devils Postpile NM	Uncertain[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Anecdotally reported, but uncertain whether breeding has occurred (D. Duhlen, personal communication).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G3T3 – Vulnerable (Moderate risk of extinction or elimination)
- National Status: N3 – Vulnerable (Moderate risk of extinction or elimination)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Subspecies not listed
- CA Department of Fish and Game Status: Species of Special Concern

Range Significance

The Spotted Owl is restricted to western North America, distributed patchily in mountains and humid coastal forests from southern British Columbia, Canada to southern California, and in the Rocky Mountain region from southern Utah and southwestern Colorado south to northern and central Mexico (Johnsgard 1998). The California Spotted Owl subspecies occurs in coniferous forests, Mixed Conifer-Hardwood, and hardwood forests in the western Sierra Nevada and mountains of southern California, and coastal mountains and foothills from Santa Barbara north to Monterey County (Verner et al. 1992). The Sierra Nevada offers the only extensive, nearly continuous habitat for the California Spotted Owl, and is of critical importance for protecting this subspecies (Siegel and DeSante 1999).

Distribution and Habitat Associations

Spotted Owls are strongly associated with areas of mature and old forest with thick canopy that contains many dense, old, live and dead trees and fallen logs (Call et al. 1992, Gutiérrez et al. 1992, Moen and Gutiérrez 1997, Bond et al. 2004, Blakesley et al. 2005, Seamans 2005). These older forests provide suitable nest sites and protection from inclement weather (Verner et al. 1992). Blakesley et al. (2005) documented increased occupancy, survival, and nesting success with increasing amounts of old-forest characteristics within Spotted Owl nest core areas in the northern Sierra Nevada. In the central Sierra Nevada, Seamans (2005) found that forests with medium and large trees and >70% canopy cover were positively associated with survival and occupancy rates of Spotted Owls, and amount of hardwood forest, brush-sapling, or pole coniferous forest was negatively associated with these parameters. These studies were conducted in unburned landscapes; recent research has documented Spotted Owls in the southern Sierra Nevada preferentially foraging in forests burned at higher intensity when available, but roosting and nesting primarily in unburned or lightly burned stands (Bond et al. 2009). Spotted Owl occupancy rates in YOSE were positively correlated to sites with higher tree basal area, but unaffected by whether sites were burned by low- or moderate-intensity fire; high-intensity burned sites were not surveyed (Roberts 2008). Spotted Owls were not detected during avian inventory surveys at any of the SIEN parks, but this is likely due to the low capability of these surveys to detect nocturnal owls. However, targeted surveys have been conducted for Spotted Owls in YOSE and SEKI.

Elevational Distribution

The Spotted Owl occurs from sea level to as high as 1200 m elevation in the northern part of its range and to about 2700 m in the southwestern U.S. (Gutiérrez et al. 1995). Nests in the Sierra Nevada were found from 300 to 2500 m (Verner et al. 1992).

Abundance, Trends and Demographic Data

Spotted Owls were not detected during Breeding Bird Surveys (BBS) throughout California, but these surveys are designed for diurnal species and do not adequately detect most owl species. Similarly, Spotted Owls are not frequently captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations. However, data on productivity and survival within the parks are available from targeted surveys for the subspecies. Adult and sub-adult survival of Spotted Owls in SEKI was higher than owls in the nearby Sierra National Forest, potentially due to the SEKI site's greater proportion of conifer forest and lower proportion of oak woodlands where survival is lower; fecundity and population growth rates were similar between study sites (Munton 2006). Blakesley et al. (2010) documented a stable population trend in SEKI from 1993-2005, and apparent annual survival of adults was higher in SEKI than three comparison study areas under forest management. Population size for YOSE was estimated at 315 (SE = 0.08) pairs of Spotted Owls in 2005 (Roberts 2008). No population estimate was available for SEKI (T. Munton, personal communication).

Stressors

Populations of all three subspecies of Spotted Owl have declined due to widespread historical and continuing habitat loss, primarily from logging stands of large, old trees favored by the owls for nesting and roosting (Verner et al. 1992, Gutiérrez et al. 1995, Davis and Gould 2008). Direct loss and fragmentation of habitat from intensive logging does not appear to be a major concern for Spotted Owls within the SIEN parks owing to the lack of commercial logging. However, invasion into the SIEN parks of the Barred Owl (*S. varia*), a non-native, aggressive competitor with Spotted Owls, might seriously threaten Spotted Owls in the near future. Furthermore, Spotted Owls support high loads of blood parasites, which may suppress the immune system and give Barred Owls a competitive advantage.

Urban development was identified as a significant problem for California Spotted Owls in the Sierran foothills and in southern California, but does not pose a major threat to owls in SIEN parks. Fire apparently has complex effects on Spotted Owls. Fire treatments that mimic natural fire regimes – including low intensity fire to maintain nesting and roosting habitat and some small patches of higher-intensity fire to create foraging habitat – should benefit this species.

Climate Change: The effects of climate change on Spotted Owls have not been directly studied. However, survival and reproduction of Spotted Owls in lower-elevation oak woodlands was lower than owls in higher-elevation coniferous forests over a 15-year demography study in SEKI (Munton 2006). If climate change shifts oak woodland habitats into higher elevations and reduces the range of mixed coniferous forests in SIEN parks, this could adversely impact Spotted Owls. Spotted Owls have been found to be unusually susceptible to heat stress, which could suggest that increasing temperatures might exceed physiological tolerances in some areas (Weathers et al. 2001).

Altered Fire Regimes: No studies using statistical analyses have documented a significant effect of high-intensity fire on Spotted Owl territory occupancy. Some observational reports note that intensely burned territories are not occupied immediately post-fire (e.g., California Spotted Owl: Elliot 1988; Northern Spotted Owl: Gaines et al. 1997), but occupancy rates did not differ significantly between burned and unburned comparison sites and territory extinction cannot be attributed to fire. In the southern Sierra Nevada, Spotted Owls selected unburned and lightly burned areas and avoided higher-intensity burned areas for roosting, but highly burned forests provided preferred foraging habitat (Bond et al. 2009). Large areas of SIEN parks burned by high-intensity fire are likely to be unsuitable for nesting by Spotted Owls, but may provide quality foraging habitat, possibly depending upon spatial configuration and extent of the burned patch. Over the longer-term, fire of varying intensities, with smaller-sized patches of high-intensity burns, likely maintains optimal habitat conditions for these owls, although research is needed.

Habitat Fragmentation or Loss: Habitat fragmentation or loss due primarily to logging has been implicated in population declines of California Spotted Owls (Verner et al. 1992, Blakesley 2005, Seamans 2005). Selective logging of the largest trees from stands results in the loss of the owls' preferred nest sites (Verner et al. 1992). At a larger scale, Seamans and Gutiérrez (2007) reported that alteration primarily due to logging of $\geq$20 ha of mature forest habitat within a 400-ha owl territory was negatively correlated to occupancy rates in the central Sierra Nevada. Habitat fragmentation or loss from logging is a major threat to Spotted Owls throughout the Sierra Nevada, but not likely a significant threat in SIEN parks. Similarly, urban development has eliminated owl habitat in the lower-elevation foothills, but this is not likely to pose a risk in the SIEN parks.

Invasive Species and Disease: Competition and possibly predation by a related owl species from the eastern United States, the Barred Owl, has been implicated in accelerated declines of the Northern Spotted Owl. Barred Owls were recently documented in SEKI (Steger et al. 2006), and may pose a serious problem for California Spotted Owls in SIEN parks in the near future. West Nile Virus, which has caused high levels of mortality in many North American hawks and owls, was not detected in Spotted Owls in the Sierra Nevada (Hull et al. 2010). However, of 11 owl species, Spotted Owls harbored the greatest number of simultaneous multi-species infections of blood parasites, which may weaken their immune systems and give Barred Owls a competitive edge (Ishak et al. 2008).

Human Use Impacts: Excessive interaction with humans for research or bird-watching may cause lowered call response rates or habituation (Gutiérrez et al. 1995). While no documentation exists of nest disturbance by birders in the SIEN parks, this is a potential threat. Altitudinal migration may expose Spotted Owls to collisions with vehicles (Verner et al. 1992).

Management Options and Conservation Opportunities

The most important actions managers can do to protect Spotted Owl populations in SIEN parks are to maintain the extent and contiguity of mature and old coniferous forest stands and allow a natural mosaic of fire of varying intensities to burn. Additional research on the impacts of fire intensity and extent on occupancy and demography of Spotted Owls and their prey (*sensu* Roberts 2008) should help guide future fire management decisions. Experimental removal of Barred Owls from Northern Spotted Owl habitats is being considered as an adaptive-management recovery action for this federally threatened subspecies. If such actions are demonstrated to clearly benefit Northern Spotted Owls and Barred Owls become established in SIEN parks, SIEN park managers also might consider a similar program to remove invasive Barred Owls to protect California Spotted Owls.

Speed limits on roads should be strictly enforced to reduce collisions between Spotted Owls and vehicles. Spotted Owl sites should be protected from harassment by bird-watchers, if necessary.

Spotted Sandpiper – *Actitis macularius*

Migratory Status

Intermediate/Long-distance migrant (Oring et al. 1997)

Residency and Breeding Status

Spotted Sandpiper is fairly common at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks and is uncommon at Devils Postpile National Monument. The species breeds regularly at all Sierra Nevada Network (SIEN) parks (Table 1).

Table 15. Breeding status and relative abundance of Spotted Sandpipers in SIEN national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly common
Yosemite NP	Summer	Regular Breeder	Fairly common
Devils Postpile NM	Migrant/Summer	Regular Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Spotted Sandpiper breeds throughout Canada and the mid to northern regions of the U.S. including the Sierra Nevada. The species does not breed widely in the lower elevations and southern parts of California (Oring et al. 1997). Thus, the SIEN parks comprise an important part of the species' California breeding range, but not a significant part of the continental range.

Distribution and Habitat Associations

Spotted Sandpipers breed along sand or gravel bars of streams and deltas, but can also be found at small rills in subalpine meadows. Transients can be found visiting the margins of most water bodies (Gaines 1992). Spotted Sandpipers were detected in moderate numbers (Table 2) along a number of survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE. Two individuals were observed in DEPO during its inventory project. Park inventories show highest associations with lower elevation and montane meadows within SEKI and YOSE respectively (Table 2).

Table 16. Number of Spotted Sandpipers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	15	18	Lower Elevation Meadow	0.11	0.18 (0.08-0.45)
			Lodgepole Pine Forest	0.01	0.02 (0.01-0.06)
Yosemite NP	35	61	Montane Meadow	0.12	
			Barren	0.05	
			Lodgepole Pine	0.03	
Devils Postpile NM	1	2	NA[1]	NA[1]	

[1]NA - Information not available due to insufficient data.

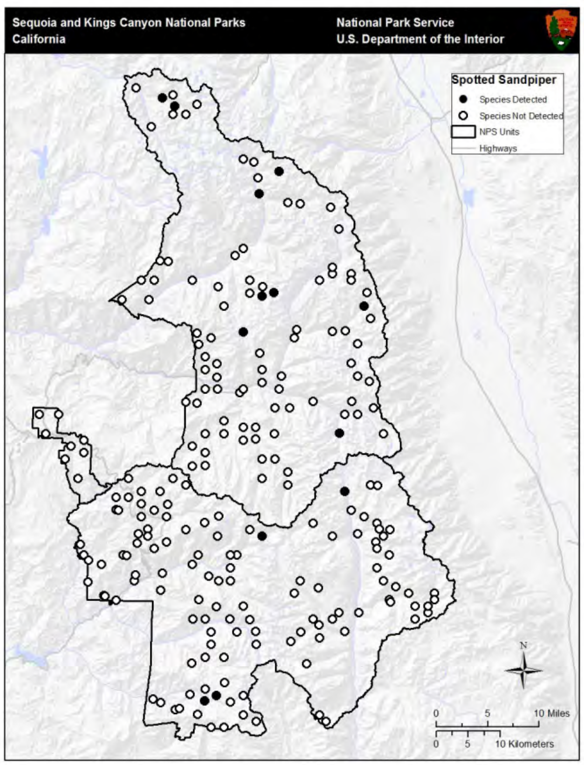

Figure 7. Bird survey transects where Spotted Sandpiper was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

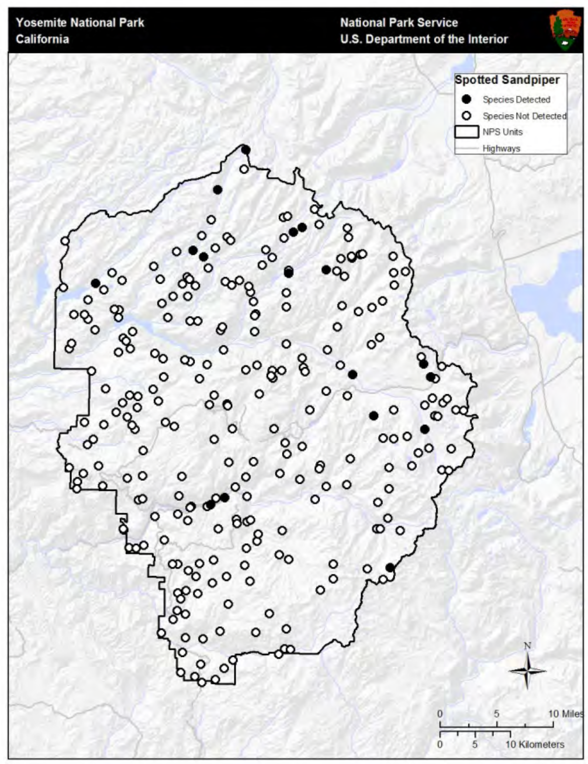

Figure 8. Bird survey transects where Spotted Sandpiper was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Spotted Sandpiper was observed primarily within the higher elevations of SEKI and YOSE during recent avian inventory projects (Figure 3). The mean elevation of observations of Spotted Sandpiper during the avian inventory at SEKI was 2932 m, with 95% of observations occurring between 2540 and 3389 m. In YOSE, the mean elevation of observations was 2381 m with 95% of observations falling between 1200 and 3073 m (Siegel et al. 2011).

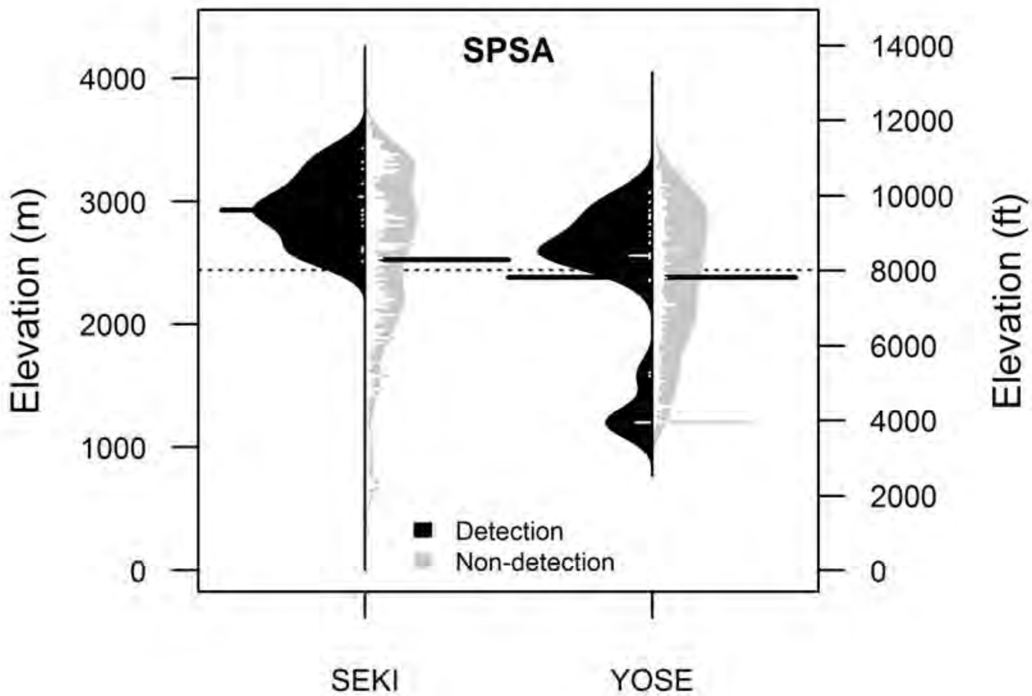

Figure 3. Elevational distributions of sites where Spotted Sandpipers (SPSA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Spotted Sandpipers are found in slightly greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at YOSE and Kings Canyon NP, but not at all along the Sequoia NP route. A significant negative trend was observed along the YOSE route during 1974-2007 (Table 3).

Table 17. Relative abundance and trends for Spotted Sandpiper according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	58	0.49	+0.6	0.65
	1980-2007			-0.1	0.95
Sierra Nevada (BCR 15)	1966-2007	16	0.37	+1.7	0.62
	1980-2007			-0.8	0.76
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.15	-21.08	0.06

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Spotted Sandpipers are infrequently captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Spotted Sandpiper populations appear stable and widespread across North America and there is little evidence of any major threats to the species. There are reports of pollutants affecting Spotted Sandpipers and the species appears to be no more prone to disease and parasites than any other. However, neither of these factors is likely to disproportionally impact SIEN populations. One point of concern is that Spotted Sandpipers may shift their breeding range northward and upward in response to climate change. If such a shift occurs, SIEN parks may see a reduction in or loss of sandpiper breeding in the future.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Spotted Sandpiper has significantly shifted 34.3 miles to the south and 22.2 miles away from the coast over the past 40 years of warming (Audubon 2009). If Spotted Sandpiper were shifting its range toward cooler areas in response to warmer winter temperatures we would expect to see movement northward and inland (Audubon 2009). Therefore, movement south and toward the coast suggests the species is responding to factors other than just changing temperatures.

The wide distribution of Spotted Sandpiper across Canada and the U.S. suggests a relatively wide tolerance for climate variation. However, SIEN parks (in particular SEKI) lie at the southern edge of their breeding range and the species breeds primarily in the higher elevations of the parks (Figure 3). Species are generally expected to experience range contraction on the southern and lower edges of their distributions in response to climate warming. If Spotted Sandpipers follow this trend, the species may breed less often or not at all within SIEN parks within a future climate.

Altered Fire Regimes: There is little information on how Spotted Sandpipers respond to fire. This is likely because their nesting and foraging grounds are not found within forest habitats most affected by changing fire regimes. Any increase in fire within Spotted Sandpiper breeding habitat would affect sandpiper populations locally. However, this is not likely a major concern for this species within SIEN parks.

Habitat Fragmentation or Loss: Any development of shorelines or damming of rivers where Spotted Sandpipers breed would be detrimental to this species. However, this does not appear to be a major threat across the species' range and is not a concern within SIEN parks.

Invasive Species and Disease: Like most species, Spotted Sandpipers have been found carrying a number of parasites (Didyk et al. 2007). Little literature is available regarding the degree to which parasites and diseases threaten this species. Likewise the impact of invasive species is largely undocumented.

Human Use Impacts: Spotted Sandpipers have been documented with concentrations of the toxins PCBs, DDE and Dieldrin. However, their reaction to such contamination is poorly studied (Oring et al. 1997). One study found that exposure of breeding birds to selenium resulted in reduced hatchability at one site, but the contamination had no significant threat on regional recruitment (Harding et al. 2005). Although individuals could be exposed to such contaminants in their winter range, the species would not be subject to the same pollution within SIEN parks.

Management Options and Conservation Opportunities

Due to the apparent health and lack of threats to the Spotted Sandpiper, little active management is needed within SIEN parks. However, the continued maintenance of breeding habitat along waterways and in montane meadows is necessary for the persistence of the species within the parks. Monitoring of this and other species could yield a better understanding of the species' response to climate change and other threats in the future.

Spotted Towhee – *Pipilo maculatus*

Migratory Status
Resident/Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Spotted Towhee is a common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and an uncommon probable breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 18. Breeding status and relative abundance of Spotted Towhees in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Common
Devils Postpile NM	Year-round	Probable Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common; widespread and abundant)
- National Status: N5 – Secure (Common; widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Spotted Towhee is found in the northern Great Plains, at middle elevations of mountains and intermountain plateaus of the western U.S., and Pacific coastal lowlands and offshore islands (Greenlaw 1996). The species is widespread, but the Sierra constitutes an important part of the species' range in California.

Distribution and Habitat Associations
The Spotted Towhee breeds in dense, low, broadleaf shrubs, with or without emergent trees, that provide deep, sheltered, partly shaded litter and humus on the ground, and a screen of twigs and foliage close overhead (Greenlaw 1996). In the Sierra Nevada, the Spotted Towhee prefers large, dense thickets with accumulations of leaf litter, in arid foothill or montane chaparral and shrubby understories of open woodland and forests on the west slope, or in dense shrub in canyons and riparian willow thickets on the east slope (Siegel and DeSante 1999). Spotted Towhees were detected in high numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventories in SEKI and YOSE but not in DEPO. After accounting for detection probabilities, park inventories indicate highest associations with Mixed Chaparral and Live Oak/California

Buckeye habitats in SEKI (Table 2). The species was abundant in Interior Live Oak and Mixed Chaparral habitats in YOSE.

Table 19. Number of Spotted Towhees recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	178	255	Mixed Chaparral	1.47	1.88 (1.54-2.30)
			Live Oak/California Buckeye	1.04	1.20 (0.49-2.70)
			California Black Oak Forest	0.96	0.86 (0.35-2.14)
			Undifferentiated Post-fire	0.85	0.97 (0.22-4.31)
Yosemite NP	226	336	Interior Live Oak	2.55	
			Mixed Chaparral	1.07	
			Foothill Pine	0.55	
			Ponderosa Pine	0.54	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

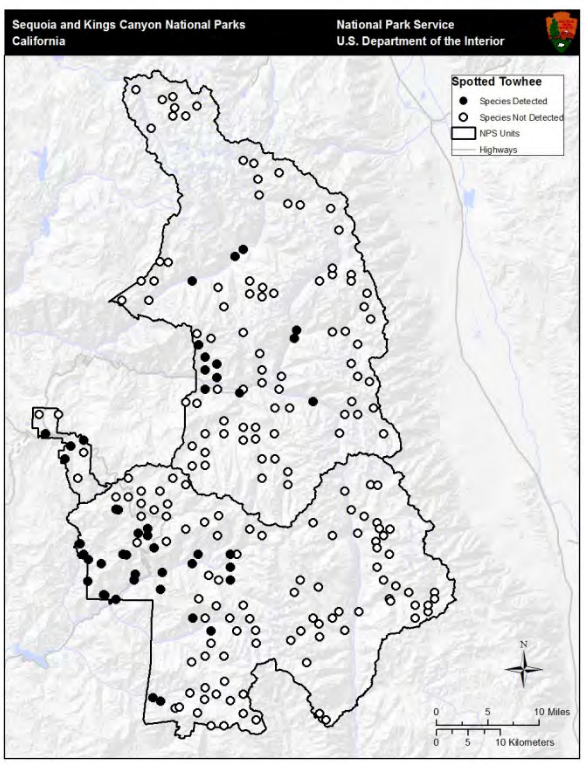

Figure 9. Bird survey transects where Spotted Towhee was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

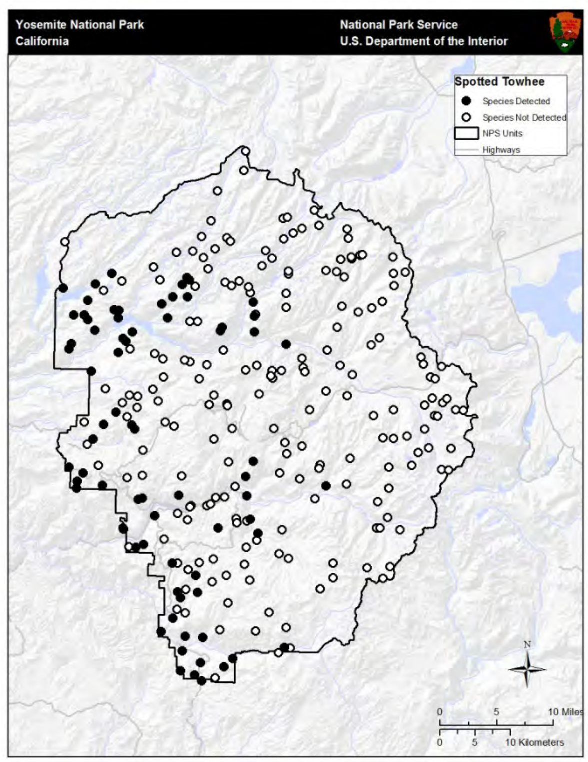

Figure 10. Bird survey transects where Spotted Towhee was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Spotted Towhee was detected at low- to mid-elevations in SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Spotted Towhee at SEKI was 1363 m, with 95% of observations occurring between 546 and 2207 m. In YOSE, the mean elevation of observations was 1711 m with 95% of observations falling between 1218 and 2358 m (Siegel et al. 2011).

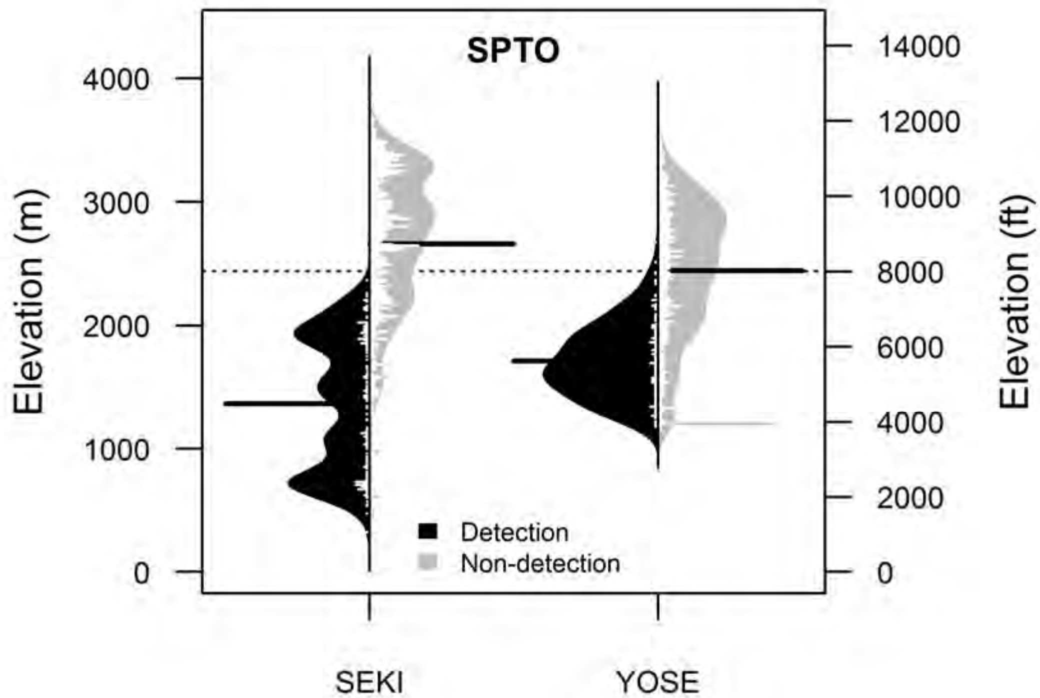

Figure 3. Elevational distributions of sites where Spotted Towhee (SPTO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) indicate Spotted Towhee is abundant in both the Sierra Region (BCR 15) and in California as a whole (Table 3). The species was particularly abundant along the BBS route in Sequoia and Kings Canyon and Yosemite NPs. No statistically significant population trends were observed (Table 3).

Table 20. Relative abundance and trends for Spotted Towhee according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	177	11.95	-0.4	0.39
	1980-2007			-0.2	0.53
Sierra Nevada (BCR 15)	1966-2007	32	14.00	+0.1	0.75
	1980-2007			-0.1	0.82
Route 14117 – Sequoia NP	1972-2005	1	18.88	+4.6	0.57
Route 14132 – Kings Canyon NP	1974-2005	1	25.60	-0.9	0.63
Route 14156 – Yosemite NP	1974-2007	1	14.12	-3.6	0.14

Mark-recapture data from SIEN MAPS stations reveal a highly significant positive population and reproductive trend for Spotted Towhees in Yosemite NP (Table 4). No significant trends were observed in Kings Canyon or DEPO.

Table 21. Population trends, productivity, trends, and survival estimates of Spotted Towhee at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.7	-4.71	0.29	-3.32	NA
Yosemite NP	1993-2009	1.9	+9.55***	0.37	+15.31***	0.417 (0.116)
Devils Postpile NM	2002-2006	0.0	NA[2]	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Spotted Towhees are abundant in the Sierra Nevada and their populations appear to be stable (Table 3) or increasing (Table 4) in SIEN parks. These shrub-dependent birds can coexist with humans and thrive in disturbed areas where agricultural and residential development is light or moderate, but intensive development such as urbanization and high-density residences reduces habitat and increases ground-nest mortality from domestic cat predation. In arid regions, heavy grazing by cattle in riparian communities can adversely affect these birds as well. The restoration of natural fire regimes that incorporate high-intensity burning is likely to benefit Spotted Towhees by maintaining suitable chaparral habitat in the long-term.

Climate Change: An analysis of shifts between the historical range of Spotted Towhee (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of "Rufous-sided Towhee" (lumped) has shifted significantly northward by 215 miles and inland by 23 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). These shifts suggest the species may be moving towards cooler climates, has already responded to climate change, and will likely continue to shift its range in the coming decades (Audubon 2009). Furthermore, modeled distribution shifts of Spotted Towhees predict an increasing probability of occurrence in the northern part of its current range, and a slight decrease in distribution in the drier southeastern deserts and southern Central Valley (Stralberg and Jongsomjit 2008). Its range is predicted to move upslope around the SIEN parks. The most important variables influencing current and projected distribution were vegetation, annual mean temperature (Maxent distribution model), and precipitation seasonality (GAM distribution model).

In SIEN parks, the Spotted Towhee was found only at low- to mid-elevations (Figure 3). If climate change causes the towhee's range to move upslope in the Sierra Nevada as is generally expected, the species should persist and thrive in the SIEN parks as long as dense, shrubby habitats are widely available. Interestingly, adult capture rates of Spotted Towhees were significantly lower during years of El Niño-like conditions (Siegel et al. 2009). If climate change results in more frequent El Niño-Southern Oscillation events, the species may be adversely impacted.

Altered Fire Regimes: High-intensity fire may temporarily reduce habitat suitability for Spotted Towhees, but the species favors mid-successional post-fire stages. Spotted Towhees are often detected in mid-successional burned forests, and can also occupy mid-successional clearcuts (Hutto 1995). They reached peak densities in low- or moderate-intensity burned patches in New Mexico one to two years after fire (Kotliar et al. 2007). The species also was a strong indicator of habitats burned twice at high-intensity in Oregon; it was most abundant in and nearly restricted to these types (Fontaine et al. 2009). In the Sierra, the Spotted Towhee was one of the most abundant bird species detected in a large 10-year old fire in the northern Sierra (Burnett et al. 2010) and favored a 50-year old burned area in the southern Sierra (Siegel and Wilkerson 2005). A future increase in extent and frequency of high-intensity fires in SIEN parks will likely benefit Spotted Towhees in the long-term by rejuvenating and maintaining the dense shrub patches required by the species.

Habitat Fragmentation or Loss: Spotted Towhees can occupy habitats where agricultural and residential development is light or moderate, but intensive development such as complete urbanization eliminates and fragments habitat (Greenlaw 1996). Intensive urbanization is not a threat in SIEN parks, and moderate development of campgrounds and facilities is not likely to pose a problem for this species.

Logging operations can temporarily eliminate suitable habitat, but if shrubs are allowed to develop, Spotted Towhees can re-occupy harvested sites in mid-successional stages (Hutto 1995).

Invasive Species and Disease: To our knowledge, invasive species and disease are not significant threats to the Spotted Towhee in SIEN parks.

Human Use Impacts: Packstock grazing within the SIEN parks is a potential risk to Spotted Towhees, at least locally where grazing is permitted, because grazing can alter or reduce shrub habitats. In the Sacramento Valley, California, Gardali and Nur (2006) reported the lowest adult survival of Spotted Towhees was at a heavily grazed site, postulating that grazing reduced shrubby vegetation needed by the birds for cover. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

As ground nesters, Spotted Towhees are susceptible to nest depredation from domestic cats (Greenlaw 1996). This is not likely a significant problem in protected areas such as the SIEN parks, but may threaten the species in developed areas adjacent to the parks.

Management Options and Conservation Opportunities

Spotted Towhee populations appear to be stable or increasing in SIEN parks. Management actions to conserve Spotted Towhee in the parks include restoring the natural fire cycle (including high-intensity fire) to ensure long-term maintenance of chaparral and riparian shrub habitats favored by the species, and assessing potential negative impacts of packstock grazing. MAPS station operation and any other opportunities to monitor Spotted Towhee populations in the parks should continue, to determine whether the species is expanding its range in response to climate change.

Steller's Jay – *Cyanocitta stelleri*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Steller's Jay is a common breeder at Sequoia and Kings Canyon (SEKI) National Parks, Yosemite (YOSE) National Park and Devils Postpile (DEPO) National Monument (Table 1).

Table 22. Breeding status and relative abundance of Steller's Jays in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Common
Devils Postpile NM	Year-round	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)
-

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Steller's Jay occurs throughout much of western North America, but is most prevalent in montane areas. The subspecies *C. s. frontalis* occurs primarily within California and in the central and southern Oregon Cascades (Siegel and DeSante 1999). The abundance of Steller's Jay in the Sierra Nevada makes the range and SIEN parks very important to the *frontalis* subspecies.

Distribution and Habitat Associations
Steller's Jays prefer oak woodlands, sometimes intermixed with conifers, for breeding and foraging (Gaines 1992). Steller's Jays were detected in moderate densities in a number of habitat types (Table 2) along many survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were observed eleven times during the DEPO survey. Park inventories show highest associations with Ponderosa Pine/Incense-cedar and White Alder forests within SEKI and YOSE respectively (Table 2). When adjusted for detectability, densities of Steller's Jay at SEKI were equally high in Ponderosa Pine/Incense-cedar forest and Ponderosa Pine Woodland. Steller's Jay was present in 20 of 28 (SEKI) and 25 of 29 (YOSE) habitat types indicating a generalist's use of habitat.

Table 23. Number of Steller's Jays recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	387	532	Ponderosa Pine/Incense Cedar	0.50	0.41 (0.29-0.60)
			Undifferentiated Riparian	0.38	0.28 (0.09-0.83)
			Jeffrey Pine Woodland	0.37	0.33 (0.24-0.46)
			Ponderosa Pine Woodland	0.32	0.41 (0.25-0.68)
			White Pine/Sugar Pine Forest	0.26	0.19 (0.13-0.27)
Yosemite NP	654	956	White Alder	0.64	
			Canyon Live Oak	0.44	
			Black Oak	0.39	
			Ponderosa Pine Mixed Conifer	0.29	
			Douglas fir/Mixed Conifer	0.28	
Devils Postpile NM	11	11	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

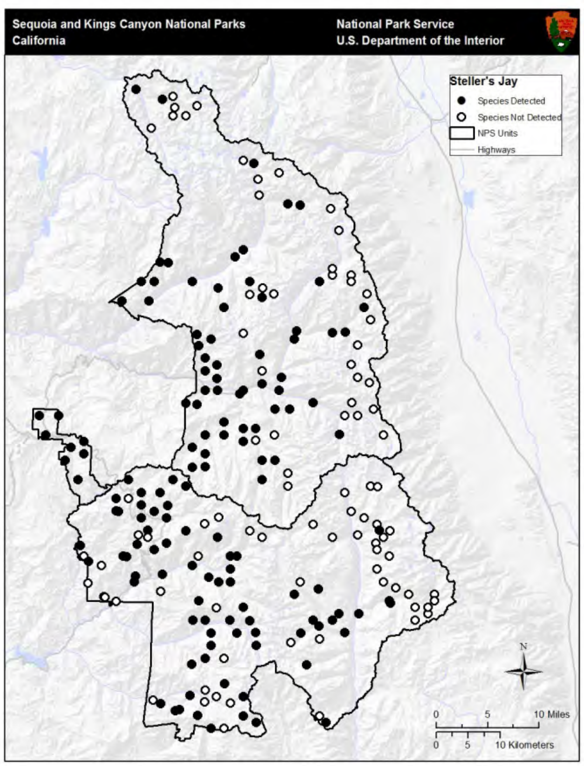

Figure 11. Bird survey transects where Steller's Jay was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

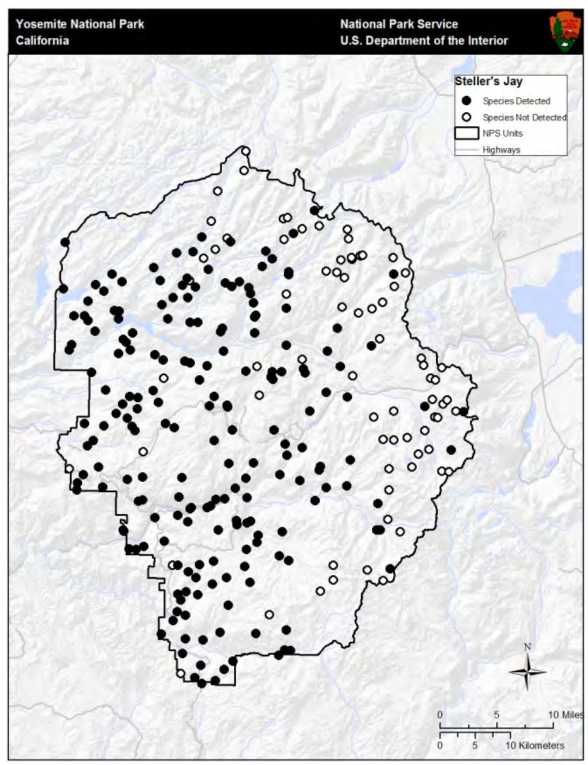

Figure 12. Bird survey transects where Steller's Jay was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution
Steller's Jay was observed from low to high elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Steller's Jay at SEKI was 2207 m, with 95% of observations occurring between 1092 and 3160 m. At YOSE, the mean elevation of observations was 2038 m with 95% of observations falling between 1200 and 2920 m (Siegel et al. 2011).

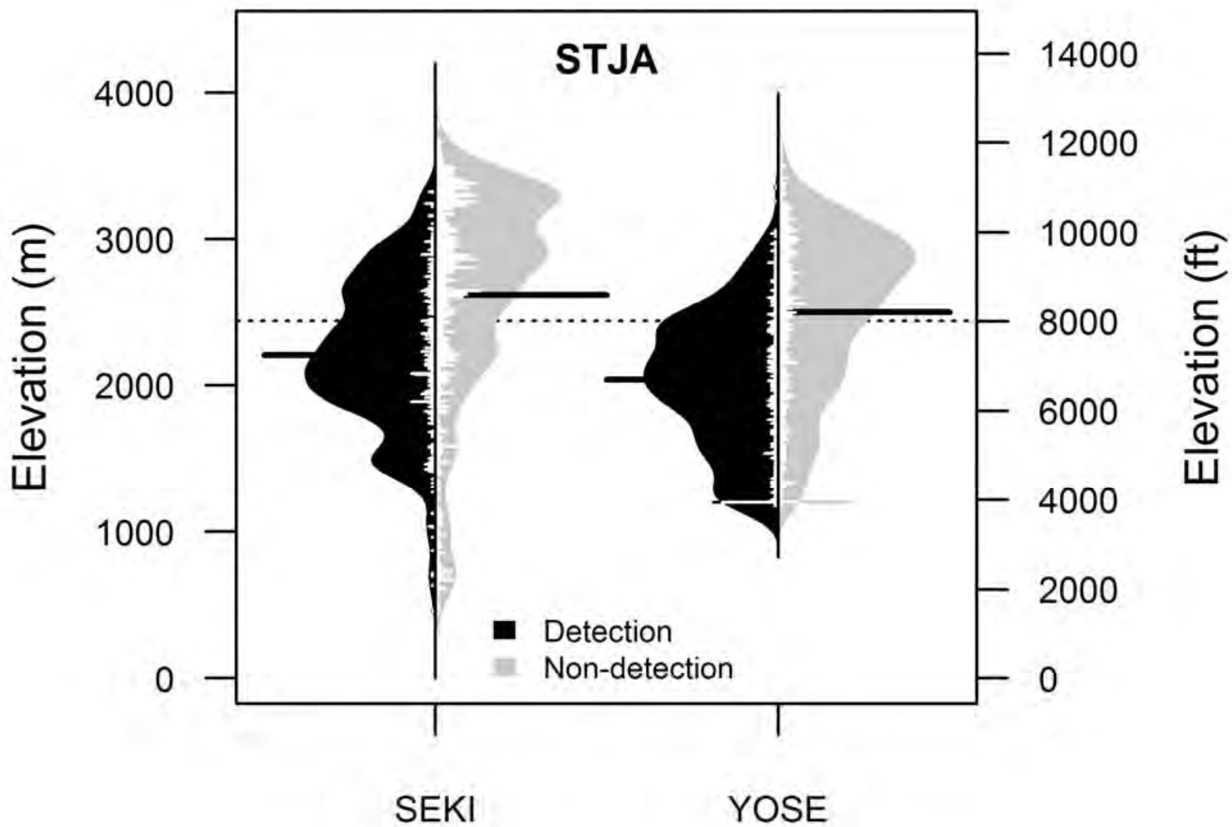

Figure 3. Elevational distributions of sites where Steller's Jays (STJA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data
Breeding Bird Survey (BBS) data indicate Steller's Jays are detected more often in the Sierra Region (BCR 15) than in California as a whole. They were detected in high numbers on individual BBS routes at YOSE and SEKI. BBS data show high relative abundance, but no significant trends within areas of interest, suggesting healthy and stable populations of Steller's Jays (Table 3).

Table 24. Relative abundance and trends for Steller's Jay according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	135	12.59	0.0	0.90
	1980-2007			+0.4	0.24
Sierra Nevada (BCR 15)	1966-2007	35	20.23	-0.7	0.14
	1980-2007			+0.2	0.65
Route 14117 – Sequoia NP	1972-2005	1	7.56	-8.5	0.45
Route 14132 – Kings Canyon NP	1974-2005	1	30.00	-0.6	0.70
Route 14156 – Yosemite NP	1974-2007	1	16.96	-3.9	0.14

MAPS data from YOSE show near significant population increases at station sites. Capture rates at the three parks are low and productivity is moderate. No other trend or adult survival data are available (Table 4).

Table 25. Population trends, productivity, trends, and survival estimates of Steller's Jay at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.7	NA[2]	0.26	NA	NA
Yosemite NP	1993-2009	0.7	+7.76*	0.27	NA	NA
Devils Postpile NM	2002-2006	1.3	NA	0.50	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Steller's Jay appears to be stable across its range (Table 3) with few threats. The species shows at least minor susceptibility to West Nile Virus and climate change may result in a shift in range, but not likely a large decrease in population. A change in fire regimes may harm local populations where large, stand-replacing burns occur, but frequent low to moderate fires will create habitat for the Steller's Jay. Similarly, disturbance in the form of timber harvest, leading to fragmented forests favors the Steller's Jay outside of SIEN parks and other human activities are unlikely to harm the species, but may aid populations where supplemental food sources are available.

Climate Change: An analysis of shifts between the historical range of Steller's Jay (1911-1929 survey) and its current range (2003-2008 resurvey) showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count data suggests that the center of abundance of Steller's Jay has significantly shifted 264.4 miles to the North and 83.1 miles toward the coast over the past 40 years (Audubon 2009). A shift northward suggest the species may be moving toward cooler areas as the climate warms, although a shift toward coastal areas, which generally have warmer winter temperatures than inland areas, provides evidence to the contrary (Audubon 2009). Observed temperature tracking by Tingley et al. (2009) and a northward shift observed by Audubon (2009) may suggest range shifts in response to climate change, but the evidence is not conclusive.

Modeled distribution shifts of Steller's Jay predict some reduction in occurrences in California's foothills, but continued occurrence of the species higher in the Sierra Nevada and along the north coast (Stromberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation (both distribution models), precipitation of the driest quarter (Maxent distribution model), and annual precipitation (GAM distribution model) (Stromberg and Jongsomjit 2008).

Steller's Jays are found breeding in low to high elevations of YOSE and SEKI (Figure 3). If climate change causes the species' range to contract away from low-elevation regions, there is much higher-altitude forest where the species might persist.

Altered Fire Regimes: A study of avian response to a gradient of fire severity found that Steller's Jay was most abundant in forests following low and moderate intensity fires, as opposed to unburned forests and forests following high-intensity fires (Kotliar et al. 2007). These results suggest that an increase in fire frequency may be beneficial to Steller's Jay, but a concurrent increase in fire intensity would be detrimental where large stand-replacing fires occurred.

Habitat Fragmentation or Loss: Steller's Jay is abundant in fragmented landscapes and appears to prefer forest edges and fragmented habitat (Marzluff et al. 2004). Forestry practices that fragment forests in the Sierra Nevada may be beneficial to Steller's Jay outside of park boundaries. Forest fragmentation from large fires may have similar effects within and beyond the park, although such large fires are associated with reduced abundance in the short-term (see above).

Invasive Species and Disease: A single dead Steller's Jay tested positive for West Nile Virus (WNV) in California during 2009 (CDPH 2010). This single case demonstrates that the species is at least minimally susceptible to the disease, although WNV was found much more often among dead individuals of the closely related Western Scrub-Jay (CDPH 2010).

Human Use Impacts: Steller's Jay can be seen at artificial feeders (Greene et al. 1998), which may lead to increased population by providing supplemental food. In general Corvid species are adaptable to some human development and are tolerant of human presence.

Management Options and Conservation Opportunities

Steller’s Jay’s abundance in the Sierra Nevada and apparent lack of threats suggest that direct management to help the species within SIEN parks is unwarranted. On the contrary, Corvid species such as the Steller’s Jay can act as nest predators to other bird species. Thus, efforts to reduce artificial food sources where park visitors are common would help prevent an inflated Steller’s Jay population and high predation rates. Steller’s Jay’s apparent susceptibility to WNV and the diseases’ ability to spread among bird species is of concern. Testing of dead jays for the disease would help track any WNV outbreak within SIEN parks and help inform subsequent response efforts.

Swainson's Thrush – *Catharus ustulatus*

Migratory Status
Neotropical Migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Swainson's Thrush occurs rarely across the Sierra Nevada Network (SIEN). The species is a possible breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks. It has not been observed breeding at Devils Postpile (DEPO) National Monument (Table 1).

Table 26. Breeding status and relative abundance of Swainson's Thrushes in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Summer	Probable Breeder	Rare
Yosemite NP	Migrant/Summer	Probably Breeder	Rare
Devils Postpile NM	Migrant/Summer	Non-Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Swainson's Thrush is distributed over much of Canada and the mountains of the western U.S. including the Sierra Nevada. The subspecies *ustulatus* is found only on the western side of the pacific slope. Given Swainson's Thrush's rarity within the Sierra Nevada and security across its range, the Sierra and SIEN parks are not of great importance to the species, although its persistence in this part of their range is tenuous (Siegel and DeSante 1999).

Distribution and Habitat Associations
In the western Sierra Nevada, Swainson's Thrushes are most often found within the dense understory of moist forested slopes near streams and meadows (Gaines 1992). Swainson's Thrushes were detected along only two transects at SEKI and one transect at YOSE (Figures 1 and 2) during avian inventory surveys and were not observed during the DEPO survey (Table 2). Due to the low detection rates, park-specific habitat associations are not available.

Table 27. Number of Swainson's Thrushes recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings	2	2	NA[1]	NA	NA
Yosemite NP	1	1	NA	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

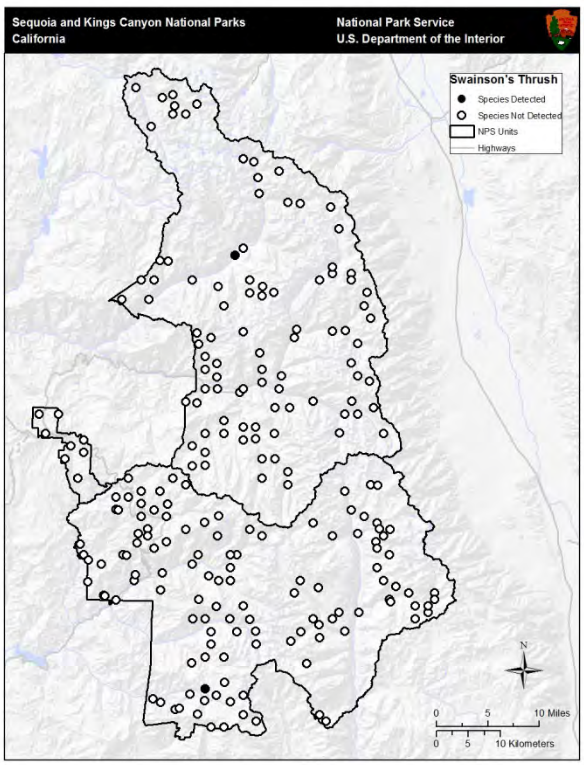

Figure 13. Bird survey transects where Swainson's Thrush was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

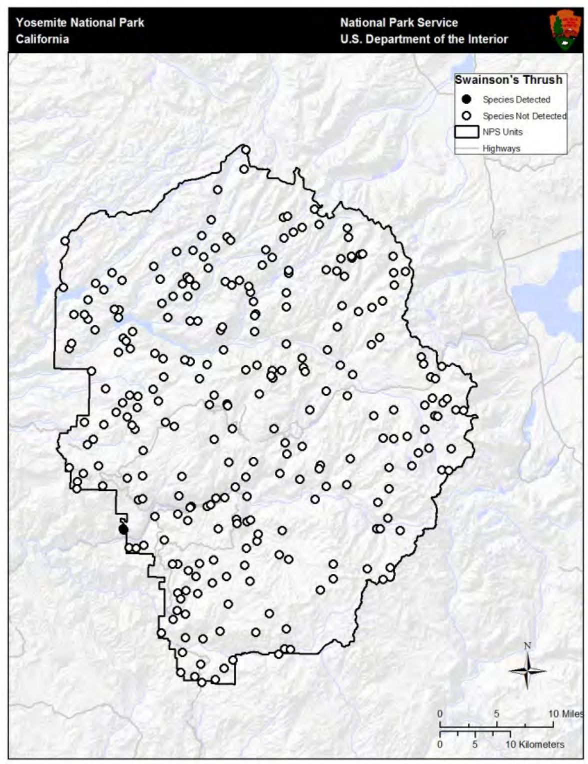

Figure 14. Bird survey transects where Swainson's Thrush was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Swainson's Thrush was observed within the middle-elevations of SEKI and lower-elevations at YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Swainson's Thrush in SEKI was 2208 m, and 1204 at YOSE (Siegel et al. 2011).

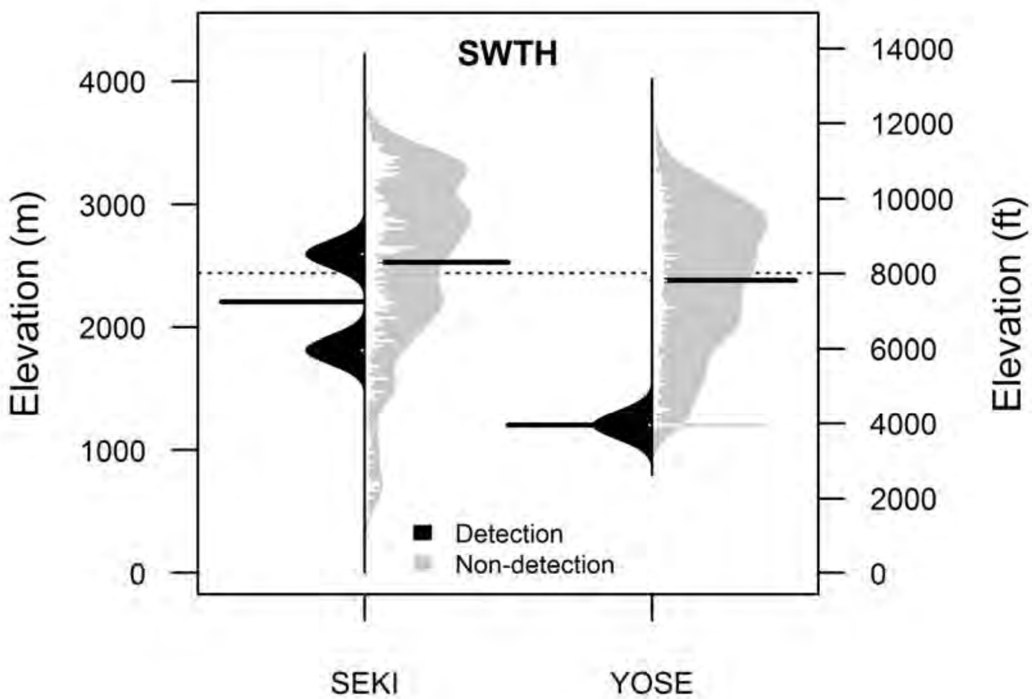

Figure 3. Elevational distributions of sites where Swainson's Thrushes (SWTH) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Swainson's Thrushes are detected more often in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at YOSE and SEKI. A significantly negative trend was observed in the Sierra Region during 1966-2007 and along the Sequoia route during 1972-2005, but very low detection rates call into question the reliability of the trend results (Table 3). Gaines (1992) notes that the species was formerly fairly common in Yosemite Valley and elsewhere along the Sierran western slope, but that the species is no longer found within the Yosemite Valley. In more recent years however, singing Swainson's Thrushes have been heard near the margin of Yosemite Valley, along Tenaya Creek upstream from Mirror Lake (R. Siegel, personal observation).

Table 28. Relative abundance and trends for Swainson's Thrush according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	47	2.16	-0.2	0.82
	1980-2007			-0.9	0.23
Sierra Nevada (BCR 15)	1966-2007[1]	6	0.08	-10.9	0.01
	1980-2007[1]			-4.1	0.63
Route 14117 – Sequoia NP	1972-2005	1	0.31	-67.7	0.00
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	0.38	-8.1	0.46

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

MAPS data from Kings Canyon and Yosemite NPs show very low capture rates for Swainson's Thrush (Table 4), such that reproductive indices and survival estimates are probably not meaningful.

Table 29. Population trends, productivity, trends, and survival estimates of Swainson's Thrush at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.1	NA[2]	0.07	NA	NA
Yosemite NP	1993-2009	0.1	NA	0.00	NA	0.948 (0.111)
Devils Postpile NM	2002-2006	0.3	NA	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Most troubling for Swainson's Thrush is a significant Sierra-wide decline in the long-term (Table 3). Suggested causes of this decline include habitat loss, degradation and fragmentation within its breeding range, but likely more importantly within its wintering range (Siegel and DeSante 1999, NatureServe 2009). Other potential threats to Swainson's Thrush include range shifts due to climate change and immerging infectious diseases including Avian Influenza and West Nile Virus. Minor and/or localized threats to the species include brood parasitism from Brown-headed Cowbirds, collisions with towers during migration outside of the SIEN and human disturbance at nesting sites. The effects of altered fire regimes on Swainson's Thrush and their habitats is unclear and will likely vary across the species' range.

Climate Change: Analyses of spring migration dates of Swainson's Thrush have shown a non-significant trend toward earlier migration with earlier springs in recent decades (Mills 2005, MacMynowski and Root 2007). While not statistically significant, these studies suggest that Swainson's Thrush may be beginning to respond to climate change.

The Sierra Nevada Mountains and SIEN parks are located at the southern edge of Swainson's Thrush's breeding range (Mack and Yong 2000). If climate change leads to the shift of the species' range northward, as is expected of many Northern Hemisphere species, the already rare populations within SIEN parks may soon be extirpated from the area. Given declines in the Sierra, this is a potentially major threat to SIEN populations of Swainson's Thrush.

Altered Fire Regimes: Where fires decrease understory vegetation the disturbance is detrimental to Swainson's Thrush. However, the response of understory vegetation and subsequent Swainson's Thrush abundance following stand-replacing fires has been mixed (Mack and Yong 2000), so it is unclear what effect changing fire regimes will have on Swainson's Thrush in the future.

Habitat Fragmentation or Loss: Habitat loss and degradation threatens breeding populations of Swainson's Thrush to a degree (NatureServe 2009), but do not appear to be major concerns in the Sierra Nevada (Siegel and DeSante 1999). Outside of protected areas, the species shows negative population responses to clear-cut timber harvests, but may benefit from selective logging where understory vegetation is increased (Mack and Yong 2000). Likely of greater concern for the species is habitat loss on its wintering grounds, especially deforestation of tropical forests (Mack and Yong 2000). Loss of wintering habitat has probably caused or at least contributed to its precipitous decline in the Sierra (Siegel and DeSante 1999).

Invasive Species and Disease: A study examining the prevalence of Avian Influenza in passerine species across the United States found that Swainson's Thrush had the highest prevalence of all species for which the authors had a large number of samples (Fuller et al. 2010). Likewise, Owen et al. (2006) showed experimentally that Swainson's Thrush can migrate while infected with West Nile Virus, making it a potential vehicle for the disease's spread.

Increased density of Brown-headed Cowbirds and change in riparian vegetation structure within riparian areas may be contributing to Swainson's Thrush declines locally (Siegel and DeSante 1999, Mack and Yong 2000). A previous study of Brown-headed Cowbirds within the western National Parks have indicated that cowbird occurrence and parasitism rates within SEKI and YOSE is rare (Halterman et al. 1999). However, the Halterman et al. study is 11 years old and may not reflect current prevalence of Brown-headed Cowbirds within SIEN parks.

Human Use Impacts: Livestock grazing may be contributing to degradation of Swainson's Thrush habitats in the Sierra Nevada. However, the species has shown willingness to use lightly grazed meadows (Siegel and DeSante 1999), suggesting that light grazing from packstock use within SIEN parks is not be a major threat, especially considering the species very local distribution within the parks.

Collisions with towers during migration have caused substantial numbers of mortalities for Swainson's Thrush in some areas (Mack and Yong 2000). Due to the lack of television and other tall towers within SIEN parks this is not a direct threat to park populations, but could reduce survivorship of birds returning to the parks.

Swainson's Thrush is sensitive to human disturbance around nest sites, especially during the egg laying period (Mack and Yong 2000).

Management Options and Conservation Opportunities

Swainson's Thrush is not currently listed or heavily managed. However, declines in the Sierra Nevada and SIEN parks suggest that without intervention the species could soon be lost in these areas. Given that the most likely cause of such declines is loss of wintering habitat (Siegel and DeSante 1999), there are few options for intervention by SIEN park managers other than promotion of habitat conservation in Mexico and Central America, and continued protection of breeding habitat within SIEN parks. Fire management practices that retain dense understory vegetation especially within riparian and meadow habitats would also benefit Swainson's Thrush.

While Swainson's Thrush shows some susceptibility to Brown-headed Cowbird parasitism, a previous assessment of cowbird pressure in SEKI and YOSE indicates that a cowbird trapping program is not warranted (Halterman et al. 1999). However, if future studies show an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Townsend’s Solitaire – *Myadestes townsendi*

Migratory Status

Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Townsend’s Solitaire is a fairly common summer and year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and Devils Postpile (DEPO) National Monument (Table 1).

Table 30. Breeding status and relative abundance of Townsend's Solitaires in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Summer/Year-round	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

The Townsend’s Solitaire is distributed over much of Canada and the mountains of western U.S. including the Sierra Nevada, but does not occur in the Pacific coastal ranges (NatureServe 2002). The Sierra Nevada is very important to the Townsend’s Solitaire population in California (Bowen 1997).

Distribution and Habitat Associations

The Townsend’s Solitaire is more closely associated with high mountain country than any other thrush except the Mountain Bluebird (Bowen 1997). The species prefers somewhat open forests and woodlands with a well-developed shrubby understory, typically on ridges or well-drained slopes where it nests on the ground under rocks, logs, or tree roots or on cut banks (Siegel and DeSante 1999). This bird migrates downslope during winter (Bowen 1997) where it feeds on berries, especially mistletoe, toyon, and elderberries (Siegel and DeSante 1999). Townsend’s Solitaires were detected in moderate to relatively high numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects at all four SIEN parks. The species was most abundant in conifer forests; park inventories show highest associations with Western White Pine Woodland and Jeffrey Pine/Red Fir within SEKI and YOSE respectively (Table 2). However, Townsend's Solitaires also were recorded in 16 different habitat types in YOSE, suggesting more generalist habitat associations but also reflecting the tendency of singing Townsend's Solitaires to be detectable from hundreds of meters away.

Table 31. Number of Townsend's Solitaires recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	141	154	Western White Pine Woodland	0.32	0.24 (0.13-0.34)
			Western Juniper Woodland	0.15	0.14 (0.04-0.53)
			Red Fir Forest	0.10	0.08 (0.05-0.13)
Yosemite NP	313	359	Jeffrey Pine/Red Fir	0.14	
			Douglas fir/Mixed Conifer	0.12	
			Red Fir	0.10	
			Jeffrey Pine	0.10	
Devils Postpile NM	8	9	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

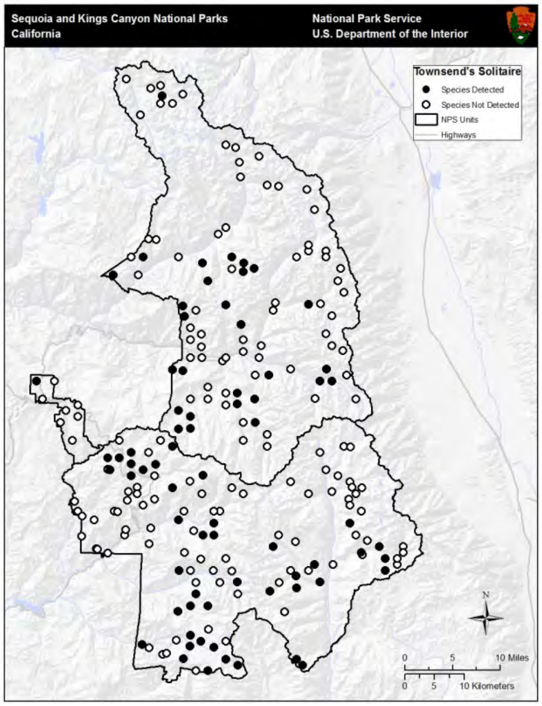

Figure 15. Bird survey transects where Townsend's Solitaire was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

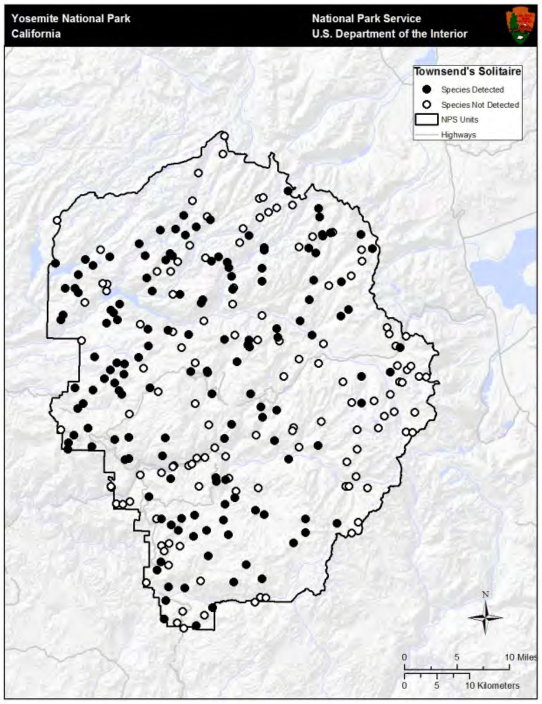

Figure 16. Bird survey transects where Townsend's Solitaire was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Townsend's Solitaire was detected from low to high elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 2655 m, with 95% of observations occurring between 1427 and 3331 m. In YOSE, the mean elevation of observations was 2332 m with 95% of observations falling between 1483 and 3051 m (Siegel et al. 2011).

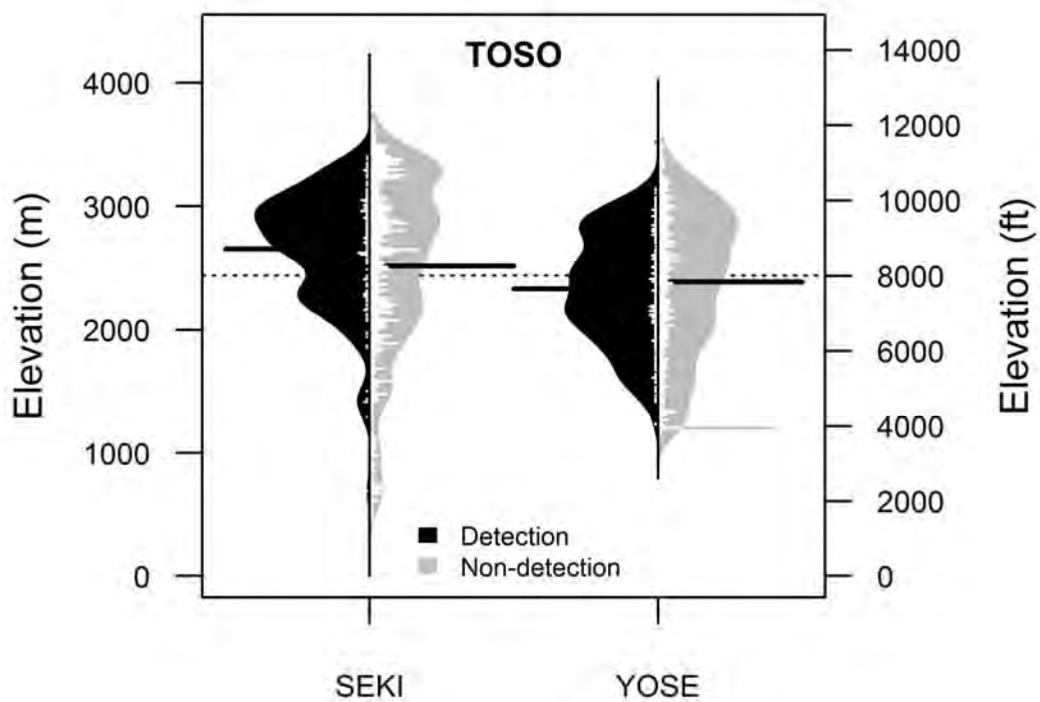

Figure 3. Elevational distributions of sites where Townsend's Solitaire (TOSO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Townsend's Solitaires are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were detected in low numbers on the individual BBS routes at Kings Canyon NP and at higher abundances in Yosemite NP. They were not detected along the route in Sequoia NP. A significant but small positive population trend was observed in California from 1966-2007 (Table 3).

Table 32. Relative abundance and trends for Townsend's Solitaire according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	62	0.98	+1.7	0.05
	1980-2007			+0.5	0.46
Sierra Nevada (BCR 15)	1966-2007	25	1.26	+1.4	0.66
	1980-2007			+0.6	0.51
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.25	-13.2	0.31
Route 14156 – Yosemite NP	1974-2007	1	1.62	+5.6	0.27

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Few Townsend's Solitaires were captured in mist nets at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The Townsend's Solitaire generally is detected at low numbers along BBS routes in the Sierra Nevada and SIEN parks (Table 3) – perhaps reflecting large territory sizes and wide spacing of individuals - but population trends appear to be stable or slightly increasing. Forest thinning and fire do not appear to significantly threaten the Townsend's Solitaire. This species may be able to colonize or persist at higher elevations in the face of climate change, but may be adversely impacted by warmer temperatures if berry crops are reduced. Townsend's Solitaires are susceptible to brood parasitism by Brown-headed Cowbirds, but predators have a far greater impact on nesting success of this ground-nester. The solitaire has developed the ability to renest multiple times during a long breeding season in response to high predation rates (Bowen 1997).

Climate Change: An analysis of shifts between the historical range of Townsend's Solitaire (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species' responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). Furthermore, an analysis of Christmas Bird Count (CBC) data indicates the center of abundance of Townsend's Solitaire has shifted significantly northward by over 99 miles and inland by over 42 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Movement in both of these directions suggests the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Townsend's Solitaire has already responded to warming temperatures and will likely continue to shift its range within the Sierra in the coming decades.

Townsend's Solitaire breeds in relatively open forests and woodlands with a well-developed shrubby understory at mid- to high-elevations in the Sierra Nevada (Table 2, Figure 3). If the species' range continues to shift upslope in response to a warming climate, there is likely sufficient habitat at higher elevations in the SIEN parks for this species to persist. However, any warming trends that adversely impact berry crops would pose a substantial threat to this species especially during winter (Siegel and DeSante 1999).

Altered Fire Regimes: Research results on fire effects to Townsend's Solitaire are equivocal. Townsend's Solitaires were common in early and mid-successional post-fire forests in the Rocky Mountains (Hutto 1995). The species was a strong, significant indicator of recently burned forests in Oregon (Fontaine et al. 2009), and these birds increased dramatically in response to high-intensity burns in Montana (Smucker et al. 2005). The species was rare in general, but more breeding pairs were detected on unburned than burned plots in the eastern Sierra during three survey periods ranging from 6 to 25 years after fire (Rafael et al. 1987), and these birds were more often detected on unburned than burned forests in the southern Sierra as well (Siegel and Wilkerson 2005). Because the Townsend's Solitaire is not highly abundant, perhaps greater power is needed to detect significant effects of fire on this species.

Habitat Fragmentation or Loss: Townsend's Solitaires do not appear to be sensitive to habitat degradation due to timber harvesting; detections increased significantly in both moderate and heavily thinned compared to untreated stands in Douglas-fir forests in Oregon (Hayes et al. 2003) and detections were common on early and mid-successional clearcuts (Hutto 1995). Thinning and clearcutting are widespread in the Sierra Nevada, but are not issues in the SIEN parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Townsend's Solitaires are susceptible to brood parasitism by Brown-headed Cowbirds, but not severely. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI.

Human Use Impacts: Packstock grazing within the parks is a potential concern for this species, at least locally where grazing is permitted, because it can attract Brown-headed Cowbirds. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Management Options and Conservation Opportunities

The most important actions park managers can take to protect Townsend's Solitaire populations in the parks are to manage ecosystems to maintain relatively open-forest and woodland habitats and to carefully manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE should be updated.

Townsend's Warbler – *Dendroica townsendi*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Townsend's Warbler is an uncommon winter resident or migrant at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 33. Breeding status and relative abundance of Townsend's Warblers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Winter	Non-Breeder	Uncommon
Yosemite NP	Migrant/Winter	Non-Breeder	Uncommon
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Townsend's Warbler breeds in coniferous forests of the Pacific Northwest, Idaho, Montana, northwest Wyoming, Alaska, and the Yukon Territory (Wright et al. 1998). Wintering Townsend's Warblers migrate through the Sierra Nevada in large numbers (Siegel and DeSante 1999) but are uncommon in the SIEN parks, at least outside of the low-elevation areas (Table 1). The species winters in small numbers in the lower-elevation wooded valleys of the Sierra foothills and occasionally in YOSE or SEKI (Dunn and Garrett 1997).

Distribution and Habitat Associations
Townsend's Warblers nest in mature fir, montane spruce-fir, and boreal forests (Wright et al. 1998). Wintering habitat in California consists of live oaks, mixed oak-coniferous forest, groves of conifers, chaparral, and stands of exotic trees in farms, ranches, suburban gardens, and parks (Wright et al. 1998). Townsend's Warblers were not detected during breeding-season avian inventory surveys at any of the SIEN parks because this species generally occurs in California during winter only, and does not breed in the state.

Elevational Distribution
Although quantitative data are unavailable, the species is largely restricted to the lower elevation portions of YOSE and SEKI.

Abundance, Trends and Demographic Data
Townsend's Warblers were not detected during Breeding Bird Surveys (BBS) or at SIEN MAPS stations, but these surveys are designed for breeding species and this warbler only winters in California. BBS data from the breeding grounds tentatively suggested a positive population trend from the early 1960s to the mid-1990s (Wright et al. 1998). A significant positive trend was observed for overwintering populations in the U.S. from Christmas Bird Counts (CBC) conducted over the past four decades (Audubon 2009).

Stressors
Forests used by Townsend's Warbler for breeding and wintering have been eliminated or fragmented by logging, which likely poses the most significant risk to the species. However, BBS and CBC survey data suggest stable populations. This warbler uses a relatively wide range of habitats during winter, including exotic trees in suburban backyards, and thus may be somewhat resilient to habitat alteration in the Sierra Nevada. Climate change may impact individuals on the breeding grounds if forests experience a drying trend. Similarly, an increase in extent and frequency of high-intensity fire may reduce habitat suitability for breeding Townsend's Warblers, but little is known about habitat requirements for migrating or overwintering individuals.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of wintering Townsend's Warblers have not significantly shifted in latitude over the past 40 years, but has moved significantly towards the coast by over 20 miles (Audubon 2009). The coastward shift could be due to factors other than climate change. In the Sierra this species overwinters in a variety of habitat types at lower elevations, and is likely adaptable to a warming climate at least during the non-breeding season. Townsend's Warblers nest in moist, shady coniferous forests, so a general drying trend may adversely impact breeding habitat.

Altered Fire Regimes: Townsend's Warblers are associated with mature coniferous forests, thus intense fire may reduce habitat suitability for this species. Breeding Townsend's Warblers decreased significantly after high-intensity fire but increased in unburned and low-intensity burned areas in Montana (Smucker et al 2005). A wider variety of habitat types are used by overwintering Townsend's Warblers, thus the species may be less impacted by fire than on its breeding grounds. Little is known about habitat requirements for migrating Townsend's Warblers (Wright et al. 2008).

Habitat Fragmentation or Loss: Little data are available on fragmentation or loss of habitat for Townsend's Warblers, but indirect evidence for impacts may be inferred from trends in important habitats (Wright et al. 2008). Mature and older forests used by breeding Townsend's Warblers in the Pacific Northwest, the Northern Rocky Mountains, Canada, and Alaska have been substantially reduced by logging. However, habitat loss and fragmentation are not a problem for this species where it overwinters in or migrates through the SIEN parks.

Invasive Species and Disease: To our knowledge, invasive species and disease are not significant risks to Townsend's Warblers in SIEN parks.

Human Use Impacts: Human-use impacts do not pose a significant threat to the species in SIEN parks.

Management Options and Conservation Opportunities

Townsend's Warblers are uncommon winter residents and migrants through SIEN parks, so management for this species is not a high priority.

Tree Swallow – *Tachycineta bicolor*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Tree Swallow is rare at Sequoia and Kings Canyon (SEKI) National Parks, locally uncommon at Yosemite (YOSE) National Park, and uncommon at Devils Postpile (DEPO) National Monument (Table 1). The species is a regular breeder at YOSE and a possible breeder at SEKI and DEPO (Table 1).

Table 34. Breeding status and relative abundance of Tree Swallows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Migrant	Possible Breeder	Rare
Yosemite NP	Summer	Regular Breeder	Locally Uncommon
Devils Postpile NM	Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Tree Swallow breeds widely across much of Alaska, Canada, the northern U.S., and California (Robertson et al. 1992). The species' broad range and relative scarcity in the Sierra Nevada suggests the Sierra Nevada and SIEN parks are not particularly important to it (Siegel and DeSante 1999).

Distribution and Habitat Associations

Tree Swallows in the Sierra Nevada are closely tied to streams, ponds, lakes, and meadows, but require cavities in trees (or human structures) for nesting (Gaines 1992). Tree Swallows were detected in very small numbers and only at YOSE (Table 2, Figure 1) during avian inventory projects at SEKI, YOSE, and DEPO.

Table 35. Number of Tree Swallows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	NA[1]	NA	NA
Yosemite NP	3	4	Black Oak Quaking Aspen	0.07 0.05	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

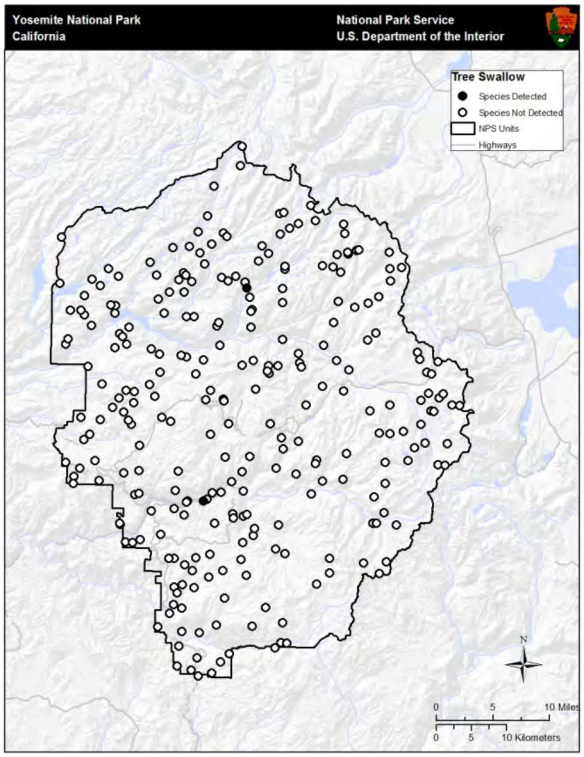

Figure 17. Bird survey transects where Tree Swallow was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Tree Swallow detections at YOSE occurred at 1212 m, 1620 m, and 2177 m (Figure 2, Siegel et al. 2011). Gaines (1992) indicates that the species nests up to 2743 m in the Yosemite area.

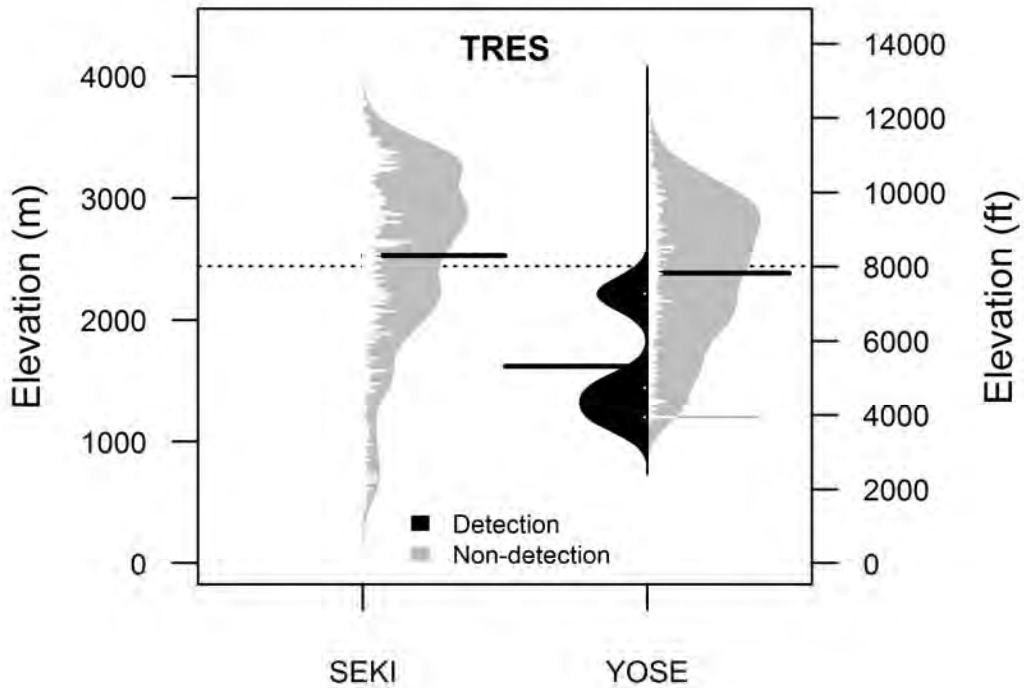

Figure 2. Elevational distributions of sites where Tree Swallows (TRES) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Tree Swallows are found in lower abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in very low numbers on all three individual BBS routes that intersect YOSE and SEKI. A significant positive trend was observed in California as whole during both 1966-2007 and 1980-2007 (Table 3).

Table 36. Relative abundance and trends for Tree Swallow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	117	2.40	+3.6	0.00
	1980-2007			+3.1	0.00
Sierra Nevada (BCR 15)	1966-2007	21	1.95	+2.6	0.20
	1980-2007			+1.9	0.51
Route 14117 – Sequoia NP	1972-2005	1	0.13	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.30	-59.5	0.00
Route 14156 – Yosemite NP	1974-2007	1	0.19	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Tree Swallows are rarely captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Tree Swallows forage over open fields, meadows, marshes, ponds, lakeshores, and other wetland margins, but nest almost exclusively in cavities in nearby dead trees which appears to limit populations (although the species readily takes to nest boxes; Robertson et al. 1992). Contrary to its congener the Violet-green Swallow and despite many potential risks such as salvage logging and pesticide use, the Tree Swallow is increasing in California (Table 3). The restoration of natural fire regimes and reduction in salvage logging will strongly benefit Tree Swallows by increasing insect prey and creating and maintaining a supply of dead trees that attracts primary cavity excavators such as woodpeckers. Climate change may adversely affect this water-associated bird.

Climate Change: An analysis of shifts between the historical range of Tree Swallow (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides strong evidence that Tree Swallow has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades. Modeled distribution shifts of Tree Swallow predict range contractions in the southern part of its range. The most prominent decreases in occurrence are expected in southern California, the southern Central Valley, and the southern Sierra Nevada including the SIEN parks. The most important variables influencing current and projected distribution were precipitation and vegetation (Maxent distribution model) and vegetation and annual mean temperature (GAM distribution model) (Stralberg and Jongsomjit 2008).

Tree Swallow requires open areas near water, including fields, marshes, shorelines, and wooded swamps with standing dead trees that provide sites for cavities. If the species expands upslope in the Sierra Nevada as generally expected, there is sufficient wet meadow habitat for colonization in SIEN parks. However, if climate change results in drier conditions in its preferred habitats, this species is likely to suffer.

Altered Fire Regimes: *Tachycineta* species are known to use burned forests for 10 to 20 years after fires, likely in response to improved conditions for aerial foraging following decreases in canopy cover and increases in flying arthropods associated with shrub regrowth (Kotliar et al. 2007). Swallows (Tree and Violet-green were pooled) were only detected in burned conifer forests, especially repeat-burned, in southwestern Oregon (Fontaine et al. 2009), and Tree Swallows often were detected in early but not mid-successional burned forests in the Rocky Mountains (Hutto 1995). An increase in extent and frequency of high-intensity fire in SIEN parks is likely to enhance foraging and nesting habitat for the Tree Swallow.

Habitat Fragmentation or Loss: Forestry practices that remove snags could adversely impact Tree Swallows by eliminating cavity sites. Densities of swallows (both Tree and Violet-green) did not differ among different levels of post-fire salvage logging, and were not correlated with any measured vegetation variables, in burned landscapes in Oregon (Cahill and Hayes 2009), suggesting that retention of at least some snags may ameliorate the effects of logging on presence of this swallow. However, nesting Tree Swallows were significantly reduced in salvage-logged stands in Montana (Hutto and Gallo 2006), and these birds only nested in dense snag patches resulting from fire and did not nest in logged patches in northwestern Washington (Zarnowitz and Manuwal 1985). Thus, salvage logging adversely impacts nesting but does not appear to affect presence within a stand.

Water pollution may negatively affect Tree Swallows (Robertson et al. 1992). Loss of marshes can result in greater concentrations of birds into smaller areas for roosting, and can deplete the local food supply, and pollution of rivers and marshes can lead to food scarcity or food contamination by toxins (Robertson et al. 1992). SIEN park habitats are protected from threats such as salvage logging, loss of wetlands, and to a substantial degree, pollution.

Invasive Species and Disease: European Starlings were introduced to New York City in 1890 and by the middle of the 20th century had spread across much of North America with the exception of Mexico. As a cavity nester, the Tree Swallow may be vulnerable to nest usurpation by European Starlings, but the extent of starling impacts on this swallow in SIEN parks is unknown. Competition with House Sparrows from nesting sites is also a potential threat to the Tree Swallow (Robertson et al. 1992).

Human Use Impacts: There are few if any human-use impacts on Tree Swallows in SIEN parks.

Management Options and Conservation Opportunities

The most important actions park managers can take to protect Tree Swallow populations are to maintain old trees with natural cavities and woodpecker holes and to restore the natural fire regimes. Park managers also can carefully manage or consider eliminating cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE should be updated. Cavity-nesting species would benefit from monitoring the effects of European Starlings, and implementing a removal program for starlings if monitoring indicates substantial conflicts.

Turkey Vulture – *Cathartes aura*

Migratory Status
Partial migrant (Kirk and Mossman 1998)

Residency and Breeding Status
Turkey Vulture is an uncommon possible breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks and an uncommon visitor to Devils Postpile National Monument (Table 1).

Table 37. Breeding status and relative abundance of Turkey Vultures in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Primarily Summer	Possible Breeder	Uncommon
Yosemite NP	Primarily Summer	Possible Breeder	Uncommon
Devils Postpile NM	Primarily Summer	Non-Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Turkey Vulture breeds throughout the U.S. including within California where the species is a year-round resident outside of the Sierra Nevada (Kirk and Mossman 1998). Because Turkey Vulture is widespread in California, but less abundant within the Sierra Nevada than other regions of the state, SIEN parks do not make up an important part of the species' range.

Distribution and Habitat Associations
On the western slope of the Sierra Nevada, Turkey Vultures are most often seen in the oak savannahs and grasslands of the foothills (Gaines 1992). Turkey Vultures were not detected during park inventories of the SIEN parks. However, individuals were observed away from survey transects in both SEKI and YOSE.

Table 38. Number of Turkey Vultures recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA[1]	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Turkey Vulture was not observed during park inventories; quantitative data on elevational distribution are not available for this species.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Turkey Vultures are found in greater abundance in California as a whole than in the Sierra Region (BCR 15). They were detected on individual BBS routes at YOSE and Sequoia NP, but not on the Kings Canyon NP route. A significant positive trend was observed in the Sierra Region as well as the state both in the long and short-terms (Table 3). Populations of Turkey Vultures appear healthy across California but are detected in the Sierra Nevada in small numbers.

Table 39. Relative abundance and trends for Turkey Vulture according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	150	1.98	+2.3	0.00
	1980-2007			+2.9	0.00
Sierra Nevada (BCR 15)	1966-2007	19	0.51	+4.1	0.00
	1980-2007			+3.6	0.03
Route 14117 – Sequoia NP	1972-2005	1	4.13	+18.6	0.37
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	0.08	-18.5	0.24

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Turkey Vultures are not captured at MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Turkey Vultures do not appear to be greatly threatened across their range and have increasing populations in California and the Sierra Nevada. In the past the species suffered from human persecution and reproductive failures due to contaminants such as DDT. While such threats have decreased in recent decades, some human activities continue to lead to vulture mortality. Most prominent among current human use impacts are lead poisoning and collisions with motor vehicles. Climate change appears to be affecting the range of Turkey Vulture, but it is not clear that the threat will cause major disruption of populations. Finally, neither disease nor altered fire regimes appear to be substantial threats to Turkey Vulture and the species has likely benefited from human land-use change and fragmentation.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Turkey Vulture has significantly shifted 53.2 miles to the north and 15.4 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These observed shifts provide evidence that Turkey Vulture has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

The modeled distribution response of Turkey Vulture to climate change is not uniform when different distribution and climate models are used. All iterations show shifts in Turkey Vulture with many predicting declines in Southern California and slight increases in foothill areas, but a great deal of uncertainty remains. The most important variables influencing current and projected distribution were vegetation (both distribution models), annual precipitation (Maxent distribution model), and annual mean temperature (GAM distribution model) (Stralberg and Jongsomjit 2008).

Turkey Vulture currently occurs in the lower elevations of the Sierra Nevada (Gaines 1992). If climate change causes the species' range to shift upward as is generally expected, there is much higher-altitude habitat within Sequoia and Kings Canyon as well as Yosemite. However, movement is likely largely dependent on the presence of sufficient carrion, as well as open-canopied plant communities. Even if climate change leads to shifts in Turkey Vulture's range, the ubiquity of the species across many climate zones suggests that future warming will not have major negative impacts on the species as a whole.

Altered Fire Regimes: There has been little study of fire's impact on Turkey Vulture. Where fires damage vulture breeding habitat there is likely to be short-term impacts on local populations, but to our knowledge fires do not play an important role in the increase or decline of Turkey Vulture populations.

Habitat Fragmentation or Loss: Turkey Vulture is found in numerous habitat types including within fragmented landscapes and habitats dominated by human land-use. The species appears to prefer mixed farmland and forest where both nesting and foraging opportunities are available (Kirk and Mossman 1998). In addition to this apparent tolerance of human land-use change, at least one study has shown a significant positive association or Turkey Vultures with urban areas (Rodríguez-Estrella 2007).

Invasive Species and Disease: Turkey Vultures are generally thought to be beneficial scavengers by consuming potentially infected carrion. Turkey Vultures may spread disease via body surfaces or in regurgitation to a small degree, but the destruction of many diseases and parasites in the species' digestive tract likely outweigh any negative impacts on other species caused by the minor spread of pathogens (Kirk and Mossman 1998).

Human Use Impacts: In the past Turkey Vultures have been trapped, shot, and poisoned because it was thought they might be a carrier of livestock disease. Such persecution has declined since the early 1900s and enactment of federal protections. However, uncommon cases of killing likely still occur in some areas (Kirk and Mossman 1998). Also of historical, but declining, significance is the species' exposure to DDT and its derivative DDE, which likely led to declines in reproductive success. Turkey Vultures may still accumulate DDT on Latin American wintering grounds (Wilbur 1978, Kirk and Mossman 1998).

Turkey Vultures are especially sensitive to lead poisoning from ingesting shot or bullet fragments in carrion. This threat is especially prevalent in late-fall and winter when individuals are most likely to encounter lead (Kirk and Mossman 1998, Clark and Scheuhammer 2003). Although hunting is not permitted within SIEN parks, individuals that move between the parks and surrounding areas may still be exposed to lead.

Collisions with human structures and especially vehicles are frequent. Other less common sources of mortality included electrocution by power lines, collisions with wind turbines, and collision with aircraft (Kirk and Mossman 1998, Smallwood et al. 2009). Of these conflicts collisions with motor vehicles is probably most relevant to SIEN parks.

Management Options and Conservation Opportunities
Different agricultural areas have taken steps to either control or enhance Turkey Vulture populations; the type of measures taken depended on differing views of the vulture as a pest or a beneficial species (Kirk and Mossman 1998).

The lack of major threats to the Turkey Vulture and the relative unimportance of SIEN parks to its conservation suggest that direct management of the species is not necessary at this time.

Varied Thrush – *Ixoreus naevius*

Migratory Status

Short-distance migrant (George 2000)

Residency and Breeding Status

Though numbers of birds are quite variable from year to year, Varied Thrush is a common winter resident at Sequoia and Kings Canyon (SEKI) National Parks and an uncommon resident at Yosemite (YOSE) National Park, but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 40. Breeding status and relative abundance of Varied Thrushes in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Winter	Non-Breeder	Common
Yosemite NP	Winter	Non-Breeder	Uncommon
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or wintering birds likely occur.

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Varied Thrush breeds from Alaska to the very northwestern tip of California, and winters along the Pacific coast to southern California. Wintering Varied Thrushes may occur in the Sierra Nevada in substantial numbers (Siegel and DeSante 1999) but are evidently more abundant at SEKI than YOSE, because SEKI has more of their favored low-elevation habitat.

Distribution and Habitat Associations

Varied Thrushes are generally restricted to dark, wet, older coastal forests for breeding, but winter in a broader range of habitat types (George 2000). During fall and winter, the species occurs in early to late-successional harvested stands (in northern California), and also can be found in riparian areas, parks, and gardens, probably due to the abundance of fruiting shrubs. Varied Thrush were not detected during breeding-season avian inventory surveys at any of the SIEN parks because this species generally occurs in the Sierra during winter only, and does not breed in the mountain range.

Elevational Distribution
Wintering Varied Thrush occur in the Sierra Nevada below approximately 1660 m (Gaines 1992).

Abundance, Trends and Demographic Data
Varied Thrush was rarely detected during Breeding Bird Surveys (BBS) and was not detected at SIEN MAPS stations, but these surveys are designed for breeding species and this thrush only winters in California. BBS data were too sparse to detect significant population trends in the Sierra or SIEN parks. No significant population trend was observed for overwintering populations in the U.S. from Christmas Bird Counts conducted over the past four decades (Audubon 2009). Recent range-wide BBS data (1980-1996) suggest a significant decline in the U.S. population (George 2000).

Table 2. Relative abundance and trends for Varied Thrush according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	12	0.50	-1.9	0.70
	1980-2007			+0.5	0.90
Sierra Nevada (BCR 15)	1966-2007	NA[1]	NA	NA	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Stressors
The Varied Thrush breeds in the northwestern continental U.S., Canada, and Alaska, and only winters in the Sierra Nevada. Christmas Bird Count (CBC) survey data suggest stable wintering populations of Varied Thrush over the past 40 years, but BBS data documented significant population declines from 1980-1996 on the breeding grounds. Further research on population trends is warranted for this species, as its range is relatively limited. Wet, old coastal forests used by Varied Thrush for breeding have been eliminated or fragmented by logging. However, this thrush uses a wider range of habitats during winter, including clearcuts, backyard gardens, and birdfeeders, and thus may be less sensitive to habitat alteration in the Sierra Nevada than on its more northern breeding grounds. Climate change may impact individuals on the breeding grounds if forests experience a drying trend. An increase in extent and frequency of high-intensity fire also may reduce habitat suitability for breeding Varied Thrush, but probably not wintering birds. Little is known about habitat requirements for migrating or overwintering individuals other than a need for fruits and berries and, in some areas, mast, especially acorns (George 2000); fire may enhance fruiting shrubs and positively affect Varied Thrush.

Climate Change: An analysis of CBC data suggests that the center of abundance of wintering Varied Thrush has significantly shifted northwards by 230 miles over the past 40 years (Audubon 2009), concurrent with increasing temperatures. Varied Thrush nest in wet, shady, old coniferous forests, so a general drying trend may adversely impact breeding habitat. In the Sierra this species overwinters in a variety of habitat types, and may be adaptable to a warming climate at least during the non-breeding season.

Altered Fire Regimes: Varied Thrush in the Rocky Mountains often were found in early and mid-successional burns and clearcuts (Hutto 1995), although more detailed data on use or selection of different burn intensities are not available. This species nests in shrubs within older forests (Shieck and Song 2006), thus lower-intensity fire or small patches of moderate and high-intensity fire that maintains the shrub layer within older forests may benefit this species. High-intensity fire may eliminate dark, dense, old forests required for breeding. Overwintering Varied Thrush eat soft (i.e., berries) and hard (i.e., acorns and nuts) mast. Burning is known to enhance berry-producing shrubs and mast species (Kay 2000), thus fire likely enhances food resources on the wintering grounds.

Habitat Fragmentation or Loss: Varied Thrush is sensitive to habitat degradation due to timber harvesting; detections decreased significantly in thinned compared to untreated stands in Douglas-fir forests in Oregon (Hayes et al. 2003). These birds are likely more sensitive to habitat alteration on the breeding grounds, thus habitat fragmentation or loss may not pose a significant threat in the Sierra Nevada.

Invasive Species and Disease: To our knowledge, invasive species and disease are not significant risks to Varied Thrushes in SIEN parks.

Human Use Impacts: The Varied Thrush is often killed in collisions with windows, and by predation from domestic cats (George 2000). However, human-use impacts do not pose a significant threat to the species in SIEN parks.

Management Options and Conservation Opportunities

Varied Thrushes are winter residents with high annual variation in population size in SIEN parks. Management for this species is not a high priority, particularly since it does not breed in the SIEN.

Vaux's Swift – *Chaetura vauxi*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Vaux's Swift is an uncommon breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks. The species is a rare visitor to Devils Postpile (DEPO) National Monument, where it is not known to breed (Table 1).

Table 41. Breeding status and relative abundance of Vaux's Swifts in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Uncommon
Yosemite NP	Summer	Regular Breeder	Uncommon
Devils Postpile NM	Migrant/Summer	Non-Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Species of Special Concern

Range Significance
Vaux's Swift is distributed along the pacific slope of western North America from British Columbia to California (Bull and Collins 2007). Most of California's Vaux's Swift population occurs within the coastal redwood forests (Bull and Collin's 2007) and Sierran populations are small, making SIEN parks relatively unimportant to the species' range (Siegel and DeSante 1999).

Distribution and Habitat Associations
Vaux's Swifts are most often observed near meadows on the western slope of the Sierra Nevada, but it has been suggested that this may be more an artifact of an abundance of birders than an indication of the swift's preference (Gaines 1998). It is more likely that the species favors mature forests where large nest snags are available as they do in other areas (Hunter 2008). Vaux's Swifts were detected anecdotally off-survey during all park inventories, but were not observed during point counts. Thus, park-specific habitat associations are not available.

Table 42. Number of Vaux's Swifts recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-census	NA[1]	NA
Yosemite NP	0	0	Detected off-census	NA	
Devils Postpile NM	0	0	Detected off-census	NA	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Vaux's Swift was not observed during park inventories; quantitative data on elevational distribution are not available for this species.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Vaux's Swifts are detected more often in California as a whole than in the Sierra Region (BCR 15). The species was not detected along BBS routes that pass through SEKI or YOSE. Within the Sierra Nevada, BBS data suggest a large and significant decline both in the long and short-term. However, this trend is based on low detection rates at only four survey routes and may not represent the entire Sierra Nevada region well (Table 3).

Table 43. Relative abundance and trends for Vaux's Swift according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	26	0.23	-2.0	0.30
	1980-2007			-2.6	0.27
Sierra Nevada (BCR 15)	1966-2007[1]	4	0.11	-8.6	0.18
	1980-2007[1]			-10.4	0.08
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Vaux's Swifts are not captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Loss of potential nest and roost sites is likely the greatest threat to Vaux's Swift (Hunter 2008) and may be contributing to their decline in unprotected Sierran forests. Climate change may also prove a substantial threat to the species and may lead to range contraction especially in the southern Sierra Nevada. To a lesser degree, Vaux's Swift is threatened by its use of potentially dangerous artificial roosting sites such as chimneys and by the application of pesticides and forestry management practices that control tree heartrot. Where the natural disturbances of fire and heartrot occur, Vaux's Swift benefits from the creation of new nesting and roosting sites.

Climate Change: Modeled distribution shifts of Vaux's Swift predict range contractions across California (Stralberg and Jongsomjit 2008). The most prominent decreases in occurrence are shown within the already limited Sierran distribution. The most important variables influencing current and projected distribution were vegetation and precipitation seasonality (Maxent distribution model) (Stralberg and Jongsomjit 2008).

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Vaux's Swift received a sensitivity score of 48.98 (UW 2010), suggesting moderate sensitivity to the threat. Certainty of results was listed as 37.50 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Vaux's Swift's sensitivity to climate change was its need for specialized habitat (UW 2010).

Although elevation ranges of Vaux's Swift are not available from park inventories, Gaines (1992) suggests that the species is found between 1200 and 2100 m along the western slope of the Sierra Nevada, allowing for some upward movement with climate change where old-growth forest habitat is available.

Altered Fire Regimes: Fire in mature forest stands creates large snags that are used by Vaux's Swift as nesting and roosting sites (NatureServe 2009). An increase in fire frequency in SIEN parks may benefit the species where new nesting and roosting sites are created.

Habitat Fragmentation or Loss: Loss of nest sites from logging of large snags along mid-elevation meadow edges is detrimental to Vaux's Swift (Siegel and DeSante 1999) and is especially problematic outside of SIEN parks where snags are removed during timber harvest operations (CalPIF 2002, Bull and Collins 2007). Furthermore, there is some evidence that forest fragmentation in Northern California has altered the species' distribution at a local scale, although further study is needed (NatureServe 2009).

Invasive Species and Disease: The presence of tree heartrot can create cavities used by Vaux's Swift and is beneficial to the species (NatureServe 2009). Management activities that reduce the prevalence of the disease could be detrimental to the species (Bull and Collins 2007).

Human Use Impacts: Pesticide use in agricultural areas may limit the availability of wind-borne insects on which Vaux's Swift relies for food (Siegel et al. 1999, Bull and Collins 2007). Grazing of meadows leading to their drying and disappearance may also threaten this species (Siegel and DeSante 1999). Vaux's Swift is known to occasionally use man-made roost sites such as chimneys or smokestacks. The sudden use of these structures to create heat has lead to large swift mortalities in the past and can be devastating to a local population (Hunter 2008). Such threats are of greater concern for populations beyond SIEN parks, but may affect park populations to a lesser degree.

Management Options and Conservation Opportunities

Steps that maintain large snags and old-growth trees for snag recruitment are recommended for the conservation of the Vaux's Swift (CalPIF 2002). While snag removal is most prevalent outside of protected areas, fire-control programs within the SIEN parks should avoid the destruction of potential nesting sites (Hunter 2008). Likewise management actions that reduce nesting and roosting site creation by preventing tree heartrot should be avoided (Bull and Collins 2007).

If swifts are found roosting in man-made structures within the SIEN parks, such as within chimneys, care should be taken to not inadvertently harm roosting birds during the breeding season when they are present. To prevent the use of such hazardous sites by Vaux's Swift, grills or other barriers can be installed (Hunter 2008), although such actions would also result in reduced roosting sites to a small degree (Bull and Collins 2007). Finally, the location and protection of Vaux's Swift nesting sites would benefit the species by promoting successful breeding (Hunter 2008) and managers could consider installation of nest boxes to supplement natural nesting sites if needed (Bull and Collins 2007).

Violet-green Swallow – *Tachycineta thalassina*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Violet-green Swallow is a fairly common summer resident at Devils Postpile National Monument (DEPO) as well as Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks. The species is a regular breeder at YOSE and SEKI, and a possible breeder at DEPO (Table 1).

Table 44. Breeding status and relative abundance of Violet-green Swallows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Fairly Common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Possible Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Violet-green Swallow breeds in montane conifer forest throughout most of western North America (Brown et al. 1992). The species' broad range suggests the Sierra Nevada and SIEN parks are not particularly important (Siegel and DeSante 1999). Nevertheless, Violet-green Swallow is the most abundant swallow species in the Sierra (Gaines 1992).

Distribution and Habitat Associations
Violet-green Swallows nest in tree cavities and on canyon walls, and are habit generalists in the Sierra Nevada (Gaines 1992). The species was detected low to moderate numbers (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and at one survey station at DEPO. Habitat associations are probably not very meaningful as birds are often seen flying above habitats to which they are not necessarily tied; the lack of associations indicated for YOSE reflects that the birds detected were explicitly classified in the field as 'flyovers' – not truly associated with the habitat in which the observer was working.

Table 45. Number of Violet-green Swallows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	9	10	NA[1]	NA	NA
Yosemite NP	20	69	Black Oak	0.10	
			Quaking Aspen	0.09	
			Montane/Alpine Riparian Shrub	0.07	
Devils Postpile NM	1	2	NA	NA	

[1]NA - Information not available due to insufficient data.

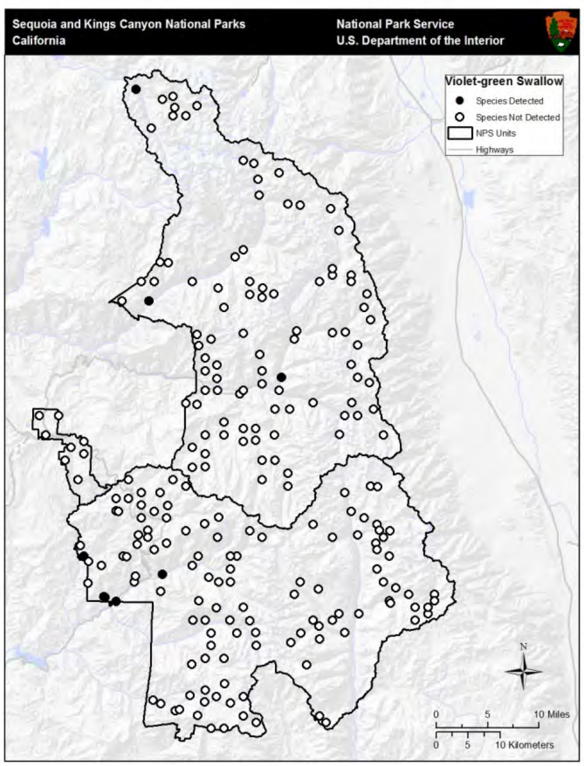

Figure 18. Bird survey transects where Violet-green Swallow was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

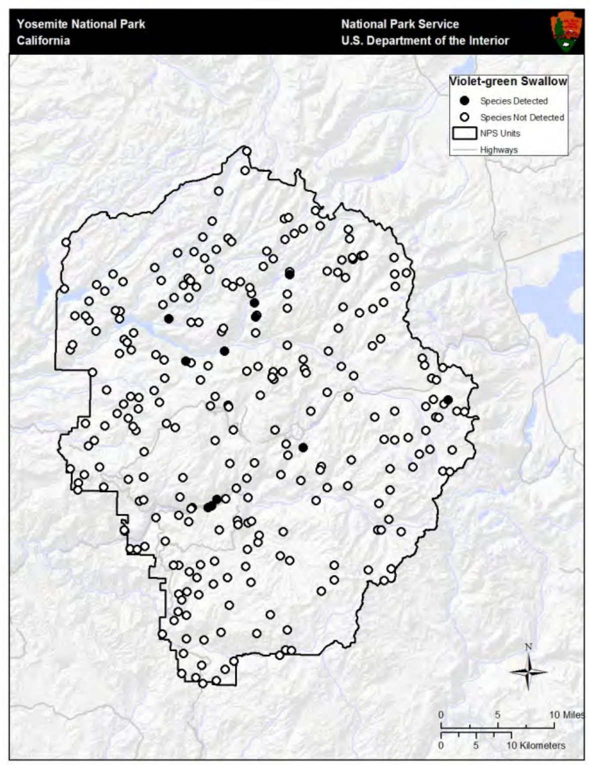

Figure 19. Bird survey transects where Violet-green Swallow was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Violet-green Swallow was observed from low- to middle-elevations at SEKI and from low- to high-elevations at YOSE (Figure 3). The mean elevation of observations of Violet-green Swallow in SEKI was 1093 m, with 95% of observations occurring between 518 and 2432 m. At YOSE, the mean elevation of observations was 2132 m with 95% of observations falling between 1195 and 2969 m (Siegel et al. 2011).

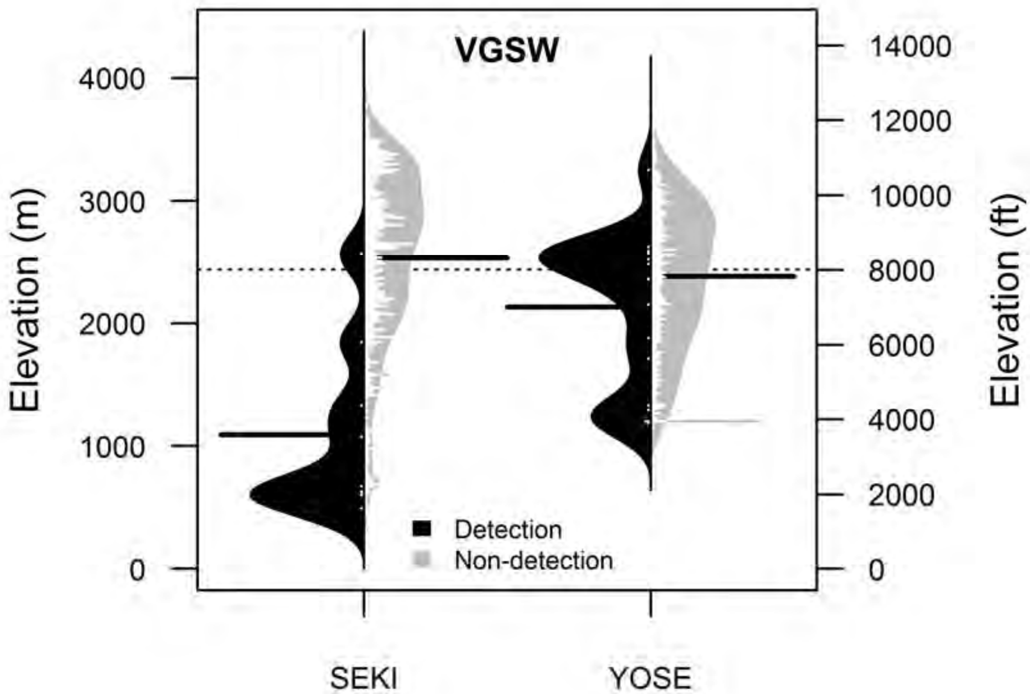

Figure 3. Elevational distributions of sites where Violet-green Swallows (VGSW) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Violet-green Swallows are detected less often in the Sierra Region (BCR 15) than in California as a whole, although not substantially. They were detected in low numbers on individual BBS routes at YOSE and Sequoia NP, but in very high numbers along the route in Kings Canyon NP. A significant negative trend was observed in California as a whole during both 1966-2007 and 1980-2007 and 1980-2007 (Table 3).

Table 46. Relative abundance and trends for Violet-green Swallow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	134	3.70	-2.2	0.01
	1980-2007			-3.6	0.01
Sierra Nevada (BCR 15)	1966-2007	20	2.81	-3.6	0.29
	1980-2007			-3.1	0.48
Route 14117 – Sequoia NP	1972-2005	1	0.67	-17.8	0.24
Route 14132 – Kings Canyon NP	1974-2005	1	25.50	+3.3	0.45
Route 14156 – Yosemite NP	1974-2007	1	1.04	+2.1	0.81

Violet-green Swallows are infrequently captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

The Violet-green Swallow occurs in open deciduous, coniferous, and mixed woodlands, nesting in abandoned woodpecker holes in tall snags or in crevices and crannies of cliff faces (Brown et al. 1992, Siegel and DeSante 1999). While abundant in the Sierra, the species has experienced significant population declines over the past 40 years (Table 3), potentially related to the widespread removal of snags and pesticide use that reduces up-mountain wind-drifted insects (Siegel and DeSante 1999). The restoration of natural fire regimes will strongly benefit Violet-green Swallows by increasing insect prey and creating a supply of dead trees that attracts primary cavity excavators such as woodpeckers. This habitat generalist may be resilient to the effects of climate change.

Climate Change: An analysis of shifts between the historical range of the Violet-green Swallow (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that the Violet-green Swallow has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades. This species occurs in a variety of woodlands and forests from low to high elevations; its generalist use of habitats suggests that it would not be highly vulnerable to the effects of climate change, as long temperature and precipitation changes do not adversely impact its insect prey base.

Altered Fire Regimes: *Tachycineta* species are known to use burned forests for 10 to 20 years after fires, likely in response to improved conditions for aerial foraging following decreases in canopy cover and increases in flying arthropods associated with shrub regrowth (Kotliar et al. 2007). Vegetation changes following fire likely benefits the Violet-green Swallow in oak woodlands (Purcell and Stephens 2005). Swallows (Tree and Violet-green were pooled) were only detected in burned habitats, especially repeat-burned, in conifer forests in southwestern Oregon (Fontaine et al. 2009). Violet-green Swallows were twice as abundant in burned compared to unburned forests in the southern Sierra (Siegel and Wilkerson 2005). An increase in extent and frequency of high-intensity fire in SIEN parks is likely to enhance foraging and nesting habitat for the Violet-green Swallow.

Habitat Fragmentation or Loss: Forestry practices that remove snags could adversely impact Violet-green Swallows by eliminating nest cavity sites. Densities of swallows (both Tree and Violet-green) did not differ among different levels of post-fire salvage logging that retained some dead trees (Cahall and Hayes 2009), suggesting that retention of at least some snags may ameliorate the effects of logging on presence of this swallow. However, Cahall and Hayes (2009) did not examine impacts on breeding. Nesting Tree Swallows were significantly reduced in salvage-logged stands in Montana (Hutto and Gallo 2006), suggesting that nesting but perhaps not presence of Violet-green Swallows is negatively impacted by logging.

The Violet-green Swallow's tolerance for human-altered landscapes and its ability to nest both in remote cliffs and near human habitation (including in nest boxes) may lessen harmful impacts of habitat fragmentation and loss due to cutting of nest trees (Brown et al. 1992). Regardless, impacts such as salvage logging are not a threat in SIEN parks.

Invasive Species and Disease: European Starlings were introduced to New York City in 1890 and by the middle of the 20th century had spread across much of North America with the exception of Mexico. As a cavity nester, the Tree Swallow may be vulnerable to nest usurpation by European Starlings, but the extent of starling impacts on this swallow in SIEN parks is unknown.

Human Use Impacts: There are few if any human-use impacts on Violet-green Swallows in SIEN parks.

Management Options and Conservation Opportunities
The most important things park managers can do to protect Violet-green Swallow populations in the parks are to maintain old trees with natural cavities and woodpecker holes and to restore the natural fire regimes.

Warbling Vireo – *Vireo gilvus*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Warbling Vireo is a common breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and Devils Postpile (DEPO) National Monument (Table 1).

Table 47. Breeding status and relative abundance of Warbling Vireos in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Common
Yosemite NP	Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S4 - Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Warbling Vireo is distributed over much of North America, including the mountainous regions of California (Gardali and Ballard 2000). Populations of the species are large within the Sierra Nevada, but likely smaller than in other regions of California (Siegel and DeSante 1999).

Distribution and Habitat Associations
Warbling Vireos can be found in virtually all mid-elevation forests within the western slope of the Sierra Nevada (Gaines 1992). Warbling Vireos were detected in moderate to high densities (Table 2) along many survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were observed 15 times during the DEPO survey. Park inventories show highest associations with undifferentiated riparian habitats and Quaking Aspen Forests within SEKI and YOSE respectively (Table 2).

Table 48. Number of Warbling Vireos recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	224	286	Undifferentiated Riparian	1.53	1.58 (0.90-2.74)
			Aspen Forest	0.58	0.48 (0.23-1.03)
			Western Juniper Woodland	0.37	0.24 (0.07-0.85)
			White Fir/Sugar Pine Forest	0.29	0.30 (0.20-0.46)
			Red Fir/White Fir Forest	0.28	0.30 (0.19-0.49)
Yosemite NP	196	265	Quaking Aspen	0.38	
			Montane Meadow	0.31	
			Black Oak	0.23	
Devils Postpile NM	14	15	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

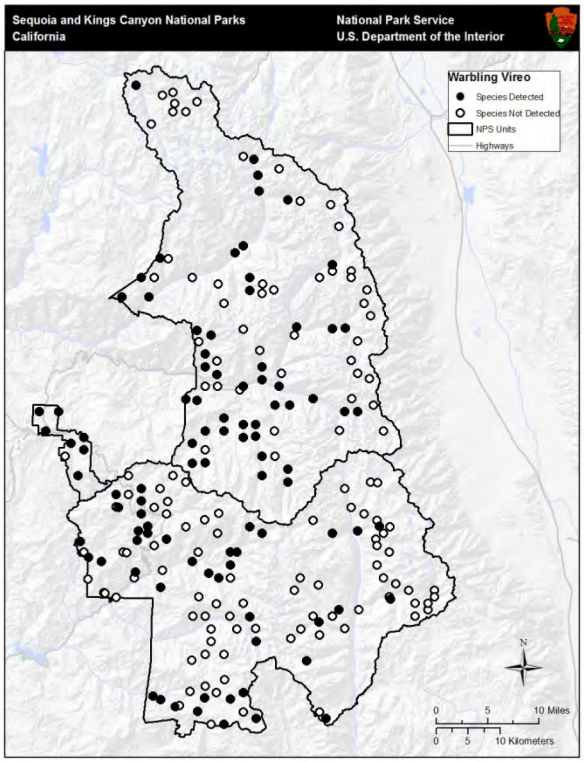

Figure 20. Bird survey transects where Warbling Vireo was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

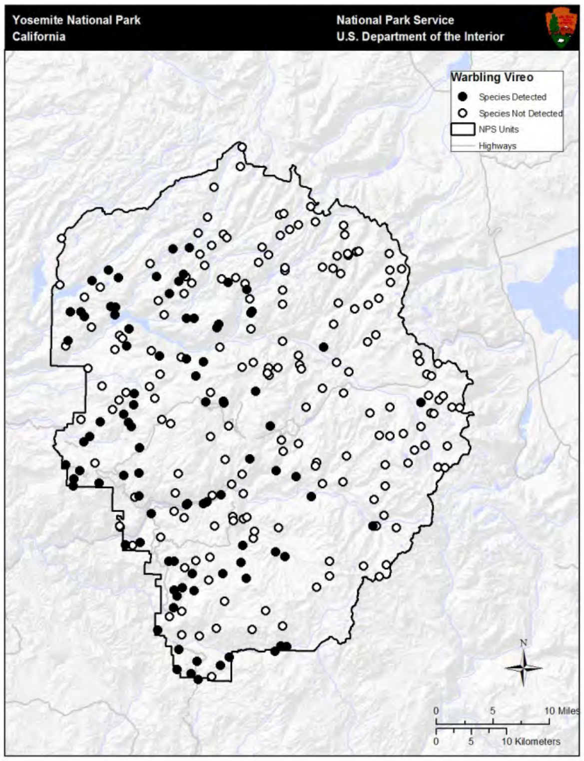

Figure 21. Bird survey transects where Warbling Vireo was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Warbling Vireo was observed within the lower to middle-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Warbling Vireo in SEKI was 2232 m, with 95% of observations occurring between 1121 and 2963 m. At YOSE, the mean elevation of observations was 1912 m with 95% of observations falling between 1200 and 2640 m (Siegel et al. 2011).

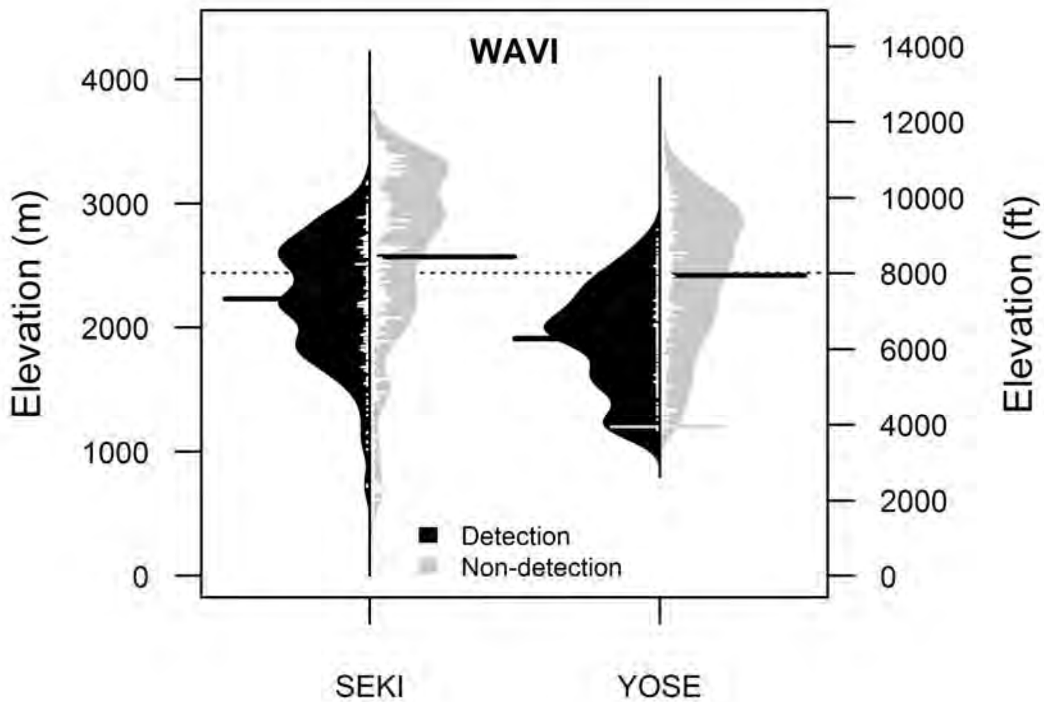

Figure 3. Elevational distributions of sites where Warbling Vireos (WAVI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Warbling Vireos are detected more often in the Sierra Region (BCR 15) than in California as a whole. They were detected in low numbers on individual BBS routes at SEKI, but in high numbers along the YOSE route. A significant negative trend was observed across California during the short and long-terms, but a significant positive trend was observed on the Kings Canyon route during 1974-2005 (Table 3).

Table 49. Relative abundance and trends for Warbling Vireo according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	127	3.78	-1.4	0.00
	1980-2007			-2.5	0.00
Sierra Nevada (BCR 15)	1966-2007	33	6.59	-0.2	0.87
	1980-2007			-2.0	0.15
Route 14117 – Sequoia NP	1972-2005	1	0.81	+67.5	0.11
Route 14132 – Kings Canyon NP	1974-2005	1	1.90	+17.2	0.03
Route 14156 – Yosemite NP	1974-2007	1	19.92	+1.9	0.38

MAPS data from Kings Canyon NP show a significant positive population trend between 1991 and 2009, while data from YOSE show a significant negative trend between 1993 and 2009. These trends are in spite of lower productivity at Kings Canyon stations than those at YOSE. Adult survival at the two parks' MAPS stations is similar. MAPS data at DEPO do not show any significant trends, but high capture rates suggest the species is abundant where the station is located (Table 4).

Table 50. Population trends, productivity, trends, and survival estimates of Warbling Vireo at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	7.0	+9.96**	0.05	-0.35	0.444 (0.097)
Yosemite NP	1993-2009	12.7	-4.53***	0.31	+0.44	0.499 (0.045)
Devils Postpile NM	2002-2006	20.4	5.00	0.03	NA	NA[2]

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors
Most troubling for Warbling Vireo is a significant California-wide decline in recent years (Sauer et al. 2008). There are a number of factors, which could be contributing to this decline including increased frequency and intensity of fires in the Sierra Nevada, forestry practices that remove deciduous forest habitat and degrade riparian areas, parasitism by Brown-headed Cowbirds, collisions with telephone towers and exposure to pesticides and herbicides. Of these threats, only increased fires and to a lesser degree, cowbird parasitism, directly impact SIEN populations, although external threats may harm vireos within the parks indirectly. Finally, climate change does not appear to threaten Warbling Vireo as much as other species.

Climate Change: Modeled distribution shifts of Warbling Vireo do not predict major shifts in occurrence across California, with the exception of some decrease in foothill areas (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were distance to stream (both distribution models), precipitation of driest quarter (Maxent distribution model), and vegetation (GAM distribution model) (Stralberg and Jongsomjit 2008).

Warbling Vireos are found breeding at the lower to middle-elevations within SIEN parks (Figure 3). If climate change causes the species' range to shift upward as is generally expected of many species, there is much higher-altitude habitat for new colonization within SEKI and YOSE. However, it is important to note that even if Warbling Vireos are able shift their range in response to climate change, populations may suffer if the habitats they depend upon are not also able to shift upslope or are degraded due to climate warming.

Altered Fire Regimes: Studies have demonstrated that Warbling Vireo abundance is lower in burned sites vs. unburned sites (Dieni and Anderson 1999) and decreases as fire severity increases (Smucker et al. 2005, Kirkpatrick et al. 2006, Kotliar et al. 2007). Any potential increase in fire frequency and/or severity would be detrimental to Warbling Vireo within and beyond SIEN parks.

Habitat Fragmentation or Loss: Forestry practices that remove or limit deciduous trees and make forests more open, may threaten Warbling Vireo (Siegel and DeSante 1999). However, manual thinning of deciduous forests in British Columbia has led to an increase in Warbling Vireo abundance (Gardali and Ballard 2000). Degradation of riparian areas due to human use or encroachment of conifers following timber harvest is deleterious to Warbling Vireos outside of SIEN parks (Gardali and Ballard 2000).

Invasive Species and Disease: Although native to North America, Brown-headed Cowbirds have expanded their range since European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Warbling Vireos are susceptible to brood parasitism by Brown-headed Cowbirds (Siegel and DeSante 1999), but cowbird occurrence and parasitism rates within the SIEN parks has been found to be rare (Halterman et al. 1999). For example, during a 1995-96 study at SEKI, only 2-3% of passerine nests monitored were parasitized by cowbirds and out of the four Warbling Vireo nests monitored no parasitism was observed, although the outcome of three nests was unknown (Halterman and Laymon 2000).

Human Use Impacts: Pesticides and herbicides have been linked with reductions in populations of Warbling Vireos and collisions with television towers during migration can cause vireo deaths (Gardali and Ballard 2000). These threats may affect Warbling Vireos in other parts of California, but are not of great concern to SIEN populations of the species.

Management Options and Conservation Opportunities

A number of threats affect Warbling Vireos outside of park boundaries and could be mitigated through conservation actions in other parts of California. Efforts that would reduce degradation of deciduous forest and riparian areas, reduce pesticides and herbicide use and make television towers more visible to migrating vireos would all benefit the species. Within SIEN parks, managers could potentially aid Warbling Vireos by reducing fire frequency and intensity, maintaining suitable habitat, and limiting factors that encourage Brown-headed Cowbirds.

Fire suppression would aid Warbling Vireos in the short-term, but prescribed burns outside of breeding season and manual removal of fuels would likely be a more sustained strategy for reducing fire in vireo habitat. A study of nesting-site selection suggests that Warbling Vireos would benefit from management actions that encouraged retention and recruitment of California Black Oaks at lower elevations and maintenance of forest stands with large trees, dense foliage, and semi-open canopy at all elevations (Purcell 2007). A previous assessment of cowbird pressure in SEKI and YOSE indicates that a cowbird trapping program is not warranted (Halterman et al. 1999). However, if future studies show an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Western Bluebird – *Sialia mexicana*

Migratory Status
Resident/short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Western Bluebird is a locally fairly summer and year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 51. Breeding status and relative abundance of Western Bluebirds in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Locally Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Locally Fairly Common
Devils Postpile NM	Not recorded[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds may occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Western Bluebird's range is patchy throughout western North America from southern British Columbia to northern Baja California and through mainland Mexico; the species is absent from the Great Basin (Guinan et al. 2008). The subspecies *occidentalis* is only fairly common in the Sierra, thus the mountain range may be of relatively low importance to this species (Siegel et al. 1999).

Distribution and Habitat Associations
Western Bluebirds breed in open coniferous and deciduous woodlands, wooded riparian areas, grasslands, farmland, and burned, lightly logged, and edge areas with scattered trees, snags, or other suitable nest and perch sites (Guinan et al. 2008). In the Sierra, this cavity nester favors open stands of oak or mixed-oak coniferous woodland interspersed with open grassy meadows, as well as open or semi-open Ponderosa Pine or Mixed Conifer forests, open riparian habitat with scattered trees (Siegel and DeSante 1999), as well as recently burned stands of conifer forest (Siegel et al. 2010). Western Bluebirds were detected in low numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory projects at SEKI and YOSE but were not

observed in DEPO. Park inventories show highest associations with Blue Oak Woodland within SEKI and Quaking Aspen in YOSE (Table 2).

Table 52. Number of Western Bluebirds recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	6	8	Blue Oak Woodland	0.34	NA[1]
			Giant Sequoia Forest	0.03	NA
			Red Fir/White Fir Forest	0.01	NA
Yosemite NP	20	27	Quaking Aspen	0.19	
			Mixed Chaparral	0.04	
			Montane Chaparral	0.03	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

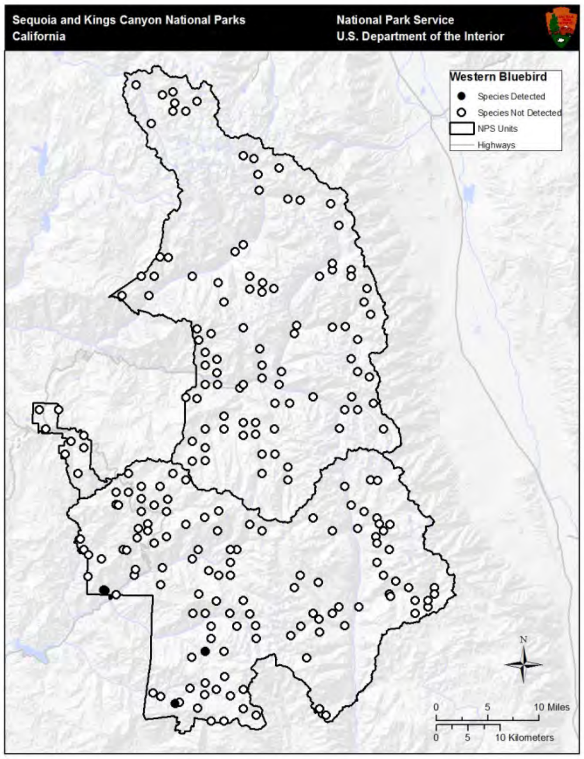

Figure 22. Bird survey transects where Western Bluebird was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

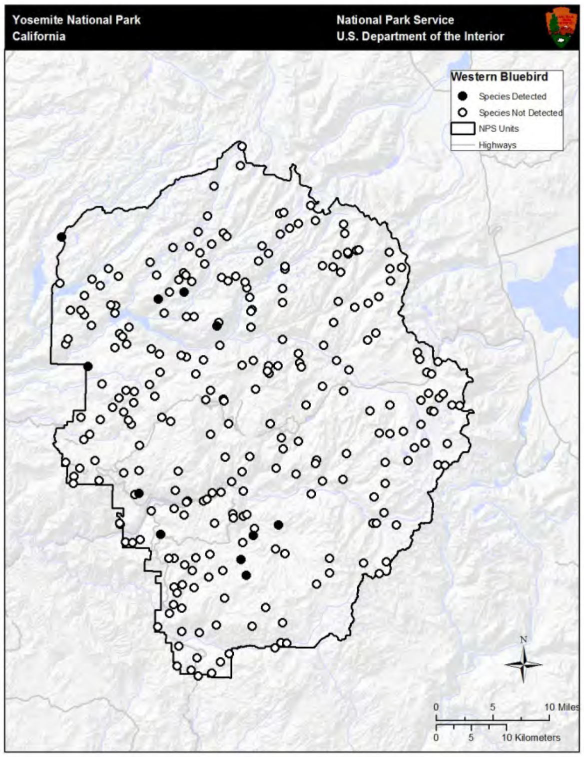

Figure 23. Bird survey transects where Western Bluebird was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Western Bluebird was detected at low to middle elevations in SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Western Bluebirds in SEKI was 1607 m, with 95% of observations occurring between 618 and 2428 m. In YOSE, the mean elevation of observations was 2259 m with 95% of observations falling between 1773 and 2621 m (Siegel et al. 2011).

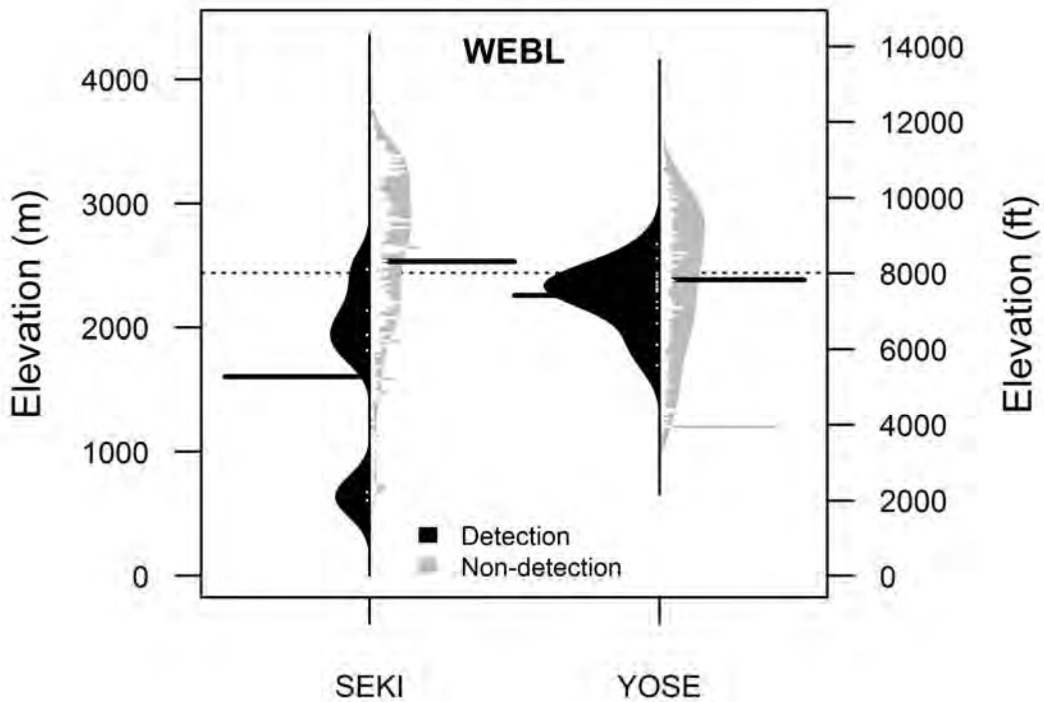

Figure 3. Elevational distributions of sites where Western Bluebird (WEBL) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Western Bluebirds are less abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). In the SIEN parks, they were detected in the greatest numbers along the BBS route at Sequoia NP. A significant positive trend of 8.2% growth per year was reported for the Sierra Nevada region from 1980-2007 (Table 3).

Table 53. Relative abundance and trends for Western Bluebird according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	129	2.57	-0.2	0.74
	1980-2007			-0.2	0.80
Sierra Nevada (BCR 15)	1966-2007	22	1.48	+5.6	0.11
	1980-2007			+8.2	0.04
Route 14117 – Sequoia NP	1972-2005	1	1.88	+4.2	0.86
Route 14132 – Kings Canyon NP	1974-2005	1	0.30	+14.8	0.22
Route 14156 – Yosemite NP	1974-2007	1	0.50	+7.2	0.46

Too few Western Bluebirds were captured in mist nets at the SIEN MAPS stations to estimate population and reproductive trends within the parks (Table 4).

Table 54. Population trends, productivity, trends, and survival estimates of Western Bluebird at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.0	NA[2]	NA	NA	NA
Yosemite NP	1993-2009	0.4	NA	0.07	NA	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Western Bluebirds may be adversely impacted by poor regeneration of Blue Oaks in California, potentially due to cattle grazing and altered fire regimes. Climate change may increase the extent of the bluebird's oak woodland habitat in the SIEN parks. Impacts of Brown-headed Cowbirds and European Starlings should be assessed to determine whether active management is necessary. The restoration of natural fire regimes, including patches of high-intensity fire in conifer forests and moderately frequent fire in oak woodlands, should strongly favor the Western Bluebird.

Climate Change: An analysis of shifts between the historical range of Western Bluebird (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation and temperature changes by shifting its range to follow its climatic niche (Tingley et al. 2009). Similarly, an analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Western Bluebird has significantly shifted more than 93 miles inland throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). These observed shifts provide some evidence that the species may have already responded to climate change and will likely continue to shift its range in the coming decades. Modeled future distribution shifts of Western Bluebirds predict an overall decrease in distribution and a range contraction throughout most of California, particularly in southern California and the lower slopes of the Sierra Nevada (including the SIEN parks), although higher elevations within the species' current range in the Sierra have an increased probability of occurrence (Stralberg and Jongsomjit 2008). Vegetation was the most important variable influencing current and projected distribution in both the Maxent and GAM distribution models.

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. In addition to evaluating sensitivity, vulnerability assessments also incorporate climate change predictions, providing modeled, spatially explicit estimates of vulnerability. An assessment of vulnerability of Western Bluebird in the Willamette Valley, Oregon gave this species a vulnerability score of 5 (a score of 5 representing least vulnerable), indicating low vulnerability to adverse impacts of climate change at least within this region (Steel et al. 2010).

Western Bluebirds currently breed in oak woodlands, Quaking Aspen, and open coniferous forests at low to middle elevations of the Sierra Nevada and may colonize higher elevations if these habitat types expand uphill or are readily available at higher elevations. If climate change causes the species' range to shift upslope as is generally expected, there is likely to be adequate oak woodlands habitat in SEKI and YOSE.

Altered Fire Regimes: Fire, set by lightning or Native Americans, historically has been an important component of oak woodlands in California. The decimation of the Native American population and the introduction of livestock and associated non-native annual grasses by European settlers altered fire regimes of this habitat type (Purcell and Stephens 2005). European settlers burned extensively to convert shrublands and woodlands to grasslands for livestock. Oak recruitment increased in some areas coincident with European settlement due to fire, but many areas of Blue Oak woodlands were entirely cleared and permanently converted to annual grassland (Purcell and Stephens 2005).

Although Blue Oak seedlings may be killed by frequent fire, seedlings and saplings are capable of resprouting after fire, and fire increases acorn and leaf production by reducing competition with understory vegetation, which in turn improves habitat for Western Bluebirds (Purcell and Stephens 2005). Western Bluebirds are likely to benefit from moderately frequent fire in oak woodlands in SIEN parks (Purcell et al. 2005).

In conifer forests, the Western Bluebird also responds favorably to fire. The species was uncommon in all but the higher burn intensities in New Mexico's forests (Kotliar et al. 2007), were only detected in a 9-year old burned site in the northern Sierra Nevada (Burnett et al. 2010), and preferred recently burned forests in the southern Sierra (Siegel and Wilkerson 2005). Thus, an increase in frequency and extent of high-intensity fire will strongly benefit this open-forest cavity nester.

Habitat Fragmentation or Loss: Western Bluebird was most often detected in Blue Oak Woodlands in the SIEN parks (Table 2). The majority of oak woodlands in California are privately owned and receive little management or regulatory protection. More recently, urban development has become the dominant reason for loss of oak woodlands. Western Bluebirds can adapt to the presence of humans, and readily utilize nest boxes for breeding. However, some natural habitat is required for the species to persist in an area. Extensive clearing of oak woodlands for urban development, extensive logging of coniferous forests, and fire suppression are major threats to Western Bluebirds in lower-elevation foothill habitats, but do not impact the species in the SIEN parks.

In pine-dominated habitats in eastern Washington, Western Bluebirds responded positively to thinning (Gaines et al. 2007). Western Bluebird nest densities were similar in logged and unlogged burned conifer forests in Idaho (Saab et al. 2007), but the species did not nest in post-fire salvage logged stands in the Rocky Mountains (Hutto and Gallo 2006). Thus, post-fire logging may adversely impact this species depending upon how it is conducted.

Invasive Species and Disease: European Starlings were introduced to New York City in 1890 and by the middle of the 20th century had spread across much of North America with the exception of Mexico. Western Bluebirds are susceptible to nest usurpation by starlings (Siegel and DeSante 1999), but extent of competition with starling in SIEN parks is unknown.

Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Western Bluebirds are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see species account for Brown-headed Cowbird in this report).

West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). The virus has caused mortality in many native birds. In 2009, West Nile Virus caused at least 2 Western Bluebird deaths in California (CDPU 2010).

Human Use Impacts: Fuelwood and timber harvesting can adversely impact Western Bluebirds by eliminating nest trees, but are not issues in SIEN parks.

A major threat to Blue Oak woodlands in California is poor regeneration over the past century, due to livestock grazing and associated invasion of non-native annual grasses (Standiford et al. 1997, CPIF 2000, Purcell and Stephens 2005). Packstock grazing within the SIEN parks could adversely impact habitat for this species if such grazing were reducing oak recruitment. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, impacts from packstock grazing are likely relatively small and localized.

Oak woodlands in north-central coastal California have been falling victim to Sudden Oak Death (SOD), a disease caused by a previously unknown species of *Phytopthora*, a fungus-like organism that has killed large numbers of oaks (coast live oak and black oak) and tanoaks. SOD was probably introduced into California from exotic plants in nursery stock. The disease has not yet been recorded in the SIEN parks, but could pose a threat to Western Bluebirds and other oak-habitat species if it reaches those regions of the Sierra Nevada.

Management Options and Conservation Opportunities

Protection of dead oaks and softwood trees is one of the most important actions park managers can take to benefit Western Bluebird populations in SIEN parks. Bluebirds will benefit from ecosystem management that retains the after-effects of high-intensity fire on the landscape. Park managers also can monitor the effects of European Starlings and Brown-headed Cowbirds, and implement a removal program for these invasive species if monitoring indicates substantial conflict with bluebirds. Managers should monitor and evaluate the advanced regeneration cohort in oak woodlands. Effects of packstock grazing on Blue Oak and other oak woodland habitats should be monitored and, if necessary, minimized. The parks should train staff to recognize oak diseases such as SOD, and preventative measures including quarantine of the area could be immediately implemented if SOD is identified. Management guidelines and regulations pertaining to SOD can be found at the California Oak Mortality Task Force website (http://www.suddenoakdeath.org/). Park staff should collect and test any bird carcasses for West Nile Virus.

Western Kingbird – *Tyrannus verticalis*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Western Kingbird is a locally uncommon, possible breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks. The species was not reported at Devils Postpile (DEPO) National Monument (Table 1).

Table 55. Breeding status and relative abundance of Western Kingbirds in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Summer	Possible Breeder	Locally Uncommon
Yosemite NP	Migrant/Summer	Possible Breeder	Locally Uncommon
Devils Postpile NM	Not reported[2]		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported by Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Western Kingbird is distributed over much the western and mid-western U.S. including throughout much of California (Gamble and Bergin 1996). However, the species' breeding range is largely limited to the lower foothills of the western slope of the Sierra Nevada (Siegel and DeSante 1999) making SIEN parks largely unimportant to breeding populations of Western Kingbird.

Distribution and Habitat Associations
Western Kingbirds are found most often in open terrain with scattered trees or human-made features suitable as perches such as fence posts and telephone poles (Gaines 1992). Western Kingbirds were detected only three times (Table 2; Figure 1) during avian inventory surveys at SEKI. At YOSE the species was only observed anecdotally, away from survey transects and no observations were made during the DEPO survey. Due to the limited number of observations, habitat associations are not available from inventory surveys.

Table 56. Number of Western Kingbirds recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	3	3	NA[1]	NA	NA
Yosemite NP	0	0	Detected off-census	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

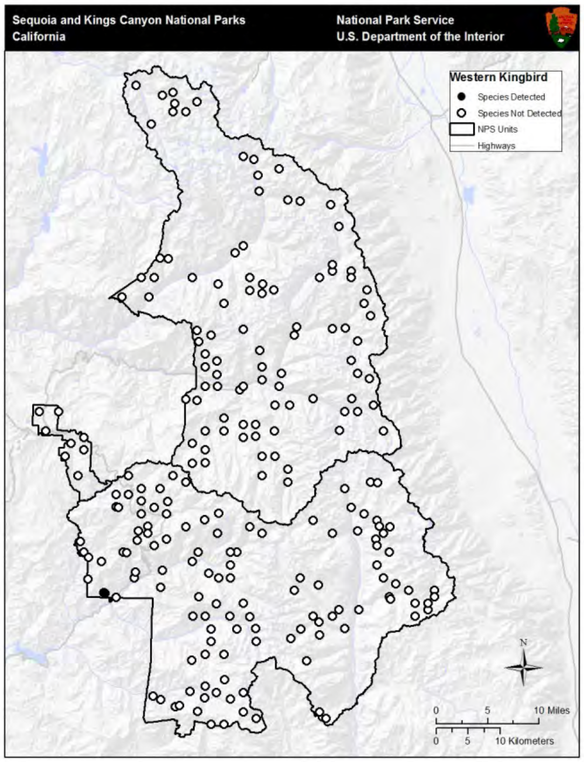

Figure 24. Bird survey transects where Western Kingbird was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

Elevational Distribution
Western Kingbird was observed within the lower-elevations at SEKI only during avian inventory surveys (Figure 2). The mean elevation of observations of Western Kingbird in SEKI was 989 m (Siegel et al. 2011).

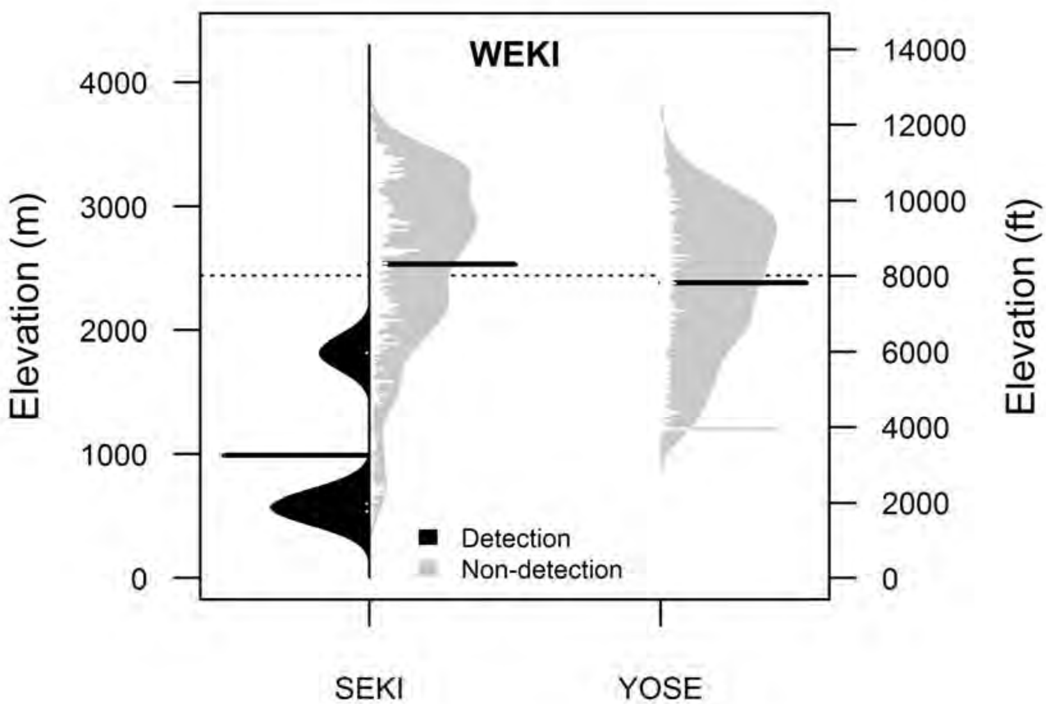

Figure 2. Elevational distributions of sites where Western Kingbirds (WEKI) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data
Breeding Bird Survey (BBS) data indicate Western Kingbirds are detected in greater numbers in California as a whole than in the Sierra Region (BCR 15). They were detected in low numbers on individual BBS routes at YOSE and Kings Canyon NP, but higher numbers along the Sequoia NP route, which begins below the park boundary. No significant trends were observed along any of the routes and regions of interest (Table 3).

Table 57. Relative abundance and trends for Western Kingbird according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	163	8.91	+0.5	0.27
	1980-2007			+0.6	0.21
Sierra Nevada (BCR 15)	1966-2007	9	0.77	+5.0	0.28
	1980-2007			-0.7	0.89
Route 14117 – Sequoia NP	1972-2005	1	5.94	-0.9	0.93
Route 14132 – Kings Canyon NP	1974-2005	1	0.30	-9.1	0.56
Route 14156 – Yosemite NP	1974-2007	1	0.04	NA[1]	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Due to the rarity of Western Kingbird in Kings Canyon NP and Yosemite NP, no MAPS data are available for this species.

Stressors

The Western Kingbird is nearly peripheral to SIEN parks, with limited occasional or perhaps regular breeding possible but not confirmed in the lowest-elevation portions of SEKI and YOSE. BBS data (Table 3) indicate that the species is stable across California and, where it occurs, within the Sierra Nevada. There do not appear to be any major threats to the species and in fact, the Western Kingbird has likely expanded its range with past human alterations to the landscape. However, where development destroys riparian and oak savannah habitat, the populations of the kingbird will suffer locally. Other potential threats to Western Kingbirds are exposure to agricultural pesticides through their prey species on both their breeding and wintering grounds as well as exposure to West Nile Virus. Fires likely help the species and the effects of climate change on the Western Kingbird is largely unknown. However, potential range shifts may result in greater occurrences of the species within SIEN parks in the future.

Climate Change: An analysis of shifts between the historical range of Western Kingbird (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Western Kingbird has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Western Kingbirds are found more in the foothills of the Sierra Nevada than in the mountain range itself (Gaines 1992). If climate change causes the species' range to shift upward as is generally expected of many species, the SIEN parks may begin to see higher occurrences of this flycatcher species in the future.

Altered Fire Regimes: A study of California's oak woodlands and the effects of fire on vegetation structure and woodland birds predicted that populations of Western Kingbirds would increase in abundance following fire (Purcell and Stephens 2005). Thus, if fire frequency increases in oak woodlands, including those found at the lower elevations of SIEN parks, populations of Western Kingbirds might benefit.

Habitat Fragmentation or Loss: Western Kingbird has largely benefited from habitat alterations by humans and has subsequently expanded its range (Gamble and Bergin 1996). However, residential and agricultural development, especially where riparian and oak savannah habitats are destroyed, would be detrimental to the species (Siegel and DeSante 1999).

Invasive Species and Disease: There do not appear to be any major threats of invasive species or disease to Western Kingbird. However, in 2009 there was one documented case of a dead Western Kingbird infected with West Nile Virus (CDPH 2010) indicating the disease may pose a minor threat where it is prevalent.

Human Use Impacts: Due to Western Kingbird's association with agricultural fields they are exposed to pesticides via their insect prey. Pesticide exposure is a potential threat to the species both in North America and on its wintering grounds (Gamble and Bergin 1996; Siegel and DeSante 1999). Pesticide use is not a concern within SIEN parks, but any exposure to pesticides that causes population declines could limit the number of kingbirds passing through the parks.

Management Options and Conservation Opportunities

Due to the expansion of populations of Western Kingbirds, intensive management of the species is not necessary (Gamble and Bergin 1996). However, protection of riparian areas where the species breeds and if needed, the restoration of shade trees in savannah areas would help local breeding populations (Gamble and Bergin 1996).

Western Meadowlark – *Sturnella neglecta*

Migratory Status
Short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Western Meadowlark is a locally uncommon summer resident and occasional breeder at Yosemite (YOSE) National Park; a rare year-round resident and possible breeder at Sequoia and Kings Canyon (SEKI) National Parks; and a rare summertime resident and possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 58. Breeding status and relative abundance of Western Meadowlarks in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Year-round	Possible Breeder	Rare
Yosemite NP	Migrant/Summer	Occasional Breeder	Locally Uncommon
Devils Postpile NM	Migrant/Summer	Possible Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Western Meadowlark inhabits natural and planted grasslands from the northern Great Plains to the Pacific Ocean, breeding as far east as west-central Texas, southeast Kansas, northwest Missouri, central Illinois, northern Indiana, northwest Ohio and extreme northwest New York (Davis and Lanyon 2008). The Sierra Nevada does not comprise an important part of the Western Meadowlark's range (Siegel and DeSante 1999).

Distribution and Habitat Associations
Western Meadowlarks prefer drier portions of large meadows, flat or rolling grasslands, and pasturelands (Siegel and DeSante 1999). Western Meadowlarks were rarely detected (Table 2) along survey transects in YOSE (Figure 1) and were not detected at SEKI or DEPO during recent avian inventory projects. The two detections in YOSE were in Ponderosa Pine, but the species is sometimes also detected at lower-elevation meadows in the park.

Table 59. Number of Western Meadowlarks recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA[1]	NA
Yosemite NP	2	2	Ponderosa Pine	0.01	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

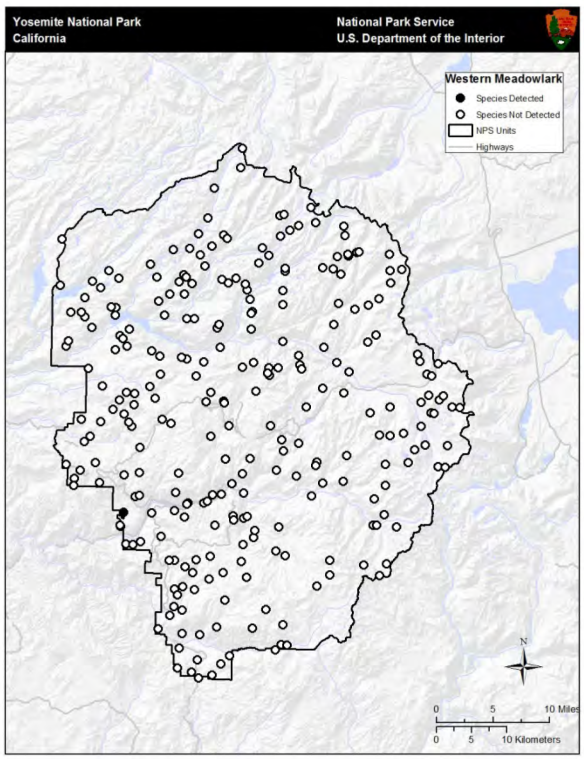

Figure 1. Bird survey transects where Western Meadowlark was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Two Western Meadowlarks were detected at 1323 m in elevation in YOSE, and was not located at SEKI during recent avian inventory surveys (Figure 2; Siegel et al. 2011).

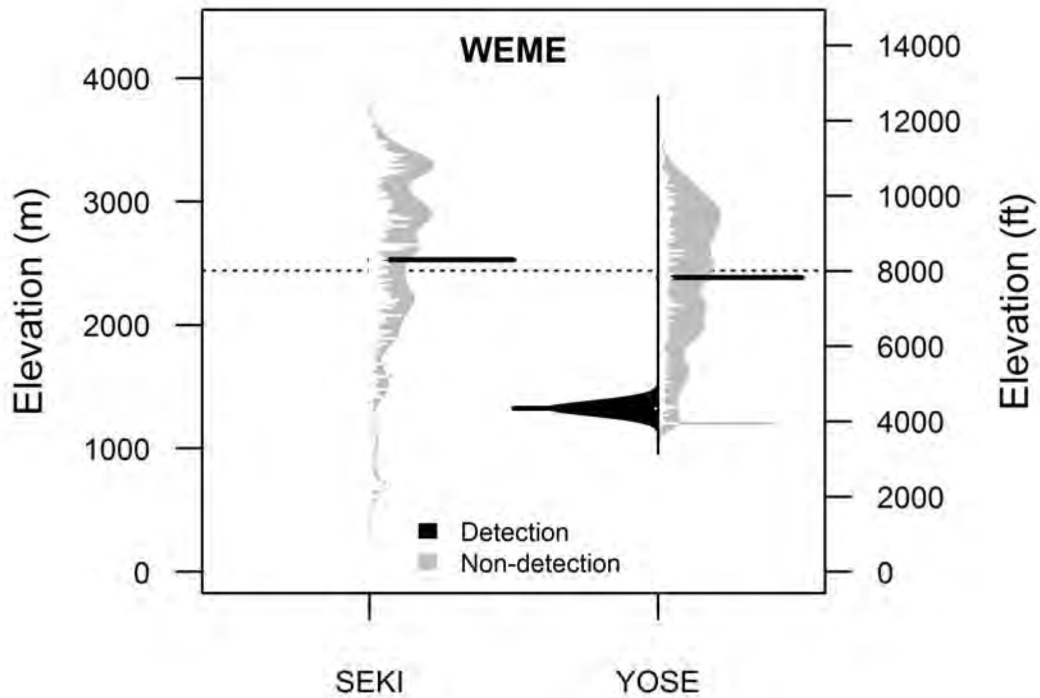

Figure 2. Elevational distributions of sites where Western Meadowlark (WEME) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) survey data indicate Western Meadowlarks were far more abundant in California overall compared with the Sierra Region (BCR15; Table 3). Meadowlarks experienced small but significant population declines in California from 1966-2007 and 1980-2007 (Table 3). Non-significant population trends were recorded along the route in Sequoia (positive) and Yosemite (negative) NPs.

Table 60. Relative abundance and trends for Western Meadowlark according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	171	21.55	-1.8	0.00
	1980-2007			-2.2	0.00
Sierra Nevada (BCR 15)	1966-2007	15	4.48	-1.4	0.31
	1980-2007			-1.7	0.14
Route 14117 – Sequoia NP	1972-2005	1	0.69	+36.8	0.36
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	0.42	-8.0	0.43

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Western Meadowlarks were not frequently captured in mist nets at SIEN MAPS stations; thus data on productivity and survival within the parks are not available.

Stressors

Western Meadowlarks inhabit a wide range of grassland habitats but are most common in native grasslands and lands converted from cropland to perennial grassland cover (Davis and Lanyon 2008). Western Meadowlarks prefer grasses and forbs of intermediate height and density, thus management that yields tall, dense vegetation or short, sparse vegetation will adversely affect populations (Davis and Lanyon 2008).

Climate Change: An analysis of Christmas Bird Count (CBC) data indicates the center of abundance of Western Meadowlark has shifted significantly south in latitude by over 25 miles and towards the coast by 42 miles throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). The southward shift in wintering birds is opposite what would be expected if the species were responding to a warming climate, however the observed shift was not large. An analysis of shifts between the historical range of Western Meadowlark (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation change (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift in the Sierra provides evidence that the Western Meadowlark has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Modeled distribution shifts of Western Meadowlark predict significant range contractions in the desert regions of southeastern California and the eastern slope of the Sierra, as well as a much lower probability of occurrence in the Central Valley (Stralberg and Jongsomjit 2008). However, the projected future distribution is likely to increase in SIEN parks. The most important variables influencing current and projected distribution were vegetation, distance to stream and annual precipitation (Maxent distribution model), and vegetation and mean diurnal range (GAM distribution model).

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. In addition to evaluating sensitivity, vulnerability assessments also incorporate climate change predictions, providing modeled, spatially explicit estimates of vulnerability. An assessment of vulnerability of Western Meadowlarks in the Willamette Valley, Oregon gave the species a vulnerability score of 5 (a score of 5 representing least vulnerable), indicating low vulnerability to climate change at least within this region (Steel et al. 2010).

Western Meadowlarks were rarely detected in SIEN parks (Table 2). If climate change causes the meadowlark's range to move upslope in the Sierra Nevada as is generally expected, the species may be more frequently seen in the SIEN parks, but only if their open grassland habitat types expand uphill as well.

Altered Fire Regimes: Fire in the SIEN parks may benefit Western Meadowlarks by maintaining open grassy habitats favored by the species, particularly if fire occurs at moderate frequencies that keep grasses and forbs at an intermediate height (Davis and Layton 2008).

Habitat Fragmentation or Loss: Conversion of grassland habitat to cropland and development poses a significant threat to Western Meadowlark populations (Davis and Layton 2008). Habitat fragmentation by grassland conversions is not a significant risk to meadowlarks in protected areas such as the SIEN parks, but may be a threat along parts of the western border of YOSE and SEKI, where development is occurring outside the parks.

Invasive Species and Disease: To our knowledge there are no major threats of invasive species or disease to Western Meadowlark populations in SIEN parks.

Human Use Impacts: Western Meadowlarks are sensitive to presence of humans in their breeding territory. Females flushed from their nest during laying or early incubation often abandon the nest (Davis and Layton 2008). This potential impact could be monitored in identified breeding habitats in SIEN parks, though perhaps is not a high-priority given the small populations within the parks and the relative unimportance of the parks to this species.

Packstock grazing within the SIEN parks is a potential risk to Western Meadowlarks, at least locally where grazing is permitted. The effects of grazing likely depend upon stocking rates and frequency and duration of grazing, as well as climate; meadowlarks may respond positively to moderate grazing in moister regions and negatively to heavier grazing in arid sites (Davis and Layton 2008). As compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks.

Management Options and Conservation Opportunities

Western Meadowlarks are rare in SIEN parks. However, if breeding populations are identified, meadowlarks will benefit from habitat management activities that maintain intermediate height and density of grasses and forbs (Davis and Layton 2008). For example, grasslands could be burned at a frequency and intensity such that vegetation structure is optimal for meadowlarks (Davis and Layton 2008). Reducing human impacts at known breeding sites also could benefit this sensitive ground-nester.

Western Screech-Owl – *Megascops kennicottii*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Western Screech-Owl is a fairly common year-round resident and breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 61. Breeding status and relative abundance of Western Screech-Owls in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly common
Yosemite NP	Year-round	Regular Breeder	Fairly common
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not Listed

Range Significance
The Western Screech-Owl is limited to western North America. It is widely but patchily distributed from northwestern Mexico and the southwestern U.S. along the Pacific coast of North America to Alaska (Cannings and Angell 2001). The species is absent from higher regions of the Sierra Nevada, mostly occupying lower-elevation foothill woodlands (Siegel and DeSante 1999, Cannings and Angell 2001). The relatively broad distribution of the Western Screech-Owl in California and its proclivity for lower-elevation woodlands means that the SIEN parks are not critically important for this species.

Distribution and Habitat Associations
Western Screech-Owls are cavity nesters found in a wide variety of woodland and forest habitats, with highest densities in riparian habitats and deciduous woodlands at low elevations (Cannings and Angell 2001). In the Sierra Nevada, the species prefers broken woodlands of Live and Blue Oaks as well as wooded riparian areas (Siegel and DeSante 1999). Western Screech-Owls were not detected during avian inventory surveys at any of the SIEN parks, but this is likely due to the low capability of these surveys to detect nocturnal owls. The species feeds primarily on insects and small birds and mammals (Johnsgard 1988).

Elevational Distribution

On the western slope of the Sierra Nevada, Western Screech-Owl nests from the foothills up to 1200 m and is transient up to 2100 m (Gaines 1992).

Abundance, Trends and Demographic Data

In diversity and area of habitats occupied, the Western Screech-Owl is the most widespread small owl in western North America (Gehlback 2010). No data are available on abundance and population trends for the species, but Cannings and Angell (2001) stated the owl is “probably declining slowly as habitat is lost.” The species is apparently susceptible to extreme environmental events: one population declined about 70% over 3 years in the Sonoran desert of Arizona during drought conditions (Hardy et al. 1999). On the other hand, Johnsgard (1988) noted that relatively abundant foods and probable increased protection from Great Horned Owls has allowed Western Screech-Owls to become abundant in city parks and suburban areas.

In California, Breeding Bird Survey (BBS) data indicate no significant changes in abundance of Western Screech-Owls from 1966-2007 (Table 2). Western Screech-Owls were not detected in sufficient numbers for analyses in the SIEN parks or the Sierra Nevada as a whole; however, these surveys are designed for diurnal species and do not adequately detect most owl species. Similarly, Western Screech-Owls are not frequently captured in mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Table 2. Relative abundance and trends for Western Screech-Owl according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007[1]	9	0.01	-1.9	0.77
	1980-2007[1]			+6.8	0.64
Sierra Nevada (BCR 15)	1966-2007	NA[1]	NA	NA	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	0	NA	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	NA	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	NA	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008). Note that BBS is designed for diurnal species and does not adequately detect most owl species.

Stressors

Habitat loss due to new high-density housing developments and clearcutting of forests are likely having a negative impact on Western Screech-Owl populations (Cannings and Angell 2001), both of which are significant threats in the lower-elevation oak-dominated foothills and riparian woodlands favored by Western Screech-Owls in the Sierra Nevada. Such direct habitat loss is not likely a substantial threat in SIEN parks. Invasive species and disease also do not appear to be major concerns for Western Screech-Owls within the SIEN parks; effects of pesticide drift from the Central Valley have been suggested as a possible issue, but no supporting data are available (Siegel and DeSante 1999).

Loss of snags and large, old trees with cavities for nesting and roosting may pose a risk to Western Screech-Owls, although likely not substantially in SIEN parks owing to the lack of commercial logging or fuelwood harvesting. Fire treatments that mimic natural fire regimes, including moderate- and high-intensity fire to maintain open conditions, should benefit this species. The lack of data on population trends or demographic rates of Western Screech-Owls in the Sierra Nevada hampers appropriate management (Siegel and DeSante 1999).

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of screech owls (Eastern and Western lumped) has significantly shifted 75 miles north and over 36 miles inland throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009).

The species is associated with lower-elevation open deciduous woodlands and riparian hardwoods in the Sierra Nevada (Siegel and DeSante 1999). Hydrologic changes due to a warmer climate that result in alteration of riparian hardwood vegetation could adversely impact the species. Further, Western Screech-Owls may be susceptible to drought conditions (Hardy et al. 1999); the species may be adversely impacted if climate change increases severity of droughts.

Altered Fire Regimes: Western Screech-Owls favor open deciduous forests. High-intensity fire can eliminate large snags with suitable nesting cavities, but over the longer-term, fire of varying intensities likely maintains open habitat conditions for these owls. One anecdotal report noted a marked increase in the number of Western Screech-Owls 4 years after an intensely burned Live Oak and Tanoak-dominated forest in the Los Padres National Forest (Elliot 1988). Thus, high-intensity fire may benefit Western Screech-Owls once vegetation has begun to re-sprout, but this effect has not been rigorously studied. High-intensity fire also attracts large woodpeckers that excavate cavities used by this owl for nesting.

Habitat Fragmentation or Loss: The Western Screech-Owl is vulnerable to loss and fragmentation of woodland habitat from urban development (Johnsgard 1988, Cannings and Angell 2001). However, urbanization is not likely to pose a major threat to the species within SIEN parks.

Invasive Species and Disease: Anecdotal evidence suggests that coastal populations of Western Screech-Owls in the Pacific Northwest have been negatively impacted by the recent invasion of Barred Owls into that region, as several historical territories near Vancouver, British Columbia, were vacated by screech-owls in the early 1990s as Barred Owls began to breed in the immediate area (Cannings and Angell 2001). This may become a threat in the future if Barred Owls increase in SIEN parks.

Human Use Impacts: Western Screech-Owls are vulnerable to loss of individual nest trees because they cannot create their own cavities and must compete with other cavity-nesting birds and mammals for suitable sites. Management activities such as post-fire salvage logging, hazard-tree removal, or cutting fire lines during fire suppression could eliminate snags containing potentially suitable nesting cavities, but these are not likely to be important factors in SIEN parks.

The Western Screech-Owl may be sensitive to local disturbance at nest sites frequented by birders, as one researcher documented eggs that chilled after incubating females were continuously lured off nests by recorded calls (Cannings and Angell 2001). While no documentation exists of nest disturbance by birders in the SIEN parks, this is a potential threat. Pesticide drift from the Central Valley may also be a problem for Western Screech-Owls, but effects are unknown (Siegel and DeSante 1999). The Western Screech-Owl is apparently vulnerable to collision with vehicles, as are most owls; Cannings and Angell (2001) noted that some regional accounts of this species are from numerous road deaths.

Management Options and Conservation Opportunities

Western Screech-Owls are considered to be fairly common in SIEN parks. The most important measures park managers can implement to protect Western Screech-Owls include retaining large snags with suitable nesting cavities, and allowing a patchy mosaic of fire of varying intensities to maintain open-forest habitats. Management for Pileated Woodpeckers, Northern Flickers, sapsuckers, and other large woodpeckers will insure future nest sites. Speed limits on roads should be strictly enforced to reduce collisions between owls and vehicles.

As with other small forest owls, the distribution, abundance, and demography of Western Screech-Owls has not been specifically quantified in the SIEN parks. Park managers might consider initiating nocturnal surveys for this and other forest owl species, potentially in conjunction with surveys for Spotted and Great Gray Owls.

Western Scrub-Jay – *Aphelocoma californica*

Migratory Status

Resident (Siegel and DeSante 1999)

Residency and Breeding Status

Western Scrub-Jay is a locally common breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks. The species has not been reported recently at Devils Postpile (DEPO) National Monument (Table 1).

Table 62. Breeding status and relative abundance of Western Scrub-Jays in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Common
Yosemite NP	Year-round	Regular Breeder	Locally Common
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Western Scrub-Jay is distributed over much of the western United States and parts of Mexico. The species is more widely distributed in the lower elevations of California (Curry et al. 2002), but the foothills of the Sierra Nevada and SIEN parks are of some importance to California populations.

Distribution and Habitat Associations

On the western slope of the Sierra Nevada, Western Scrub-Jays are found most often in dry woodlands mixed with chaparral, but can be found in a number of other habitats as well (Gaines 1992). Western Scrub-Jays were detected in moderate densities (Table 2) along a number of survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were not observed during the DEPO survey. Park inventories show highest associations with Blue Oak Forest and Mixed Chaparral within SEKI and YOSE respectively (Table 2).

Table 63. Number of Western Scrub-Jays recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	43	53	Blue Oak Forest	0.54	0.37 (0.19-0.70)
			Live Oak/California Buckeye	0.28	0.19 (0.10-0.38)
			Mixed Chaparral	0.25	0.14 (0.08-0.24)
Yosemite NP	20	25	Mixed Chaparral	0.12	
			Foothill Pine	0.09	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

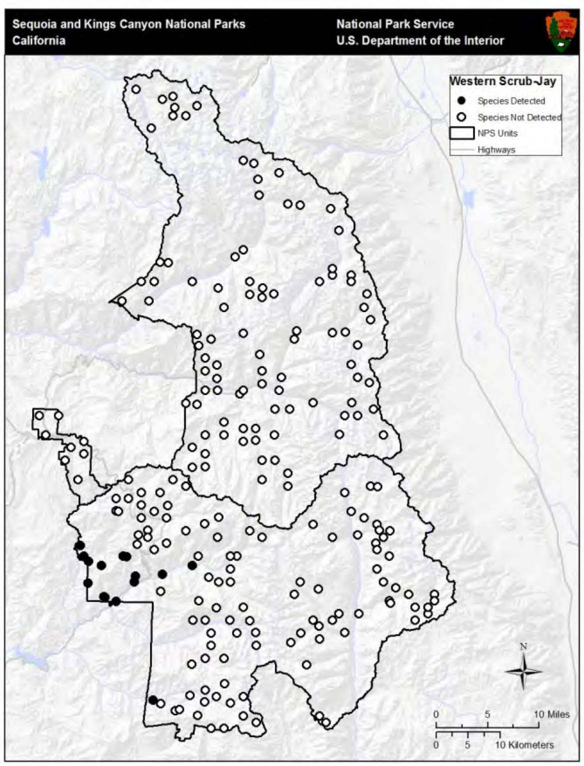

Figure 25. Bird survey transects where Western Scrub-Jay was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

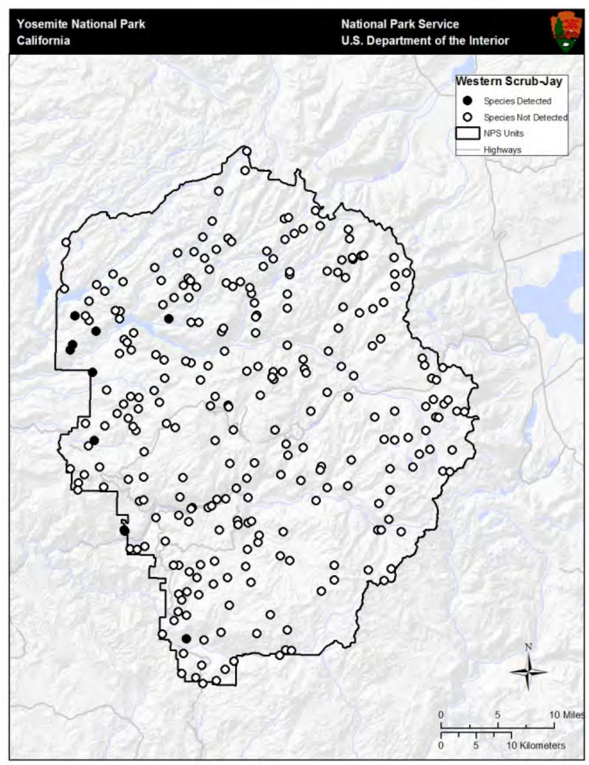

Figure 26. Bird survey transects where Western Scrub-Jay was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution
Western Scrub-Jay was observed within the lower-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Western Scrub-Jay in SEKI was 877 m, with 95% of observations occurring between 534 and 1496 m. At YOSE, the mean elevation of observations was 1475 m with 95% of observations falling between 1200 and 1738 m (Siegel et al. 2011).

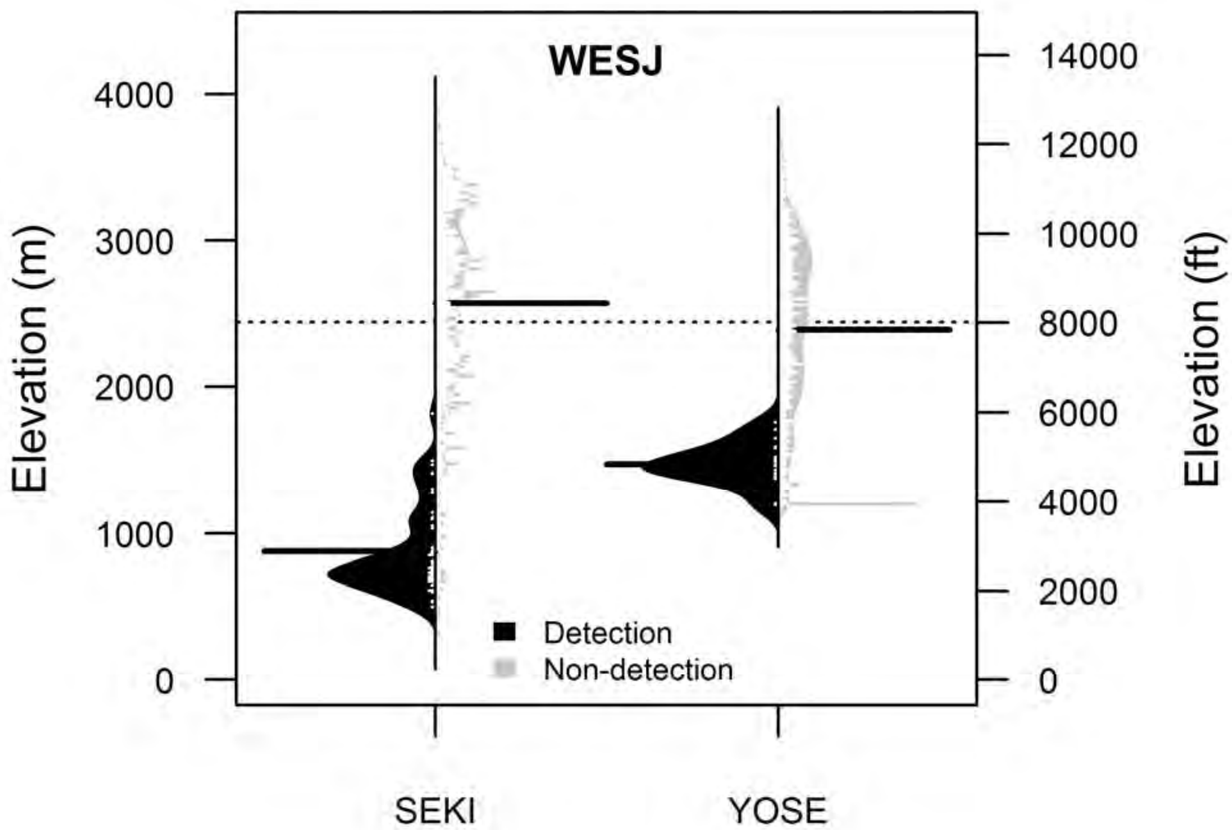

Figure 3. Elevational distributions of sites where Western Scrub-Jays (WESJ) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Western Scrub-Jays are detected more often in California as a whole than in the Sierra Region (BCR 15). They were detected in moderate to high numbers on individual BBS routes at YOSE and SEKI. There were no significant trends observed within the regions and routes of interest (Table 3).

Table 64. Relative abundance and trends for Western Scrub-Jay according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	167	10.41	+0.2	0.53
	1980-2007			-0.4	0.30
Sierra Nevada (BCR 15)	1966-2007	21	4.68	-1.5	0.26
	1980-2007			-1.4	0.31
Route 14117 – Sequoia NP	1972-2005	1	26.50	+11.4	0.18
Route 14132 – Kings Canyon NP	1974-2005	1	8.70	+2.6	0.33
Route 14156 – Yosemite NP	1974-2007	1	2.27	+5.7	0.38

Capture rates of Western Scrub-Jays at SIEN MAPS stations are too low to make inferences about productivity and survival within the parks.

Stressors

There do not appear to be any great threats to this relatively abundant species, the one possible exception being high susceptibility to West Nile Virus. Sudden Oak Death is another disease that has the potential to negatively affect Western Scrub-Jay through habitat alteration, although the disease is not yet found within SIEN parks. Loss of oak habitats either through land-use change or high-intensity fires would be detrimental to the species, but Western Scrub-Jays are generally very adaptable to human development and habitat conversion making these only minor threats. Finally, human use impacts and climate change do not appear to be threats to this species, although understanding of the impacts of climate change remains limited.

Climate Change: An analysis of shifts between the historical range of Western Scrub-Jay (1911-1929 survey) and its current range (2003-2008 resurvey) indicate that the species has not responded to temperature or precipitation change by shifting its range to follow its climatic niche (Tingley et al. 2009). However, a similar analysis of Christmas Bird Count data suggests that the center of abundance of Western Scrub-Jay has significantly shifted 45.8 miles to the North and 34.4 miles away from the coast across its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). These conflicting observations highlight the uncertainty of how Western Scrub-Jay has and will respond in the future to changes in regional climate.

Modeled distribution shifts of Western Scrub-Jay predict little change in the distribution of the species across California and indicate that densities of the Western Scrub-Jay may in fact increase in some areas (Stralberg and Jongsomjit 2008). This prediction of minimal change in probability of occurrence is inclusive of foothill areas within and around SIEN parks. The most important variables influencing current and projected distribution were vegetation (both distribution models), annual mean temperature (Maxent distribution model), and mean diurnal range (GAM distribution model) (Stralberg and Jongsomjit 2008).

Western Scrub-Jays are found breeding in the lower-elevations of SIEN parks (Figure 3). If climate change causes the species' range to shift upward as is generally expected of many species, there is much higher-altitude habitat for new colonization within Sequoia and Kings Canyon as well as Yosemite. However, it is important to note that even if Western Scrub-Jays are able shift their range in response to climate change, populations may suffer if the habitats they depend upon are not also able to shift upslope or are degraded due to climate warming.

Altered Fire Regimes: Little research has been conducted on the direct effects of fire on the Western Scrub-Jay. However, large fires within oak habitats that lead to loss of mature trees would be detrimental to Western Scrub-Jay. Any increase in fire frequency and intensity within oak habitats would likely have minor negative impacts on the species.

Habitat Fragmentation or Loss: Western Scrub-Jays likely suffer when acorn crops are poor (Siegel and DeSante 1999) and would likewise experience declines if oak habitat were removed. However, Western Scrub-Jays are highly adaptable and are often found in urban and suburban areas, demonstrating their low susceptibility to habitat conversion and fragmentation (Curry et al. 2002).

Invasive Species and Disease: During 2009, 94 dead Western Scrub-Jays tested positive for West Nile Virus in California, the highest incidence of the disease within dead birds during that year (CDPH 2010). Furthermore, in a recent study evaluating the risk of California birds to West Nile Virus, Western Scrub-Jay received a combined risk score of 3.5 (with a score of 4 indicating the greatest risk) (Wheeler et al 2009). Both studies indicate that Western Scrub-Jays are highly susceptible to West Nile Virus.

Western Scrub-Jays' use of oak habitats make them vulnerable to outbreaks of Sudden Oak Death (Curry et al. 2002). Sudden Oak Death is not yet a problem within SIEN parks, but could threaten oak habitats and associated bird species in the future if the disease spreads.

Human Use Impacts: Western Scrub-Jays are largely tolerant of human disturbances and are commonly found in urban and suburban areas (Curry et al. 2002).

Management Options and Conservation Opportunities

Western Scrub-Jay is generally healthy and threats to the species are not acute. Thus direct management of the species for conservation is largely unwarranted (Curry et al. 20002). Continued protection of oak woodlands and prevention of the spread of Sudden Oak Death would benefit Western Scrub-Jays. Due to the species' high susceptibility to West Nile Virus, testing of live and deceased birds for the virus would help track any spread of the disease into SIEN parks.

Western Tanager – *Piranga ludoviciana*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Western Tanager is a common summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and Devils Postpile (DEPO) National Monument (Table 1).

Table 65. Breeding status and relative abundance of Western Tanagers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Common
Yosemite NP	Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Western Tanager breeds in open coniferous and mixed coniferous-deciduous woodlands of western North America, from southeast Alaska to the mountains of California and as far east as Idaho, Wyoming, Utah, and Nevada, and winters in Mexico (Hudon 1999). The species is common in the Sierra Nevada, which is an important part of its overall range (Siegel and DeSante 1999).

Distribution and Habitat Associations
Western Tanager prefers relatively open dry or moist coniferous forests (Siegel and DeSante 1999). The species also is found in mixed hardwood, aspen, and riparian forests, typically containing some conifer trees. Western Tanagers were detected at high numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventories in all SIEN parks. Park inventories show strongest associations in a variety of coniferous forests in SEKI and in Canyon Live oak, coniferous forest, and burned areas in YOSE (Table 2).

Table 66. Number of Western Tanagers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	345	434	Giant Sequoia Forest	0.60	0.61 (0.40-0.94)
			White Fir/Sugar Pine Forest	0.49	0.42 (0.27-0.66)
			Red Fir/White Fir Forest	0.43	0.42 (0.27-0.66)
			Undifferentiated Post-fire	0.42	0.27 (0.06-1.21)
			Live Oak/California Buckeye	0.38	0.25 (0.12-0.51)
Yosemite NP	463	593	Canyon Live Oak	0.47	
			Recent Burn	0.33	
			Ponderosa Pine/Mixed Conifer	0.30	
			White Fir	0.28	
			Ponderosa Pine	0.27	
Devils Postpile NM	3	3	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

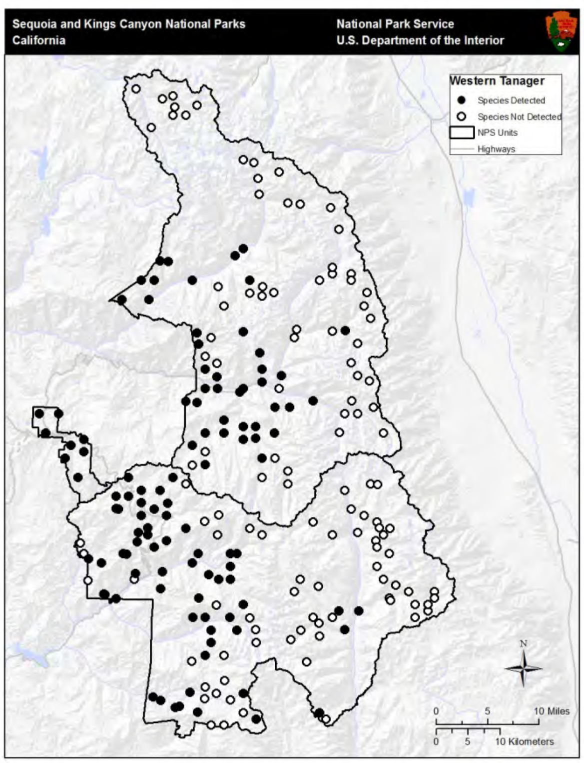

Figure 27. Bird survey transects where Western Tanager was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

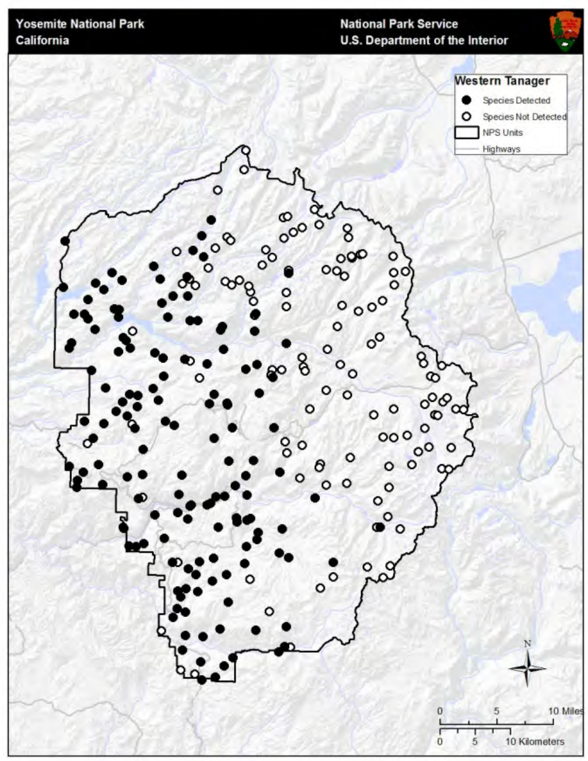

Figure 28. Bird survey transects where Western Tanager was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Western Tanager was detected from low to mid elevations in SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations for Western Tanager at SEKI was 1994 m, with 95% of observations occurring between 688 and 2760 m. In YOSE, the mean elevation of observations was 1943 m with 95% of observations falling between 1200 and 2652 m (Siegel et al. 2011).

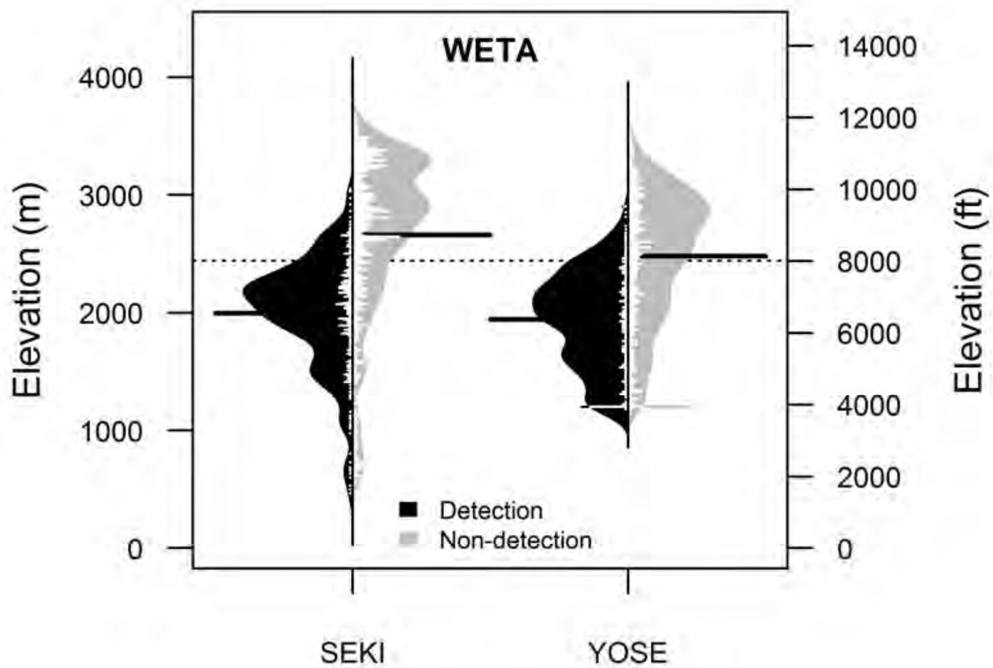

Figure 3. Elevational distributions of sites where Western Tanager (WETA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Western Tanager are nearly 3 times more abundant in the Sierra Nevada Region (BCR 15) than California as a whole (Table 3). The survey data reveal small but significant population increases throughout California (from 1980-2007) and the Sierra Nevada during 1966-2007 and 1980-2007. Conversely, a large but non-significant population increase was observed along the BBS route in Sequoia National Park from 1972-2005 (Table 3).

Table 67. Relative abundance and trends for Western Tanager according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	146	8.13	+0.8	0.24
	1980-2007			+1.1	0.05
Sierra Nevada (BCR 15)	1966-2007	35	22.18	+1.4	0.01
	1980-2007			+1.3	0.02
Route 14117 – Sequoia NP	1972-2005	1	13.06	+12.0	0.24
Route 14132 – Kings Canyon NP	1974-2005	1	13.90	+2.7	0.47
Route 14156 – Yosemite NP	1974-2007	1	22.58	-0.6	0.76

Similar to BBS surveys, SIEN MAPS data found significant population increases of Western Tanager at Yosemite NP from 1993-2009 (Table 4).

Table 68. Population trends, productivity, trends, and survival estimates of Western Tanager at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	3.5	+3.26	0.19	-23.44	0.595 (0.320)
Yosemite NP	1993-2009	4.5	+3.02**	0.46	+2.64	0.567 (0.080)
Devils Postpile NM	2002-2006	1.0	NA[2]	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Western Tanager apparently increased in the Sierra Nevada and California over the past 40 years. Risks to Western Tanager may include intensive logging operations at large scales such as clearcutting, although some light thinning or patchy clearcuts might not be harmful because the species prefers open forests (Hudon 1999). Loss of montane riparian habitat and cowbird parasitism are minor threats (Siegel and DeSante 1999). While at present populations of Western Tanagers appear abundant and stable, predicted negative effects of climate change and increased extent of high-intensity fire may adversely impacts the species in the Sierra Nevada and SIEN parks.

Climate Change: An analysis of shifts between the historical range of Western Tanager (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation and temperature change by shifting its range to follow its climatic niche (Tingley et al. 2009). Furthermore, modeled distribution shifts of Western Tanager predict substantial range contractions in the California coast range and Sierra foothills as well as southern Sierra (Stralberg and Jongsomjit 2008). The modeled distribution also predicts lower probability of occurrence in SIEN parks, especially SEKI. The most important variables influencing current and projected distribution were annual mean temperature and vegetation (Maxent and GAM distribution models). These observed and predicted shifts range suggest that the Western Tanager has already responded to climate change and will likely continue to shift its range in the coming decades.

Western Tanager was observed in a variety of coniferous forests (Table 2) from low- to mid-elevations (Figure 3) of the SIEN parks. If climate change causes the species' range to shift upslope as is generally expected, there remains much higher-altitude coniferous forest habitat for new colonization within SEKI and YOSE. However, the predicted modeling of the species' future distribution indicates range contractions in the SIEN parks, especially SEKI, suggesting this species may be more sensitive to temperature changes than other birds. Continued monitoring of the species' response to climate change is warranted.

Altered Fire Regimes: Higher-intensity fire may adversely impact Western Tanagers, although research results have not been definitive. Western Tanager was an indicator of mature forest in Oregon, although not significantly so (Fontaine et al. 2009). No differences in densities of tanagers were detected among logged and unlogged burned forests in Oregon (Cahall and Hayes 2009). Western Tanager was found in a variety of habitat types and seral stages, but often in early-successional burned forests (Hutto 1995). After accounting for burn intensity, tanagers in Montana decreased in response to high-intensity but increased in response to moderate- and low-intensity fire (Smucker et al. 2005) while in New Mexico tanagers had similar densities across all burn intensities (Kotliar et al. 2007). The species was detected in burns but significantly more abundant in unburned forests in the northern, eastern, and southern Sierra (Rafael et al. 1987, Siegel and Wilkerson 2005, Burnett et al. 2010). Some evidence exists that an increase in extent and frequency of high-intensity fire in SIEN parks may adversely impact Western Tanagers.

Habitat Fragmentation or Loss: Research on impacts of logging practices on Western Tanager is equivocal. Some studies documented greatest densities of tanagers in old-growth and mature forests, while others found increased abundance in younger age classes (see Hudon 1999). Hayes et al. (2003) found a strong positive response by Western Tanagers to thinning in Oregon. Regardless of effects, commercial logging is not a threat to the species in SIEN parks.

Invasive Species and Disease: West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). The virus has caused mortality in many native birds. In 2009, West Nile Virus caused at least one Western Tanager death in California (CDPU 2010).

Avian influenza virus (AIV) is known to mutate and cross the species barrier to infect humans, and is thus an important public health issue (Fuller et al. 2010). A recent study (Fuller et al. 2010) documented 9% of Western Tanagers were AIV positive. Since passerines share the same habitat as poultry, they may be effective transmitters of the disease.

Western Tanager is also susceptible to brood parasitism from invasive Brown-headed Cowbirds. Cowbirds are nest parasites that have been implicated in declines of many native bird species. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for this species, at least locally where grazing is permitted because it can attract Brown-headed Cowbirds (see *Invasive Species and Disease* above).

Management Options and Conservation Opportunities

Research is needed to identify conditions that support thriving populations of Western Tanagers and to manage habitats to meet these conditions (Hudon 1999). Park managers can protect Western Tanager by carefully managing or considering elimination of cowbird feeding sites (Shuford and Gardali 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE should be updated. MAPS station operation and other means of monitoring Western Tanager populations in the parks should continue. Park staff should collect and test any bird carcasses for West Nile Virus or Avian Influenza Virus.

Western Wood-Pewee – *Contopus sordidulus*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Western Wood-Pewee is a common breeder in Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and Devils Postpile (DEPO) National Monument (Table 1).

Table 69. Breeding status and relative abundance of Western Wood-Pewees in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Common
Yosemite NP	Summer	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
Western Wood-Pewee is distributed over much of western North America including the mountainous regions of California. The species' absence from much of California's Central Valley makes the Sierra Nevada and SIEN parks somewhat important for its range in the state (Bemis and Rising 1999).

Distribution and Habitat Associations
Western Wood-Pewees can be found within almost any forest type within their Sierran range (Gaines 1992). Western Wood-Pewees were detected in low to medium densities (Table 2) along many survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and were observed at numerous survey stations during the DEPO survey. Park inventories show highest associations with Undifferentiated Riparian habitat and Interior Live Oak forests within SEKI and YOSE respectively (Table 2).

Table 70. Number of Western Wood-Pewees recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	214	255	Undifferentiated Riparian	0.38	0.33 (0.12-0.90)
			Ponderosa Pine Woodland	0.32	0.31 (0.12-0.84)
			Ponderosa Pine/Incense Cedar	0.17	0.17 (0.06-0.43)
			Canyon Live Oak Forest	0.16	0.09 (0.03-0.27)
			California Black Oak Forest	0.15	0.15 (0.05-0.43)
Yosemite NP	287	356	Interior Live Oak	1.27	
			Black Oak	0.26	
			Giant Sequoia	0.16	
			Quaking Aspen	0.14	
Devils Postpile NM	20	22	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

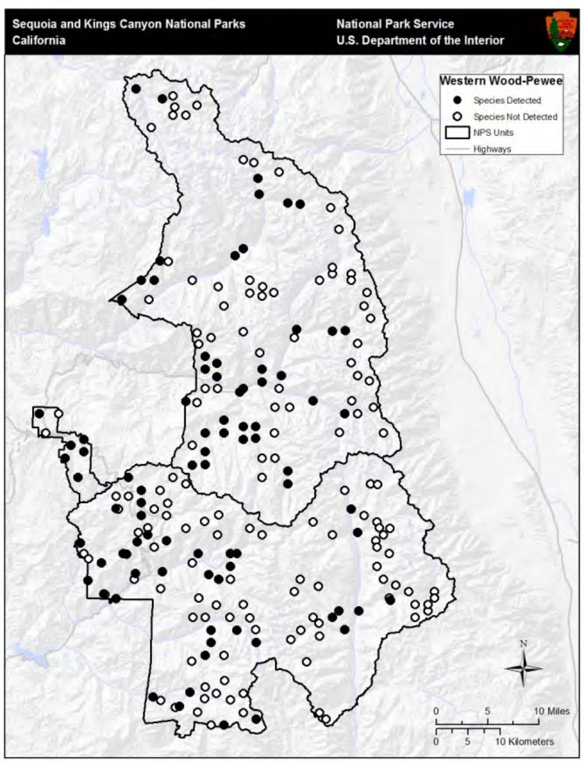

Figure 29. Bird survey transects where Western Wood-Pewee was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

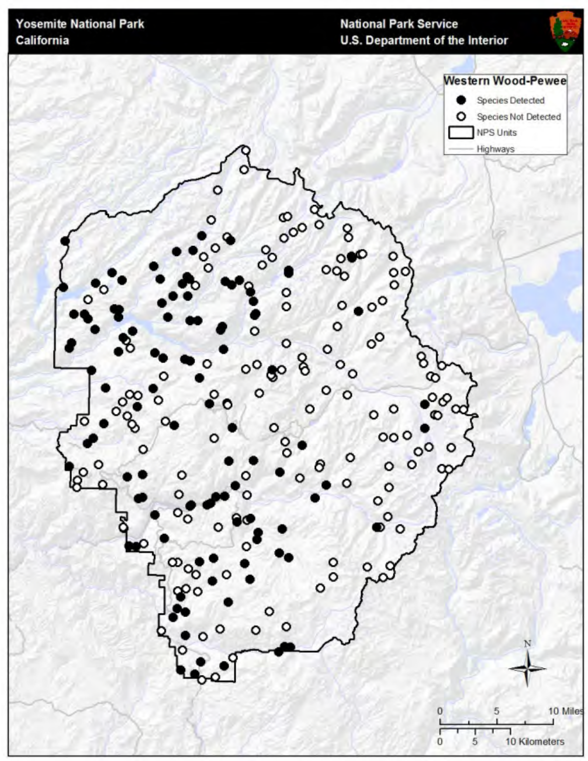

Figure 30. Bird survey transects where Western Wood-Pewee was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Western Wood-Pewee was observed within the lower to middle-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Western Wood-Pewee in SEKI was 2155 m, with 95% of observations occurring between 719 and 2888 m. At YOSE, the mean elevation of observations was 1957 m with 95% of observations falling between 1200 and 2680 m (Siegel et al. 2011).

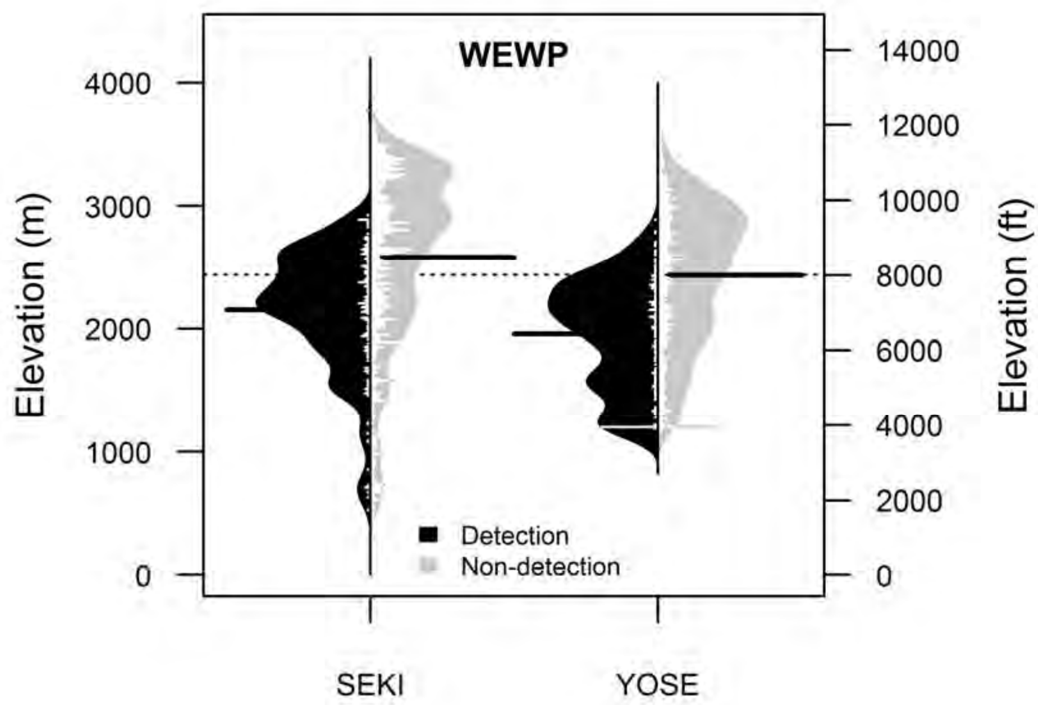

Figure 3. Elevational distributions of sites where Western Wood-Pewees (WEWP) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Western Wood-Pewees are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole. They were detected in moderate to high numbers on individual BBS routes at YOSE and SEKI. However, significant negative trends were observed in the Sierra Region and California as a whole in both the short and long-terms as well as along the Yosemite route during 1974-2007 (Table 3).

Table 71. Relative abundance and trends for Western Wood-Pewee according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	173	6.76	-1.8	0.00
	1980-2007			-1.5	0.04
Sierra Nevada (BCR 15)	1966-2007	35	22.97	-1.8	0.02
	1980-2007			-1.9	0.04
Route 14117 – Sequoia NP	1972-2005	1	5.19	+15.4	0.29
Route 14132 – Kings Canyon NP	1974-2005	1	11.05	-4.9	0.48
Route 14156 – Yosemite NP	1974-2007	1	24.19	-4.4	0.00

MAPS data from Kings Canyon and Yosemite NPs show no significant population trends between 1991 and 2008, although the Kings Canyon stations show an apparent negative - but not statistically significant - trend. This possible decline appears to be coupled with low productivity and moderate adult survival. The YOSE stations show somewhat higher productivity and adult survival than the Kings Canyon stations. There is not enough data from the DEPO MAPS station to draw inferences about Western Wood-Pewee demographics (Table 4).

Table 72. Population trends, productivity, trends, and survival estimates of Western Wood-Pewee at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	1.6	-12.21	0.03	NA	0.411 (0.190)
Yosemite NP	1993-2009	3.2	+1.79	0.24	+0.60	0.605 (0.079)
Devils Postpile NM	2002-2006	1.2	NA[2]	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Likely the greatest threat to Western Wood-Pewee is habitat loss on their South American wintering grounds. Habitat degradation can also be a concern in the species' breeding range where large-scale agriculture and clear-cut timber harvest occurs, but does not affect populations within SIEN parks. Conversely, fragmentation of forests creates suitable habitat for Western Wood-Pewees and periodic fires likely do the same. The species has been shown to respond to recent climate change through range shifts. However, SIEN parks are likely able to provide higher-elevation habitat as the species adapts to warmer temperatures in the future. Finally, there do not appear to be any major threats of disease or invasive species and where habitat is not damaged, human use impacts are not a concern for the Western Wood-Pewee.

Climate Change: An analysis of shifts between the historical range of Western Wood-Pewee (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature and precipitation change by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that Western Wood-Pewee has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Western Wood-Pewees are found breeding below 3000 m in SEKI and YOSE (Figure 3). If climate change causes the species' range to shift upward as is generally expected, there is much higher-altitude forest habitat for new colonization within Sequoia and Kings Canyon as well as Yosemite. However, it is important to note that even if Western Wood-Pewee are able shift their range in response to climate change, populations may suffer if the habitats they depend upon are not also able to shift upslope or are degraded due to climate warming.

Altered Fire Regimes: One study in a western aspen forest detected Western Wood-Pewees significantly less often in recently burned sites than unburned sites (Dieni and Anderson 1999). Contrary to Dieni and Anderson's (1999) findings, Western Wood-Pewee increased after fire in Montana (Smucker et al. 2005) and was among the more frequently encountered bird species in recently burned forest throughout the Sierra Nevada (Burnett et al. 2010, Siegel et al. 2010), nesting more often in burned than unburned forests (Rafael et al. 1987). Most research results indicate fires are beneficial to the species. Western Wood-Pewee's association with forest edges and apparent aversion to very dense forests (Siegel and DeSante 1999) suggests that periodic burns are necessary to maintain the heterogeneous habitat used by the species.

Habitat Fragmentation or Loss: Western Wood-Pewees inhabit forest openings and edges (Siegel and DeSante 1999) and may have benefited from forest fragmentation that created more patchy forest habitat (Bemis and Rising 1999). However, where riparian zones within arid habitats have been reduced or eliminated by agriculture or urbanization Western Wood-Pewee has suffered (Bemis and Rising 1999). Likewise the species has experienced moderate declines due to forest clearcuts and are negatively impacted where grazing degrades riparian habitats (Bemis and Rising 1999). Finally, Western Wood-Pewee is vulnerable to deforestation on its South American wintering grounds (Siegel and DeSante 1999), but its nonbreeding distribution is not well documented (Bemis and Rising 1999). Although habitat degradation and loss is not a concern within SIEN parks, losses on Western Wood-Pewee wintering grounds could affect park populations indirectly.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Western Wood-Pewees are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Human use impacts that lead to habitat degradation such as timber harvest or livestock grazing in riparian areas can be detrimental to the Western Wood-Pewee (see above). With the exception of minimal packstock grazing, such threats are not of concern within SIEN parks.

Management Options and Conservation Opportunities

The Western Wood-Pewee is not heavily managed across its range. Within SIEN parks, there does not appear to be any need to take additional conservation steps aside from continued habitat protection. While some minor threats to the Western Wood-Pewee exist that could affect park populations indirectly, the cause of these threats are external to protected areas.

White-breasted Nuthatch – *Sitta carolinensis*

Migratory Status

Resident (Siegel and DeSante 1999)

Residency and Breeding Status

White-breasted Nuthatch is a fairly common breeder at Yosemite National Park (YOSE) and Devils Postpile National Monument (DEPO) and a common breeder at Sequoia and Kings Canyon (SEKI) National Parks (Table 1).

Table 73. Breeding status and relative abundance of White-breasted Nuthatches in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Year-round	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

White-breasted Nuthatch is widely distributed in wooded areas across much of the United States, southern Canada, and Mexico (Grubb, Jr. and Pravosudov 2008). Two subspecies commonly occur in the SIEN parks, *tenuissima* which occupies the Great Basin, eastern Sierra, and high-elevation areas of the western Sierra, and *aculeata*, which is present from Washington to Baja California and in the Sierra is restricted largely to the foothill zone; the Sierra Nevada is perhaps not very important to either race (Siegel and DeSante 1999).

Distribution and Habitat Associations

In the Sierra Nevada White-breasted Nuthatches occupy open-canopied forests and woodlands with trees with large trunks (Gaines 1992). The *tenuissima* subspecies occurs in numerous higher-elevation pine-dominated forest types, while the *aculeata* subspecies is mostly restricted to areas with Foothill Pine or oaks (Gaines 1992). White-breasted Nuthatches were detected in moderate densities (Table 2) along numerous survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE and at six survey stations during the DEPO survey (Table 2). Park inventories show highest associations with higher-elevation forest types at SEKI (particularly Western White Pine and Foxtail Pine) and Western White Pine at YOSE (Table 2). However the species also occurs regularly in foothill habitats at SEKI and YOSE.

Table 74. Number of White-breasted Nuthatches recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	105	127	Western White Pine Woodland	0.19	0.10 (0.04-0.24)
			Foxtail Pine	0.12	0.12 (0.07-0.19)
			Lodgepole Pine Forest	0.05	0.04 (0.02-0.06)
Yosemite NP	100	116	Western White Pine	0.13	
			Red Fir	0.06	
			Douglas-fir/Mixed Conifer	0.04	
Devils Postpile NM	6	6	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

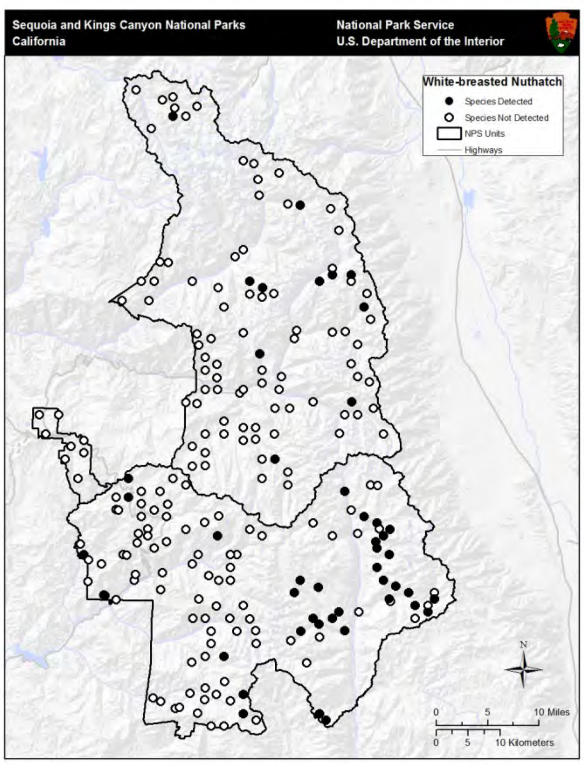

Figure 31. Bird survey transects where White-breasted Nuthatch was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

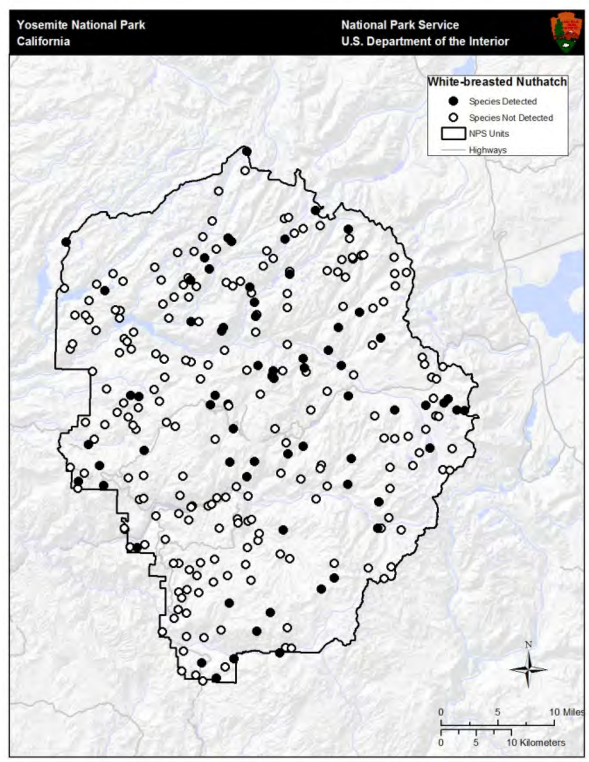

Figure 32. Bird survey transects where White-breasted Nuthatch was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

White-breasted Nuthatch was observed from low to high elevations at both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of White-breasted Nuthatch in SEKI was 2940 m, with 95% of observations occurring between 610 and 3404 m. At YOSE, the mean elevation of observations was 2532 m with 95% of observations falling between 1575 and 3215 m (Siegel et al. 2011)

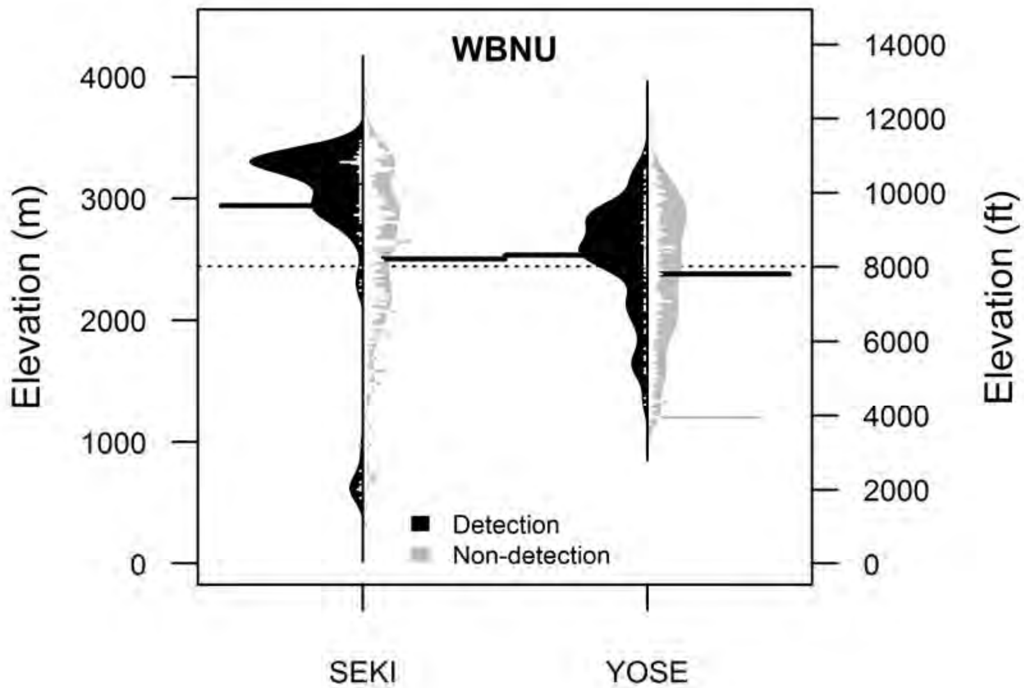

Figure 3. Elevational distributions of sites where White-breasted Nuthatches (WBNU) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate White-breasted Nuthatches are detected in similar numbers in the Sierra Region (BCR 15) as in California as a whole. They were detected in low numbers on individual BBS routes at YOSE and SEKI. No significant population trends were evident for California as a whole, but a nearly significant positive trend was observed in the Sierra Region during 1980-2007 (Table 3).

Table 75. Relative abundance and trends for White-breasted Nuthatch according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	124	2.78	+1.4	0.17
	1980-2007			+0.5	0.69
Sierra Nevada (BCR 15)	1966-2007	27	2.95	+1.0	0.55
	1980-2007			+4.5	0.06
Route 14117 – Sequoia NP	1972-2005	1	2.00	+26.6	0.26
Route 14132 – Kings Canyon NP	1974-2005	1	0.35	-0.8	0.92
Route 14156 – Yosemite NP	1974-2007	1	0.73	-12.4	0.17

White-breasted Nuthatches are infrequently captured at SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

White-breasted Nuthatch uses natural cavities or woodpecker holes in dead trees for nest sites; as such, the widespread removal of snags poses the most significant threat to the species. In addition, the *aculeata* subspecies in the western Sierra foothills depends upon acorn crops in the winter, while the high-elevation and east slope *tenuissima* subspecies is somewhat dependent on pine nut crops in winter; any factors influencing hard mast crops might adversely impact the species in this mountain range (Siegel and DeSante 1999). The species exhibits a mixed or neutral response to high-intensity fire; the restoration of natural fire regimes is likely to provide long-term benefits by creating a supply of dead trees and attracting woodpeckers that excavate nesting cavities. Urbanization of lower-elevation foothill oak and pine forests likely reduces habitat for White-breasted Nuthatches. Climate change may adversely affect the subspecies that occupies higher-elevation pine forests.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of White-breasted Nuthatch has significantly shifted 17 miles southward and 10 miles away from the coast over the past 40 years, corresponding with increases in temperature (Audubon 2009). This shift is in the opposite direction predicted for species that are moving towards cooler regions in the face of climate change (Audubon 2009). Conversely, modeled future distribution shifts of White-breasted Nuthatch predict increased probability of occurrence within the northern part of its current range in California, and some movement upslope in the foothills of the central and southern Sierra and east-side mountains (Stralberg and Jongsomjit 2008). Vegetation and annual precipitation were the most important variables influencing the predicted distribution (Stralberg and Jongsomjit 2008).

In addition to observed changes and modeled range shifts, new tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. In addition to evaluating sensitivity, vulnerability assessments also incorporate climate change predictions, providing modeled, spatially explicit estimates of vulnerability. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, White-breasted Nuthatch received a sensitivity score of 24.49 (UW 2010), suggesting moderate sensitivity to the threat. Certainty of results was listed as 31.25 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to White-breasted Nuthatch's sensitivity to climate change was its need for specialized habitat (UW 2010). A similar assessment of vulnerability of White-breasted Nuthatch in the Willamette Valley, Oregon gave White-breasted Nuthatch a vulnerability score of 5 (a score of 5 representing least vulnerable), indicating low vulnerability to climate change at least within this region (Steel et al. 2010).

White-breasted Nuthatch were found from low to high elevations of the SIEN parks (Figure 3), and were detected typically in open, higher-elevation pine types (Table 2). High-elevation forests are predicted to contract due to climate change (Stralberg and Jongsomjit 2008), which may adversely affect the *tenuissima* subspecies. The *aculeata* subspecies species occurs regularly in lower-elevation foothill pine and oak habitats in the SIEN parks which are predicted to expand upslope (Stralberg and Jongsomjit 2008); thus this subspecies may be more resilient to shifts in forest distribution resulting from climate change.

Altered Fire Regimes: White-breasted Nuthatches exhibit somewhat of a 'mixed' response to high-intensity fire in coniferous forests. Densities of breeding White-breasted Nuthatches were greater in burned than unburned plots in the eastern Sierra Nevada, but not substantially so (Rafael et al. 1987), while the species was detected at significantly higher densities in unburned forests in the southern Sierra (Siegel and Wilkerson 2005). White-breasted Nuthatch was common across the entire burn severity gradient and did not appear to respond to any particular intensity of fire in New Mexico (Kotliar et al. 2007) but in Montana, the species increased after fire at burned points and decreased after fire at unburned points (Smucker et al. 2005). For the foothills *aculeata* subspecies, fire in oak woodlands increases acorn and leaf production by reducing competition with understory vegetation, which in turn improves habitat. The species uses natural cavities or woodpecker holes for nesting, thus the restoration of natural fire regimes that attract woodpeckers in SIEN parks likely benefits White-breasted Nuthatches by ensuring a long-term supply of nesting sites.

Habitat Fragmentation or Loss: Forestry practices that remove old, dead trees could reduce White-breasted Nuthatch densities by eliminating cavity sites (Grubb, Jr. and Pravosudov 2008). Densities of White-breasted Nuthatches did not differ among different levels of post-fire salvage logging, and were not correlated with any measured vegetation variables in burned landscapes in Oregon (Cahall and Hayes 2009), but the species did not nest in salvage-logged plots in burned forests in Montana (Hutto and Gallo 2006), suggesting that salvage logging impacts nesting but perhaps not foraging. Densities of this bird were positively correlated with overstory mortality in insect-infested Eastern Hemlock forests (Tingley et al. 2002). Snag removal is less of a threat to this species in SIEN parks then elsewhere in its Sierra range, where logging of burned and insect-affected forests is pervasive. Urbanization undoubtedly eliminates habitat in lower-elevation foothill habitats outside of SIEN parks, although the nuthatch occasionally can occupy residential areas (Grubb, Jr. and Pravosudov 2008).

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the White-breasted Nuthatch.

Human Use Impacts: There are few if any human-use impacts on White-breasted Nuthatches in SIEN parks. The species can be found in residential areas and regularly visits birdfeeders in fall and winter (Grubb, Jr. and Pravosudov 2008).

Management Options and Conservation Opportunities

The most important things park managers can do to protect White-breasted Nuthatch populations in the parks are to maintain old trees with natural cavities and old woodpecker holes and to restore the natural fire regimes. Avian inventory surveys and other means of monitoring White-breasted Nuthatch populations in the parks should continue, in order to determine impacts of climate change and fire on the species, particularly in higher-elevation pine forests.

White-crowned Sparrow – *Zonotrichia leucophrys*

Migratory Status
Short-distance/Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
White-crowned Sparrow is a common summer or year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks (the *oriantha* subspecies is a breeding summer resident, whereas the *gambeli* subspecies occurs as a non-breeding visitor during winter and migration), and a summer resident and regular breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 76. Breeding status and relative abundance of White-crowned Sparrows in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Common
Yosemite NP	Summer/Year-round	Regular Breeder	Common
Devils Postpile NM	Summer	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
White-crowned Sparrow breeds throughout Alaska and northern Canada, south through interior-western Canada, the interior Rocky Mountains and the Great Basin, and in California in the Cascade Range, Warner Mountains, and Sierra Nevada as well as in a narrow band along the Pacific Coast to Santa Barbara (Chilton et al. 1995). Disjunct populations occur in southern California and north-central Arizona (Chilton et al. 1995). Subspecies differ markedly in behavior; populations can be year-round residents, short-distance migrants, or long-distance migrants (Chilton et al. 1995). The Sierra represents an important part of the breeding range of White-crowned Sparrows (*Z. l. oriantha*) in California (Siegel and DeSante 1999). Winter migrants include *Z. l. gambeli*.

Distribution and Habitat Associations
Breeding White-crowned Sparrows in the Sierra Nevada are found in montane meadows with low, dense willow thickets, along upper stream courses, and around lake edges (Siegel and DeSante 1999). The species can breed in lower-elevation meadows but reaches maximum

densities in meadows around treeline (Siegel and DeSante 1999). White-crowned Sparrows were detected in high numbers (Table 2) along survey transects (Figures 1 and 2) during avian inventory surveys at all SIEN parks. Detections were concentrated at higher elevations in the parks (Figures 1 and 2). After accounting for detection probability, park inventories show highest associations with high-elevation meadows, and to a lesser extent mid-elevation meadows, Whitebark Pine Woodland, and shrubland within SEKI. The species occurred in Montane/Alpine Riparian shrub and alpine or subalpine meadows in YOSE (Table 2). Habitat associations could not be determined at DEPO.

Table 77. Number of White-crowned Sparrows recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	196	371	Higher Elevation Meadow	1.11	1.32 (1.01-1.71)
			Mid Elevation Meadow	0.90	0.88 (0.51-1.50)
			Whitebark Pine Woodland	0.77	0.81 (0.60-1.09)
			Sagebrush/Dwarf Shrubland	0.38	0.42 (0.20-0.85)
			Higher Elevation Sparse Veg.	0.29	0.53 (0.31-0.91)
Yosemite NP	166	249	Montane/Alpine Riparian Shrub	0.64	
			Subalpine/Alpine Meadow	0.37	
			Whitebark Pine	0.12	
Devils Postpile NM	3	4	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

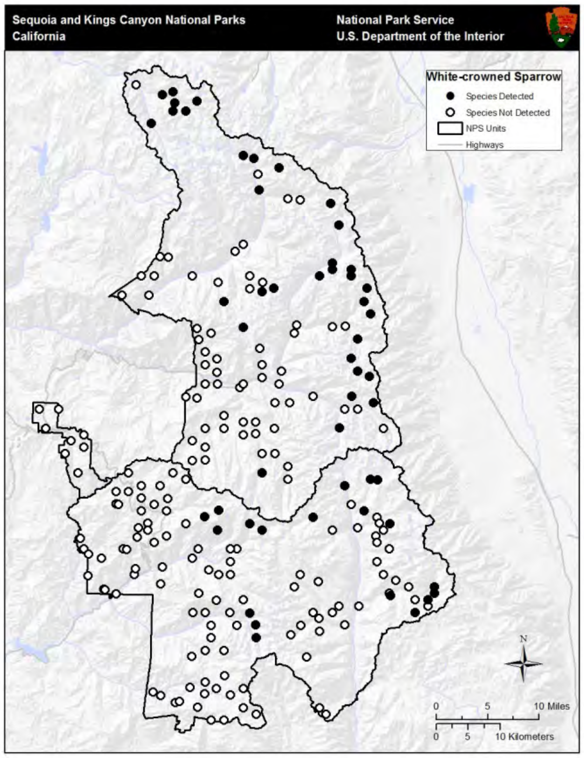

Figure 33. Bird survey transects where White-crowned Sparrow was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

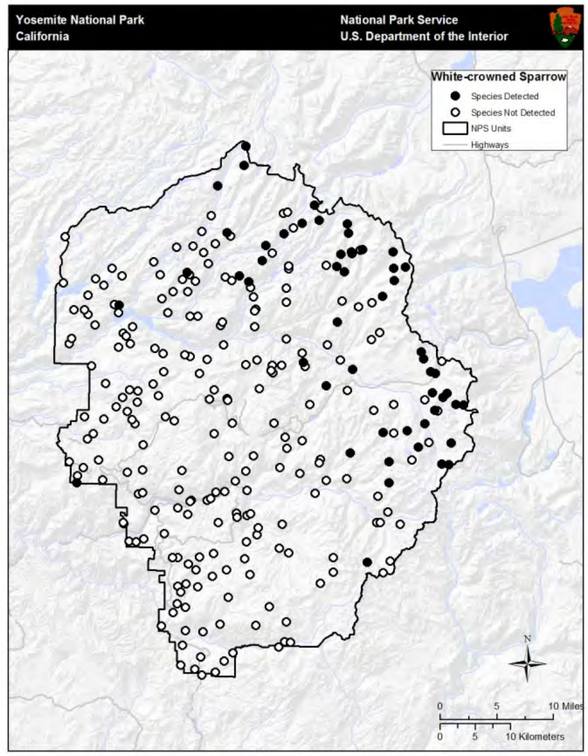

Figure 34. Bird survey transects where White-crowned Sparrow was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

White-crowned Sparrow was detected at high elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of White-crowned Sparrow in SEKI was 3203 m, with 95% of observations occurring between 2488 and 3590 m. In YOSE, the mean elevation of observations was 2993 m with 95% of observations falling between 2560 and 3377 m (Siegel et al. 2011).

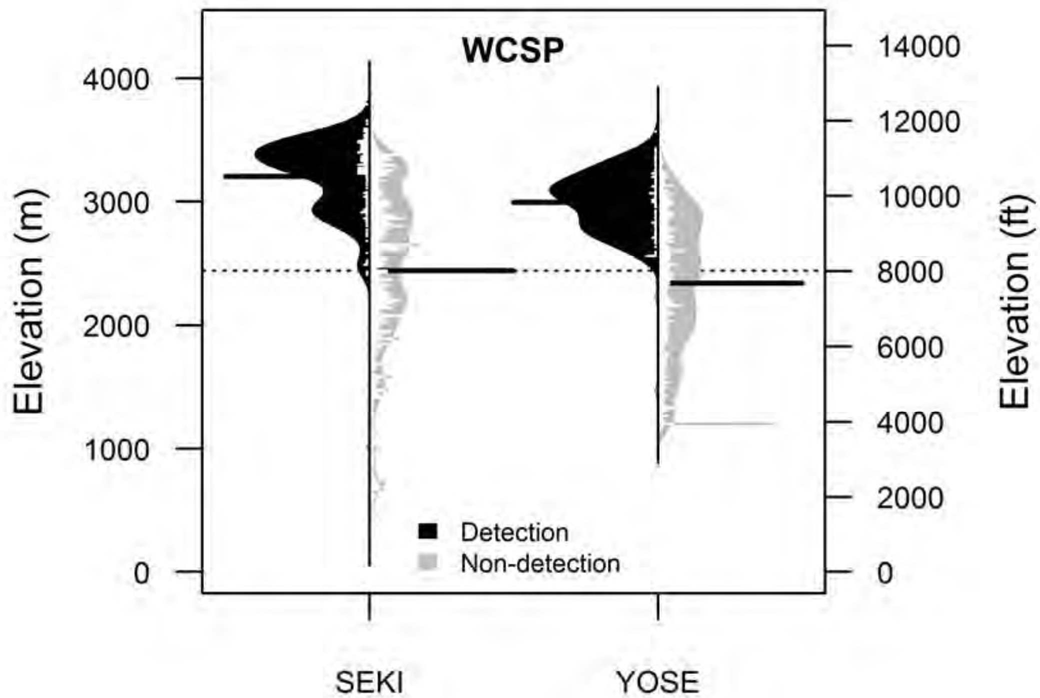

Figure 3. Elevational distributions of sites where White-crowned Sparrow (WCSP) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) suggest White-crowned Sparrows are much less abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3), however BBS does not adequately cover high-elevation habitats and thus this comparison is probably biased. The species was detected in very low numbers on individual BBS routes at Sequoia and Kings Canyon NPs, and was not detected along the BBS route in Yosemite. A significant negative annual population trend was reported for California (Table 3).

Table 78. Relative abundance and trends for White-crowned Sparrow according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	26	1.97	-3.2	0.00
	1980-2007			-2.3	0.00
Sierra Nevada (BCR 15)	1966-2007	7	0.54	-2.3	0.22
	1980-2007			-1.6	0.61
Route 14117 – Sequoia NP	1972-2005	1	0.06	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

White-crowned Sparrows were not captured in mist nets at SIEN MAPS stations in Kings Canyon and Yosemite NPs. Data from DEPO are too sparse for meaningful trend assessment (Table 4).

Table 79. Population trends, productivity, trends, and survival estimates of White-crowned Sparrow at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.0	NA[2]	NA	NA	NA
Yosemite NP	1993-2009	0.0	NA	NA	NA	NA
Devils Postpile NM	2002-2006	5.8	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

White-crowned Sparrow breeding habitat includes grasses, bare ground for foraging, dense shrubs or small conifers thick enough to provide a roost and conceal a nest, standing or running water on or near territory, and tall coniferous trees on the edges of territories (Chilton et al. 1995). Along with other wet montane meadow species such as Lincoln's and Song Sparrows, the White-crowned Sparrow's upper elevation limit seems to be increasing (Siegel and DeSante 1999). Possible explanations include montane meadow successional dynamics, climate change leading to warmer, drier conditions, and grazing pressure on montane meadows (though not in SIEN parks) (Siegel and DeSante 1999).

Any factor that degrades higher-elevation meadow habitats within SIEN is a major threat to White-crowned Sparrow. Most troubling concerns for the species within SIEN parks are drying of meadows due to climate change and the risk of degradation due to packstock grazing. Brown-headed Cowbird parasitism, exacerbated by presence of packstock, is also a problem for White-crowned Sparrows. Evidence of elevational shifts due to climate change has already been observed and shifts are likely to continue. During this transition up-slope, montane meadows in protected areas such as SIEN will become increasingly important for White-crowned Sparrow and may act as refugia from climate change as lower-elevation meadows become less suitable. Increased occurrence of high-intensity may have a positive impact on this species.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of White-crowned Sparrows has significantly shifted over 21 miles north throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Similarly, an analysis of shifts between the historical range of White-crowned Sparrow (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature and precipitation changes by shifting its range to follow its climatic niche (Tingley et al. 2009). These observed shifts provide evidence that this sparrow has already responded to climate change by moving toward cooler, wetter areas, and will likely continue to shift its range within the Sierra in the coming decades.

Modeled distribution shifts of White-crowned Sparrows predict a near-extirpation of the species in the state of California; only the very highest elevations of the Sierra would continue to be occupied, and the species would be extirpated in the coastal Bay Area and experience a range contraction along the Humboldt County coast (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation, precipitation seasonality (Maxent distribution model), and annual mean temperature (GAM distribution model).

The White-crowned Sparrow currently occurs in higher-elevation meadows above 2500 m in the SIEN parks (Figure 3) and may lose whatever lower-elevation habitat is currently suitable and be forced to colonize higher elevations as the climate warms. Elevational range shifts of White-crowned Sparrow already have been observed in recent decades. This species may be adjusting its elevational range as the climate warms and low-elevation meadows dry out. If sufficient meadow habitat containing willows and other required components is not available for breeding, this species will suffer in the face of climate change.

Altered Fire Regimes: White-crowned Sparrow was a highly significant indicator of repeat-burned forests in Oregon, and was not detected in mature or regrown post-fire forests (Fontaine et al. 2009). Nearly half of the studies examined by Hutto (1995) detected this bird in early-seral post-fire areas (in addition to streams and aspen groves). Moreover, occurrence of White-crowned Sparrow was correlated with fire size, along with deciduous tree cover, in the Rocky Mountains (Hutto 1995). White-crowned Sparrow was only detected in burned forests in the northern Sierra (Burnett et al. 2010). A future increase in high-intensity fire may increase habitat suitability for this species, although wet montane meadows remain a requirement for breeding.

Habitat Fragmentation or Loss: White-crowned Sparrow is vulnerable to loss and degradation of meadow habitats, and appears particularly vulnerable to habitat degradation resulting from heavy livestock grazing. Since livestock grazing (other than localized packstock grazing) is largely absent from the parks, this should not be a major issue within SIEN parks. Meadow restoration efforts both within the parks and on adjacent lands would benefit White-crowned Sparrow populations within the SIEN parks.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. White-crowned Sparrows are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within the SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

West Nile Virus is a mosquito-borne flavivirus that was first detected in eastern North America in 1999 and spread quickly across the continent, arriving in California in 2003 (Hull et al. 2010). In 2009, West Nile Virus caused at least 4 White-crowned Sparrow deaths in California (CDPU 2010).

Human Use Impacts: Damage to meadow habitats – especially willows – from livestock grazing may negatively impact White-crowned Sparrows (Cicero 1997). Grazing tends to denude willows of their lower foliage (Siegel and DeSante 1999). Habitat degradation due to packstock grazing within the parks is therefore a potential concern for this species, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage riparian shrubs. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized (Siegel and DeSante 1999).

Management Options and Conservation Opportunities

The most important things park managers can do currently to protect White-Crowned Sparrow populations in the parks are to maintain wet montane meadow habitats and to eliminate or manage cowbird feeding sites such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicated that a cowbird trapping program was not warranted (Halterman et al. 1999). However, this assessment is now more than 15 years old, and an updated assessment may be useful. If an updated assessment indicates an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

Meadow desiccation has been implicated in reduced nesting success of Willow Flycatchers and Yellow Warblers, by granting easier access to mammalian predators (Cain et al. 2003). The same process may also affect White-crowned Sparrow, which nests in similar habitats, although nests are constructed and placed much differently. If climate change leads to substantial meadow desiccation and reduces reproductive success, restoration of meadow hydrology could benefit breeding White-crowned Sparrows. Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites, perhaps along with active restoration of riparian deciduous vegetation, would likely benefit this sparrow and other riparian and meadow-dwelling bird species.

As with several other high-elevation breeding species, White-crowned Sparrow populations in the parks are currently not effectively monitored; development of suitable monitoring efforts to assess how the species is responding to climate change and any other threats would be helpful.

White-headed Woodpecker – *Picoides albolarvatus*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
White-headed Woodpecker is a fairly common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and Devils Postpile (DEPO) National Monument (Table 1).

Table 80. Breeding status and relative abundance of White-headed Woodpeckers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Year-round	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G4 – Apparently Secure (Uncommon, but not rare)
- National Status: N4 – Apparently Secure (Uncommon, but not rare)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The White-headed Woodpecker breeds only in isolated mountainous areas of extreme southwestern British Columbia, Washington, western Idaho, Oregon, and California (Garrett et al. 1996). This species may be more common in the Sierra Nevada than any other part of its range. Thus, the Sierra is of great importance to the species' overall population (Siegel and DeSante 1999).

Distribution and Habitat Associations
White-headed Woodpecker is restricted to mixed coniferous forests dominated by pines (Garrett et al. 1996). In the Sierra, the species prefers mature forests but also commonly occurs in more open Ponderosa and Jeffrey Pine forest and less commonly in closed Red Fir forest and eastside Jeffrey Pine forest (Siegel and DeSante 1999). The species was detected in relatively high numbers (Table 2) in a variety of forest types along survey transects (Figures 1 and 2) during avian inventory projects at all SIEN parks. Detections at SEKI and YOSE tended to occur in the western portion of the parks. After accounting for detection probability, park inventories show strongest associations with Giant Sequoia Forest, and to a lesser extent Ponderosa Pine/Incense-cedar and Red fir/White Fir forest within SEKI. In YOSE, White-headed Woodpeckers appeared

most abundant in White Alder forest, but this was an artifact of the very small sample size in that habitat. The birds were most reliably common in Ponderosa Pine, Mixed Conifer, Montane Chaparral, and recent burns (Table 2). Habitat associations could not be determined at Devils Postpile.

Table 81. Number of White-headed Woodpeckers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings	73	80	Giant Sequoia Forest	0.12	0.14 (0.08-0.26)
			Ponderosa Pine/Incense Cedar	0.10	0.06 (0.02-0.17)
Canyon NPs			Red Fir/White Fir Forest	0.07	0.04 (0.02-0.09)
	148	162	White Alder	1.27	
Yosemite NP			Ponderosa Pine	0.13	
			Ponderosa Pine/Mixed Conifer	0.12	
			Montane Chaparral	0.12	
			Recent Burn	0.11	
Devils Postpile NM	3	3	NA[1]	NA	3

[1]NA - Information not available due to insufficient data.

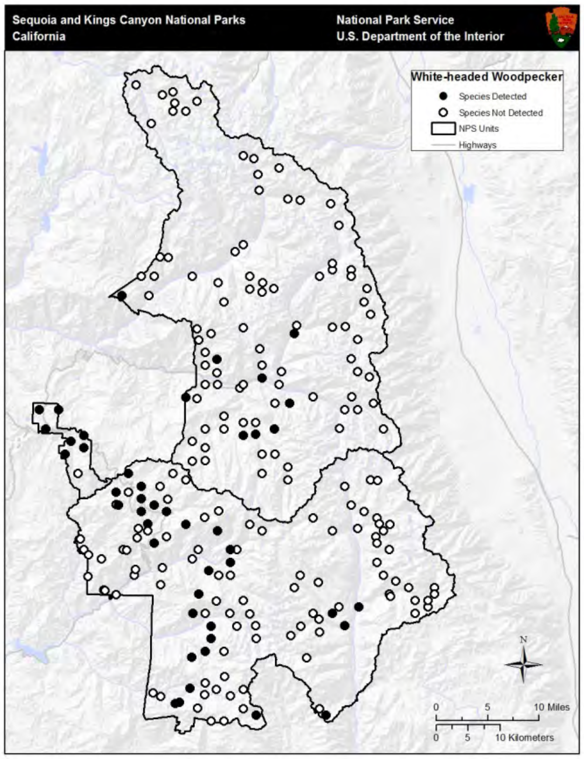

Figure 35. Bird survey transects where White-headed Woodpecker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

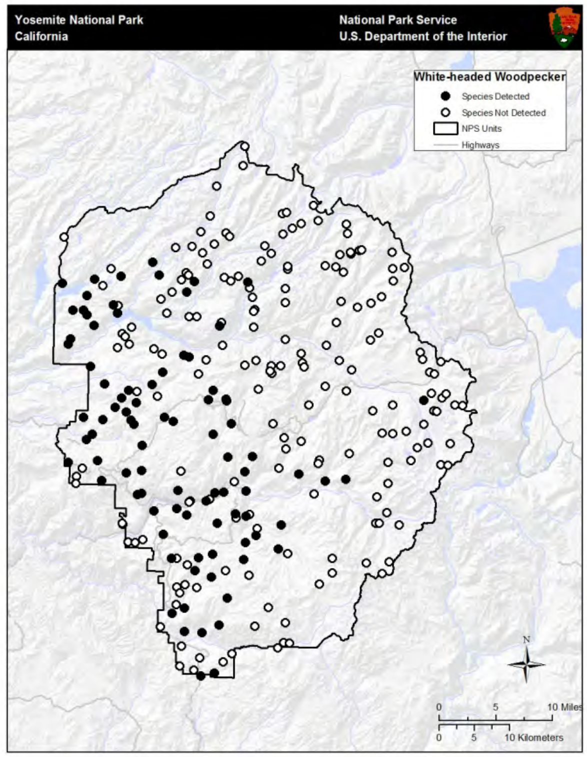

Figure 36. Bird survey transects where White-headed Woodpecker was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

White-headed Woodpecker was detected at mid-elevations in SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of White-headed Woodpecker in SEKI was 2217 m, with 95% of observations occurring between 1762 and 2907 m. In YOSE, the mean elevation of observations was 1964 m with 95% of observations falling between 1207 and 2601 m (Siegel et al. 2011).

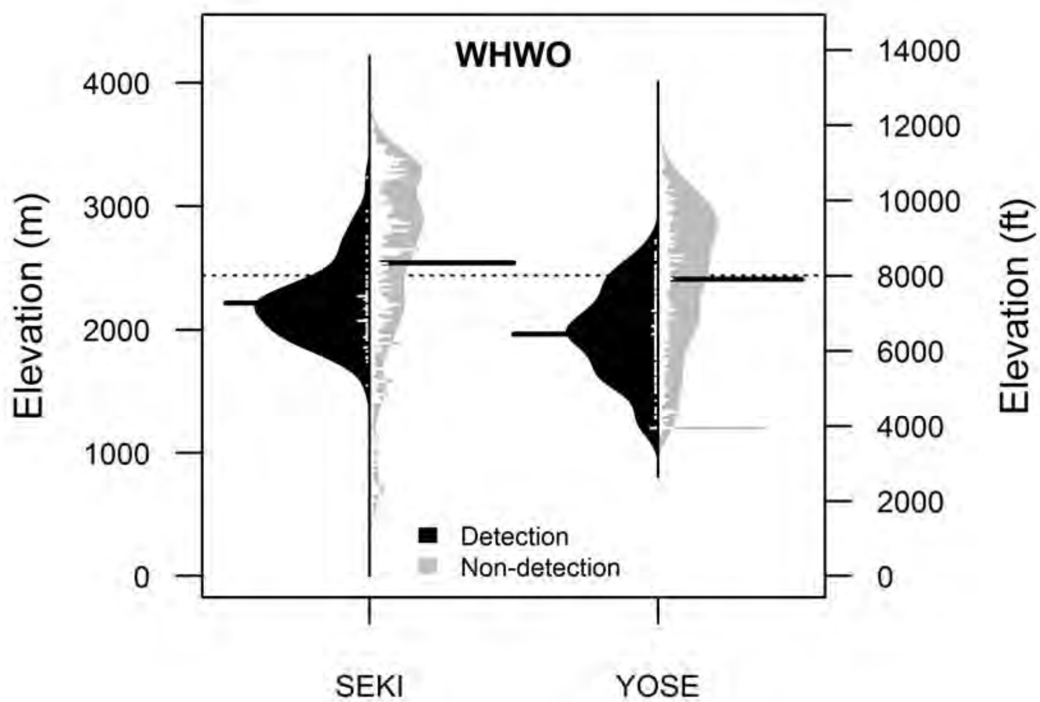

Figure 3. Elevational distributions of sites where White-headed Woodpecker (WHWO) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) data indicate White-headed Woodpeckers are much more abundant in the Sierra Region (BCR 15) than in California as a whole (Table 3). They were relatively abundant at Kings Canyon and especially Yosemite NP on individual BBS routes. BBS data showed significant slight population increases in California and the Sierra Region from 1966-2007, although a non-significant negative trend was evident for the route in Yosemite NP from 1974-2007 (Table 3).

Table 82. Relative abundance and trends for White-headed Woodpecker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	62	0.66	+1.9	0.01
	1980-2007			+1.3	0.17
Sierra Nevada (BCR 15)	1966-2007	30	1.62	+2.2	0.01
	1980-2007			+1.7	0.14
Route 14117 – Sequoia NP	1972-2005	1	0.19	+2.8	0.93
Route 14132 – Kings Canyon NP	1974-2005	1	1.00	+8.1	0.44
Route 14156 – Yosemite NP	1974-2007	1	2.69	-3.3	0.50

White-headed Woodpeckers were not captured in sufficient numbers at MAPS stations to estimate population and reproductive trends for all SIEN parks (Table 4). However, mark-recapture data from YOSE suggest a high adult apparent survival rate, which may explain population increases throughout California.

Table 83. Population trends, productivity, trends, and survival estimates of White-headed Woodpecker at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.8	NA[2]	0.13	NA	NA
Yosemite NP	1993-2009	0.8	NA	0.23	NA	0.948 (0.111)
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

White-headed Woodpecker is one of the least-studied woodpeckers in North America. The species is more abundant in California than elsewhere in its range, where populations are declining (Wightman et al. 2010). The Sierra Nevada is particularly important for White-headed Woodpeckers: they were detected in relatively high numbers during inventory surveys in SIEN parks (Table 2), BBS data show an increasing population trend over the past 40 years (Table 3), and MAPS data indicate adults have relatively high survival (Table 4).

Loss or degradation of habitat, invasive species, and disease do not appear to be major concerns for White-headed Woodpeckers within the SIEN parks. Fire treatments that mimic natural fire regimes, including high-intensity fire to open the canopy and low-intensity fire to retain live cone-producing pines, will benefit this species.

Climate Change: An analysis of shifts between the historical range of White-headed Woodpeckers (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature changes (but not precipitation change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that White-headed Woodpecker has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

White-headed Woodpecker is abundant at mid-elevation zones of SEKI and YOSE (Figure 3). If climate change causes the species' range to shift upward as is generally expected, some higher-altitude forest habitat exists for new colonization within Sequoia and Kings Canyon as well as Yosemite. The species may be able to adapt to climate change long as coniferous forests with an element of pine remain intact above the woodpecker's current range.

Altered Fire Regimes: White-headed Woodpeckers forage and nest successfully in unburned and burned forests, including post-fire salvage-logged (Saab and Dudley 1998, Hanson and North 2008) and commercially thinned stands (Gaines et al. 2007). This species was significantly more abundant in burned compared to green forests in the northern Sierra Nevada (Burnett et al. 2010) and in the McNally Fire in the southern Sierra Nevada, but found equally often in burned and unburned stands in the nearby Manter Fire (Siegel and Wilkerson 2005). In burned forests in Oregon, White-headed Woodpeckers selected nest sites with more and larger dead trees within a mosaic of burn intensities (Wightman et al. 2010). High-intensity fire opens forest canopies and creates decayed snags for nesting, while unburned or low-intensity burned stands retain live, cone-producing pines for food resources (Wightman et al. 2010). Over the long term, fire of varying intensities in the SIEN parks maintains optimal habitat conditions for White-headed Woodpeckers.

Habitat Fragmentation or Loss: White-headed Woodpeckers prefer open forests with high density of large trees and snags (Buchanan et al. 2003). Some thinning of smaller-sized trees may benefit the species, although clearcut harvest, selective logging of large trees, even-aged stand management, snag removal, fire suppression, and forest fragmentation – particularly loss of large-diameter Ponderosa Pines – have contributed to local declines of this species. Lack of commercial logging in SIEN parks means that habitat loss or fragmentation do not pose a major threat to the species.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the White-headed Woodpecker.

Human Use Impacts: Pesticide use on forest insect outbreaks outside the parks could be a risk (Siegel and DeSante 1999) but no data are available.

Management Options and Conservation Opportunities

Management actions in SIEN parks that would most benefit White-headed Woodpeckers include ecosystem management that retains and recruits large Ponderosa Pines, and allows a patchy mosaic of fire of varying intensities to maintain open-forest habitats. The parks might also consider an education program to the public about the value of high-intensity fire to many wildlife species.

White-tailed Ptarmigan – *Lagopus leucura*

Migratory Status

Short-distance/Elevational migrant (Braun et al. 1993)

Residency and Breeding Status

White-tailed Ptarmigan is an uncommon resident at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks, but is not known to occur at Devils Postpile National Monument (DEPO) (Table 1).

Table 84. Breeding status and relative abundance of White-tailed Ptarmigans in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round, Non-native	Local Breeder	Locally Uncommon
Yosemite NP	Year-round, Non-native	Local Breeder	Locally Uncommon
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNA – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

White-tailed Ptarmigan is native to northwestern North America with the majority of its range occurring in western Canada and southern Alaska. There are also pockets of native occurrences in the Cascade Range of Washington and the Rocky Mountain cordillera from Montana to northern New Mexico. The species was deliberately introduced to other parts of the Rocky Mountains and the Sierra Nevada in the late 1960s and early 1970s (Braun et al. 1993). The entire Sierra population apparently stems from the release of 73 birds near Mono Pass in 1971 and 1972 (Roberson 1993). By 1990 the population was known to have spread at least as far south as Bishop (Frederick and Gutiérrez 1992). During the SEKI avian inventory (see below), the species was detected in Dusy Basin, and also just south of Pynchot Pass; the latter may represent the most southerly record in the Sierra (Siegel and Wilkerson 2005a). White-tailed Ptarmigan are not native to SIEN parks, so the parks are not important for the species' natural range.

Distribution and Habitat Associations

In the Sierra Nevada, White-tailed Ptarmigan favor alpine areas with sod-forming alpine vegetation and abundant water (Gaines 1992). During bird inventories of the SIEN parks, White-tailed Ptarmigan was detected twice in YOSE (Figure 1) and but not at SEKI or DEPO (Table 2). Within YOSE, the small amount of inventory data indicates that the species is associated with subalpine Whitebark Pine, which is also the habitat in which the birds were anecdotally detected at SEKI. Habitat associations are not well covered for this species, as park inventories are not designed to survey habitats above tree line.

Table 85. Number of White-tailed Ptarmigans recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	0	0	Detected off-survey	NA[1]	NA
Yosemite NP	2	2	Whitebark Pine	0.01	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

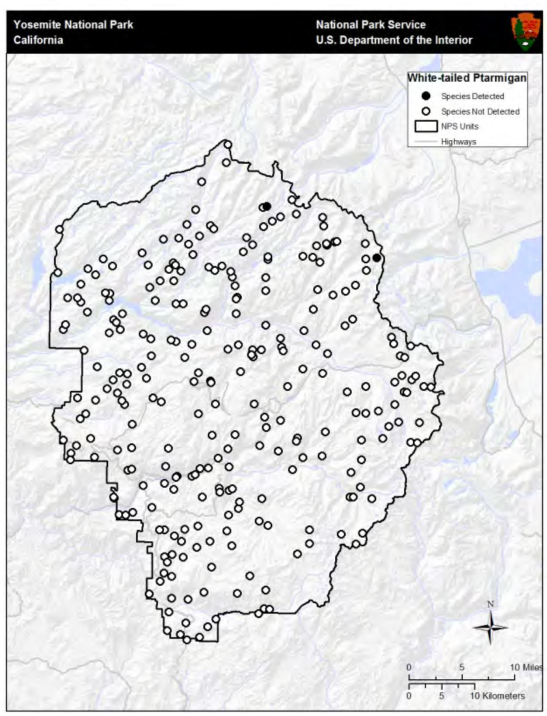

Figure 1. Bird survey transects where White-tailed Ptarmigan was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

White-tailed Ptarmigan was observed within the high elevations of YOSE, but not observed in SEKI during recent avian inventory projects (Figure 2). The two observations were made at 3227 and 3299 m, respectively (Siegel et al. 2011).

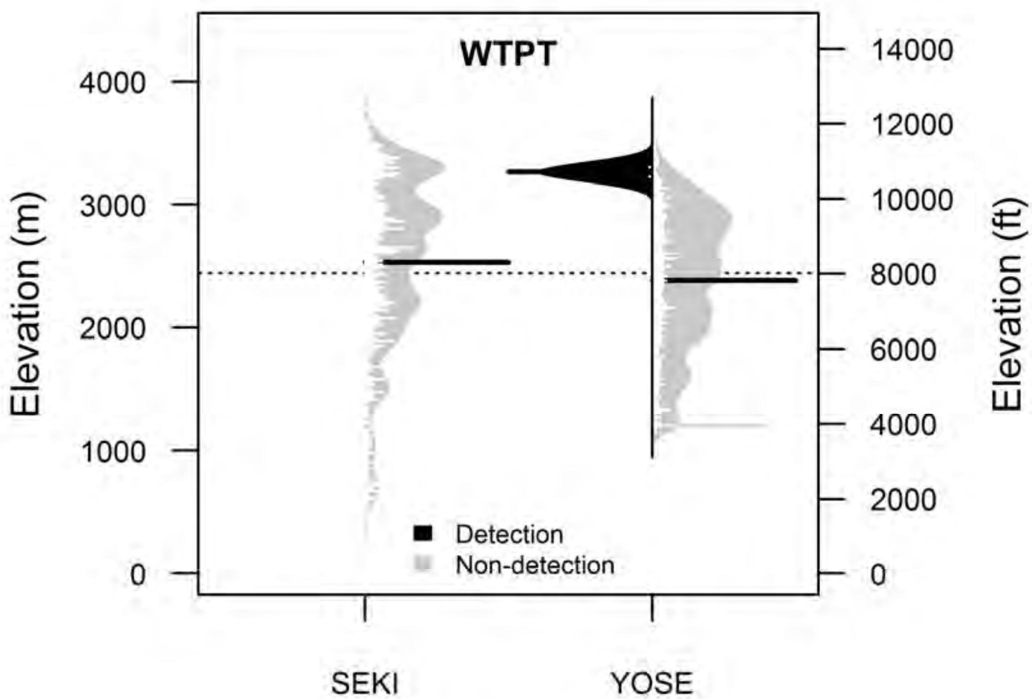

Figure 2. Elevational distributions of sites where White-tailed Ptarmigans (WTPT) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

There is insufficient Breeding Bird Survey (BBS) data across California and the Sierra Nevada to estimate abundance and trends and no individuals were observed along BBS routes within SEKI and YOSE (Table 3).

Table 86. Relative abundance and trends for White-tailed Ptarmigan according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with Detections	Abundance (birds/route)	Trend (annual % change)	*P*
California	1966-2007	NA[1]	NA	NA	NA
	1980-2007			NA	NA
Sierra Nevada (BCR 15)	1966-2007	NA	NA	NA	NA
	1980-2007			NA	NA
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA	NA
Route 14132 – Kings Canyon NP	1974-2005	0	0.00	NA	NA
Route 14156 – Yosemite NP	1974-2007	0	0.00	NA	NA

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

White-tailed Ptarmigan do not utilize low- and mid-elevation meadow habitats, so SIEN MAPS stations do not sample them; data on productivity and survival within SIEN parks are not available.

Stressors

Development in alpine areas, hunting, and climate change are the greatest threats to the White-tailed Ptarmigan in the Sierra Nevada. Of these threats, climate change is the only major concern within SIEN parks. Evidence of negative responses to climate change and the position of the Sierra Nevada outside of the species' native range suggest the species will not fare well in the SIEN parks as the Sierra warms. Altered fire regimes, invasive species, and disease do not appear to be major threats to this species within SIEN parks.

Climate Change: Studies of White-tailed Ptarmigan response to climate change have shown that spring temperatures influence breeding timing (Wang et al. 2002, Wilson and Martin 2010) and breeding effort, with warmer springs correlated with reduced clutch size (Wilson and Martin 2010). Furthermore, Wang et al. (2002) found that warmer winters are associated with slower population growth, suggesting that climate change is contributing to declines in White-tailed Ptarmigan abundance. Alpine species and habitats are thought to be especially susceptible to climate change and evidence suggests that White-tailed Ptarmigan is not an exception to this rule. Furthermore, the Sierra Nevada falls outside - and to the south of - the species' native distribution, suggesting SIEN parks may fall outside of White-tailed Ptarmigan's preferred climatic range as well.

Altered Fire Regimes: Wildfire is rare near or above tree line where White-tailed Ptarmigan live. For this reason any increase in fire frequency is unlikely to directly affect this species.

Habitat Fragmentation or Loss: Any development or land use that reduces the abundance of winter food, especially willow, can be detrimental to White-tailed Ptarmigan. Degrading activities can include construction of roads, snow catchment fences, reservoirs, mining, ski area development, off-road vehicle use, and overgrazing by livestock (Braun et al. 1993), but none of these are likely to be important concerns within SIEN parks.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the White-tailed Ptarmigan.

Human Use Impacts: White-tailed Ptarmigan were introduced for hunting and over-harvest can be a major threat to the species outside of SIEN parks.

Management Options and Conservation Opportunities

The implementation of surveys for alpine bird species such as the White-tailed Ptarmigan are needed to accurately assess populations within SIEN parks and to better understand their impact on native flora and fauna. Management options for the conservation of this species are largely limited to the restriction of harmful human activities, most of which do not occur within national parks. For this reason there is little park managers can do to promote White-tailed Ptarmigan within SIEN parks, if support of this introduced species is desired.

White-throated Swift – *Aeronautes saxatalis*

Migratory Status

Short-distance/Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

White-throated Swift is a fairly common breeder at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) national parks. The species is an uncommon, but possible breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 87. Breeding status and relative abundance of White-throated Swifts in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Fairly Common
Yosemite NP	Summer/Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Migrant/Summer	Possible Breeder	Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S4 – Apparently Secure (Uncommon, but not rare)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

White-throated Swift is distributed across much of the western U.S. (Siegel and DeSante 1999) including throughout the Sierra Nevada and coast range of California (Ryan and Collins 2000). Due to its widespread distribution within the western U.S., the SIEN parks do not make up a significant part of the species’ range.

Distribution and Habitat Associations

White-throated Swifts can be seen flying over all types of habitat, but make their nests on granite or volcanic cliff faces (Gaines 1992). White-throated Swifts were detected in moderate densities (Table 2) along a handful of survey transects (Figures 1 and 2) during avian inventory surveys at SEKI and YOSE (where numerous point counts in Yosemite Valley likely registered the same distant individuals) and were detected only anecdotally away from survey transects during the DEPO survey. Park inventories show highest associations with Canyon Live Oak and Black Oak forests within SEKI and YOSE respectively (Table 2). Surveys were not designed to target areas where White-throated Swifts are known to nest (i.e. cliff faces); thus survey results most likely reflect preferred foraging habitat rather than breeding habitat.

Table 88. Number of White-throated Swifts recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	25	38	Canyon Live Oak Forest	0.12	NA[1]
Yosemite NP	58	229	Black Oak Ponderosa Pine/Mixed Conifer Canyon Live Oak	0.16 0.03 0.03	
Devils Postpile NM	0	0	Detected off-census	NA	

[1]NA - Information not available due to insufficient data. Habitat densities at Sequoia and Kings Canyon not available due to aerial behavior of this species (see Siegel and Wilkerson 2005).

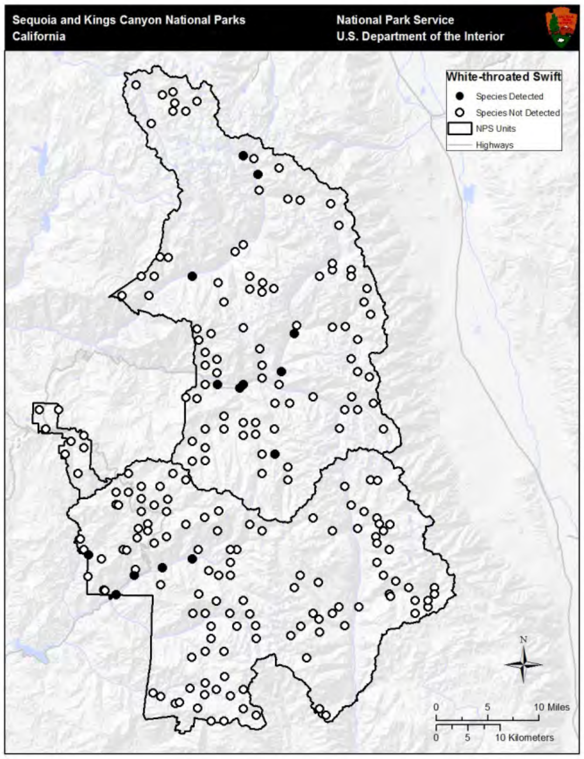

Figure 37. Bird survey transects where White-throated Swift was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

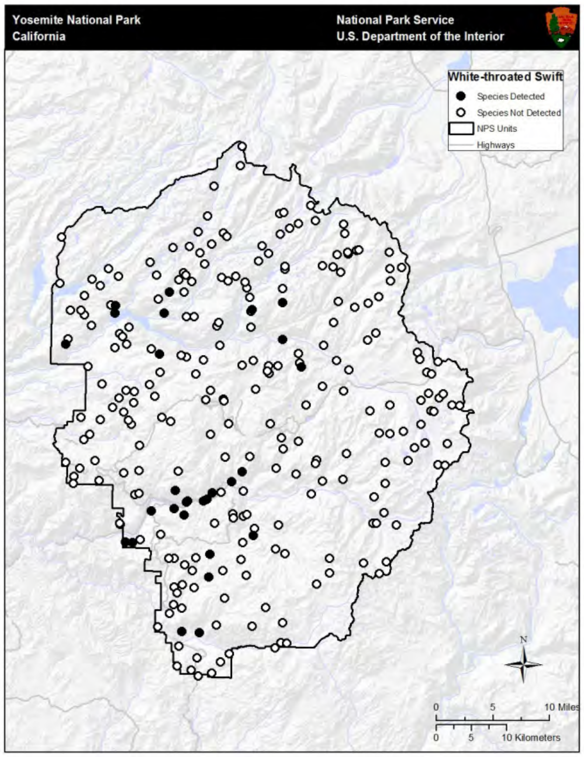

Figure 38. Bird survey transects where White-throated Swift was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

White-throated Swift was observed within the lower-elevations of both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of White-throated Swift in SEKI was 1539 m, with 95% of observations occurring between 521 and 2734 m. At YOSE, the mean elevation of observations was 1640 m with 95% of observations falling between 1200 and 2706 m (Siegel et al. 2011).

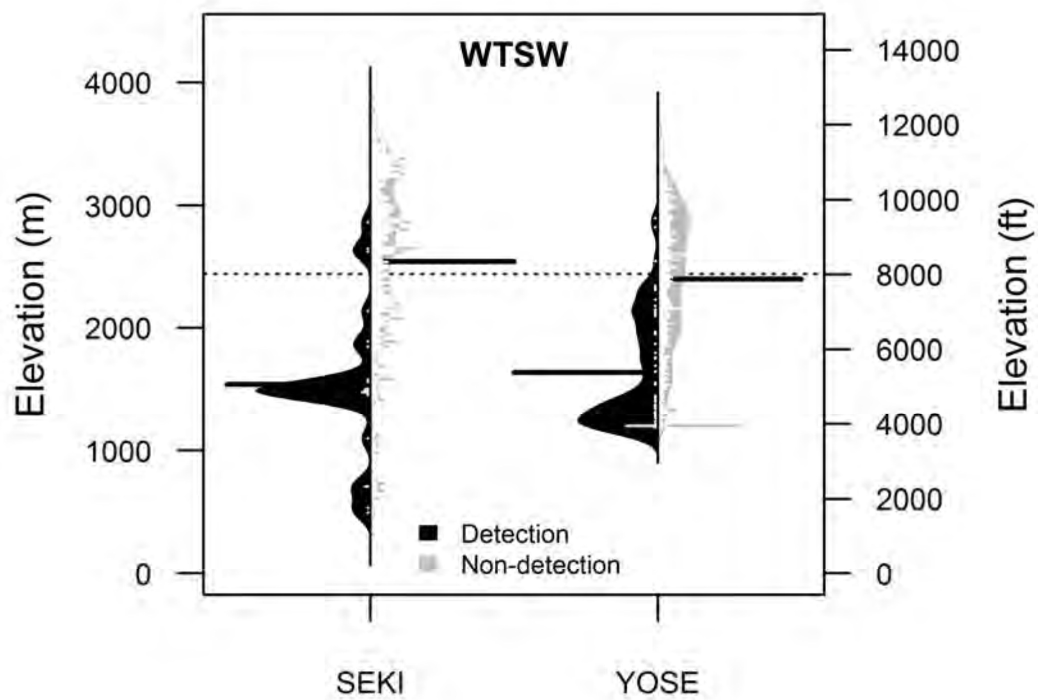

Figure 3. Elevational distributions of sites where White-throated Swifts (WTSW) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate White-throated Swifts are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole, although only along eight routes in the Sierra. They were detected in moderate numbers on individual BBS routes at YOSE and Sequoia NP, and in large numbers along the Kings Canyon NP route. Populations appear stable with no significant trends along any relevant routes or regions (Table 3).

Table 89. Relative abundance and trends for White-throated Swift according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	69	1.53	-1.7	0.52
	1980-2007			+0.6	0.78
Sierra Nevada (BCR 15)	1966-2007[1]	8	4.71	-11.6	0.41
	1980-2007[1]			-2.3	0.67
Route 14117 – Sequoia NP	1972-2005	1	6.56	+15.5	0.39
Route 14132 – Kings Canyon NP	1974-2005	1	118.9	-2.7	0.44
Route 14156 – Yosemite NP	1974-2007	1	3.50	-1.7	0.78

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

White-throated Swifts are infrequently captured in ground-level mist nets intended for passerines, and therefore are not sampled by SIEN MAPS stations; data on productivity and survival within the parks are not available.

Stressors

Populations of the White-throated Swift appear healthy across the western U.S. including within the Sierra Nevada. This stability is likely due to an apparent lack of significant natural or anthropogenic threats to the species. White-throated Swift has generally benefitted from human activities that create nesting habitat. Potential minor threats include exposure to pesticides and nest disturbance from rock climbing, although neither threat appears to have significant impacts on the species. The effects of climate change on White-throated Swift is largely unknown, but the species does not appear particularly vulnerable to changing conditions.

Climate Change: The impacts of climate change on the White-throated Swift are largely unknown. However, given its fairly wide range across different climate zones in the western U.S., the species does not appear limited to specific climatic conditions. Furthermore, the swifts are found toward the lower elevations of the SIEN parks (Figure 3) and the parks are located comfortably in the middle of the species' breeding range. If White-throated Swifts shift northward and upward as is generally expected, the species is likely to remain in SIEN parks in the future.

Altered Fire Regimes: White-throated Swifts nest on cliff faces and human structures, neither of which is particularly susceptible to fire. Likewise, their foraging range is extensive (possibly traveling more miles in one day than any other species; Gaines 1992) allowing individuals to avoid any habitat made unsuitable by fire.

Habitat Fragmentation or Loss: Nesting habitat is more often created by human activities than destroyed (see *Human Use Impacts* below). Likewise, fragmentation or loss of foraging habitat does not appear to pose a threat to the White-throated Swift.

Invasive Species and Disease: To our knowledge, there are no major threats of invasive species or disease to the White-throated Swift.

Human Use Impacts: In general White-throated Swifts benefit from construction of artificial nesting sites in the form of highway overpasses, bridges, and some buildings. Natural nesting sites are rarely disturbed by humans because of their remote nature (Ryan and Collins 2000). The possible exception to this in SIEN parks is disturbance from rock climbing, although the magnitude of such effects is unknown. Nesting sites can be destroyed due to mining activities or decommissioning of old human structures used for breeding (Ryan and Collins 2000). Pesticide application to insect prey populations could pose a threat to White-throated Swift, but evidence that this is a concern is limited (Ryan and Collins 2000).

Management Options and Conservation Opportunities

White-throated Swift is not a heavily managed species. Where nesting on human infrastructure occurs, care should be taken to avoid excessive disturbance during the breeding season, although individuals are largely tolerant of human activities (Ryan and Collins 2000). Surveys and monitoring of nesting sites within SIEN parks would help better understand the status and trends of populations in these areas. Human activities around nesting sites are likely rare, but if rock climbing occurs around such locations in SIEN parks, its restriction during the breeding season would help protect breeding White-throated Swifts.

Williamson's Sapsucker – *Sphyrapicus thyroideus*

Migratory Status

Resident/short-distance migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Williamson's Sapsucker is a fairly common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and a fairly common summer resident and regular breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 90. Breeding status and relative abundance of Williamson's Sapsuckers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Fairly Common
Yosemite NP	Year-round	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common; widespread and abundant)
- National Status: N5 – Secure (Common; widespread and abundant)
- California Status: S3 – Vulnerable (Moderate risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Species of Conservation Concern
- CA Department of Fish and Game Status: Not listed

Range Significance

Williamson's Sapsuckers breed in western mountain ranges from southern British Columbia to California and New Mexico and winter in the southwestern U.S. and Mexico (Dobbs et al. 1997). The Sierra Nevada is not of great importance to the species' overall population but comprises a significant portion of the species' breeding range in California and thus is very important for the state population.

Distribution and Habitat Associations

Williamsons' Sapsucker inhabits open coniferous and mixed coniferous-deciduous forests, from dry, rocky, openly wooded ridges to densely forested valley bottoms (Siegel and DeSante 1999). The species was detected in moderate numbers at SEKI and YOSE (Table 2) in a variety of forest types along survey transects (Figures 1 and 2) during avian inventory projects. No birds were detected at DEPO. Detections of Williamson's Sapsucker were scattered throughout the parks and not concentrated in any particular region. After accounting for detection probability, park inventories show strongest associations with Western White Pine woodlands, lower-elevation meadows, and White Fir/Sugar Pine forests within SEKI. In YOSE, White-headed

Woodpeckers were equally abundant in Mountain Hemlock, Lodgepole Pine, and barren habitats (Table 2).

Table 91. Number of Williamson's Sapsuckers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	38	40	Western White Pine Woodland	0.13	0.07 (0.02-0.27)
			Lower Elevation Meadow	0.03	0.02 (0.01-0.10)
			White Fir/Sugar Pine Forest	0.02	0.04 (0.02-0.09)
Yosemite NP	21	24	Mountain Hemlock	0.02	
			Lodgepole Pine	0.02	
			Barren	0.02	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

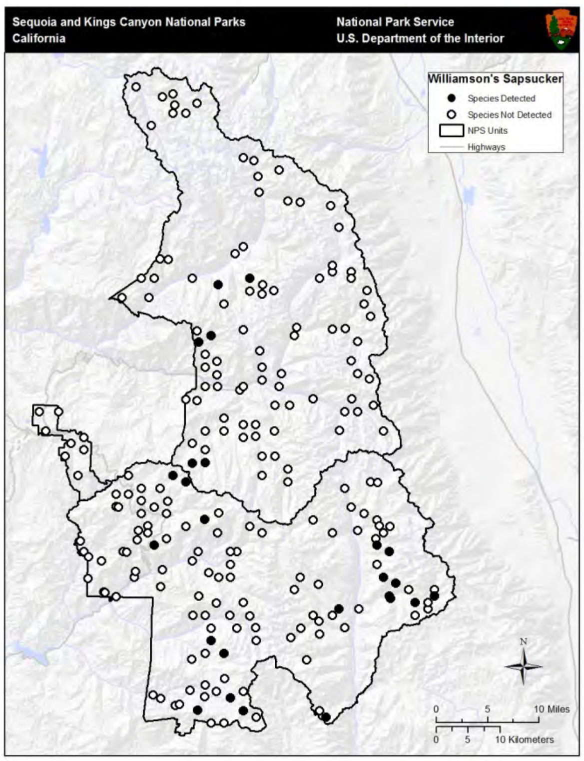

Figure 39. Bird survey transects where Williamson's Sapsucker was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

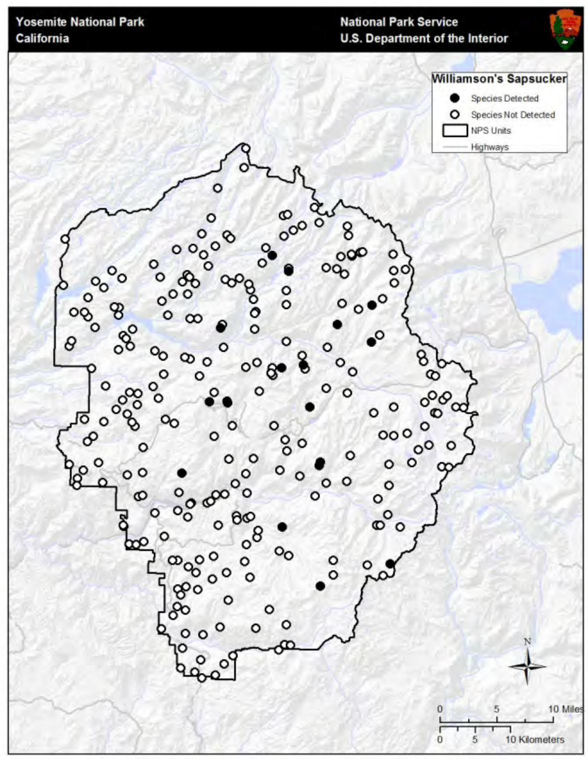

Figure 40. Bird survey transects where Williamson's Sapsucker was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Williamson's Sapsucker was detected at mid- to high-elevations in SEKI and YOSE during recent avian inventory surveys (Figure 3). The mean elevation of observations in SEKI was 2870 m, with 95% of observations occurring between 2388 and 3373 m. In YOSE, the mean elevation of observations was 2679 m with 95% of observations falling between 2302 and 2967 m (Siegel et al. 2011).

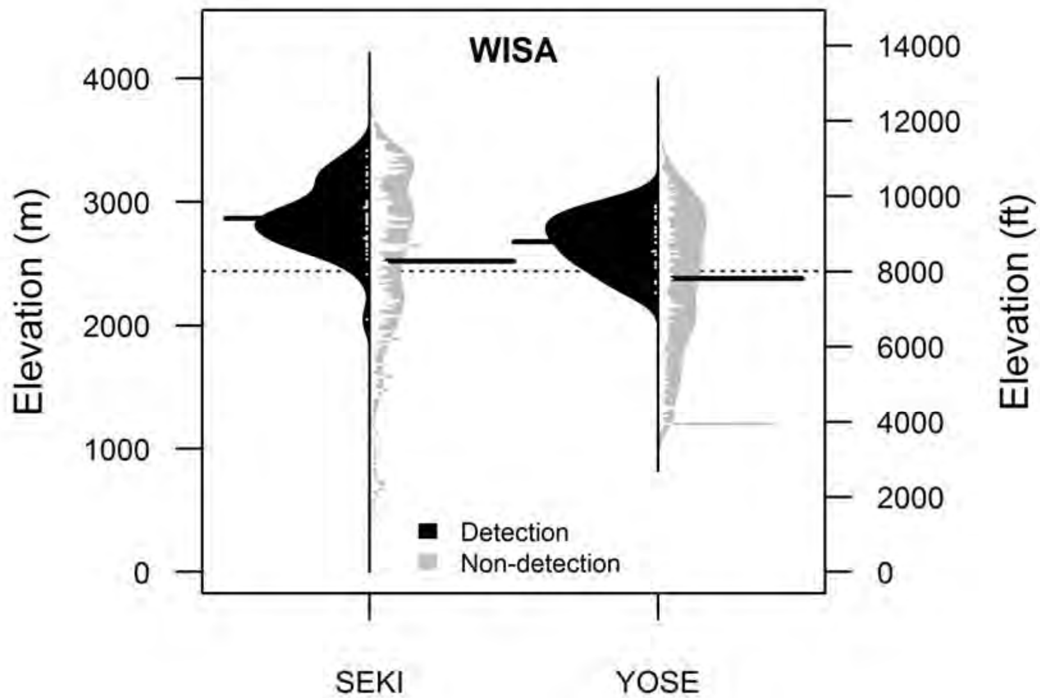

Figure 3. Elevational distributions of sites where Williamson's Sapsucker (WISA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) data indicate Williamson's Sapsuckers are equally abundant in the Sierra Region (BCR 15) and California as a whole (Table 3). Within SIEN parks, this species was most abundant along the route in Sequoia NP; fewer birds were detected along the Yosemite and, especially Kings Canyon routes. No significant population trends were observed, although a non-significant negative trend was evident for the Yosemite route (Table 3).

Table 92. Relative abundance and trends for Williamson's Sapsucker according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007[1]	15	0.27	-0.7	0.89
	1980-2007[1]			+0.3	0.96
Sierra Nevada (BCR 15)	1966-2007[1]	8	0.27	-1.0	0.82
	1980-2007[1]			-0.1	0.99
Route 14117 – Sequoia NP	1972-2005	1	0.38	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	0.19	-8.7	0.67

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Sufficient data from MAPS stations were only available to estimate Williamson's Sapsucker demographic trends for YOSE. This species exhibited non-significant negative population and reproductive trends from 1993-2009 (Table 4), in agreement with BBS data from Yosemite National Park (Table 3).

Table 93. Population trends, productivity, trends, and survival estimates of Williamson's Sapsucker at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.0	NA[2]	NA	NA	NA
Yosemite NP	1993-2009	0.9	-1.89	0.31	-5.95	0.623 (0.141)
Devils Postpile NM	2002-2006	1.3	NA	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Williamson's Sapsuckers are associated with mid- and higher-elevation open forest types in the SIEN parks. Populations exhibited no significant trends in the Sierra Nevada, but data are sparse. Clearcutting and removal of snags likely has adverse impacts on this species, but these activities are not threats within the SIEN parks. Williamson's Sapsuckers occur at higher-elevations and may face serious challenges adapting to climate change.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Williamson's Sapsucker has significantly shifted over 50 miles north and 60 miles inland throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Shifts in both these directions suggest the species may be moving toward cooler areas as the climate warms (Audubon 2009). Similarly, an analysis of shifts between the historical range of Williamson's Sapsucker (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to temperature and precipitation changes by shifting its range to follow its climatic niche (Tingley et al. 2009). These observed shifts provide strong evidence that this species has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades.

Williamson's Sapsucker currently breeds at relatively high elevations in the SIEN parks (Figure 3) and is already shifting its range in response to climate change. If climate change causes the species' range to shift upward as is generally expected, there may not be sufficient amounts of open coniferous forest at higher altitudes for new colonization within Sequoia and Kings Canyon and Yosemite. This species may face serious challenges, although the fact that it occupies a somewhat broad range of forest types may indicate resilience.

Altered Fire Regimes: Williamson's Sapsucker may be able to tolerate habitat disturbance from fire due to its preference for open forests. However, research suggests a negative response to some fires. This species nested on burned plots but were more abundant breeders on unburned plots (Rafael et al. 1987). Williamson's sapsuckers decreased in response to all burn severities, but not significantly, in Montana (Smucker et al. 2005). The effect of fire on these birds is somewhat equivocal, but a future increase in high-intensity fire in SIEN parks may reduce habitat suitability.

Habitat Fragmentation or Loss: Williamson's Sapsuckers occur in relatively open forest. As such, timber harvest that retains snags for nesting sites may not adversely impact this species (Dobbs et al. 1997). Historical clearcutting, elimination of snags, and fire-suppression may have harmed Williamson's Sapsuckers, but the birds are apparently able to withstand considerable disturbance. Habitat fragmentation and loss is not a major threat to the species within SIEN parks.

Invasive Species and Disease: European Starlings were introduced to New York City in 1890 and by the middle of the 20th century had spread across much of North America with the exception of Mexico. Williamson's Sapsuckers were not examined, but Red-breasted Sapsucker population declines were correlated with invasion by starlings (Koenig 2003). Extent of sapsucker competition with starling in SIEN parks is unknown, but Williamson's Sapsuckers preference for higher-elevation forests may buffer it somewhat from competition with starlings.

Human Use Impacts: Pesticide use on forest insect outbreaks outside the parks may be a risk (Siegel and DeSante 1999), but no data are available.

Management Options and Conservation Opportunities

Sapsuckers are important primary cavity excavators, but unfortunately are understudied in the Sierra Nevada. Park managers can help conserve Williamson's Sapsucker populations by managing ecosystems to retain and recruit patches of snags and areas of high snag density, especially those in drainage bottoms or other low-lying areas (Dobbs et al. 1997). Another priority should be monitoring the effects of European Starlings, and implementing a removal program for starlings if monitoring indicates substantial conflict with sapsuckers. Also of concern is the potential range shift of Williamson's Sapsucker due to climate change. Monitoring of this species should continue in order to detect any effects of climate change and other threats on the species within SIEN parks.

Willow Flycatcher – *Empidonax traillii*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Willow Flycatcher is a rare former breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, and a rare non-breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 94. Breeding status and relative abundance of Willow Flycatchers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Migrant/Summer	Former Breeder	Rare
Yosemite NP	Migrant/Summer	Former Breeder	Rare
Devils Postpile NM	Migrant/Summer	Non-Breeder	Rare

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S1S2 – Critically Imperiled/Imperiled (High to very high risk of extinction or elimination)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Bird of Conservation Concern
  - Federally Endangered (Southwestern Subspecies which likely does not occur in SIEN parks)
- CA Department of Fish and Game Status: State Endangered

Range Significance
Willow Flycatcher is distributed over much of the United States (Siegel and DeSante 1999). Three subspecies of Willow Flycatcher (*E. t. brewsteri*, *E. t. adastus*, and *E. t. extimus*) occur within the Sierra Nevada, all of which are on the California Endangered Species list (Siegel et al. 2008). Much of Willow Flycatcher's preferred habitat in California's central valley and coastal southern California has been lost or is highly fragmented (Craig and Williams 1998), thus any habitats where Willow Flycatcher is still found within SIEN parks is very important to the species.

Distribution and Habitat Associations
As their name suggests, Willow Flycatchers frequent the willows found along languid streams and, to a lesser degree, within moist meadows (Gaines 1992). Willow Flycatchers were not detected during avian inventory surveys at the SIEN parks (Table 2), but other research and

monitoring efforts at YOSE have documented the decline, recent extirpation as a breeder, and continued occurrence as a rare migrant (Siegel et al. 2008).

Table 95. Number of Willow Flycatchers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings	0	0	Not detected	NA[1]	NA
Yosemite NP	0	0	Detected off-survey	NA	
Devils Postpile NM	0	0	Not detected	NA	

[1]NA - Information not available due to insufficient data.

Elevational Distribution

Willow Flycatcher was not observed during park inventories; quantitative data on elevational distribution are not available for this species.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Willow Flycatchers are detected infrequently both within the Sierra Nevada region (BCR 15) and across California. They were detected in low numbers on individual BBS routes at YOSE and Kings Canyon (but not in recent years), and have not been observed along the Sequoia route. There are no statistically significant population trends during any time period within the areas of interest (Table 3), but the species is known to have been lost from some areas of the Sierra Nevada including as a breeder from YOSE (Siegel et al. 2008).

Table 96. Relative abundance and trends for Willow Flycatcher according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007[1]	24	0.04	+31.2	0.16
	1980-2007[1]			+7.7	0.12
Sierra Nevada (BCR 15)	1966-2007[1]	6	0.07	+51.9	0.23
	1980-2007[1]			-18.8	0.25
Route 14117 – Sequoia NP	1972-2005	0	0.00	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.05	NA	NA
Route 14156 – Yosemite NP	1974-2007	1	1.81	-1.8	0.68

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

MAPS stations at YOSE formerly captured adult and young Willow Flycatchers with regularity, but in recent years the species only appears at YOSE and DEPO as a rare migrant (Table 4).

Table 97. Population trends, productivity, trends, and survival estimates of Willow Flycatcher at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.0	NA[2]	NA	NA	NA
Yosemite NP	1993-2009	0.7	NA	0.20	NA	NA
Devils Postpile NM	2002-2006	0.3	NA	0.00	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Habitat loss and alteration is likely the greatest cause of Willow Flycatcher's decline in the west (NatureServe 2009). Within the Sierra Nevada, habitat degradation due to historic and/or ongoing grazing of riparian and meadow habitats is especially problematic (Siegel et al. 2008). Other threats such as climate change, altered fire regimes and invasive species can also lead to habitat degradation indirectly (see below). Climate change may be contributing to meadow desiccation, which is detrimental to Willow Flycatcher, but the phenomenon does not appear to threaten the species directly. The invasion of tamarisk species and Brown-headed Cowbirds is a substantial threat to Willow Flycatcher where invasions have occurred, particularly outside of the SIEN. Finally, collisions with human structures and reduced reproductive success due to heavy recreational use are both minor threats within SEIN parks.

Climate Change: New tools are being developed to assess a species' sensitivity or vulnerability to changes in climate. These assessments rely on expert and published knowledge of life-history characteristics that contributed to sensitivity and/or adaptability of the species. In addition to evaluating sensitivity, vulnerability assessments also incorporate climate change predictions, providing modeled, spatially explicit, estimates of vulnerability. A sensitivity assessment conducted by researchers at the University of Washington found that on a scale of 0 to 100, with 100 representing maximum sensitive to climate change, Willow Flycatcher received a sensitivity score of 25.51 (UW 2010), suggesting low sensitivity to the threat. Certainty of results was listed as 35.00 out of 100 (a score of 100 representing complete certainty). Among the factors assessed, the characteristic most contributing to Willow Flycatcher's sensitivity to climate change was the relatively small distance juveniles stray from their natal nests to establish new territories (UW 2010). A similar assessment of vulnerability of Willow Flycatcher in the Willamette Valley, Oregon gave Willow Flycatcher a vulnerability score of 5 (a score of 5 representing least vulnerable), indicating low vulnerability to climate change at least within this region (Steel et al. 2010).

Where Willow Flycatchers still breed, they reside between approximately 1200 and 1500 meters on the western slope of the Sierra Nevada (Gaines 1992). If climate change causes the species to shift upward in elevation as is expected of many species, there remains ample riparian and meadow habitat to be colonized (or recolonized) by the species in both YOSE and SEKI. However, in order to successfully shift its range in response to climate change, willow species and other habitat conditions required by Willow Flycatcher must shift as well. Finally, climate change may already be contributing to meadow desiccation and subsequent reduced reproductive success of Willow Flycatcher in the Sierra Nevada (Siegel et al. 2008).

Altered Fire Regimes: Where tamarisk has invaded riparian areas (see below) fire frequency and intensity can be increased (NatureServe 2009). If tamarisk becomes a problem within SIEN parks it could contribute to a current trend of increasing frequency and intensity of fires in the Sierra Nevada. Little research has been conducted on the direct response of Willow Flycatcher to increases in fire, but any destruction of riparian and montane meadow habitat from fire would be detrimental to the already sensitive species.

Habitat Fragmentation or Loss: Any loss of riparian or meadow habitats used by Willow Flycatcher is detrimental to the species (Sedgwick 2000). Factors that can degrade Willow Flycatcher habitat include water diversion, agricultural and urban development, overgrazing, recreational use and invasion by non-native species (Sedgwick 2000, NatureServe 2009). Habitat loss is a greater concern outside of SIEN parks, but habitat degradation from grazing (see below) and meadow desiccation may be contributing to declines within the parks as well (Siegel et al. 2008).

Invasive Species and Disease: Although native to North America, Brown-headed Cowbirds have expanded their range with European settlement. Within national parks, cowbirds are sometimes found and can be particularly problematic near campgrounds, horse stables, and trails. Willow Flycatchers are susceptible to brood parasitism by Brown-headed Cowbirds (Craig and Williams 1998), but cowbird occurrence and parasitism rates within the SIEN parks has been found to be rare (Halterman et al. 1999). For example, during a 1995/96 study of SEKI, 2.8% and 2% of passerine nests monitored were parasitized by cowbirds during the two years. However, likely due to their scarcity, no Willow Flycatcher nests were monitored during this study (Halterman and Laymon 2000). An updated assessment of cowbird pressure in the parks may be warranted given some evidence that cowbird populations may be increasing (see Brown-headed Cowbird account in this report).

The introduction and spread of tamarisk species and Russian Olive may be contributing to Willow Flycatcher’s decline in some regions where they have invaded riparian areas (Sedwick 2000, NatureServe 2009).

Human Use Impacts: Packstock grazing within the parks may have been detrimental to Willow Flycatcher, both because grazing can attract Brown-headed Cowbirds and because packstock can damage riparian willows (Siegel and DeSante 1999). Riparian grazing is of greater concern outside of protected areas where livestock are more widely permitted, but the threat is also of concern where packstock grazing occurs within SIEN parks and historic alterations of meadows by commercial livestock grazing may continue to affect habitat suitability (Siegel et al. 2008).

Collisions with human structures during night migrations are a source of mortality for Willow Flycatcher, but the impact on populations is unknown (Sedgwick 2000). Finally, heavy recreational use, especially activities such as the use of off-road vehicles within breeding habitat can be detrimental to the species, but only where it occurs - outside of SIEN parks (Craig and Williams 1998).

Management Options and Conservation Opportunities

The most important things park managers can do to protect Willow Flycatcher populations in the parks are to maintain and restore riparian and montane willow habitats used by Willow Flycatchers, reduce the number of grazed areas and to eliminate or carefully manage cowbird feeding sites such as stables).

A previous assessment of cowbird pressure in SEKI and YOSE indicates that a cowbird-trapping program is not warranted (Halterman et al. 1999). However, if future studies show an increasing problem of cowbird parasitism within the SIEN, cowbird control programs for the purpose of restoring Willow Flycatchers have been implemented in other areas (Sedgwick 2000) and guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

If climate change leads to substantial meadow desiccation and reproductive success declines, restoration of meadow hydrology could benefit breeding Willow Flycatchers (Cain et al. 2003). Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historic grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites, perhaps along with active restoration of riparian willow vegetation, may increase the likelihood of recolonization by Willow Flycatcher and also help other riparian and meadow-dwelling bird species.

Wilson's Warbler – *Wilsonia pusilla*

Migratory Status
Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status
Wilson's Warbler is a common summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) National Parks and a fairly common breeder and summer resident at Yosemite (YOSE) National Park and Devils Postpile (DEPO) National Monument (Table 1).

Table 98. Breeding status and relative abundance of Wilson's Warblers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Common
Yosemite NP	Summer	Regular Breeder	Fairly Common
Devils Postpile NM	Summer	Regular Breeder	Fairly Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Wilson's Warbler breeds in boreal and humid coastal forests in North America (Ammon and Gilber 1999). Sierran populations of this species are smaller than populations in the Coast Range, so the SIEN parks may not be particularly important for the overall range (Siegel and DeSante 1999).

Distribution and Habitat Associations
The Wilson's Warbler in the Sierra Nevada typically occupies montane riparian habitats and moist deciduous trees and thickets on the edges of montane meadows, and sometimes in the moist understory of mature coniferous forests (Siegel and DeSante 1999). At higher elevations and on the east slope this warbler favors willows of both montane meadows and alpine slopes, especially during upslope dispersal and migration (Siegel and DeSante 1999). Wilson's Warblers were detected in moderate numbers (Table 1. Breeding status and relative abundance of Say's Phoebes in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency1	Breeding Status1	Abundance1
Sequoia and Kings Canyon NPs	Migrant/Summer	Non-Breeder	Rare

Yosemite NP	Migrant/Summer	Non-Breeder	Rare
Devils Postpile NM	Not recorded2		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

), along survey transects (Figure 1 and Figure 2) during avian inventory projects in the SIEN parks. After accounting for detection probabilities, the species was most associated with lower-elevation meadows but was also found in other riparian and shrubland habitats in SEKI (Table 1. Breeding status and relative abundance of Say's Phoebes in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency1	Breeding Status1	Abundance1
Sequoia and Kings Canyon NPs	Migrant/Summer	Non-Breeder	Rare
Yosemite NP	Migrant/Summer	Non-Breeder	Rare
Devils Postpile NM	Not recorded2		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

). In YOSE Wilson's Warblers were most abundant in Quaking Aspen but were also found in riparian and meadow habitats and oak woodlands.

Table 99. Number of Wilson's Warblers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	97	111	Undifferentiated Riparian	0.64	0.56 (0.22-1.42)
			Lower Elevation Meadow	0.34	0.71 (0.39-1.28)
			Aspen Forest	0.23	0.36 (0.11-1.16)
			Sagebrush/Dwarf Shrubland	0.19	0.37 (0.12-1.15)
			Mid Elevation Rock/Sparse Veg.	0.19	0.35 (0.16-0.78)
Yosemite NP	63	82	Quaking Aspen	0.99	
			Montane/Alpine Riparian Shrub	0.17	
			Black Oak	0.16	
			Montane Meadow	0.14	
			Canyon Live Oak	0.14	
Devils Postpile NM	2	2	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

.

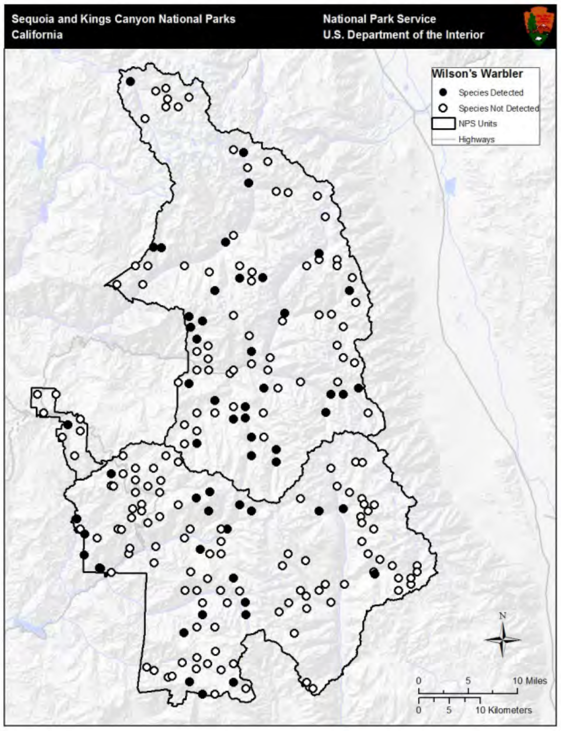

Figure 41. Bird survey transects where Wilson's Warbler was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

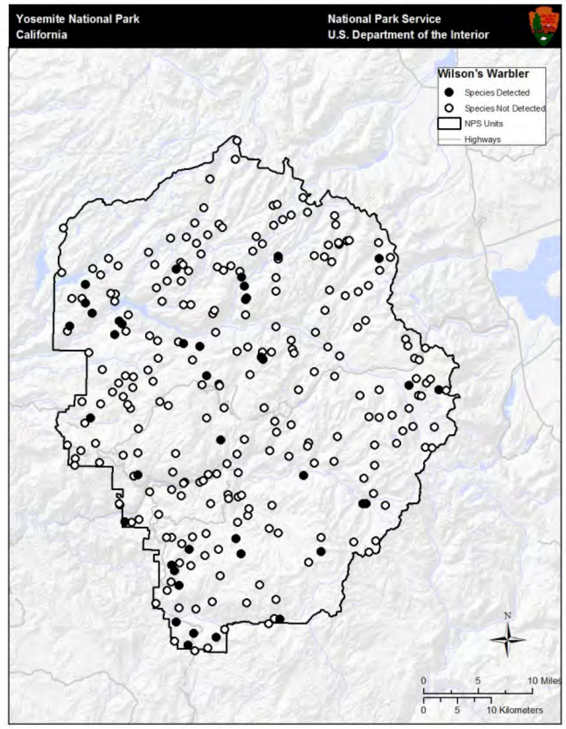

Figure 42. Bird survey transects where Wilson's Warbler was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Wilson's Warbler was observed within the low to relatively high elevations of SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Wilson's Warbler in SEKI was 2508 m, with 95% of observations occurring between 759 and 3284 m. At YOSE, the mean elevation of observations was 2213 m with 95% of observations falling between 1335 and 3201 m (Siegel et al. 2011).

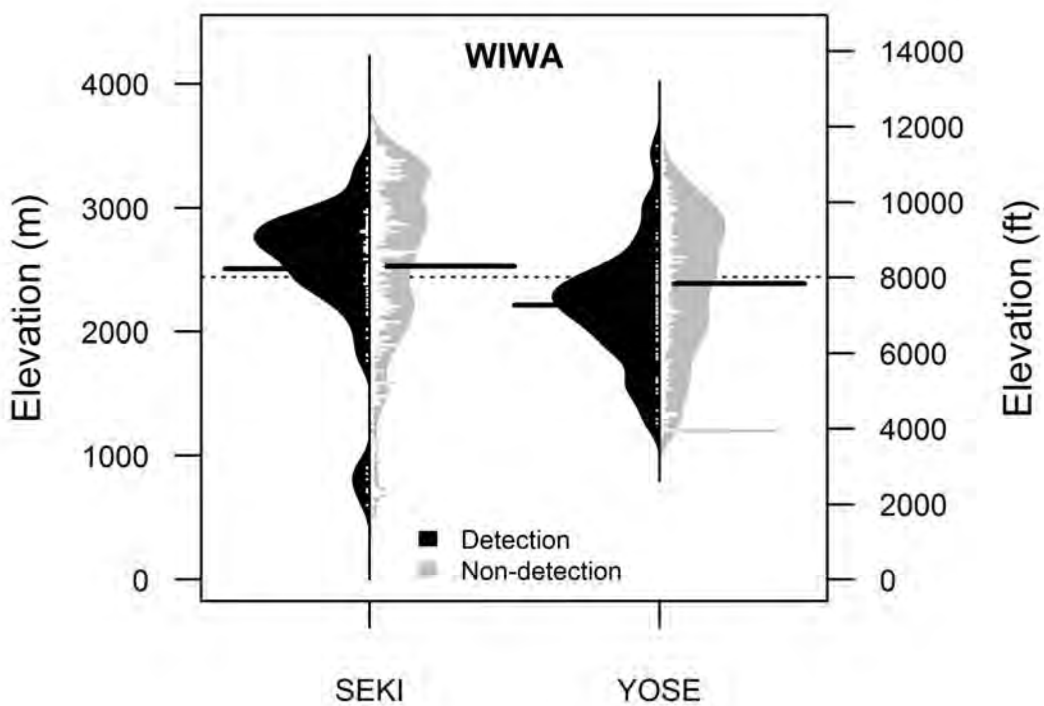

Figure 3. Elevational distributions of sites where Wilson's Warblers (WIWA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Wilson's Warblers are less abundant in the Sierra Region (BCR 15) than in California as a whole (**Error! Reference source not found.**). They were detected in low numbers on individual BBS routes at YOSE and SEKI. Populations declined significantly throughout California and especially the Sierra Nevada from both time periods 1966-2007 and 1980-2007 (Table 3). A large negative population trend was observed along the Yosemite route during 1974-2007.

Table 100. Relative abundance and trends for Wilson's Warbler according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	104	1.92	-1.9	0.01
	1980-2007			-1.9	0.01
Sierra Nevada (BCR 15)	1966-2007	22	0.91	-7.7	0.00
	1980-2007			-7.0	0.00
Route 14117 – Sequoia NP	1972-2005	1	0.81	-17.0	0.56
Route 14132 – Kings Canyon NP	1974-2005	1	0.50	NA[1]	NA
Route 14156 – Yosemite NP	1974-2007	1	0.35	-37.4	0.00

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

Similar to BBS trends, MAPS data from Yosemite NP and DEPO reveal a significant large population decline at the YOSE stations from 1993-2009, and large but non-significant population and reproductive declines at DEPO stations (Table 4).

Table 101. Population trends, productivity, trends, and survival estimates of Wilson's Warbler at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	3.4	NA[2]	0.73	NA	NA
Yosemite NP	1993-2009	1.7	-8.30**	1.36	NA	0.948 (0.111)
Devils Postpile NM	2002-2006	18.1	-19.74	0.56	-10.52	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Available survey data indicate Wilson's Warbler experienced a significant Sierra-wide decline in recent years (Tables 3 and 4). As with other birds dependent upon riparian vegetation and meadows, loss and degradation of montane meadows and riparian vegetation from grazing and other management activities may be implicated in the decline (Siegel and DeSante 1999). Logging practices that eliminate mature and old-growth forests is an additional threat, thus the protected nature of SIEN parks makes them important refugia from loss of old forests elsewhere in the Sierra. The Wilson's Warbler is more dependent upon moist, humid conditions than any other warbler aside from the Common Yellowthroat, so a warming, drying climate could pose a serious risk to Wilson's Warblers in the near future. The species is also particularly susceptible to Brown-headed Cowbird parasitism (Siegel and DeSante 1999). Due to apparent declining populations, the Wilson's Warbler and all possible threats should be monitored closely.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Wilson's Warbler has significantly shifted over 47 miles southward and 62 miles coastward throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). The majority of other woodland birds shifted northward, so the southward move may be due to factors other than climate change. Modeled distribution shifts of Wilson's Warbler predict severe range contractions in the southern portion of its range in California, including near-extirpation in SIEN parks (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation and distance to stream (Maxent and GAM distribution models).

Wilson's Warblers are found breeding in the lower to higher elevations of SEKI and YOSE (Table 3). If climate change causes the species' range to shift upward as is generally expected, there is higher-altitude riparian and meadow habitat for new colonization within SEKI and YOSE. However, even if Wilson's Warblers are able shift their range in response to climate change, populations may suffer if the habitats they depend upon are not also able to shift upslope or are degraded or dry out due to climate warming. For example, Cain et al. (2003) observed greater nest success of Yellow Warblers in flooded meadows than dry meadows due to reduced predator access. Other meadow-dependent birds such as Wilson's Warblers may be similarly impacted. If climate change results in drier meadows for a longer portion of the breeding season, Wilson's Warbler reproductive success may be reduced.

Altered Fire Regimes: Even in old-growth forests, shrub patches develop under closed-canopy conditions, benefiting birds that utilize it for a nesting substrate (CalPIF 2002). The combined effect of fire suppression and logging has created homogenous even-aged forests with little shrub cover over much of the Sierra Nevada (CalPIF 2002). Fire may not adversely impact Wilson's Warblers, as this species has been detected in early and mid-successional burned forests in the Rocky Mountains (Hutto 1995). The restoration of natural fire regimes should help maintain the understory layer for Wilson's Warblers and other shrub-nesting forest birds (CalPIF 2002).

Habitat Fragmentation or Loss: Loss of mature and old-growth coniferous forests from logging is likely a threat to Wilson's Warblers, particularly when the understory shrub layer used as nesting habitat is removed. Some light to moderate logging may not adversely affect this species. Wilson's Warbler abundance did not respond significantly to either moderate or heavy thinning in western Oregon (Hayes et al. 2003) and the species has been found in mid-successional clearcut forests, but not early-successional clearcuts (Hutto et al. 1995). Wilson's Warblers in the Rocky Mountains were less abundant in young clearcuts than in unlogged forest, but more abundant in older clearcuts than in unlogged forest, once shrubs had re-grown (Hejl et al. 1995). Wilson's Warbler also is vulnerable to loss of riparian and montane meadow habitat from development and heavy grazing (Ammon and Gilbert 1999, Siegel and DeSante 1999). Intensive logging and riparian habitat loss are not likely to threaten the species within SIEN parks where such habitats are protected from conversion.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Wilson's Warblers are susceptible to brood parasitism by Brown-headed Cowbirds.

A 15-year-old study found cowbird occurrence and parasitism rates within SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Habitat degradation due to packstock grazing within the parks is a potential concern for the Wilson's Warbler, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage riparian shrubs (Ammon and Gilbert 1999). However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Wilson's Warblers are vulnerable to collisions with TV towers during migration (Ammon and Gilbert 1999).

Management Options and Conservation Opportunities

Park managers can protect populations of Wilson's Warblers by restoring montane meadow and riparian vegetation, particularly willow thickets, and eliminating or carefully managing Brown-headed Cowbird feeding sites such as stables. Guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

If climate change leads to substantial meadow desiccation and reproductive success declines, restoration of meadow hydrology could benefit breeding Wilson's Warblers. Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites, perhaps along with active restoration of riparian deciduous vegetation, would likely benefit Wilson's Warbler and other riparian and meadow-dwelling bird species.

MAPS station operation and other means of monitoring Wilson's Warbler populations in the parks should continue, to resolve whether population declines are indeed occurring, and if so, to determine their causes.

Wrentit – *Chamaea fasciata*

Migratory Status
Resident (Siegel and DeSante 1999)

Residency and Breeding Status
Wrentit is a locally fairly common year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks, but has not been recorded at Devils Postpile (DEPO) National Monument (Table 1).

Table 102. Breeding status and relative abundance of Wrentits in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Year-round	Regular Breeder	Locally Fairly Common
Yosemite NP	Year-round	Regular Breeder	Locally Fairly Common
Devils Postpile NM	Not recorded		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status
NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: S5 – Secure (Common, widespread and abundant)

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance
The Wrentit breeds in western Oregon, California, and northwestern Baja, but California forms the most important part of its range (Siegel and DeSante 1999). The species is widely distributed throughout California.

Distribution and Habitat Associations
In the Sierra, Wrentit is common in dense, hard chaparral, especially Chamise, Ceanothus, and Poison Oak (Siegel and DeSante 1999). Wrentits were detected in moderate numbers (Table 2) along transects in SEKI and YOSE (Figures 1 and 2) during avian inventory surveys. Not surprisingly, the species was most strongly associated with Mixed Chaparral in both SEKI and YOSE.

Table 103. Number of Wrentits recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	80	111	Mixed Chaparral	0.62	0.76 (0.52-1.12)
			Undifferentiated Postfire	0.42	0.23 (0.03-1.92)
			Live Oak/California Buckeye	0.38	0.39 (0.16-0.96)
Yosemite NP	36	53	Mixed Chaparral	3.98	
			Foothill Pine	0.91	
			Canyon Live Oak	0.83	
Devils Postpile NM	0	0	Not detected	NA[1]	

[1]NA - Information not available due to insufficient data.

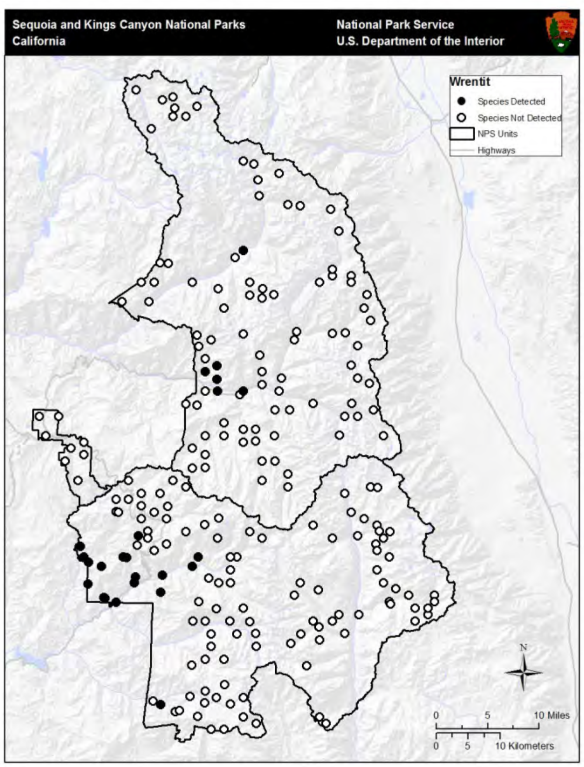

Figure 43. Bird survey transects where Wrentit was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

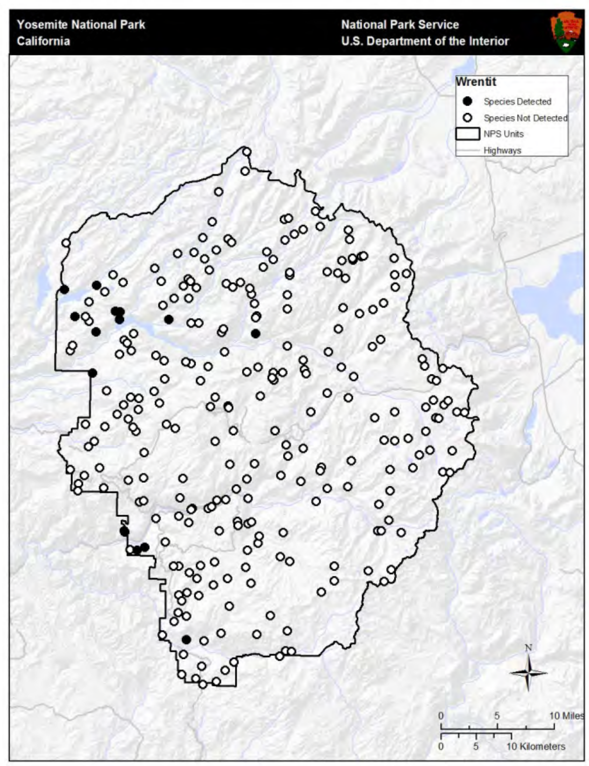

Figure 44. Bird survey transects where Wrentit was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Wrentit was detected at lower elevations in both SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Wrentit in SEKI was 1085 m, with 95% of observations occurring between 621 and 2012 m. In YOSE, the mean elevation of observations was 1488 m with 95% of observations falling between 1183 and 1850 m (Siegel et al. 2011).

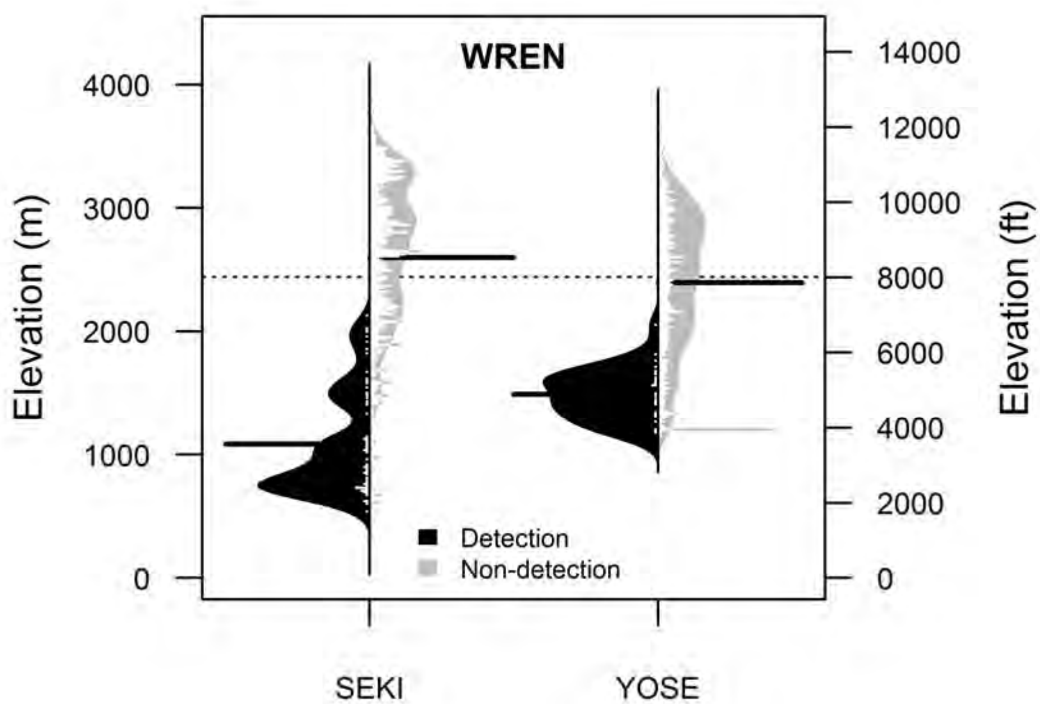

Figure 3. Elevational distributions of sites where Wrentit (WREN) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

The Breeding Bird Survey (BBS) indicates Wrentits were less abundant in the Sierra Region (BCR 15) than in California as a whole, but were very abundant along individual routes in Sequoia and Kings Canyon NPs (Table 3). BBS data suggest the species declined significantly from 1980-2007 in the Sierra Nevada; no other significant population trends were detected elsewhere, but nearly significant negative population trends were observed throughout all of California from 1966-2007 and 1980-2007 (Table 3). Conversely, a non-significant positive population trend was observed along the route in Sequoia NP from 1972-2005.

Table 104. Relative abundance and trends for Wrentit according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	122	7.25	-1.1	0.17
	1980-2007			-1.8	0.15
Sierra Nevada (BCR 15)	1966-2007	20	3.19	-2.5	0.15
	1980-2007			-3.6	0.01
Route 14117 – Sequoia NP	1972-2005	1	22.31	+6.5	0.29
Route 14132 – Kings Canyon NP	1974-2005	1	11.05	+0.3	0.91
Route 14156 – Yosemite NP	1974-2007	1	2.92	-1.5	0.71

Mark-recapture data from SIEN MAPS stations reveal highly significant increasing population and reproductive trends for Wrentits in Yosemite NP from 1993-2009 (Table 4), which corresponds to the post-fire maturation of chaparral around Big Meadow.

Table 105. Population trends, productivity, trends, and survival estimates of Wrentit at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	0.1	NA[2]	1.00	NA	NA
Yosemite NP	1993-2009	0.9	+26.37***	0.88	+24.26***	NA
Devils Postpile NM	2002-2006	0.0	NA	NA	NA	NA

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

The chaparral-dependent Wrentit apparently is decreasing in the Sierra (Table 3) but thriving in at least some locales within the SIEN parks (Table 4). This species may suffer from fire suppression, thus restoration of natural fire regimes, including increased frequency and extent of high-intensity fire, and allowing regeneration of chaparral will certainly benefit this species. Urban development in the Sierra foothills likely threatens Wrentits (Siegel and DeSante 1999).

Climate Change: An analysis of shifts between the historical range of Wrentit (1911-1929 survey) and its current range (2003-2008 resurvey) in the Sierra Nevada showed that the species responded to precipitation changes (but not temperature change) by shifting its range to follow its climatic niche (Tingley et al. 2009). This observed shift provides evidence that the Wrentit has already responded to climate change and will likely continue to shift its range within the Sierra in the coming decades. Modeled distribution shifts of Wrentits predict range contractions and a decreasing probability of occurrence in southern California, the Central Valley, and the Sierran foothills, and an increase in distribution in northeastern California and higher elevations of the southern Sierra Nevada (Stralberg and Jongsomjit 2008). Vegetation was the most important variable influencing current and projected distribution in both the Maxent and GAM distribution models.

In SIEN parks, the Wrentit was found at low to middle elevation portions (Figure 2). If climate change causes the Wrentit's range to move upslope in the Sierra Nevada as is generally expected, the species should persist and thrive in the SIEN parks as long as Mixed Chaparral habitats expand uphill as well.

Altered Fire Regimes: Mixed Chaparral habitats favored by Wrentits are well-adapted to fire; some shrub species resprout after fire while others regenerate from seed banks (Riggan et al. 1994). Wrentits were detected in post-fire habitats on avian inventory surveys in SIEN parks (Table 2) and were a strong indicator of older (15-year old) burned stands in Oregon (Fontaine et al. 2009). Similarly, Siegel and Wilkerson (2005) found that Wrentit was one of the more common species on a 50-year old burned site, suggesting that this chaparral-dependent bird depends on fire to maintain patches of habitat in the long-term. A future increase in extent and frequency of fire that creates open shrub stands will increase habitat for Wrentits in the longer-term, while post-fire management activities that eliminate shrubs that are regenerating after fire would threaten this species. Policies of prescribed natural fire likely benefit this species in SIEN parks.

Habitat Fragmentation or Loss: Chaparral shrubs provide little nourishment for domestic livestock, thus range managers historically removed chaparral by controlled burning and reseeding with non-native annual grasses; in 1950 alone, ranchers in 30 California counties cleared about 97,000 acres of chaparral (Lawrence 1966). Over the past century, loss, degradation, and fragmentation of shrublands likely reduced habitat for Wrentits (Siegel and DeSante 1999). Urban and agricultural development do not pose a significant threat to the species in SIEN parks, but as this species occurs primarily at low elevations outside these protected parks, some type of landscape-scale protection of chaparral habitat in the Sierra Nevada is warranted.

Invasive Species and Disease: To our knowledge, there are no significant impacts of invasive species and disease to Wrentits in the SIEN parks.

Human Use Impacts: Intense grazing can reduce shrub cover needed by Wrentits to breed. Habitat degradation due to packstock grazing within the parks is therefore a potential concern for this species, at least locally where grazing is permitted. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized in SIEN parks (Siegel and DeSante 1999).

Management Options and Conservation Opportunities

Park managers can protect Wrentit populations in the parks by restoring the fire cycle (including high-intensity fire) to maintain dense chaparral habitats.

Yellow Warbler – *Dendroica petechia*

Migratory Status

Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Yellow Warbler is a locally fairly common summer resident and regular breeder at Sequoia and Kings Canyon (SEKI) National Parks, a locally common summer resident and regular breeder at Yosemite (YOSE) National Park, and a locally uncommon summer resident and occasional breeder at Devils Postpile (DEPO) National Monument (Table 1).

Table 106. Breeding status and relative abundance of Yellow Warblers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer	Regular Breeder	Locally Fairly Common
Yosemite NP	Summer	Regular Breeder	Locally Common
Devils Postpile NM	Summer	Occasional Breeder	Locally Uncommon

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Heath (2008), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked for California

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not Listed
- CA Department of Fish and Game Status: Species of Special Concern

Range Significance

Breeding populations are distributed across much of North America including throughout the Sierra Nevada. SIEN populations have only limited importance to the overall range of the species (Siegel and DeSante 1999).

Distribution and Habitat Associations

Yellow Warblers occur locally in riparian habitats and less commonly in montane chaparral in the Sierra Nevada, including all three SIEN parks (Gaines 1992). Relatively few individuals were detected (Table 1. Breeding status and relative abundance of Say's Phoebes in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency1	Breeding Status1	Abundance1
Sequoia and Kings Canyon NPs	Migrant/Summer	Non-Breeder	Rare
Yosemite NP	Migrant/Summer	Non-Breeder	Rare
Devils Postpile NM	Not recorded2		

1Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

), along relatively few transects (Figure 1 and Figure 2) during avian inventory surveys in the SIEN parks. The limited number of observations reflects the species' rather specific habitat needs and avoidance of the upland habitats that constitute most of the land area of the parks. Although Yellow Warbler was not detected during the avian inventory at DEPO in 2003, it has been regularly encountered at the MAPS station at DEPO's Soda Springs Meadow and has been confirmed as a breeder there in at least one year (Richardson and Moss 2010).

Although Yellow Warbler was recorded at low densities in several upland forest habitats at SEKI and YOSE, these results are largely artifacts of the study design, which classified habitats according to the dominant vegetation within 50 m of the survey station, as Yellow Warblers often occurred in small patches of riparian vegetation within a larger matrix of upland forest. At YOSE and SEKI Yellow Warblers were also detected (albeit at relatively low densities) in the Riparian, Meadow, Aspen, and Montane Chaparral habitats with which they are commonly associated (Table 1. Breeding status and relative abundance of Say's Phoebes in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency1	Breeding Status1	Abundance1
Sequoia and Kings Canyon NPs	Migrant/Summer	Non-Breeder	Rare
Yosemite NP	Migrant/Summer	Non-Breeder	Rare
Devils Postpile NM	Not recorded2		

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).
[2]Not reported in Richardson and Moss (2010); occasional migrants or dispersing birds likely occur.

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Table 107. Number of Yellow Warblers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	13	14	Ponderosa Pine/Incense Cedar	0.07	0.05 (0.02-0.16)
			Aspen Forest	0.06	0.03 (0.00-0.16)
			Jeffrey Pine Woodland	0.05	0.03 (0.01-0.11)
Yosemite NP	36	56	Black Oak	0.10	
			White Fir	0.06	
			Montane/Alpine Riparian Shrub	0.05	
			Montane Chaparral	0.05	
Devils Postpile NM	0	0	Detected off-survey	NA[1]	

[1]NA - Information not available due to insufficient data.

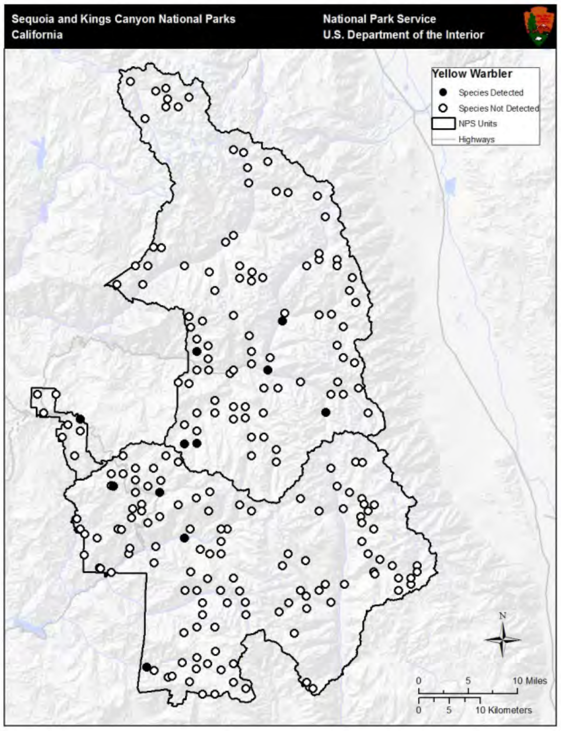

Figure 45. Bird survey transects where Yellow Warbler was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

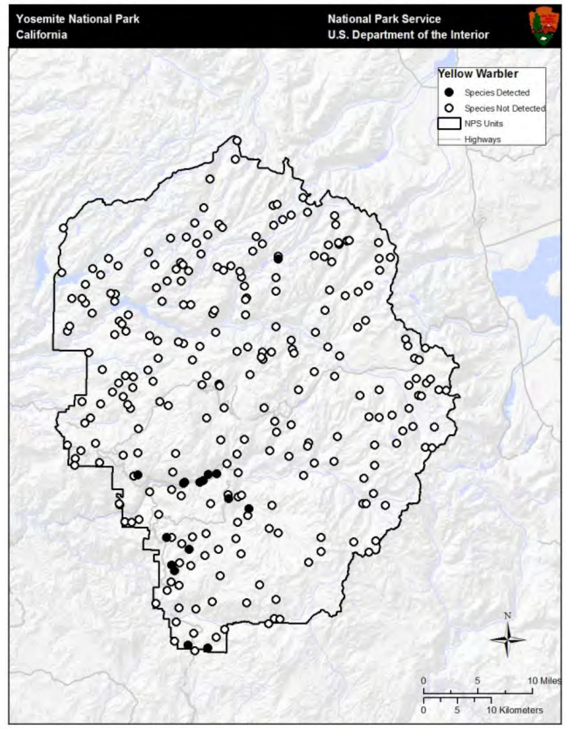

Figure 46. Bird survey transects where Yellow Warbler was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Yellow Warbler was observed within the lower to middle-elevations of SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Yellow Warbler in SEKI was 2073 m, with 95% of observations occurring between 1343 and 2843 m. At YOSE, the mean elevation of observations was 1461 m with 95% of observations falling between 1199 and 2323 m (Siegel et al. 2011).

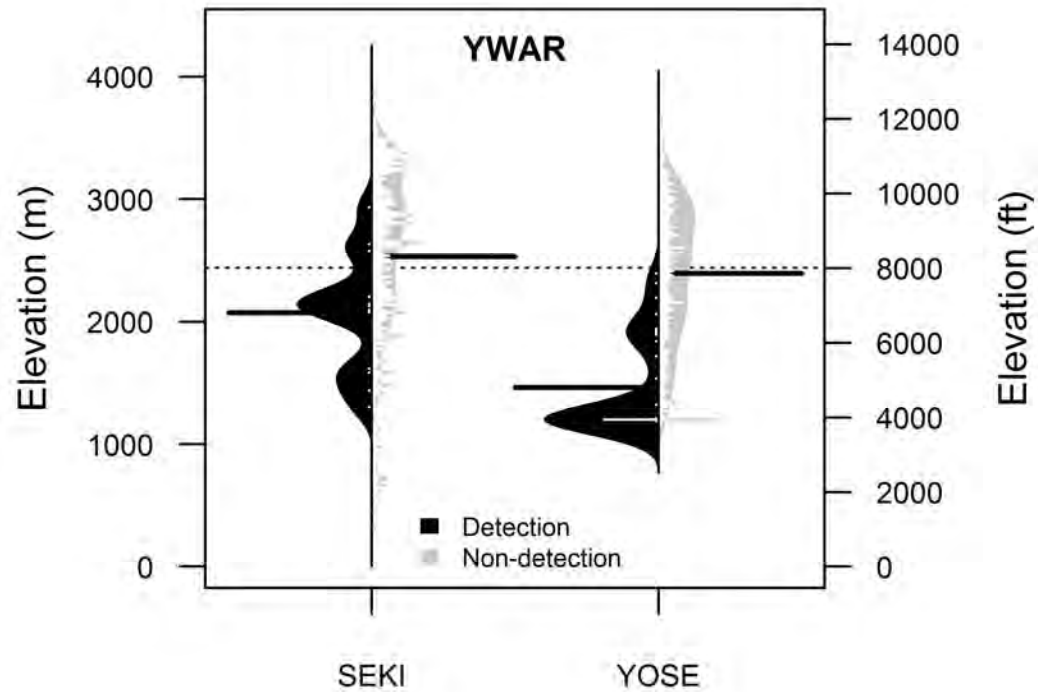

Figure 3. Elevational distributions of sites where Yellow Warblers (YWAR) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Yellow Warblers are found in greater abundance in the Sierra Region (BCR 15) than in California as a whole (**Error! Reference source not found.**). They were detected in low numbers on individual BBS routes at YOSE and SEKI. A significant negative trend was observed in the Sierra Region during 1980-2007, although a significant positive trend was observed on the Yosemite route (but nevertheless based on very few detections) during 1974-2007.

Table 108. Relative abundance and trends for Yellow Warbler according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	117	1.69	-1.1	0.17
	1980-2007			-1.7	0.10
Sierra Nevada (BCR 15)	1966-2007	31	3.67	-1.7	0.20
	1980-2007			-3.3	0.03
Route 14117 – Sequoia NP	1972-2005	1	0.53	NA[1]	NA
Route 14132 – Kings Canyon NP	1974-2005	1	0.55	+14.1	0.38
Route 14156 – Yosemite NP	1974-2007	1	1.65	+13.5	0.05

[1]No data or insufficient data according to credibility guidelines provided by Sauer et al. (2008).

MAPS data from Kings Canyon NP and DEPO are relatively sparse, but Yellow Warbler is clearly declining at the YOSE stations, where the reproductive index is increasing. Since the reproductive index is the ratio of adults to young birds, this may indicate high local nest success, but poor recruitment into the adult population, perhaps due to factors on the wintering grounds or migration routes.

Table 109. Population trends, productivity, trends, and survival estimates of Yellow Warblers at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	2.2	NA[2]	0.35	NA	0.572 (0.129)
Yosemite NP	1993-2009	2.8	-6.54***	0.92	+9.30*	0.607 (0.042)
Devils Postpile NM	2002-2006	6.2	NA	0.24	NA	0.297 (0.209)

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Most troubling for Yellow Warblers is a significant Sierra-wide decline in recent years (Table 3). Suggested causes of this decline include loss of montane riparian habitat, alteration of meadow hydrology and vegetation resulting from grazing and other management activities, Brown-Headed Cowbird parasitism, and problems on the wintering grounds or migration routes (Siegel and DeSante 1999). Evidence suggesting that Yellow Warblers are able to shift their range in response to a warming climate (Moritz 2007) and are somewhat adaptable to changing fire-regimes (Gaines 1992, Siegel and DeSante 1999) indicates these may be relatively minor threats. Finally, infection by West Nile Virus appears to be a potential, but minor threat to the species in California.

With the exception of some packstock grazing pressure on montane meadows, habitat loss and degradation are not substantial threats within SIEN parks. Likewise, due to a lack of livestock grazing and nearby agriculture, Brown-headed Cowbirds do not appear to be a major threat to Yellow Warbler within the parks (Halterman et al. 1999). Factors threatening Yellow Warbler populations across the Sierra appear to be less threatening in protected areas such as the SIEN parks. However, due to apparent declining populations, this species and all possible threats should be monitored closely.

Climate Change: A re-survey of the Grinnell-Storer transects showed a decline of Yellow Warblers in Yosemite Valley, but colonization of the higher-elevation Tuolumne Meadows area (Moritz 2007). These observations may suggest an upward altitudinal shift, although statistical analysis has not yet been completed for the species. A study assessing migration timing between 1975 and 2000 (a period of recent climate change), showed that Yellow Warbler has significantly shifted toward earlier spring arrival and earlier autumn departure from the area (Mills 2005). These observations suggest that Yellow Warbler may be responding to climate change through range shifts and migration timing, and will continue to do so in the future.

Yellow Warblers are found breeding in the lower and middle elevations of SEKI and YOSE (Figure 3). If climate change causes the species' range to shift upward as is generally expected, there is much higher-altitude riparian and meadow habitat for new colonization within SEKI and YOSE. However, it is important to note that even if Yellow Warblers are able shift their range in response to climate change, populations may suffer if the habitats they depend upon are not also able to shift upslope or are degraded due to climate warming. For example, Cain et al. (2003) observed greater nest success of Yellow Warblers in flooded meadows than dry meadows due to reduced predator access. If climate change results in drier meadows for a longer portion of the breeding season, Yellow Warbler reproductive success may be reduced.

Altered Fire Regimes: Yellow Warbler may be adapting to – or at least is capable of utilizing – chaparral vegetation that may be favored by more frequent fire (Gaines 1992, Siegel and DeSante 1999).

Habitat Fragmentation or Loss: Yellow Warbler is vulnerable to loss of riparian and montane meadow habitat, (Siegel and DeSante 1999) but this is not likely to pose a major threat to the species within SIEN parks where such habitats are protected from conversion.

Invasive Species and Disease: Although native to North America, Brown-headed Cowbirds have expanded their range with European settlement. Within national parks, cowbirds are sometimes found and can be particularly problematic near campgrounds, horse stables, and trails. Yellow Warblers are susceptible to brood parasitism by Brown-headed Cowbirds, but cowbird occurrence and parasitism rates within the SIEN parks has been found to be rare (Halterman et al. 1999). For example, during a 1995/96 study of SEKI, 2.8% and 2% of passerine nests monitored were parasitized by cowbirds during the two years. However, no Yellow Warbler nests were monitored during this study (Halterman and Laymon 2000). An updated assessment of cowbird pressure in the parks may be warranted given some evidence that cowbird populations may be increasing (see Brown-headed Cowbird account in this report).

There do not appear to be any major threats of disease to the Yellow Warbler. However, one dead Yellow Warbler tested positive for West Nile Virus in California in 2009 (CDPU 2010), suggesting that the species has at least minimal susceptibility to the disease.

Human Use Impacts: Yellow Warblers have been shown to have reduced abundance along grazed streams as compared to ungrazed streams (Popotnik and Giuliano 2000). Thus habitat degradation due to packstock grazing within the parks is a potential concern for this species, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage riparian shrubs. However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized..

Management Options and Conservation Opportunities

Elsewhere in the Sierra, Yellow Warblers have likely benefited from meadow and riparian restoration, and Brown-headed Cowbird trapping programs targeting Southwestern Willow Flycatcher recovery (Heath 2008).

The most important things park managers can do to protect Yellow Warbler populations in the parks are to maintain riparian and montane willow habitats used by Yellow Warblers and to eliminate or carefully manage cowbird feeding sites (Heath 2008) such as stables. A previous assessment of cowbird pressure in SEKI and YOSE indicates that a cowbird trapping program is not warranted (Halterman et al. 1999). However, if future studies show an increasing problem of cowbird parasitism, guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004).

If climate change leads to substantial meadow desiccation and reproductive success declines, restoration of meadow hydrology could benefit breeding Yellow Warblers (Cain et al. 2003). Even in the absence of clear effects of climate change on meadow hydrology, individual meadows throughout the SIEN parks have been altered by historical grazing, road construction, or other activities (e.g., Cooper and Wolf 2006), and restoration of hydrologic processes at such sites, perhaps along with active restoration of riparian deciduous vegetation, would likely benefit Yellow Warbler and other riparian and meadow-dwelling bird species.

MAPS station operation and other means of monitoring Yellow Warbler populations in the parks should continue, to resolve whether population declines are indeed occurring, and if so, to determine their causes.

Yellow-rumped Warbler – *Dendroica coronata*

Migratory Status

Short-distance/Neotropical migrant (Siegel and DeSante 1999)

Residency and Breeding Status

Yellow-rumped Warbler is a common summer or year-round resident and regular breeder at Sequoia and Kings Canyon (SEKI) and Yosemite (YOSE) national parks and at Devils Postpile (DEPO) National Monument (Table 1).

Table 110. Breeding status and relative abundance of Yellow-rumped Warblers in Sierra Nevada Network (SIEN) national parks (NPs) and national monuments (NMs).

Park	Residency[1]	Breeding Status[1]	Abundance[1]
Sequoia and Kings Canyon NPs	Summer/Year-round	Regular Breeder	Common
Yosemite NP	Summer/Year-round	Regular Breeder	Common
Devils Postpile NM	Summer/Year-round	Regular Breeder	Common

[1]Based on Beedy and Granholm (1985), Warner and San Miguel (1991), Gaines (1992), Siegel and DeSante (2002), Siegel and Wilkerson (2005a), Siegel et al. (2009, 2010), Stock and Espinoza (2009), Richardson and Moss (2010).

Conservation Status

NatureServe Conservation Rankings (NatureServe 2009)

- Global Status: G5 – Secure (Common, widespread and abundant)
- National Status: N5 – Secure (Common, widespread and abundant)
- California Status: SNR – Unranked

Federal and CA State Designations (CDFG 2010, Shuford and Gardali 2008, USFWS 2008)

- US Fish and Wildlife Service Status: Not listed
- CA Department of Fish and Game Status: Not listed

Range Significance

Formerly considered two species, the Myrtle Warbler in the East and Audubon’s Warbler in the West, the Yellow-rumped Warbler is one of the most common warblers in North America. The Audubon’s Yellow-rumped Warbler breeds from southern Alaska south through the mountains of central and western U.S., with disjunct breeding populations in central New Mexico, Mexico, and Guatemala (Hunt and Flaspohler 1998). Yellow-rumped Warblers are very common in the Sierra which constitutes an important part of their range (Siegel and DeSante 1999).

Distribution and Habitat Associations

Yellow-rumped Warblers breed in mature coniferous and mixed coniferous-deciduous habitats in mountainous regions, but with little habitat specificity within this broad habitat category (Hunt and Flaspohler 1998). The species was detected in very high numbers (Table 2) along survey transects (Figure 1 and 2) during avian inventory surveys in the SIEN parks. Detections at SEKI and YOSE were scattered throughout most areas of the parks. The most densely occupied habitats included coniferous forest types, including pine and fir, in SEKI and Montane Meadow as well as fir and hemlock types in YOSE (Table 2). Yellow-rumped Warblers were detected in

24 of 26 habitat types at SEKI and 25 of 29 at YOSE, indicating that this species is a widespread habitat generalist.

Table 111. Number of Yellow-rumped Warblers recorded during The Institute for Bird Populations' landbird inventories of Sequoia and Kings Canyon NPs (1,732 point count stations surveyed during 2003-2004; Siegel and Wilkerson 2005a), Yosemite NP (2,646 point count stations surveyed during 1998-2000; Siegel and DeSante 2002), and Devils Postpile NM (42 point count stations surveyed in 2003; Siegel and Wilkerson 2004). Note that absolute density estimates (adjusted for detectability) were available only for Sequoia and Kings Canyon NPs. Habitat associations are not available for Devils Postpile.

Park	Count Stations with Detections	Indiv. Birds Counted	Most Densely Occupied Habitats	Relative Abundance (detections per station)	Density of birds per ha (95% c.i.)
Sequoia and Kings Canyon NPs	709	1002	Western White Pine Woodland	0.89	0.80 (0.41-1.54)
			Red Fir/White Fir Forest	0.88	0.75 (0.47-1.21)
			Lodgepole Pine Forest	0.76	0.76 (0.49-1.18)
			Red Fir Forest	0.74	0.81 (0.51-1.27)
			White Fir/Sugar Pine Forest	0.73	0.71 (0.45-1.13)
Yosemite NP	1013	1608	Montane Meadow	0.74	
			Red Fir	0.69	
			White Fir	0.69	
			Mountain Hemlock	0.69	
			Lodgepole Pine	0.61	
Devils Postpile NM	17	25	NA[1]	NA	

[1]NA - Information not available due to insufficient data.

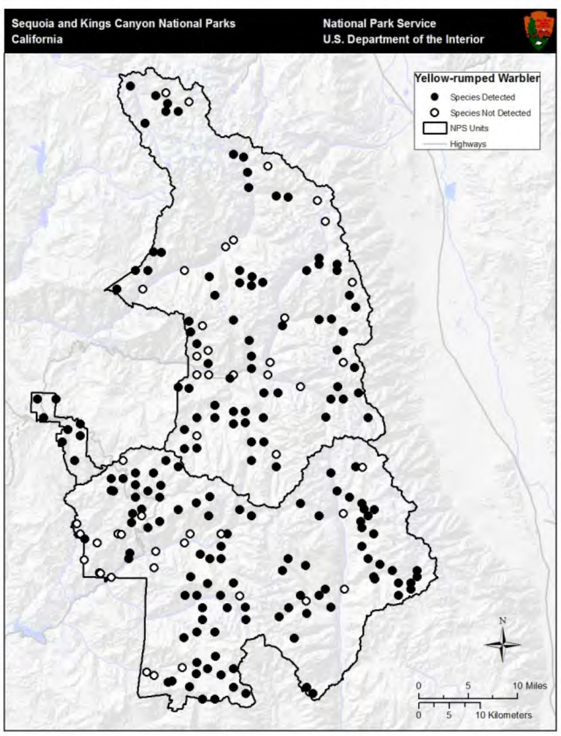

Figure 47. Bird survey transects where Yellow-rumped Warbler was (black circles) and was not (white circles) detected during the 2003-2004 landbird inventory at SEKI (Siegel and Wilkerson 2005).

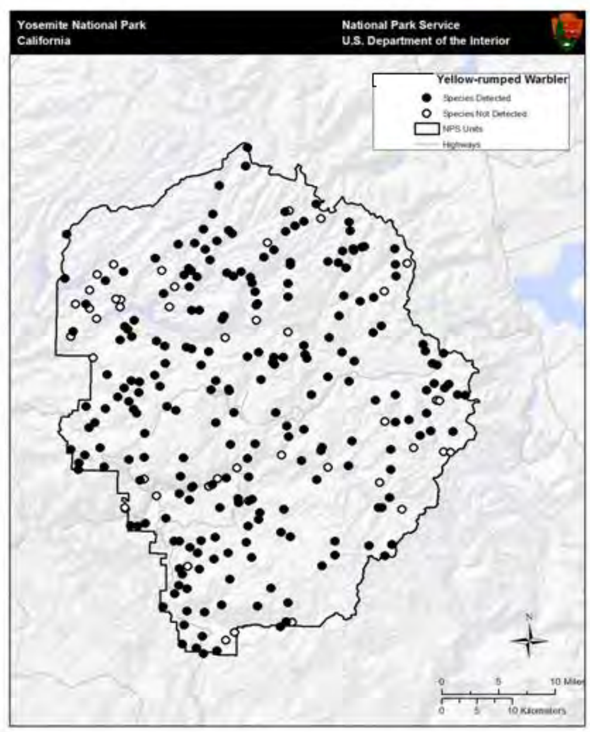

Figure 48. Bird survey transects where Yellow-rumped Warbler was (black circles) and was not (white circles) detected during the 1998-2000 landbird inventory at YOSE (Siegel and DeSante 2002).

Elevational Distribution

Yellow-rumped Warbler was observed within the middle to high elevations of SEKI and YOSE during avian inventory surveys (Figure 3). The mean elevation of observations of Yellow-rumped Warbler in SEKI was 2678 m, with 95% of observations occurring between 1727 and 3360 m. At YOSE, the mean elevation of observations was 1461 m with 95% of observations falling between 1433 and 3136 m (Siegel et al. 2011).

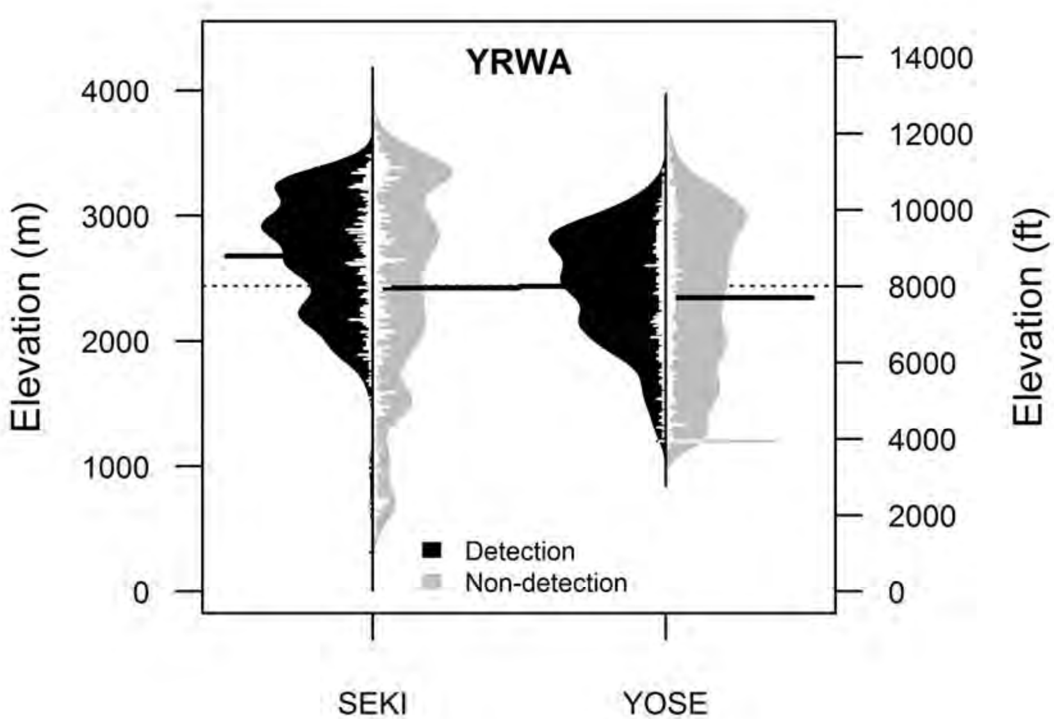

Figure 3. Elevational distributions of sites where Yellow-rumped Warblers (YRWA) were detected and not detected during landbird inventories at SEKI and YOSE. Individual count stations are represented by tick marks, with longer tick marks representing multiple stations at the same elevation. Shaded regions delineate normal density traces of the data. Detection sites for each park are shown to the left of vertical center lines and are described by the black density traces. Non-detection sites are shown to the right of vertical center lines and are represented by gray density traces. Black horizontal lines show means for detection (left of center lines) and non-detection (right of center lines) sites. The dashed line shows the mean elevation for all sites surveyed across both parks.

Abundance, Trends and Demographic Data

Breeding Bird Survey (BBS) data indicate Yellow-rumped Warblers are abundant throughout California but are found in much greater abundance in the Sierra Region (BCR 15) than in California as a whole (**Error! Reference source not found.**). They were detected in high numbers on individual BBS routes at Yosemite NP and Sequoia NP. A significant positive annual population trend of 10% was observed along the Yosemite NP route during 1974-2007, with no significant trends recorded elsewhere.

Table 112. Relative abundance and trends for Yellow-rumped Warbler according to Breeding Bird Survey (BBS) data (Sauer et al. 2008). Trend calculation for regional analyses is based on the route regression method (Link and Sauer 1994). We caution that regional analysis of BBS results may be prone to spurious results when relative abundance is low (less than 1.0 birds per route) or the sample is based on fewer than 14 routes over the long-term (Sauer et al. 2011).

Region	Time Period	Routes with detections	Abundance (Birds/route)	Trend (Annual % Change)	*P*
California	1966-2007	97	6.86	+0.6	0.34
	1980-2007			+0.1	0.87
Sierra Nevada (BCR 15)	1966-2007	34	17.79	+0.4	0.57
	1980-2007			-0.1	0.93
Route 14117 – Sequoia NP	1972-2005	1	3.75	-0.4	0.98
Route 14132 – Kings Canyon NP	1974-2005	1	0.35	+4.0	0.73
Route 14156 – Yosemite NP	1974-2007	1	16.58	+10.0	0.00

Mark-recapture data from SIEN MAPS stations reveal no significant annual population trends, but large non-significant declines were observed in Kings Canyon NP and at DEPO (Table 4). The Yosemite NP population did not increase or decrease significantly, but a nearly significant positive reproductive trend was reported there.

Table 113. Population trends, productivity, trends, and survival estimates of Yellow-rumped Warbler at Monitoring Avian Productivity and Survival (MAPS) stations in SIEN parks (see Siegel et al. 2009, 2010; Richardson and Moss 2010). See Methods for explanation of calculations. Asterisks indicate significance levels of trends based on linear regression: * p < 0.1; ** p < 0.05; *** p < 0.01.

Park	Time Period	Adults per 600 net-hours	Population Trend (annual % change)	Repr. Index (young per adult)	Repr. Trend (annual % change)	Adult Survival (SE)
Kings Canyon NP	1991-2009[1]	6.3	-10.23	0.01	NA	0.700 (0.125)
Yosemite NP	1993-2009	15.3	+1.56	1.37	+5.50*	0.366 (0.037)
Devils Postpile NM	2002-2006	6.2	-37.23	0.24	NA	0.297 (0.209)

[1]Data collected in 1991-1993 and 2001-2009; trends and survival estimates based on 2001-2009 data only.
[2]NA - Values not available due to insufficient data.

Stressors

Yellow-rumped Warbler populations appear to be stable or increasing in the Sierra Nevada (Table 3) although mark-recapture data from MAPS stations suggest possible (non-significant) declines in King's Canyon NP and Devils Postpile NM. As with most warblers, the Yellow-rumped is vulnerable to nest parasitism from Brown-headed Cowbirds. The species may be resilient to climate change due to its generalist habitat use. Yellow-rumped Warblers favor mature forests but with mixed-open canopies, so some forest thinning from either fire or mechanical harvest may enhance habitat for the species.

Climate Change: An analysis of Christmas Bird Count (CBC) data suggests that the center of abundance of Yellow-rumped Warbler has significantly shifted 15 miles inland throughout its North American range over the past 40 years, corresponding with increases in temperature (Audubon 2009). Modeled distribution shifts of Yellow-rumped Warbler predict slight range contractions in the lower-elevation foothills of the Sierra, Klamath, and southern California mountains and Coast ranges (Stralberg and Jongsomjit 2008). The most important variables influencing current and projected distribution were vegetation and precipitation seasonality (Maxent distribution model) and annual precipitation and annual mean temperature (GAM distribution model).

Yellow-rumped Warblers breed in the middle and higher elevations of SEKI and YOSE (Figure 3). If climate change causes the species' range to shift upward as is generally expected (Stralberg and Jongsomjit 2008), there is much higher-elevation coniferous forest for colonization within SEKI and YOSE. The generalist use of habitat by this species suggests that it is likely adaptable to a warming climate.

Altered Fire Regimes: Yellow-rumped Warbler inhabits a wide variety of forest types including Mixed Conifer, Lodgepole Pine, spruce-fir, early and mid-successional burned forests, and mid-successional clearcuts (Hutto 1995). Research results on fire effects on this species are somewhat equivocal. Yellow-rumped Warbler was a significant indicator of recently burned sites, but was also found in mature forest and old burn in Oregon (Fontaine et al. 2009). Other research found Yellow-rumped Warblers decreased in relative abundance after fire in Montana (Smucker et al. 2005). Similarly, Yellow-rumped Warblers occurred in significantly higher densities in unburned forests in the southern Sierra (Siegel and Wilkerson 2005) and were more abundant in unburned than burned forests in the northern Sierra, although the species was also detected frequently in fire-affected areas (Burnett et al. 2010). These warblers occasionally were detected in high-intensity burned patches in New Mexico, but declined with increasing burn intensity (Kotliar et al. 2007). This species prefers a mixed-open canopy, so small forest openings or edges created by fire may create suitable habitat while expansive areas of high-intensity fire are avoided (Kotliar et al. 2007). Allowing a patchy mosaic of burn intensities to occur across the landscape, as would naturally occur in the absence of fire suppression, is likely to benefit Yellow-rumped Warblers in the Sierra and SIEN parks.

Habitat Fragmentation or Loss: Yellow-rumped Warblers may be adversely impacted by clearcutting but benefits of forest thinning are not well established. The species was much less common in early successional stages of coniferous forest (Hunt and Flaspohler 1998), and densities and relative abundances were greater in plots that were not salvage logged than in those that were salvaged. The species decreased in thinned plots but increased in control and burn-only plots in Ponderosa Pine forests of Arizona (Hurteau et al. 2008). Conversely, Siegel and DeSante (2003) recorded more detections and more than twice as many nests in thinned versus unthinned plots in the northern Sierra. Some thinning of forests due to fire or mechanical means may benefit the species but more intensive removal of trees appears to have an adverse impact. Logging may pose less of a threat to the Yellow-rumped Warbler than some other warblers. Habitat fragmentation or loss from logging is not likely to pose a major threat to the species within SIEN parks where its habitats are protected.

Invasive Species and Disease: Native to the short-grass plains of North America, Brown-headed Cowbirds have expanded their range into California following European settlement. Within national parks, cowbirds can be particularly problematic near campgrounds, horse stables, and picnic areas. Yellow-rumped Warblers are susceptible to brood parasitism by Brown-headed Cowbirds. A 15-year-old study found cowbird occurrence and parasitism rates within the two

SIEN parks to be rare (Halterman et al. 1999) but an updated assessment may be warranted given some evidence that cowbird populations have been increasing in YOSE and SEKI (see Brown-headed Cowbird account in this report).

Human Use Impacts: Thus habitat degradation due to packstock grazing within the parks is a potential concern for the Yellow-rumped Warbler, at least locally where grazing is permitted, both because it can attract Brown-headed Cowbirds and because packstock can damage montane riparian shrubs and meadow habitat used by dispersing juveniles (Ammon and Gilbert 1999, Siegel and DeSante 1999). However, as compared to the greater Sierra Nevada where cattle grazing is widespread, adverse impacts from packstock grazing are likely relatively small and localized.

Yellow-rumped Warbler is vulnerable to collisions with antennas, buildings, and other tall human-made structures, and was the most abundant warbler in tower kills in Florida (Hunt and Flaspohler 1998).

Management Options and Conservation Opportunities
The most important actions park managers can take to protect Yellow-rumped Warblers in the SIEN parks is to restore natural fire regimes and allow a patchy mosaic of burn intensities to maintain mixed-open forest habitat, and carefully manage or consider eliminating Brown-headed Cowbird feeding sites (Heath 2008) such as stables. Guidelines for implementing control programs are available (e.g., Siegle and Ahlers 2004). MAPS station operation and other means of monitoring Yellow-rumped Warbler populations in the parks should continue, in order to better determine population trends, and elucidate their causes.

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