



North Coast Cascades Network Landbird Monitoring

Report for the 2009 Field Season

Natural Resource Technical Report NPS/NCCN/NRTR—2010/392



ON THE COVER

Red Crossbill (*Loxia curvirostra*)

Photograph by: Phil Green

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Executive Summary

In 2009 we completed the third year of full implementation for the landbird monitoring project in the North Coast Cascades Network (NCCN). The NCCN landbird monitoring protocol requires annual survey effort consisting of an annual panel (34 transects distributed among Mount Rainier National Park [MORA], North Cascades National Park Service Complex [NOCA], and Olympic National Park [OLYM]) plus one of five alternating panels (an additional 34 transects distributed throughout MORA, NOCA, and OLYM) and the completion of a grid of survey points at either of the smaller parks—San Juan Island National Historical Park (SAJH) or Lewis and Clark National Historical Park (LEWI). SAJH and LEWI are to be surveyed in alternating years. In 2009 we surveyed the annual panel and the third alternating panel in the large parks, along with the point grid in San Juan Island National Historical Park.

We conducted 960 point counts at survey stations located along 68 transects in the three large parks—including all transects in the annual panel and the third alternating panel. We detected 137 bird species in the three large parks, 79 of which were detected during one or more point counts. The remaining 58 species were recorded by our crew as incidental detections. For 57 species (all species detected at least 15 times on annual-panel transects between 2005 and 2009), we present the total number of detections on annual-panel transects in each park during the 2005, 2006, 2007, 2008, and 2009 field seasons. We caution, however, that these detection totals have not been adjusted for differences in survey effort or potential differences in detectability of birds between years; such adjustments will be made in conjunction with trend analyses in our five-year report.

At SAJH, we conducted 54 point counts, including 38 point counts at American Camp and 16 point counts at British Camp. Our field crew detected 75 species while at SAJH, 61 of which were detected during point counts. We present the number of detections, and the number of points with detections, for each species detected during point counts at SAJH.

The NCCN landbird monitoring project has had another successful year, with a comprehensive, field-tested protocol, two years of annual-panel data collected during the protocol development phase (2005 and 2006), and three years of full project implementation (2007, 2008, and 2009) that include data collection on the annual panel as well as the first three alternating panels. Preliminary results indicate we will have robust sample sizes for many species when we conduct our 5-year trend analysis in 2011, and that we are detecting substantial annual fluctuations in bird populations. These fluctuations, when analyzed in the context of annual weather variation and perhaps other factors, should yield interesting and useful findings about the drivers of avian population dynamics in Pacific Northwest forests, and are likely to spur additional targeted research and help refine management priorities and needs within these parks.

Acknowledgments

We thank the 2009 crew members for their hard work and dedication to the project: M. Fournier, M. Holmgren (Field Lead), E. Huston, M. Ortega-Welch, C. Waythomas, J. Wheeler Baldwin, and D. Wolfson. We thank K. Jenkins (FRESC Olympic Field Station) and the entire NCCN Landbird Monitoring Group for their contributions toward developing the NCCN landbird monitoring protocol. We thank S. Gremel, P. Happe, and M. Reid, for assistance and logistical support at the respective parks, N. Antonova and K. Beirne for GIS training and support, and J. Boetsch for extensive help with data management. We thank R. Holmes for help with formatting this report to National Park Service standards. We thank Mark Huff, NCCN Inventory and Monitoring Program Coordinator, for his support of the project. And, we thank the ESRI Conservation Program for software support. This is Contribution No. 394 of The Institute for Bird Populations.

Introduction

Reported declines of many Neotropical migratory bird species and other bird species breeding in North America have stimulated interest in avian population trends and mechanisms driving those trends (Robbins et al. 1989, DeSante and George 1994, Peterjohn et al. 1995). Data from the North American Breeding Bird Survey indicate that many landbird populations in Pacific Northwest coniferous forests are declining (Andelman and Stock 1994a, 1994b, Sharp 1996, Saab and Rich 1997, Altman 1999a, 1999b, Sauer et al. 2008, North American Bird Conservation Initiative - U.S. Committee 2009). Indeed, Altman (1999a) reported that 30 species exhibit statistically significant, recent and/or long-term declining trends, while only 14 species in the region have significant increasing trends.

Threats to bird populations breeding in Pacific Northwest conifer forests include outright habitat loss as well as forest management practices that discourage the development of old-growth conditions. Since European settlement, large tracts of low-elevation coniferous forest have been lost to residential and agricultural development, with the overall extent of old-growth forest reduced by more than half since World War II (Bolsinger and Waddell 1993). Landscapes that have been managed for timber production are now dominated by early- and mid-successional forests (Bunnell et al. 1997), and exhibit increased fragmentation as well as a variety of altered structural characteristics that likely affect bird community composition (Meslow and Wight 1975, Hagar et al. 1995, Bunnell et al. 1997, Altman 1999a).

Pacific Northwest landbirds breeding in habitats other than conifer forests face substantial threats as well. Species that breed in the subalpine and alpine zones are exposed to visitor impacts, ecological changes resulting from alterations of the natural fire regime, and perhaps most importantly, may be among the birds most strongly affected by climate change during the coming decades. Indeed, Oregon-Washington Partners in Flight has explicitly called on the National Park Service to take responsibility for monitoring birds in high-elevation areas throughout the Pacific Northwest (Altman and Bart 2001). Additional threats also face the Pacific Northwest's migratory landbirds on their wintering grounds and along migration routes.

The three large parks in the North Coast and Cascades Network (NCCN)—Olympic (OLYM), North Cascades (NOCA), and Mount Rainier (MORA)—range from sea level to nearly 4,400 m and contain huge tracts of late-successional, conifer forest on the Olympic Peninsula and the west slope of the Cascades, as well as large areas dominated by subalpine and alpine plant communities. North Cascades National Park Service Complex also includes substantial tracts of conifer forest typical of the east side of the Cascades, which hosts a somewhat distinct avifauna (Altman 1999b). San Juan Islands National Historical Park (SAJH), in the rain shadow of the Olympic Mountains, includes small but important examples of coastal prairie and Garry Oak woodlands, plant communities that are fairly rare in western Washington (Atkinson and Sharpe 1985) and host unusual bird communities (Lewis and Sharpe 1987; Siegel et al. 2002). Lewis and Clark National Historical Park (LEWI) includes lowland wetlands as well as coastal and upland forests, and extends our project's area of inference substantially southward. Avian inventory projects assessing park- and/or habitat-specific abundance of all commonly occurring bird species have been completed at all five parks (Siegel et al. 2002, Siegel et al. 2004a, Siegel et al. 2004b, Wilkerson et al. 2005, Siegel et al. 2007c).

National parks in the NCCN can fulfill vital roles as both refuges for bird species dependent on late-successional forest conditions, and as reference sites for assessing the effects of land use and land cover changes on bird populations throughout the larger Pacific Northwest region (Silsbee and Peterson 1991). These changes may result from regional activities such as land conversion and forest management, or from broader-scale processes such as global climate change. Indeed, monitoring population trends at 'control' sites in national parks is especially important because parks are among the sites in the United States where population trends due to large-scale regional or global change patterns are likely least confounded with local changes in land-use (Simons et al. 1999). Additionally, long-term monitoring of landbirds throughout the NCCN is expected to provide information that will inform future decisions about important management issues in the parks, including visitor impacts, fire management, and the effects of introduced species.

The specific objectives of the NCCN landbird monitoring project are:

- 1) to detect trends in the density of as many landbird species (including passerines, near passerines, and galliformes) as possible throughout accessible areas of five NCCN parks during the breeding season.

- 2) to track changes in the breeding season distribution of landbird species throughout accessible areas of the three large wilderness parks.

This report and subsequent annual reports for the landbird monitoring project are intended primarily as administrative reports. More comprehensive analyses of the data, including trend analysis that accounts for the potentially confounding effects of variation in detectability and sampling effort, will be conducted in conjunction with the project's five-year reports, the first of which is expected to be completed after the 2011 field season.

Study Area

The study area for the NCCN landbird monitoring project (Figure 1) includes areas of MORA, NOCA and OLYM that are accessible by foot and lie within 1 km of a road or trail, as well as all of SAJH (including both American Camp and English Camp) and portions of LEWI.

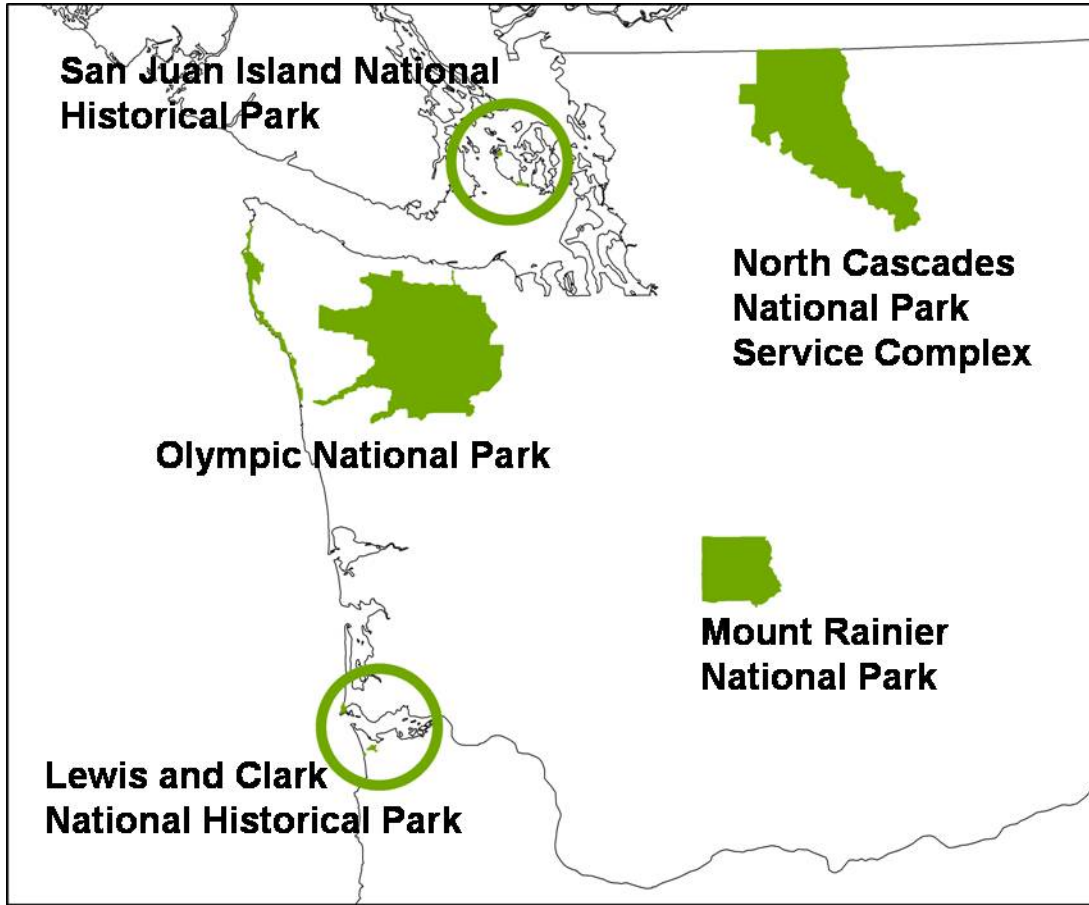


Figure 1. National Park Service units participating in the NCCN Landbird Monitoring Project.

Methods

Sample Design

Siegel et al. (2007a) provide a detailed description of the sample design for the NCCN landbird monitoring project. In brief, the sample design for the three large parks utilizes six panels of transects in each park. At NOCA and at OLYM each panel includes four low-elevation transects (transect starting points < 650 m), four mid-elevation transects (transect starting point from 650 m to 1,350 m) and four high elevation transects (transect starting points >1,350 m). At MORA the sample design is the same as at the other two large parks, except there are only two low-elevation transects in each panel, and the cutoff between low-elevation transects and mid-elevation transects is 800 m rather than 650 m. All transect starting points are on park roads or trails, but the transects they define consist of a line of approximately 8-12 points, extending perpendicularly (or as close to perpendicularly as topographic and physiographic features allow) in both directions away from the trail. In 2009 we surveyed the annual panel of transects ('Ann1') and the third alternating panel of transects ('Alt4').

In 2009 we implemented the full study design in the three large parks for the third consecutive year, including surveys of the annual panel of transects as well as the third alternating panel (Figures 2-4). During the first two years of protocol development (2005-2006) we surveyed only the annual panel (Siegel et al. 2006, 2007b). We provide results from the first two years of full project implementation in Siegel et al. (2008) and Wilkerson et al. (2009).

At the two smaller parks (LEWI and SAJH) the sample design consists of a systematic grid of survey points, with the two parks scheduled to be surveyed in alternating years. In the summer of 2009 we surveyed the grid at SAJH (Figure 5).

Crew Training and Certification

Mandy Holmgren, a contract biologist with The Institute for Bird Populations (IBP), served as the 2009 Field Lead. Mandy began training six field technicians on May 1, with assistance from IBP Staff Biologist Bob Wilkerson and NPS Project Lead Bob Kuntz. Training followed guidelines described in the NCCN landbird monitoring protocol (Siegel et al. 2007a). By the end of the official training session on May 19, three of the six field technicians had passed the rigorous point count certification exam, and were ready to begin collecting data. A week later two of the remaining three field technician were also certified, and the final field technician was certified shortly thereafter. All individuals who collected data during the 2009 field season (Table 1) were employees, contract biologists, or field biologist interns with The Institute for Bird Populations.

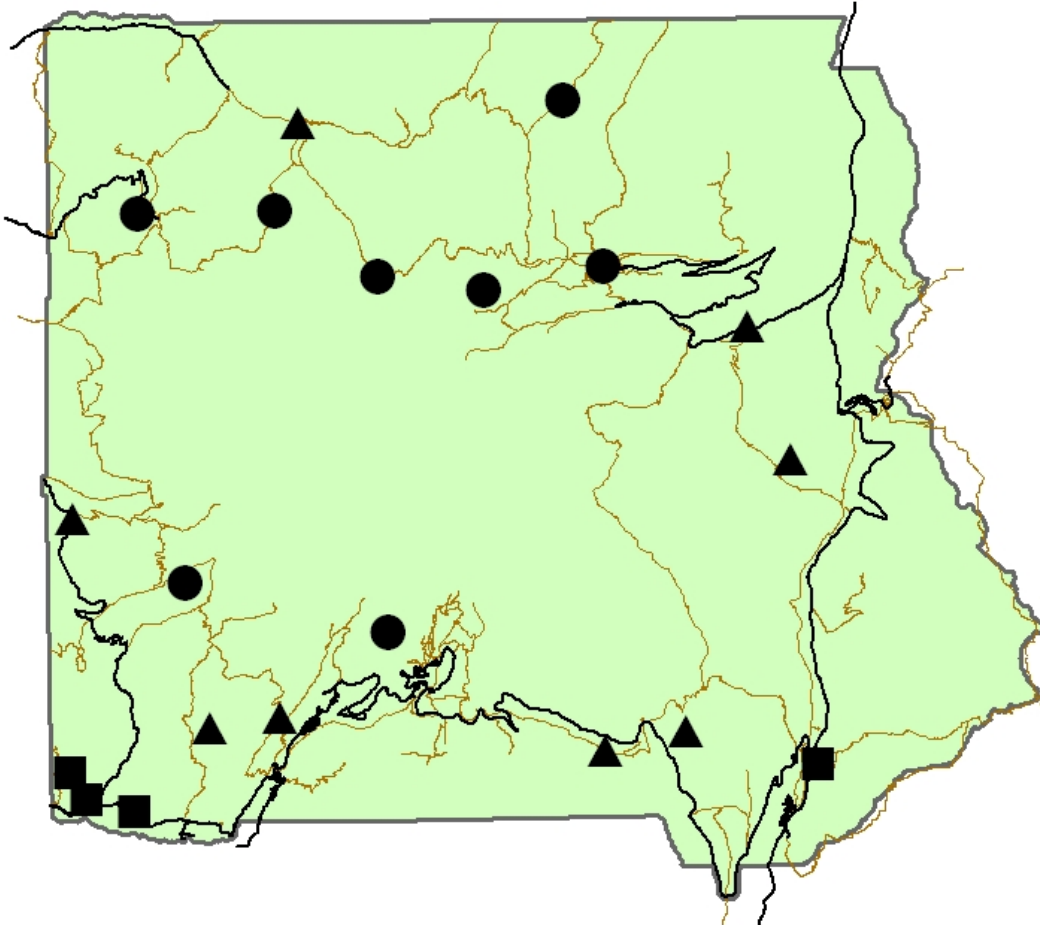


Figure 2. Approximate locations of transects conducted at MORA in 2009. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high elevation transects.

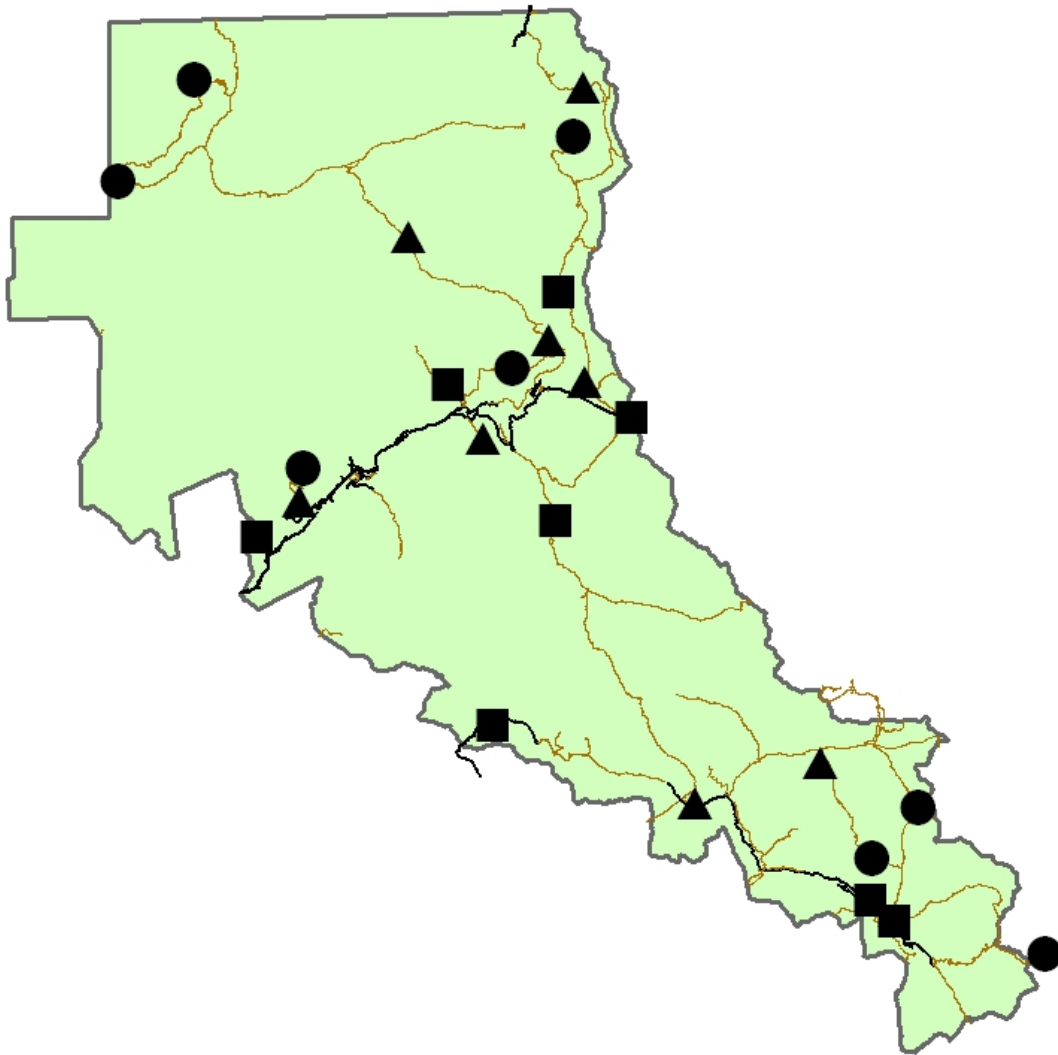


Figure 3. Approximate locations of transects conducted at NOCA in 2009. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high elevation transects.

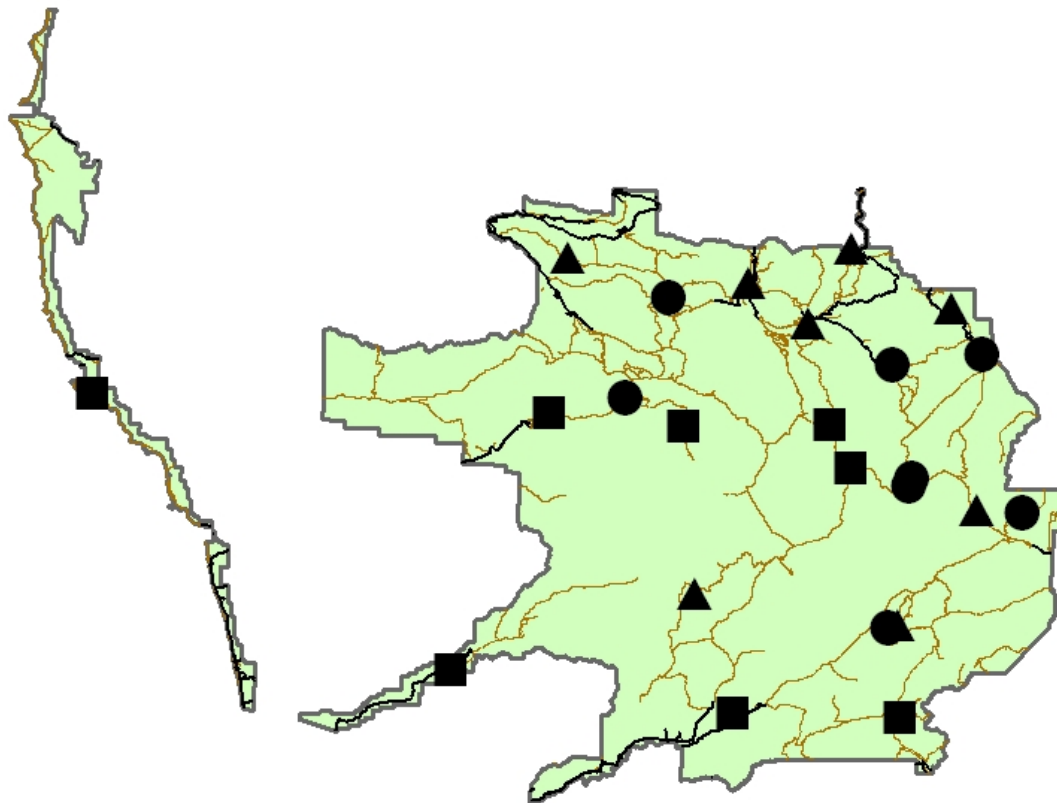
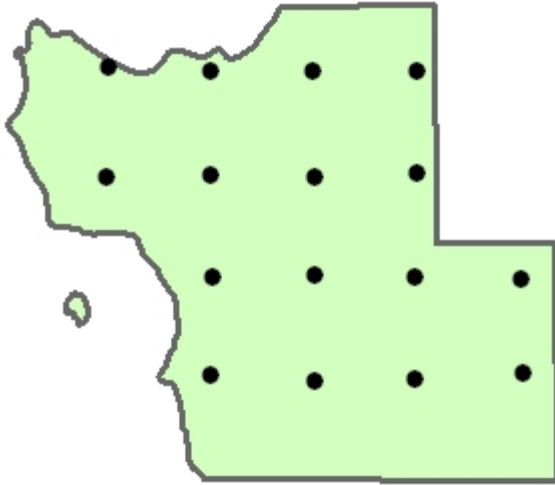


Figure 4. Approximate locations of transects conducted at OLYM in 2009. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high elevation transects.

British Camp



American Camp

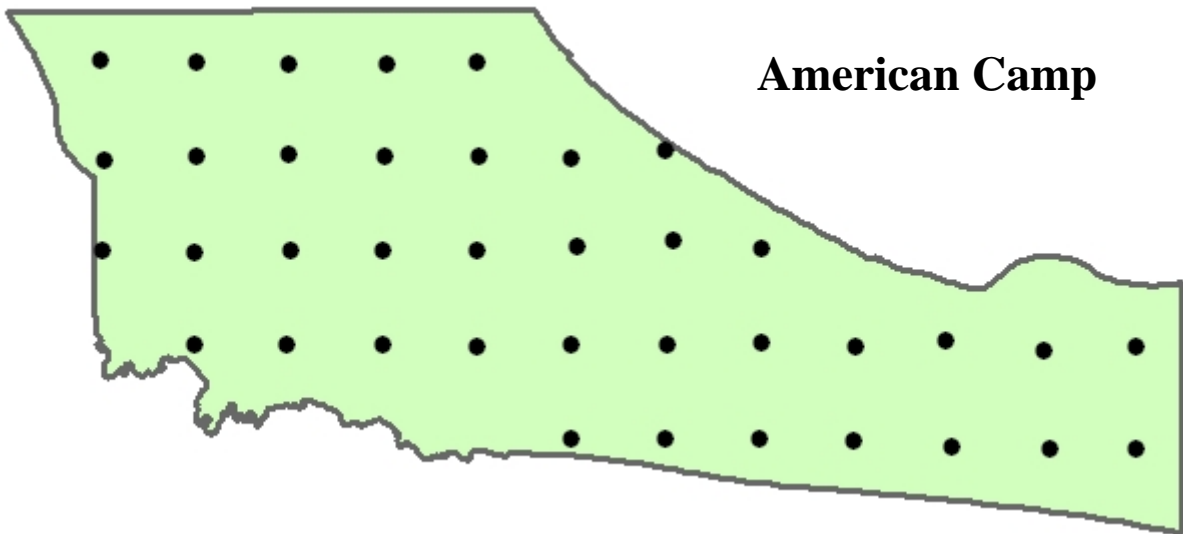


Figure 5. Locations of point count stations surveyed at SAJH in 2009.

Table 1. Observers who conducted point counts in the NCCN in 2009.

Observer	Role
Marie-Catherine Fournier	Technician
Mandy Holmgren	Field lead
Eric Huston	Technician
Marissa Ortega-Welch	Technician
Craig Waythomas	Technician
Justin Wheeler Baldwin	Technician
David Wolfson	Technician

Data Collection

All point count data were collected between May 25 and May 28 at SAJH, between June 14 and July 30 at MORA, between May 29 and July 22 at NOCA, and between May 30 and July 30 at OLYM. At the three large parks, low-elevation transects were generally surveyed first, followed by the mid-elevation transects, and finally the high-elevation transects. Data collection was deliberately begun later at MORA than at the other parks, because there is less low-elevation habitat to survey there, and breeding phenology generally seems later than at the other two large parks, even at equivalent elevations.

Data collection followed the detailed procedures explained in the NCCN landbird monitoring protocol (Siegel et al. 2007a). Crew members worked in pairs to survey a single transect each morning. Crew members were provided with a) maps and coordinates indicating the location of transect ‘starting points’, which lay directly on trails or roads, as well as all point count stations on the already-established annual panel, and b) narrative descriptions of point count stations and the travel routes between successive stations. Beginning within 10 minutes of official sunrise, each observer conducted a point count, and then continued along the transect, conducting another point count every 200 m until 3.5 hours after official local sunrise.

When surveying transects on the annual panel, crew members used the maps and narrative descriptions to locate the same point count stations that were established and surveyed in previous years. However, in a few instances, annual-panel transects had to be re-routed because routes chosen in previous years were deemed overly dangerous or difficult to traverse under present snow cover or stream-depth conditions. In these instances, observers established new routes, following the guidelines in Siegel et al. (2007a), then project managers met at the end of the field season to determine whether the new route would become the permanent route to be surveyed in future years. When surveying transects on the alternating panel, crew members began from the indicated starting points, and then established transect routes according to the guidelines in Siegel et al. (2007a).

At each point count station observers recorded the starting time, scored the degree of noise interference caused by such factors as flowing water or wind, recorded the weather conditions, and then began the five-minute point count. Birds observed in the first three minutes were recorded separately from those observed in the last two minutes, in order to allow comparison with Breeding Bird Survey data (Sauer et al. 2008), which are based on three-minute counts. Observers estimated the horizontal distance, to the nearest meter, to each bird detected. The observers also recorded whether the distance estimates were based on an aural or visual detection, and whether the bird ever sang during the point count.

After completing their last point count each morning, observers retraced their steps back to the starting point. Along the way, they conducted a rapid habitat assessment at each of the survey points. The rapid habitat assessment consisted of characterizing the habitat within a 50-m radius of the survey point, noting the primary (and secondary, if appropriate) plant community type, canopy cover class, and tree size class, according to the categories developed by Pacific Meridian Resources (1996). While conducting the habitat assessments, observers also used Global Positioning System (GPS) units to collect location data files. Where necessary, observers amended narrative descriptions of the point locations.

Whenever crew members detected species thought to be rare in the parks or difficult to detect during diurnal point count surveys, they completed “Rare Bird Report Forms”, including descriptions of the birds’ appearance and behavior, and location coordinates. These reports covered not only birds detected during point counts, but also birds detected while sampling vegetation, hiking between transects, relaxing at camp in the evening, or at any other time during the field season, including the pre-season training session.

After completing their fieldwork each day, partners reviewed each other’s data forms for missing or incorrectly recorded data, discussed any interesting or surprising bird detections, and completed a Transect Visit Log summarizing the day’s efforts.

Data Entry and Validation

Our protocol requires crews working at each large park to enter their own data into the NCCN landbird monitoring project’s Microsoft Access database throughout the field season. Although the crews were able to enter much of their data during the field season, a heavy fieldwork schedule prevented completion of data entry before the field season ended. All the remaining data were entered by the Field Lead after the field season. Data entry procedures followed the guidelines in Siegel et al. (2007a).

The database includes built-in quality assurance components such as pick-lists and validation rules to test for missing data or illogical combinations. While entering the data, the data entry person visually reviewed her or his work to ensure that the data on the screen matched the field form. When all the data were entered, we inspected the database for incompleteness and errors, and used the built-in Quality Assurance Tools to check for logical inconsistencies and data outliers. Any errors or data omissions were then corrected.

Data Analysis

We summarized and tabulated data according to the template in Siegel et al. (2007a). We present survey results without making any adjustments for detectability, which may vary substantially by species, habitat, observer, or other factors. In conjunction with the first five-year report for this monitoring project, a thorough analysis of factors affecting detectability of birds during point counts will be conducted, allowing for annual results to be adjusted to account for variable detectability (Buckland et al. 2001, Nichols et al. 2009). Until that analysis is completed, any results should be viewed as provisional only.

Results

We surveyed all 34 annual-panel transects in the large parks, and all 34 transects in the third alternating panel (Table 2), for a total of 68 transects (Table 3). Appendix 1 provides a detailed multi-year survey history of all transects sampled in the large parks to date. We conducted 289 individual point counts at MORA, 361 point counts at NOCA and 310 point counts at OLYM (Table 2). We also conducted 54 point counts at SAJH. During the 960 large park point counts we counted 6,309 individual birds. Across the three large parks, we documented the presence of 137 species (Table 4), 79 of which were detected during point counts; the remaining 58 species were recorded only as incidental detections or on “Rare Bird Report Forms”.

For the annual-panel transects only, the number of individuals of each species detected during point counts (unlimited radius) and the number of transects on which each species was detected are provided in Table 5. On the annual-panel transects we detected 38 bird species during point counts at MORA, 61 species during point counts at NOCA, and 53 species during point counts at OLYM (Table 5). Pooling detections on annual-panel transects across all species, we amassed 774 individual bird detections (5.41 detections/point) at MORA, 1,390 detections (7.32 detections/point) at NOCA, and 972 detections (5.79 detections per point) at OLYM (Table 5). The five most frequently detected species on the annual-panel transects in 2009 were: Pine Siskin (327 detections), Dark-eyed Junco (301 detections), Varied Thrush (231 detections), Winter Wren (191 detections), and Townsend’s Warbler (151 detections). Pooling data across the annual-panel transects as well as the transects in the third alternating panel (“Alt4”), the number of individuals of each species detected during point counts (unlimited radius) and the number of transects on which each species was detected are provided in Table 6.

Again pooling data across the annual-panel transects as well as the transects in the third alternating panel, we detected 52 bird species during point counts at MORA, 66 species during point counts at NOCA, and 58 species during point counts at OLYM (Table 6). Considering data from all 68 surveyed transects, the five most frequently detected species were: Pine Siskin (692 detections), Dark-eyed Junco (592 detections), Varied Thrush (432 detections), Townsend’s Warbler (375 detections), and Winter Wren (357 detections).

Two species of particular conservation interest—Spotted Owl and Peregrine Falcon—were only detected as incidental sightings, not during point counts, and were documented on ‘rare bird’ detection forms. These detections are summarized in Table 7.

For 57 species (all species for which we amassed at least 15 point count detections on annual-panel transects between 2005 and 2009), we present the total number of detections of each species on each park’s annual-panel transects during the 2005, 2006, 2007, 2008, and 2009 field seasons (Figure 6). We caution, however, that these detection totals have not been adjusted for differences in survey effort or potential differences in detectability of birds between years; such adjustments will be made in conjunction with trend analyses in our five-year report.

At SAJH our 54 point counts yielded 908 detections of 61 species (Table 8), a detection rate of 16.8 birds per point count. The most frequently detected species was American Robin (61

detections), followed by Canada Goose (56 detections), American Goldfinch (56 detections), Brown-headed Cowbird (47 detections), and Savannah Sparrow (46 detections).

Table 2. NCCN landbird monitoring transects that were surveyed in 2009.

Park	Panel	Elevation	Transect	No. of points surveyed
MORA	ann1	Low	4001	12
MORA	ann1	Low	4005	12
MORA	ann1	Medium	4002	11
MORA	ann1	Medium	4004	13
MORA	ann1	Medium	4009	11
MORA	ann1	Medium	4012	19
MORA	ann1	High	4003	12
MORA	ann1	High	4007	20
MORA	ann1	High	4011	17
MORA	ann1	High	4014	16
MORA	alt4	Low	4021	12
MORA	alt4	Low	4022	17
MORA	alt4	Medium	4057	10
MORA	alt4	Medium	4060	24
MORA	alt4	Medium	4061	15
MORA	alt4	Medium	4065	13
MORA	alt4	High	4035	12
MORA	alt4	High	4036	14
MORA	alt4	High	4039	11
MORA	alt4	High	4043	18
NOCA	ann1	Low	1013	11
NOCA	ann1	Low	1017	12
NOCA	ann1	Low	1020	16
NOCA	ann1	Low	1023	21
NOCA	ann1	Medium	1015	15
NOCA	ann1	Medium	1018	22
NOCA	ann1	Medium	1022	14
NOCA	ann1	Medium	1024	10
NOCA	ann1	High	1014	20
NOCA	ann1	High	1016	15
NOCA	ann1	High	1019	12
NOCA	ann1	High	1021	22
NOCA	alt4	Low	1036	20
NOCA	alt4	Low	1054	11
NOCA	alt4	Low	1061	10
NOCA	alt4	Low	1122	20
NOCA	alt4	Medium	1033	20
NOCA	alt4	Medium	1035	16
NOCA	alt4	Medium	1038	13
NOCA	alt4	Medium	1041	14
NOCA	alt4	High	1048	11
NOCA	alt4	High	1049	12

Table 2. NCCN landbird monitoring transects that were surveyed in 2009 (continued).

Park	Panel	Elevation	Transect	No. of points surveyed
NOCA	alt4	High	1050	13
NOCA	alt4	High	1052	11
OLYM	ann1	Low	3001	11
OLYM	ann1	Low	3121	17
OLYM	ann1	Low	3126	13
OLYM	ann1	Low	3134	18
OLYM	ann1	Medium	3122	16
OLYM	ann1	Medium	3123	14
OLYM	ann1	Medium	3130	9
OLYM	ann1	Medium	3200	21
OLYM	ann1	High	3124	11
OLYM	ann1	High	3125	14
OLYM	ann1	High	3127	14
OLYM	ann1	High	3128	10
OLYM	alt4	Low	3155	10
OLYM	alt4	Low	3159	11
OLYM	alt4	Low	3161	11
OLYM	alt4	Low	3163	15
OLYM	alt4	Medium	3160	10
OLYM	alt4	Medium	3167	11
OLYM	alt4	Medium	3168	10
OLYM	alt4	Medium	3174	14
OLYM	alt4	High	3158	14
OLYM	alt4	High	3164	14
OLYM	alt4	High	3171	12
OLYM	alt4	High	3173	10

Table 3. Summary history of NCCN landbird monitoring transects completed through 2009.

Park	Elevation stratum	Number of transects surveyed				
		2005 ^a	2006 ^a	2007 ^b	2008 ^c	2009 ^d
MORA	Low	2	2	4	4	4
MORA	Medium	4	4	8	8	8
MORA	High	4	4	8	8	8
MORA	All	10	10	20	20	20
NOCA	Low	4	4	8	8	8
NOCA	Medium	4	4	7	7	8
NOCA	High	4	4	7	5	8
NOCA	All	12	12	22	20	24
OLYM	Low	4	4	8	8	8
OLYM	Medium	4	3	8	7	8
OLYM	High	4	4	7	8	8
OLYM	All	12	11	23	23	24
All	Low	10	10	20	20	20
All	Medium	12	11	23	22	24
All	High	12	12	22	21	24
All	All	34	33	65	63	68

^aOnly the annual panel transects were surveyed in 2005 and 2006, during the protocol development phase of the project.

^bThe annual panel along with the first alternating panel were sampled in 2007.

^cThe annual panel along with the second alternating panel were sampled in 2008.

^dThe annual panel along with the third alternating panel were sampled in 2009.

Table 4. All species recorded in the three large NCCN parks during the 2009 field season, including the pre-season training session. Asterisks indicate species that were detected only at times other than during point counts.

Common Name	Scientific Name
Common Loon	<i>Gavia immer</i>
Pied-billed Grebe *	<i>Podilymbus podiceps</i>
Western Grebe *	<i>Aechmophorus occidentalis</i>
Double-crested Cormorant *	<i>Phalacrocorax auritus</i>
Pelagic Cormorant *	<i>Phalacrocorax pelagicus</i>
Great Blue Heron *	<i>Ardea herodias</i>
Turkey Vulture *	<i>Cathartes aura</i>
Canada Goose	<i>Branta canadensis</i>
Wood Duck *	<i>Aix sponsa</i>
American Wigeon *	<i>Anas americana</i>
Mallard *	<i>Anas platyrhynchos</i>
Cinnamon Teal *	<i>Anas cyanoptera</i>
Green-winged Teal *	<i>Anas crecca</i>
Ring-necked Duck *	<i>Aythya collaris</i>
Harlequin Duck *	<i>Histrionicus histrionicus</i>
Surf Scoter *	<i>Melanitta perspicillata</i>
Bufflehead *	<i>Bucephala albeola</i>
Barrow's Goldeneye	<i>Bucephala islandica</i>
Common Merganser *	<i>Mergus merganser</i>
Osprey *	<i>Pandion haliaetus</i>
Bald Eagle *	<i>Haliaeetus leucocephalus</i>
Sharp-shinned Hawk *	<i>Accipiter striatus</i>
Cooper's Hawk *	<i>Accipiter cooperii</i>
Northern Goshawk	<i>Accipiter gentilis</i>
Red-tailed Hawk *	<i>Buteo jamaicensis</i>
Peregrine Falcon *	<i>Falco peregrinus</i>
Prairie Falcon *	<i>Falco mexicanus</i>
Ruffed Grouse	<i>Bonasa umbellus</i>
White-tailed Ptarmigan *	<i>Lagopus leucurus</i>
Sooty Grouse	<i>Dendragapus fuliginosus</i>
Killdeer *	<i>Charadrius vociferus</i>
American Black Oystercatcher *	<i>Haematopus bachmani</i>
Spotted Sandpiper	<i>Actitis macularia</i>
Least Sandpiper *	<i>Calidris minutilla</i>
Mew Gull *	<i>Larus canus</i>
Western Gull *	<i>Larus occidentalis</i>
Glaucous-winged Gull *	<i>Larus glaucescens</i>
Caspian Tern *	<i>Sterna caspia</i>
Common Murre *	<i>Uria aalge</i>
Pigeon Guillemot *	<i>Cepphus columba</i>
Marbled Murrelet	<i>Brachyramphus marmoratus</i>
Rhinoceros Auklet *	<i>Cerorhinca monocerata</i>
Band-tailed Pigeon	<i>Patagioenas fasciata</i>
Mourning Dove *	<i>Zenaida macroura</i>
Great Horned Owl *	<i>Bubo virginianus</i>
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>
Spotted Owl *	<i>Strix occidentalis</i>
Barred Owl	<i>Strix varia</i>
Northern Saw-whet Owl *	<i>Aegolius acadicus</i>
Common Nighthawk	<i>Chordeiles minor</i>
Vaux's Swift	<i>Chaetura vauxi</i>
Calliope Hummingbird	<i>Stellula calliope</i>
Rufous Hummingbird	<i>Selasphorus rufus</i>
Belted Kingfisher	<i>Ceryle alcyon</i>
Red-naped Sapsucker *	<i>Sphyrapicus nuchalis</i>

Table 4. All species recorded in the three large NCCN parks during the 2009 field season, including the pre-season training session. Asterisks indicate species that were detected only at times other than during point counts (continued).

Common Name	Scientific Name
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>
Downy Woodpecker *	<i>Picoides pubescens</i>
Hairy Woodpecker	<i>Picoides villosus</i>
American Three-toed Woodpecker *	<i>Picoides dorsalis</i>
Northern Flicker	<i>Colaptes auratus</i>
Pileated Woodpecker	<i>Dryocopus pileatus</i>
Olive-sided Flycatcher	<i>Contopus cooperi</i>
Western Wood-Pewee	<i>Contopus sordidulus</i>
Willow Flycatcher	<i>Empidonax traillii</i>
Hammond's Flycatcher	<i>Empidonax hammondii</i>
Dusky Flycatcher *	<i>Empidonax oberholseri</i>
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>
Say's Phoebe *	<i>Sayornis saya</i>
Cassin's Vireo	<i>Vireo cassinii</i>
Hutton's Vireo *	<i>Vireo huttoni</i>
Warbling Vireo	<i>Vireo gilvus</i>
Red-eyed Vireo	<i>Vireo olivaceus</i>
Gray Jay	<i>Perisoreus canadensis</i>
Steller's Jay	<i>Cyanocitta stelleri</i>
Clark's Nutcracker	<i>Nucifraga columbiana</i>
American Crow	<i>Corvus brachyrhynchos</i>
Common Raven	<i>Corvus corax</i>
Horned Lark	<i>Eremophila alpestris</i>
Tree Swallow *	<i>Tachycineta bicolor</i>
Violet-green Swallow	<i>Tachycineta thalassina</i>
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
Cliff Swallow *	<i>Petrochelidon pyrrhonota</i>
Barn Swallow *	<i>Hirundo rustica</i>
Mountain Chickadee	<i>Poecile gambeli</i>
Chestnut-backed Chickadee	<i>Poecile rufescens</i>
Red-breasted Nuthatch	<i>Sitta canadensis</i>
Brown Creeper	<i>Certhia americana</i>
Canyon Wren *	<i>Catherpes mexicanus</i>
House Wren *	<i>Troglodytes aedon</i>
Winter Wren	<i>Troglodytes troglodytes</i>
Marsh Wren *	<i>Cistothorus palustris</i>
American Dipper	<i>Cinclus mexicanus</i>
Golden-crowned Kinglet	<i>Regulus satrapa</i>
Ruby-crowned Kinglet	<i>Regulus calendula</i>
Townsend's Solitaire	<i>Myadestes townsendi</i>
Veery	<i>Catharus fuscescens</i>
Swainson's Thrush	<i>Catharus ustulatus</i>
Hermit Thrush	<i>Catharus guttatus</i>
American Robin	<i>Turdus migratorius</i>
Varied Thrush	<i>Ixoreus naevius</i>
European Starling *	<i>Sturnus vulgaris</i>
American Pipit	<i>Anthus rubescens</i>
Cedar Waxwing	<i>Bombycilla cedrorum</i>
Orange-crowned Warbler	<i>Vermivora celata</i>
Nashville Warbler	<i>Vermivora ruficapilla</i>
Yellow Warbler	<i>Dendroica petechia</i>
Yellow-rumped Warbler	<i>Dendroica coronata</i>
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>
Townsend's Warbler	<i>Dendroica townsendi</i>
Townsend's x Hermit Warbler hybrid	<i>Dendroica townsendi x occidentalis</i>
Hermit Warbler	<i>Dendroica occidentalis</i>

Table 4. All species recorded in the three large NCCN parks during the 2009 field season, including the pre-season training session. Asterisks indicate species that were detected only at times other than during point counts (continued).

Common Name	Scientific Name
American Redstart *	<i>Setophaga ruticilla</i>
MacGillivray's Warbler	<i>Oporornis tolmiei</i>
Common Yellowthroat *	<i>Geothlypis trichas</i>
Wilson's Warbler	<i>Wilsonia pusilla</i>
Western Tanager	<i>Piranga ludoviciana</i>
Spotted Towhee	<i>Pipilo maculatus</i>
Chipping Sparrow	<i>Spizella passerina</i>
Savannah Sparrow	<i>Passerculus sandwichensis</i>
Fox Sparrow	<i>Passerella iliaca</i>
Song Sparrow	<i>Melospiza melodia</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>
Lazuli Bunting	<i>Passerina amoena</i>
Red-winged Blackbird *	<i>Agelaius phoeniceus</i>
Western Meadowlark *	<i>Sturnella neglecta</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Bullock's Oriole *	<i>Icterus bullockii</i>
Gray-crowned Rosy-Finch	<i>Leucosticte tephrocotis</i>
Pine Grosbeak	<i>Pinicola enucleator</i>
Purple Finch	<i>Carpodacus purpureus</i>
Cassin's Finch	<i>Carpodacus cassinii</i>
House Finch *	<i>Carpodacus mexicanus</i>
Red Crossbill	<i>Loxia curvirostra</i>
Pine Siskin	<i>Carduelis pinus</i>
American Goldfinch *	<i>Carduelis tristis</i>
Evening Grosbeak	<i>Coccothraustes vespertinus</i>

Table 5. Number of transects with detections and number of individual detections for each species detected during point counts on annual-panel transects in the three large NCCN parks in 2009.

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Canada Goose		1		1		1		1
Barrow's Goldeneye			1	1			1	1
Northern Goshawk			1	1			1	1
Ruffed Grouse			2	2			2	2
Sooty Grouse	1	3	6	10	1	6	12	19
Spotted Sandpiper	2		1	3	3		6	9
Band-tailed Pigeon			7	7			13	13
Northern Pygmy-Owl			1	1			1	1
Barred Owl	1		2	3	1		2	3
Common Nighthawk			1	1			1	1
Vaux's Swift	2	4	2	8	3	16	4	23
Calliope Hummingbird	1	1		2	2	1		3
Rufous Hummingbird	6	8	7	21	45	11	15	71
Belted Kingfisher			1	1			1	1
Red-breasted Sapsucker		1		1		4		4
Hairy Woodpecker	2	5	4	11	2	5	9	16
Northern Flicker		4	6	10		5	11	16
Pileated Woodpecker		1	1	2		1	1	2
Olive-sided Flycatcher		3	5	8		14	12	26
Western Wood-Pewee		4		4		16		16
Willow Flycatcher		1		1		1		1
Hammond's Flycatcher	3	9	7	19	7	76	31	114
Pacific-slope Flycatcher	5	4	10	19	19	14	116	149
Cassin's Vireo		3		3		8		8
Warbling Vireo	2	7	4	13	5	27	28	60
Red-eyed Vireo		2		2		4		4
Gray Jay	2	2	5	9	8	3	11	22
Steller's Jay	3	3	4	10	5	3	8	16
Clark's Nutcracker	1	1		2	3	13		16
American Crow		1	2	3		1	2	3
Common Raven		2	3	5		5	8	13
Violet-green Swallow		1	1	2		4	1	5
Mountain Chickadee	1	3		4	3	9		12
Chestnut-backed Chickadee	9	9	10	28	45	49	50	144
Red-breasted Nuthatch	9	12	10	31	39	63	46	148
Brown Creeper	6	4	5	15	17	20	12	49
Winter Wren	9	6	10	25	60	59	72	191

Table 5. Number of transects with detections and number of individual detections for each species detected during point counts on annual-panel transects in the three large NCCN parks in 2009 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
American Dipper		1	1	2		1	1	2
Golden-crowned Kinglet	8	8	11	27	30	37	37	104
Ruby-crowned Kinglet		1	1	2		4	1	5
Townsend's Solitaire	1		3	4	1		3	4
Veery		1		1		5		5
Swainson's Thrush	5	7	2	14	10	84	10	104
Hermit Thrush	7	5	8	20	17	86	34	137
American Robin	7	6	8	21	20	44	37	101
Varied Thrush	8	8	12	28	98	87	46	231
American Pipit	2		1	3	19		1	20
Cedar Waxwing		2		2		4		4
Orange-crowned Warbler	1	1		2	2	1		3
Nashville Warbler		3		3		13		13
Yellow Warbler		6	1	7		35	2	37
Yellow-rumped Warbler	1	10	1	12	1	65	1	67
Black-throated Gray Warbler		2	1	3		12	5	17
Townsend's Warbler	7	8	6	21	46	79	26	151
Townsend's x Hermit Warbler hybrid			1	1			1	1
Hermit Warbler	2			2	3			3
MacGillivray's Warbler		6	1	7		15	1	16
Wilson's Warbler		2	4	6		9	16	25
Western Tanager	1	9	3	13	2	55	8	65
Spotted Towhee		1		1		1		1
Fox Sparrow	1	1		2	4	2		6
Song Sparrow		1		1		5		5
White-crowned Sparrow	1	2	1	4	1	2	2	5
Dark-eyed Junco	8	9	11	28	87	83	131	301
Black-headed Grosbeak		5	1	6		10	1	11
Lazuli Bunting		2		2		4		4
Brown-headed Cowbird		2		2		6		6
Gray-crowned Rosy-Finch	1		1	2	4		1	5
Pine Grosbeak		1	3	4		1	3	4
Purple Finch		2		2		3		3
Cassin's Finch	1	2		3	3	7		10
Red Crossbill	4	4	8	16	5	6	50	61

Table 5. Number of transects with detections and number of individual detections for each species detected during point counts on annual-panel transects in the three large NCCN parks in 2009 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Pine Siskin	8	8	9	25	146	114	67	327
Evening Grosbeak	5	7	5	17	7	40	10	57
All Species Pooled					774	1,390	972	3,136
Detections per Point (All Species Pooled)					5.41	7.32	5.79	6.26

Table 6. Number of transects with detections and number of individual detections for each species detected during point counts (annual- and alternating-panel transects combined) in the three large NCCN parks in 2009.

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Common Loon		1		1		3		3
Canada Goose		1		1		1		1
Barrow's Goldeneye			1	1			1	1
Northern Goshawk			2	2			2	2
Ruffed Grouse			2	2			2	2
Sooty Grouse	1	7	14	22	1	14	33	48
Spotted Sandpiper	2	1	3	6	3	2	8	13
Marbled Murrelet			3	3			6	6
Band-tailed Pigeon			11	11			26	26
Northern Pygmy-Owl			1	1			1	1
Barred Owl	1		2	3	1		2	3
Common Nighthawk			1	1			1	1
Vaux's Swift	6	10	4	20	17	38	11	66
Calliope Hummingbird	1	2		3	2	2		4
Rufous Hummingbird	11	15	14	40	55	30	29	114
Belted Kingfisher			2	2			2	2
Red-breasted Sapsucker	1	4		5	2	13		15
Hairy Woodpecker	4	9	7	20	4	10	13	27
Northern Flicker	3	6	11	20	10	8	19	37
Pileated Woodpecker		3	1	4		3	1	4
Olive-sided Flycatcher	2	7	10	19	3	24	21	48
Western Wood-Pewee		5		5		20		20
Willow Flycatcher		1	1	2		1	1	2
Hammond's Flycatcher	7	16	12	35	31	133	52	216
Pacific-slope Flycatcher	10	6	20	36	49	23	198	270
Cassin's Vireo	1	4		5	1	11		12
Warbling Vireo	3	12	7	22	9	48	41	98
Red-eyed Vireo		2		2		4		4
Gray Jay	6	5	14	25	17	6	32	55
Steller's Jay	5	7	7	19	7	13	11	31
Clark's Nutcracker	3	2		5	14	17		31
American Crow		1	3	4		1	3	4
Common Raven	1	2	4	7	1	5	9	15
Horned Lark			1	1			2	2
Violet-green Swallow		1	1	2		4	1	5
Northern Rough-winged Swallow			1	1			1	1
Mountain Chickadee	4	5		9	29	19		48

Table 6. Number of transects with detections and number of individual detections for each species detected during point counts (annual- and alternating-panel transects combined) in the three large NCCN parks in 2009 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Chestnut-backed Chickadee	17	17	22	56	99	112	106	317
Red-breasted Nuthatch	19	23	20	62	97	137	100	334
Brown Creeper	11	10	11	32	28	32	26	86
Winter Wren	18	16	21	55	120	91	146	357
American Dipper	1	1	2	4	1	1	2	4
Golden-crowned Kinglet	18	15	22	55	59	62	83	204
Ruby-crowned Kinglet		2	2	4		5	5	10
Townsend's Solitaire	2		5	7	2		5	7
Veery		2		2		7		7
Swainson's Thrush	9	16	3	28	28	151	18	197
Hermit Thrush	13	13	15	41	35	144	61	240
American Robin	10	13	16	39	29	78	76	183
Varied Thrush	16	16	24	56	172	142	118	432
American Pipit	3	2	3	8	21	7	19	47
Cedar Waxwing		3		3		6		6
Orange-crowned Warbler	1	1		2	2	1		3
Nashville Warbler		5		5		36		36
Yellow Warbler	2	9	1	12	4	56	2	62
Yellow-rumped Warbler	2	19	4	25	6	134	9	149
Black-throated Gray Warbler	1	3	2	6	1	14	8	23
Townsend's Warbler	12	18	13	43	99	196	80	375
Hermit Warbler	5		1	6	13		1	14
MacGillivray's Warbler	1	11	2	14	3	31	2	36
Western Tanager	4	17	7	28	8	121	23	152
Spotted Towhee		2		2		3		3
Chipping Sparrow	2	8		10	2	52		54
Savannah Sparrow	1	1		2	1	4		5
Fox Sparrow	1	2		3	4	10		14
Song Sparrow		3	2	5		8	3	11
White-crowned Sparrow	2	3	3	8	2	3	7	12
Dark-eyed Junco	18	20	23	61	172	183	237	592
Black-headed Grosbeak	1	7	1	9	1	15	1	17
Lazuli Bunting		2		2		4		4
Brown-headed Cowbird		3		3		8		8
Gray-crowned Rosy-Finch	1	1	1	3	4	1	1	6
Pine Grosbeak		2	4	6		4	7	11
Purple Finch	1	4		5	3	6		9

Table 6. Number of transects with detections and number of individual detections for each species detected during point counts (annual- and alternating-panel transects combined) in the three large NCCN parks in 2009 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Cassin's Finch	1	2		3	3	7		10
Red Crossbill	9	9	17	35	22	15	112	149
Pine Siskin	13	15	16	44	388	164	140	692
Evening Grosbeak	15	15	12	42	36	85	28	149
All Species Pooled					1,724	2,605	1,980	6,309
Detections per Point (All Species Pooled)					5.97	7.22	6.39	6.57
No. of Species Detected During Point Counts					52	66	58	79

Table 7. Species of potential management concern recorded on ‘rare bird’ detection forms in each park in 2009, excluding individuals that were also detected during point counts.

Species	No. of birds detected (excluding individuals also detected during point counts)		
	Mount Rainier	North Cascades	Olympic
Marbled Murrelet			7
Northern Goshawk		1	2
Peregrine Falcon			1
Spotted Owl			2

Table 8. Number of points with detections and number of individual detections for each species detected during point counts at San Juan Island National Historical Park in 2009.

Species	Number of points with detections	Number of individual detections
Common Loon	1	1
Double-crested Cormorant	1	2
Pelagic Cormorant	1	1
Canada Goose	11	56
Mallard	1	2
Bald Eagle	5	6
Red-tailed Hawk	2	2
California Quail	9	9
Glaucous-winged Gull	10	25
Caspian Tern	2	3
Rhinoceros Auklet	2	31
Rufous Hummingbird	7	7
Hairy Woodpecker	1	1
Northern Flicker	6	6
Pileated Woodpecker	1	1
Olive-sided Flycatcher	6	6
Hammond's Flycatcher	1	1
Pacific-slope Flycatcher	24	36
Cassin's Vireo	3	3
Warbling Vireo	8	13
Steller's Jay	1	1
American Crow	15	21
Common Raven	5	5
Northern Rough-winged Swallow	1	1
Barn Swallow	6	10
Chestnut-backed Chickadee	21	26
Red-breasted Nuthatch	21	24
Brown Creeper	7	7
Bewick's Wren	7	8
House Wren	21	26
Winter Wren	8	10
Golden-crowned Kinglet	6	11
Swainson's Thrush	25	32
American Robin	41	61
Varied Thrush	3	3
European Starling	3	4
Cedar Waxwing	3	6
Orange-crowned Warbler	27	38
Yellow Warbler	2	2
Yellow-rumped Warbler	8	8
Black-throated Gray Warbler	6	6
Townsend's Warbler	8	12
Common Yellowthroat	2	2
Wilson's Warbler	11	11
Western Tanager	4	4
Spotted Towhee	18	22
Chipping Sparrow	1	1
Vesper Sparrow	3	3
Savannah Sparrow	21	46
Song Sparrow	18	24
White-crowned Sparrow	25	45
Dark-eyed Junco	15	20
Black-headed Grosbeak	3	3
Red-winged Blackbird	10	13

Table 8. Number of points with detections and number of individual detections for each species detected during point counts at San Juan Island National Historical Park in 2009 (continued).

Species	Number of points with detections	Number of individual detections
Brown-headed Cowbird	33	47
Purple Finch	14	17
House Finch	10	11
Red Crossbill	9	15
Pine Siskin	13	23
American Goldfinch	30	56
Evening Grosbeak	1	11

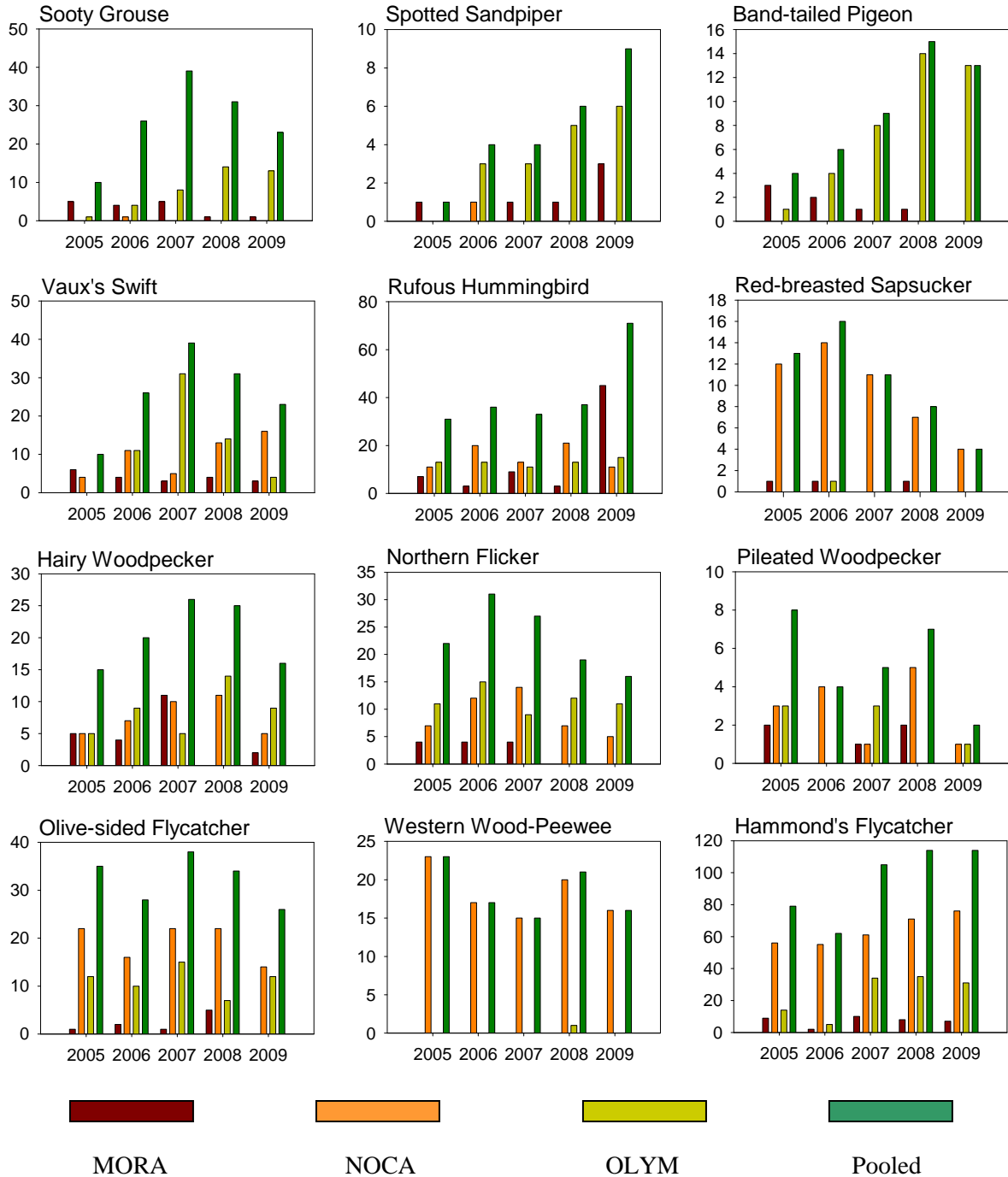


Figure 6. Number of times each species was detected on annual-panel transects at MORA, NOCA, OLYM, and all three parks pooled (always presented in that order) during the 2005, 2006, 2007, 2008, and 2009 field seasons. The figure includes all species for which we amassed at least 15 point count detections on annual-panel transects over the five years indicated. Numbers of detections are unadjusted for differences in survey effort or potential differences in detectability of birds between years. These adjustments will be made in conjunction with trend analyses in our five-year reports.



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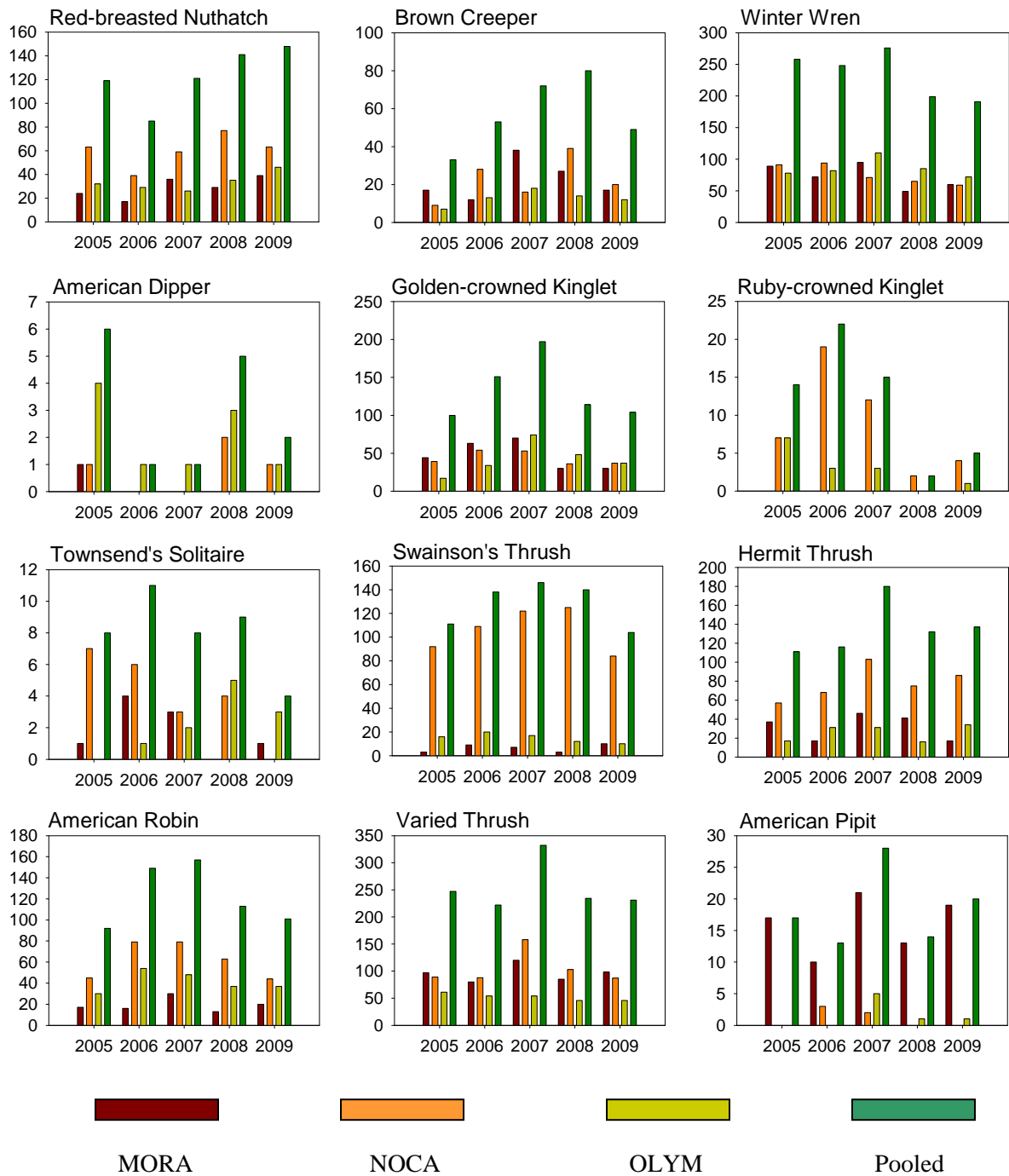


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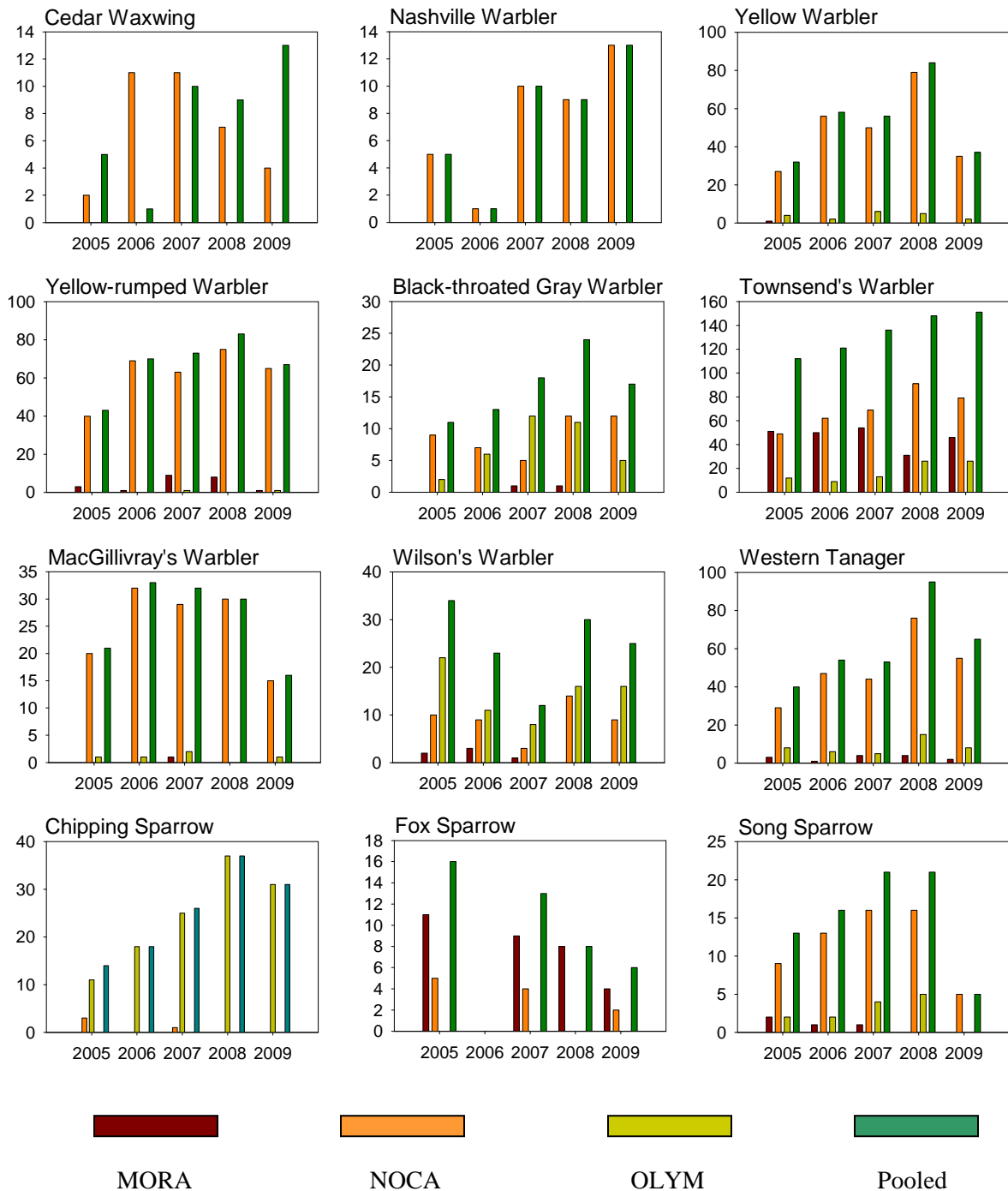


Figure 6. Number of times each species was detected on annual-panel transects at MORA, NOCA, OLYM, and all three parks pooled (always presented in that order) during the 2005, 2006, 2007, 2008, and 2009 field seasons. The figure includes all species for which we amassed at least 15 point count detections on annual-panel transects over the five years indicated. Numbers of detections are unadjusted for differences in survey effort or potential differences in detectability of birds between years. These adjustments will be made in conjunction with trend analyses in our five-year reports (continued).

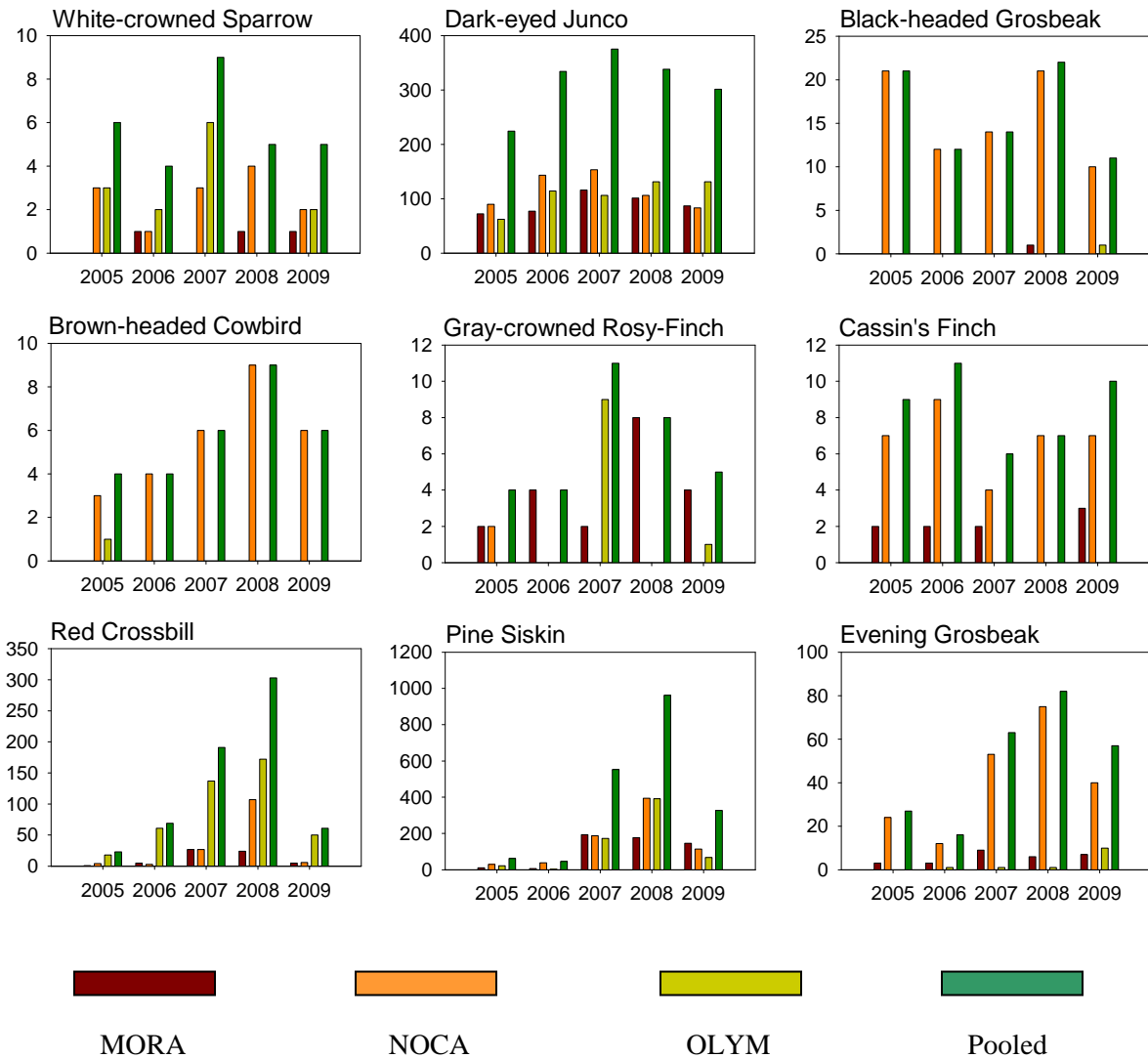


Figure 6. Number of times each species was detected on annual-panel transects at MORA, NOCA, OLYM, and all three parks pooled (always presented in that order) during the 2005, 2006, 2007, 2008, and 2009 field seasons. The figure includes all species for which we amassed at least 15 point count detections on annual-panel transects over the five years indicated. Numbers of detections are unadjusted for differences in survey effort or potential differences in detectability of birds between years. These adjustments will be made in conjunction with trend analyses in our five-year reports (continued).

Discussion

With the experience gained from two pilot field seasons (2005 and 2006) and two previous years of full project implementation (2007 and 2008) our third year of fully implementing the NCCN landbird monitoring project was our most successful to date. Our procedures for season preparation, data collection, data management, data analysis, and reporting (Siegel et al. 2007a) have all been well vetted, and were found this year to require no substantial changes. The addition of a seventh field crew member coupled with good weather conditions allowed the field crew to successfully survey all 68 transects in the three large parks for the first time. However, this additional field crew member did not increase our ability to successfully enter all of the data during the field season, mainly because our field crew spent extra days in the field trying to complete as many transects as possible. For the 2010 field season we plan to keep the field crew members working for several days after all of the field data have been collected in the hope that they will then be able to complete all the data entry.

Interpreting our survey results at this juncture is premature, as they have not yet been adjusted for differences in survey effort or potential differences in detectability of birds between years, analyses which will take place in conjunction with trend analyses in our first five-year report. Nevertheless, our preliminary results indicate that this monitoring project will provide valuable insight into bird populations in NCCN national parks on both an annual and longer-term cycle. The value of data from the annual panel visits is already becoming apparent.

After several years of sizeable increases in the number of birds detected in the large parks (notably NOCA and OLYM), in 2009 we saw an overall decrease in detections. These declines appear to be driven almost completely by the decline in numbers of Pine Siskin and Red Crossbill, which nearly returned to pre-irruption detection totals seen in 2007. Notably, Pine Siskin detections decreased from 2,123 total detections in 2008 to 692 detections in 2009. Pooling results across annual-panel transects in all three parks, in 2006 we recorded 46 Pine Siskin detections on the annual-panel transects, compared with 553 detections in 2007, 962 detections in 2008, and 327 detections in 2009 (Siegel et al. 2007b, Siegel et al. 2008, Wilkerson et al. 2009).

Although overall detection numbers are down in 2009, the decline in annual-panel detections of Winter Wren, Golden-crowned Kinglet and Varied Thrush that we noted during 2008 (Wilkerson et al. 2009) stabilized in 2009. With additional years of data (as well as the more nuanced analysis of detectability that will be conducted on the first five years of data) we will gain the capacity to rigorously assess apparent changes like these, and to generate and test hypotheses about their causes.

Results from SAJH this year indicate that high detection rates of common species will yield robust results for many common breeding species; however, the large number of Brown-headed Cowbirds (47 individual detections, up from 30 individual detections in 2007) continue to be a concern at SAJH (Siegel et al. 2007b).

Conclusion

The NCCN landbird monitoring project has had another successful year, with a comprehensive, field-tested protocol, two years of annual-panel data collected during the protocol development phase (2005 and 2006), and three full years of project implementation (2007, 2008, and 2009), including data collection on the annual panel as well as the first three alternating panels.

Preliminary results indicate we will have robust sample sizes for many species when we conduct our 5-year trend analysis in 2011, and that we are detecting substantial annual fluctuations in bird populations. These fluctuations, when analyzed in the context of annual weather variation and perhaps other factors, should yield interesting and useful findings about the drivers of avian population dynamics in Pacific Northwest forests, and are likely to spur additional targeted research and help refine management priorities and needs within the parks.

Literature Cited

- Altman, B. 1999a. Conservation strategy for landbirds in coniferous forests of western Oregon and Washington. Version 1.0. American Bird Conservancy and Oregon-Washington Partners in Flight.
- Altman, B. 1999b. Conservation strategy for landbirds in coniferous forests of the east slope of the Cascades. Version 1.0. American Bird Conservancy and Oregon-Washington Partners in Flight.
- Altman, B. and J. Bart. 2001. Special species monitoring and assessment in Oregon and Washington: landbird species not adequately monitored by the Breeding Bird Survey. Oregon-Washington Partners in Flight.
- Andelman, S. J. and A. Stock. 1994a. Management, research, and monitoring priorities for the conservation of Neotropical migratory landbirds that breed in Oregon. Washington Dept. of Natural Resources, Olympia, WA.
- Andelman, S. J. and A. Stock. 1994b. Management, research, and monitoring priorities for the conservation of Neotropical migratory landbirds that breed in Washington. Washington Dept. of Natural Resources, Olympia, WA.
- Atkinson, S., and F. A. Sharpe. 1985. Wild plants of the San Juan Islands. The Mountaineers, Seattle, WA.
- Bolsinger, C. L. and K. L. Waddell. 1993. Area of old-growth forests in California, Oregon and Washington. USDA Forest Service Resource Bulletin PNW-RB-197.
- Buckland, S. T., D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. 2001. Introduction to distance sampling: estimating abundance of biological populations. Oxford University Press, Oxford.
- Bunnell, F. L., L. L. Kremsater, and R. W. Wells. 1997. Likely consequences of forest management on terrestrial, forest-dwelling vertebrates in Oregon. Report M-7 of the Centre for Applied Conservation Biology, University of British Columbia.
- DeSante, D.F. and George. 1994. Population trends in the landbirds of western North America. Pages 173-190 *in* Jehl, J.R. Jr. and N.K. Johnson (eds.), A century of avifaunal change in western North America. Studies in Avian Biology No. 15.
- Hagar, J. C., W. C. McComb, and C. C. Chambers. 1995. Effects of forest practices on wildlife, *in* R. P. Beschta et al. (eds), Cumulative effects of forest practices in Oregon: literature and synthesis. Oregon State University, Corvallis.
- Lewis, M. G. and F. A. Sharpe. 1987. Birding in the San Juan Islands. The Mountaineers, Seattle, WA.

- Meslow, E. C. and H. M. Wight. 1975. Avifauna and succession in Douglas-fir forests of the Pacific Northwest. Pages 266-271 *in* D. R. Smith (ed.), Proceedings of the symposium on management of forest and rangeland habitats for non-game birds. USDA Forest Service General Technical Report WO-1.
- Nichols, J. D., L. Thomas, and P. B. Conn. 2009. Inferences about landbird abundance from count data: recent advances and future directions. Pages 201-235 *in* D.L. Thomson et al. (eds.), Modeling Demographic Processes in Marked Populations (Environmental and Ecological Statistics 3). DOI 10.1007/978-0-387-78151-8 9,
- North American Bird Conservation Initiative, U.S. Committee. 2009. The state of the birds, United States of America, 2009. U.S. Department of Interior: Washington, DC. 36 pages.
- Pacific Meridian Resources. 1996. Vegetation and landform database development study: final report. Pacific Meridian Resources, Portland, OR.
- Peterjohn, B. G., J. R. Sauer, and C. S. Robbins. 1995. Population trends from North American breeding bird survey. Pages 3-39 *in* T. E. Martin and D. M Finch (eds.), Ecology and management of Neotropical migratory birds. Oxford Press, New York.
- Robbins, C. S., J. R. Sauer, R. Greenburg and S. Droege. 1989. Population declines in North American birds that migrate to the neotropics. Proceedings of the National Academy of Sciences 86:7658-7662.
- Saab, V. A. and T. D. Rich. 1997. Large-scale conservation assessment for Neotropical migratory land birds in the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-285. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon.
- Sauer, J. R., J. E. Hines, and J. Fallon. 2008. The North American breeding bird survey, results and analysis 1966-2007. Version 5.15.2008. USGS Patuxent Wildlife Research Center, Laurel, MD.
- Sharp, B. E. 1996. Avian population trends in the Pacific Northwest. Bird Populations 3:26-45.
- Siegel, R. B., R. L. Wilkerson, and S. Hall. 2004a. Landbird inventory for Olympic National Park (2002-2003), final report. The Institute for Bird Populations, Point Reyes Station, CA.
- Siegel, R. B., R. L. Wilkerson, K. J. Jenkins, R. C. Kuntz II, J. R. Boetsch, J. P. Schaberl, and P. J. Happe. 2007a. Landbird monitoring protocol for national parks in the North Coast and Cascades Network. U.S. Geological Survey Techniques and Methods 2-A6.
- Siegel, R. B., R. L. Wilkerson, and R. C. Kuntz II. 2006. Landbird monitoring in the North Coast and Cascades Monitoring Network: report for the 2005 pilot field season. The Institute for Bird Populations, Point Reyes Station, CA.

- Siegel, R. B., R. L. Wilkerson, and R. C. Kuntz II. 2007b. Landbird monitoring in the North Coast and Cascades Monitoring Network: report for the 2006 pilot field season. The Institute for Bird Populations, Point Reyes Station, CA.
- Siegel, R. B., R. L. Wilkerson, and R. C. Kuntz II. 2007c. 2006 Landbird inventory for Lewis and Clark National Historical Park. The Institute for Bird Populations, Point Reyes Station, CA.
- Siegel, R. B., R. L. Wilkerson, and R. C. Kuntz II. 2008. North Coast and Cascades Network landbird monitoring report for the 2007 field season. Natural Resource Technical Report NPS/NCCN/NRTR—2008/114. National Park Service, Fort Collins, Colorado.
- Siegel, R. B., R. L. Wilkerson, R. C. Kuntz II, and J. F. McLaughlin. 2004b. Landbird inventory for North Cascades National Park Service Complex (2001-2002), final report. The Institute for Bird Populations, Point Reyes Station, CA.
- Siegel, R. B., R. L. Wilkerson, H. K. Pedersen, and R. C. Kuntz II. 2002. Landbird inventory of San Juan Island National Historical Park. Technical Report NPS D 73 of the National Park Service.
- Silsbee, G. G. and D. L. Peterson. 1991. Designing and implementing comprehensive long-term inventory and monitoring programs for National Park System lands. Natural Resources Report NPS/NRUW/NRR-91/04, Denver, CO.
- Simons, T. R., K. N. Rabenold, D. A. Buehler, J. A. Collazo, and K. E. Fransreb. 1999. The role of indicator species: neotropical migratory song birds. Pages 187-208 in J. D. Peine, (ed.), *Ecosystem Management for Sustainability: Principles and Practices Illustrated by a Regional Biosphere Reserve Cooperative*. Lewis Publishers. New York.
- Wilkerson, R. L., R. B. Siegel, and J. Schaberl. 2005. Landbird inventory of Mount Rainier National Park (2003-2004), final report. The Institute for Bird Populations, Point Reyes Station, CA.
- Wilkerson, R.L., R.B. Siegel, and R. C. Kuntz II. 2008. North Coast and Cascades Network landbird monitoring report for the 2008 field season. Natural Resource Technical Report NPS/NCCN/NRTR—2009/114. National Park Service, Fort Collins, Colorado.
- Wilkerson, R.L., R.B. Siegel, and R. C. Kuntz II. 2009. North Coast and Cascades Network landbird monitoring report for the 2009 field season. Natural Resource Technical Report NPS/NCCN/NRTR—2009/xxx. National Park Service, Fort Collins, Colorado.

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