



North Coast and Cascades Network Landbird Monitoring

Report for the 2010 Field Season

Natural Resource Technical Report NPS/NCCN/NRTR—2011/473



ON THE COVER

Dark-eyed Junco (*Junco hyemalis*)

Photograph by: Phil Green

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Executive Summary

In 2010 we conducted 845 point counts at point count survey stations located along 65 transects in the three large parks of the North Coast and Cascades Network, including Mount Rainier National Park (MORA), North Cascades National Park Service Complex (NOCA), and Olympic National Park (OLYM). Three of the 68 intended transects could not be surveyed due to late lingering snowpack at two high elevation survey areas and at one area because of a permanent closure of the trail.

We detected 141 bird species in the three large parks, 83 of which were detected during one or more point counts. For 57 species (all species detected at least 18 times on annual-panel transects between 2005 and 2010), we present the total number of detections on annual-panel transects in each park during the 2005, 2006, 2007, 2008, 2009, and 2010 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 LEWI, we conducted 71 point counts, including 37 at Cape Disappointment, 29 at Fort Clatsop, and five at Sunset Beach. Our field crew detected 72 species while in the park, 63 of which were detected during point counts. We present the number of detections, and the number of point count stations with detections, for each species detected during point counts at LEWI.

After the overall decrease in the number of birds detected in 2009 in the large parks, 2010 yielded an overall increase in detections, notably at NOCA. More specifically, there was a slight decrease in detections at MORA (averaging 5.41 detections per point on annual-panel transects in 2009, compared with 4.81 detections per point in 2010), a slight increase in detections per point at OLYM (averaging 5.79 detections per point on annual-panel transects in 2009, compared with 6.40 detections per point in 2010), and a substantial increase in detections per point at NOCA (averaging 7.32 detections per point on annual-panel transects in 2009, compared with 10.46 detections per point in 2010). This increase was in large part driven by the increase of Evening Grosbeaks at NOCA, rising from 40 detections on annual-panel transects in 2009 to 164 detections in 2010 (compared with 53 detections in 2007 and 75 detections in 2008), even with fewer points surveyed in 2010.

The NCCN Landbird Monitoring Project completed 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 four years of full project implementation (2007, 2008, 2009, and 2010), including data collection on the annual panel as well as the first four alternating panels. Preliminary results indicate we will have robust sample sizes for many species in 2012 when we conduct our five-year trend analysis, 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 of 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 2010 crew members for their hard work and dedication to the project: M. Fournier, E. Huston, M. Ortega-Welch, H. Panci, S. Price, C. Waythomas, 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 for assistance during training and for help with field work during the season. We thank P. Happe, M. Reid, and D. Sweeny, for assistance and logistical support at their 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 M. Huff, Program Manager for the NCCN Inventory and Monitoring Program Coordinator, for his support of the project. Lastly, we thank the ESRI Conservation Program for software support. This is Contribution No. 410 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 1999, 2000, Sauer et al. 2008, North American Bird Conservation Initiative- U.S. Committee 2009). Indeed, Altman (1999) 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 (Bolsinger and Waddell 1993). 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 1999).

Pacific Northwest landbirds breeding in habitats other than conifer forests face substantial threats as well. Species that breed in the subalpine and alpine zones may be 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 National Park (OLYM), North Cascades National Park Complex (NOCA), and Mount Rainier National Park (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. NOCA also includes substantial tracts of conifer forest typical of the east side of the Cascades, which hosts a somewhat distinct avifauna (Altman 2000). 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 (*Quercus garryana*) 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. 2009e). 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. 2009e, Siegel et al. 2009a, Siegel et al. 2009d, Wilkerson et al. 2009a, Siegel et al. 2009c).

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 in 2012.

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.

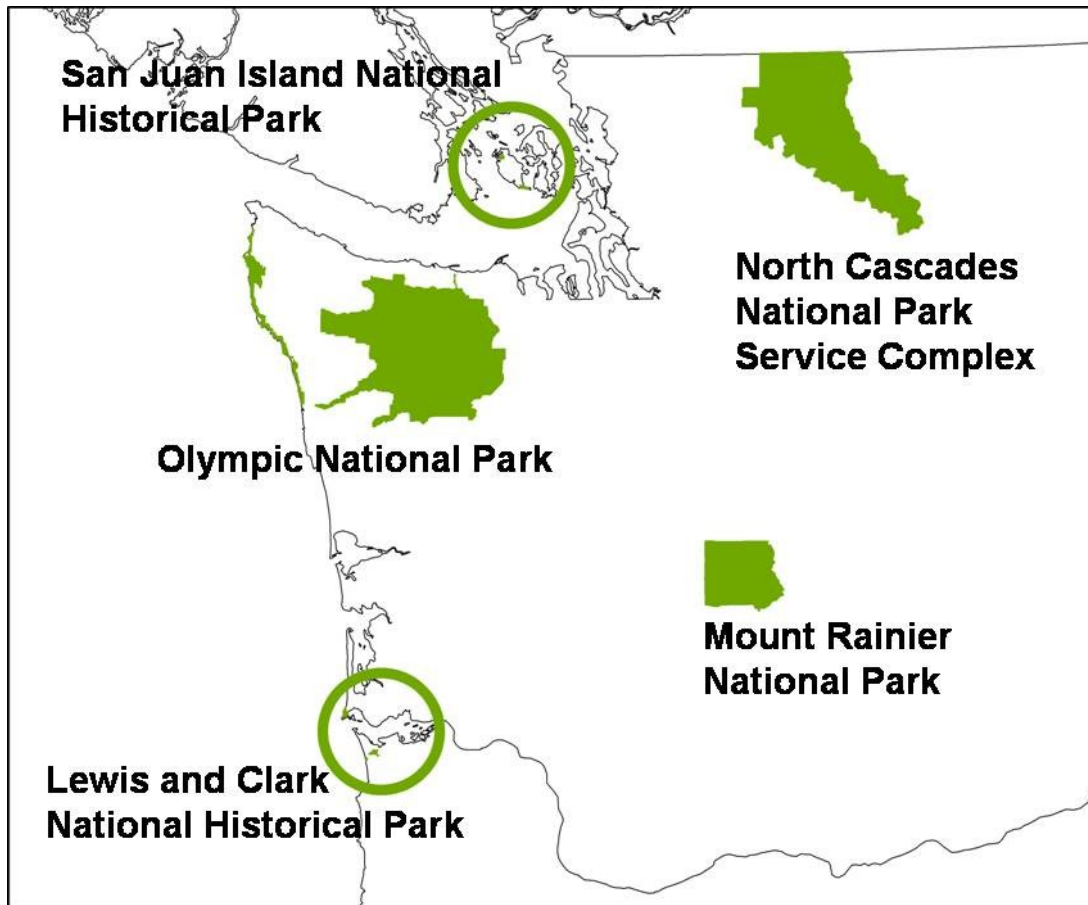


Figure 1. National Park Service units participating in the NCCN Landbird Monitoring Project.

Methods

Sample Design

A detailed description of the sample design for the NCCN Landbird Monitoring Project is provided in the NCCN landbird monitoring protocol (Siegel et al. 2007). 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 between 650 m and 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, and the transects 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 2010 we surveyed the annual panel of transects ('Ann1') and the fourth alternating panel of transects ('Alt5').

In 2010 we implemented the full study design in the three large parks for the fourth consecutive year, including surveys of the annual panel as well as the fourth 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, 2009b). We provide results from the first three years of full implementation in Siegel et al. (2008) and Wilkerson et al. (2009b, 2010).

At the two smaller parks (LEWI and SAJH) the sample design consists of a systematic grid of point count survey stations, with the two parks scheduled to be surveyed in alternating years. In the summer of 2010 we surveyed the grid at LEWI (Figure 5).

Crew Training and Certification

Mandy Holmgren, Staff Biologist with The Institute for Bird Populations (IBP), served as the 2010 Field Lead. Mandy began training six field technicians on May 1, with assistance from IBP Staff Biologist Bob Wilkerson and National Park Service (NPS) Project Lead Bob Kuntz. Training followed guidelines described in the NCCN landbird monitoring protocol (Siegel et al. 2007). By the end of the official training session on May 19, five of the six field technicians had passed the rigorous point count certification exam, and were ready to begin collecting data. The sixth technician never passed the exam and consequently did not conduct any point counts during the field season. Instead she worked on other field tasks and data entry. All individuals who collected data during the 2010 field season (Table 1) were employees or field biologist interns of The Institute for Bird Populations or employees of the National Park Service.

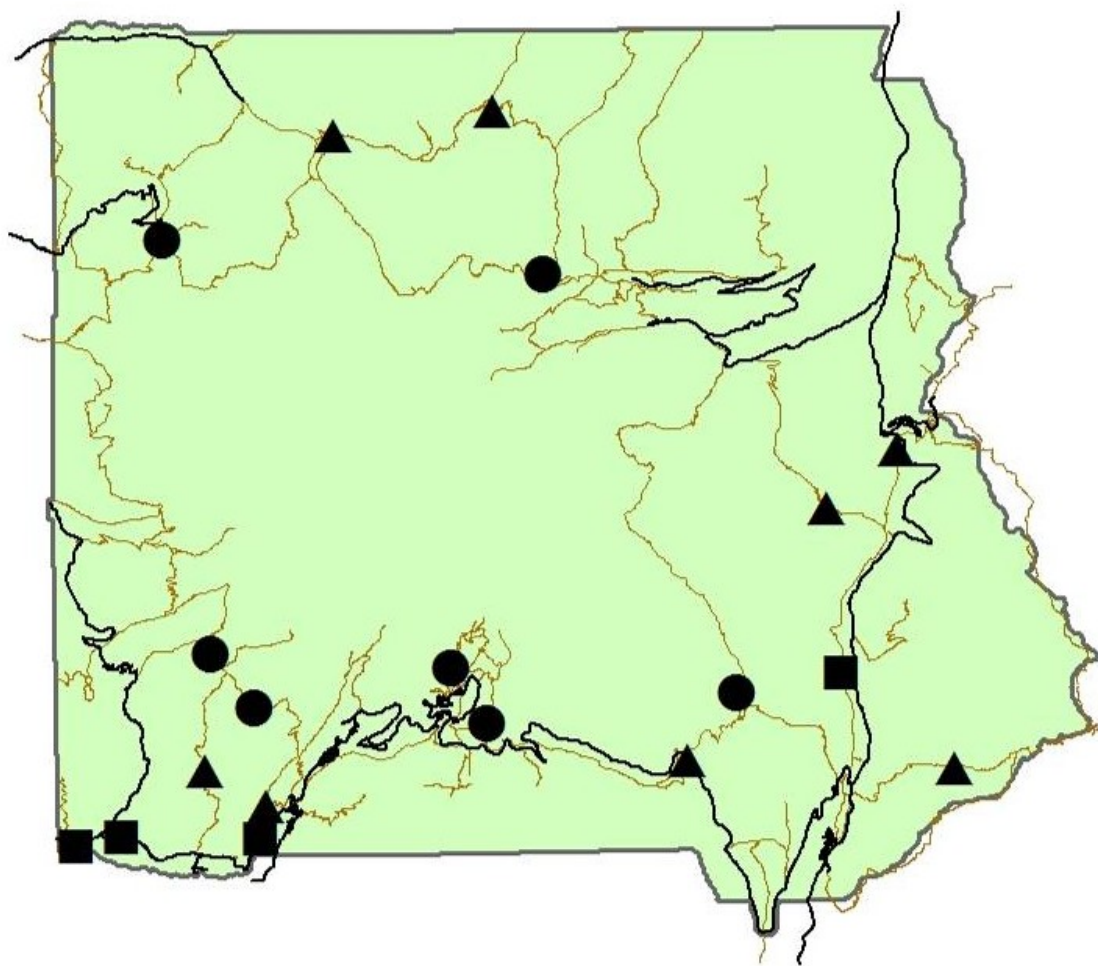


Figure 2. Approximate locations of transects surveyed at MORA in 2010. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high-elevation transects. Black lines indicate roads and brown lines indicate trails.

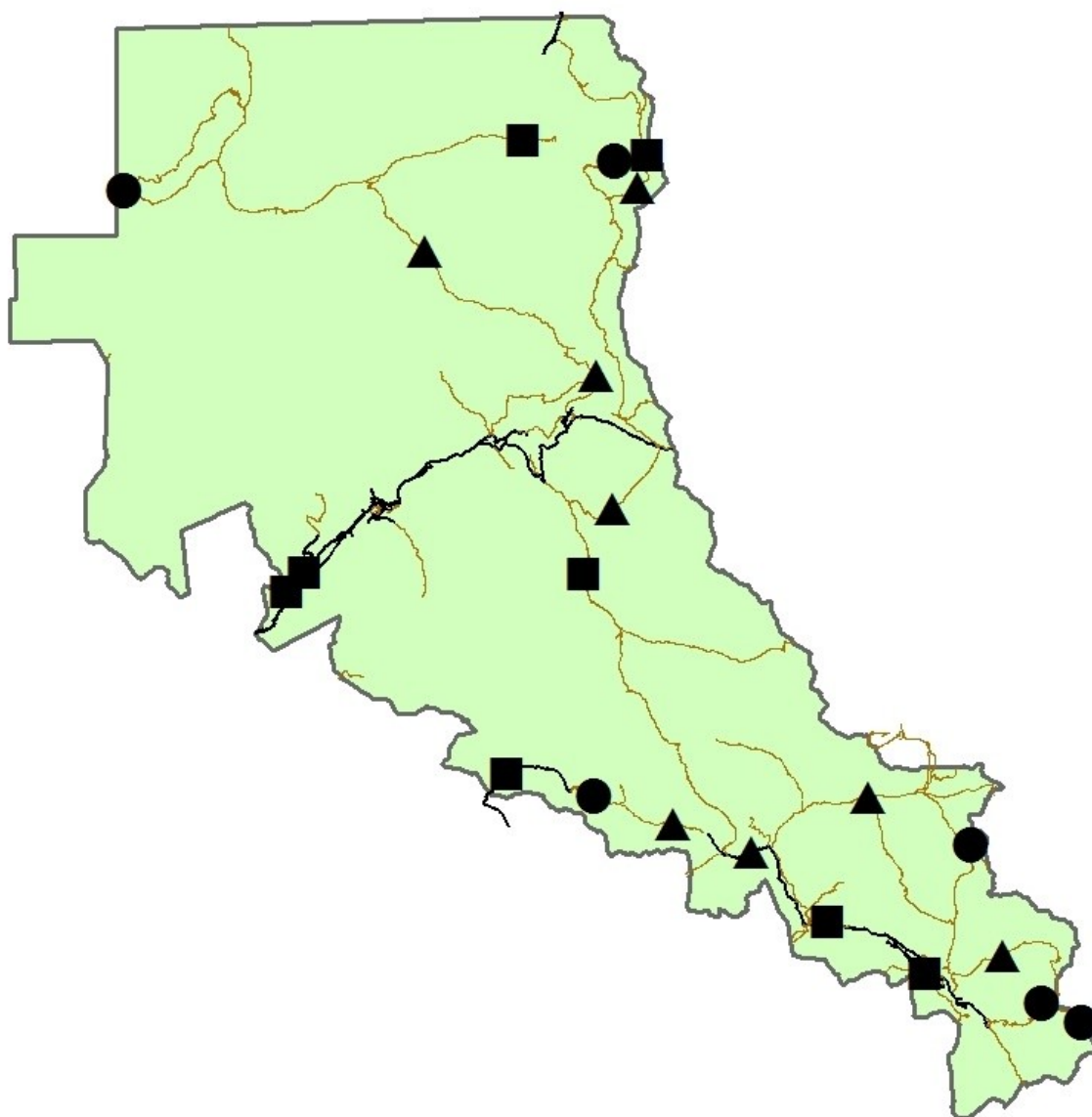


Figure 3. Approximate locations of transects surveyed at NOCA in 2010. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high-elevation transects. Black lines indicate roads and brown lines indicate trails.

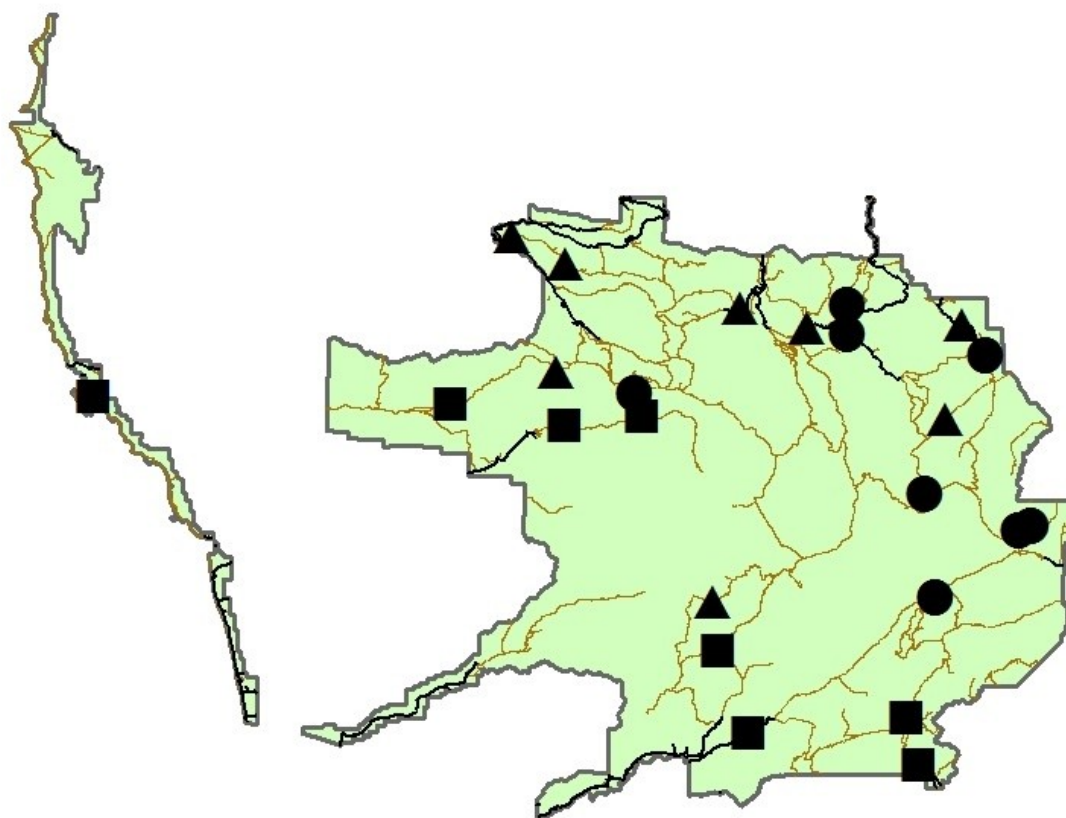


Figure 4. Approximate locations of transects surveyed at OLYM in 2010. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high-elevation transects. Black lines indicate roads and brown lines indicate trails.

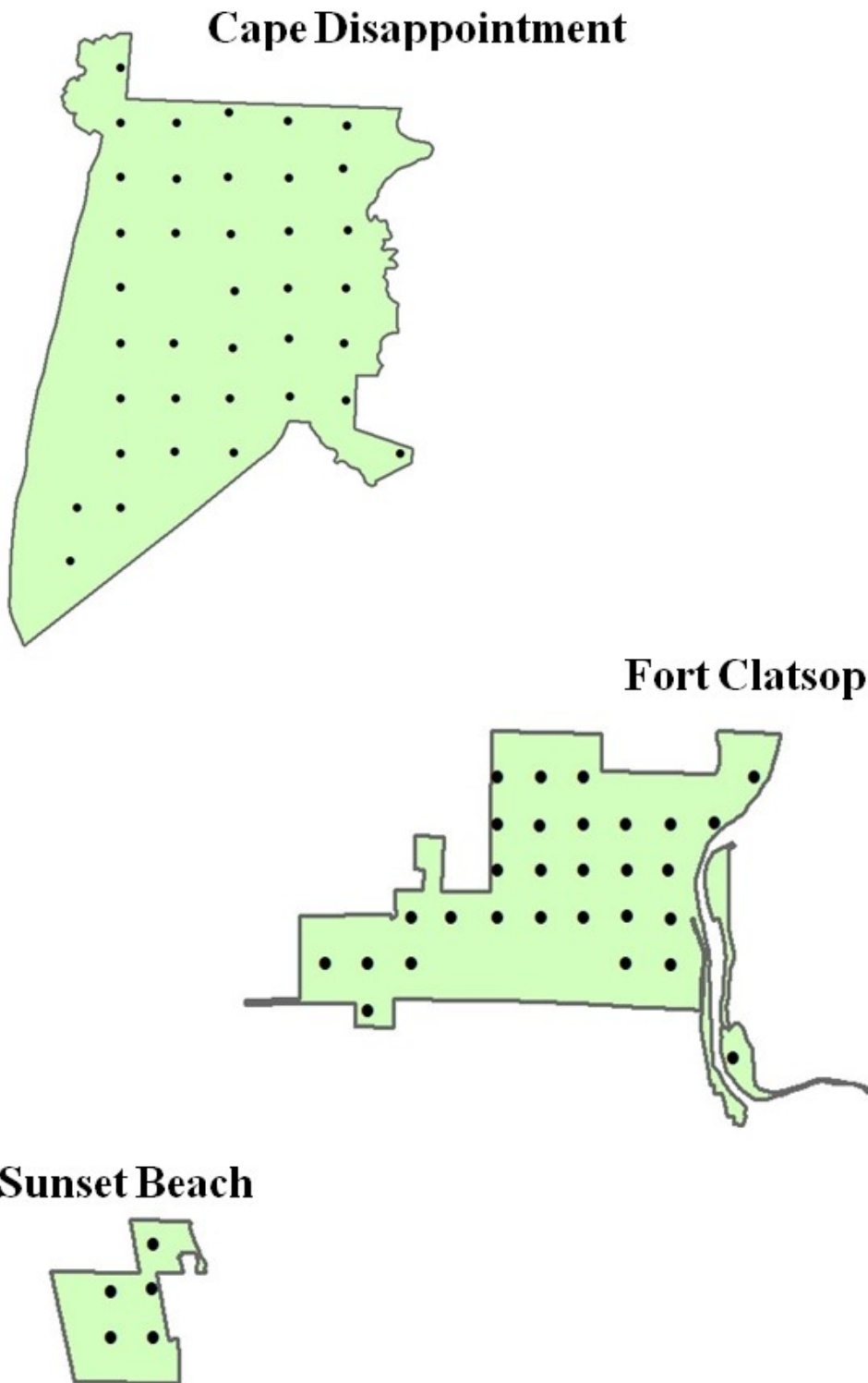


Figure 5. Locations of point count stations surveyed at LEWI in 2010.

Table 1. Observers who conducted point counts in the NCCN in 2010.

Observer	Role
Marie-Catherine Fournier	Technician
Scott Gremel	NPS Biologist
Mandy Holmgren	Field Lead
Eric Huston	Technician
Marissa Ortega-Welch	Technician
Hannah Panci	Technician
Craig Waythomas	Technician
Bob Wilkerson	Project Co-lead
David Wolfson	Technician

Data Collection

All point count data were collected between May 23 and May 27 at LEWI, between June 15 and July 25 at MORA, between May 27 and July 30 at NOCA, and between June 1 and July 29 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 followed the detailed procedures explained in the NCCN landbird monitoring Protocol (Siegel et al. 2007). Crew members generally worked in pairs to survey a single transect each morning. Crew members were provided with maps and coordinates indicating the location of transect ‘starting points’, which lay directly on trails or roads. Crew members were also provided maps and coordinates of all point count station locations on the already-established annual panel, as well as 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 route, 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. (2007); project managers then 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. (2007).

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 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 park or difficult to detect during diurnal point count surveys, they completed “Rare Bird Report Forms”, including descriptions of the birds’ appearance, behavior, and precise location. 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. The crew worked for an extra three days at the end of the season this year, allowing them to enter and verify nearly all of their data during the field season for the first time. The remaining data were entered and verified by the Field Lead after the field season. Data entry procedures followed the guidelines in Siegel et al. (2007).

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. (2007). 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, all results should be viewed as provisional only.

Results

We surveyed 33 of the 34 annual-panel transects in the large parks, and 32 of the 34 transects in the fourth alternating panel (Table 2), for a total of 65 transects (Table 3). Appendix 1 provides a detailed multi-year survey history of all transects sampled in the large parks to date. We conducted 252 individual point counts at MORA, 275 point counts at NOCA and 318 point counts at OLYM (Table 2). We also conducted 71 point counts at LEWI. During the 845 point counts in the large parks we counted 5,873 individual birds. Across the three large parks, we documented the presence of 141 species (Table 4), 83 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 43 bird species during point counts at MORA, 65 species during point counts at NOCA, and 51 species during point counts at OLYM (Table 5). Pooling detections on annual-panel transects across all species, we amassed 644 individual bird detections (4.81 detections/point) at MORA, 1,695 detections (10.46 detections/point) at NOCA, and 1,101 detections (6.40 detections per point) at OLYM (Table 5). The five most frequently detected species on the annual-panel transects in 2010 were: dark-eyed junco (283 detections), pine siskin (250 detections), varied thrush (210 detections), Pacific wren (205 detections), and chestnut-backed chickadee (201 detections).

Pooling data across the annual-panel transects as well as the transects in the fourth alternating panel (“Alt5”), 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. Using data pooled across all transects, we detected 49 bird species during point counts at MORA, 73 species during point counts at NOCA, and 62 species during point counts at OLYM (Table 6). Considering data from all 65 surveyed transects, the five most frequently detected species were: dark-eyed junco (503 detections), pine siskin (412 detections), Pacific wren (364 detections), varied thrush (347 detections), and chestnut-backed chickadee (345 detections).

Four species of particular conservation interest—golden eagle, peregrine falcon, marbled murrelet, and spotted owl—were detected at times other than during point counts, and were documented on “Rare Bird Report Forms”. Detections of these species are summarized in Table 7.

For 57 species (all species for which we amassed at least 18 point count detections between 2005 and 2010), we present the total number of detections of each species on each park’s annual panel transects during the 2005, 2006, 2007, 2008, 2009, and 2010 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 LEWI, our 71 point counts yielded 1,008 detections of 63 species (Table 8), a detection rate of 14.20 birds per point. The most frequently detected species was Swainson’s thrush (100

detections), followed by Pacific wren (91 detections), Pacific-slope flycatcher (58 detections), American crow (54 detections), and American robin (42 detections).

Table 2. NCCN landbird monitoring transects that were surveyed or intended to be surveyed in 2010.

Park	Panel	Elevation	Transect	No. of points surveyed
MORA	Ann1	Low	4001	10
MORA	Ann1	Low	4005	9
MORA	Ann1	Medium	4002	14
MORA	Ann1	Medium	4004	15
MORA	Ann1	Medium	4009	13
MORA	Ann1	Medium	4012	13
MORA	Ann1	High	4003	10
MORA	Ann1	High	4007	20
MORA	Ann1	High	4011	15
MORA	Ann1	High	4014	15
MORA	Alt5	Low	4024	25
MORA	Alt5	Low	4025	9
MORA	Alt5	Medium	4068	9
MORA	Alt5	Medium	4073	13
MORA	Alt5	Medium	4074	13
MORA	Alt5	Medium	4076	15
MORA	Alt5	High	4045	12
MORA	Alt5	High	4046	10
MORA	Alt5	High	4052	12
MORA	Alt5	High	4055	0
NOCA	Ann1	Low	1013	9
NOCA	Ann1	Low	1017	12
NOCA	Ann1	Low	1020	12
NOCA	Ann1	Low	1023	20
NOCA	Ann1	Medium	1015	15
NOCA	Ann1	Medium	1018	25
NOCA	Ann1	Medium	1022	13
NOCA	Ann1	Medium	1024	11
NOCA	Ann1	High	1014	0
NOCA	Ann1	High	1016	14
NOCA	Ann1	High	1019	12
NOCA	Ann1	High	1021	19
NOCA	Alt5	Low	1062	8
NOCA	Alt5	Low	1063	9
NOCA	Alt5	Low	1065	11
NOCA	Alt5	Low	1067	8
NOCA	Alt5	Medium	1042	15
NOCA	Alt5	Medium	1043	9
NOCA	Alt5	Medium	1044	11
NOCA	Alt5	Medium	1045	10
NOCA	Alt5	High	1055	13
NOCA	Alt5	High	1058	0
NOCA	Alt5	High	1060	9
NOCA	Alt5	High	1064	10

Table 2. NCCN landbird monitoring transects that were surveyed or intended to be surveyed in 2010 (continued).

Park	Panel	Elevation	Transect	No. of points surveyed
OLYM	Ann1	Low	3001	12
OLYM	Ann1	Low	3121	14
OLYM	Ann1	Low	3126	13
OLYM	Ann1	Low	3134	18
OLYM	Ann1	Medium	3122	16
OLYM	Ann1	Medium	3123	15
OLYM	Ann1	Medium	3130	9
OLYM	Ann1	Medium	3200	23
OLYM	Ann1	High	3124	11
OLYM	Ann1	High	3125	15
OLYM	Ann1	High	3127	15
OLYM	Ann1	High	3128	11
OLYM	Alt5	Low	3165	10
OLYM	Alt5	Low	3166	12
OLYM	Alt5	Low	3169	8
OLYM	Alt5	Low	3170	11
OLYM	Alt5	Medium	3178	11
OLYM	Alt5	Medium	3183	13
OLYM	Alt5	Medium	3184	16
OLYM	Alt5	Medium	3185	9
OLYM	Alt5	High	3175	12
OLYM	Alt5	High	3179	16
OLYM	Alt5	High	3180	16
OLYM	Alt5	High	3188	12

Table 3. Summary history of NCCN landbird monitoring transects completed through 2010.

Park	Elevation Stratum	Number of transects completed					
		2005 ^a	2006 ^a	2007 ^b	2008 ^c	2009 ^d	2010 ^e
MORA	Low	2	2	4	4	4	4
MORA	Medium	4	4	8	8	8	8
MORA	High	4	4	8	8	8	7
MORA	All	10	10	20	20	20	19
NOCA	Low	4	4	8	8	8	8
NOCA	Medium	4	4	7	7	8	8
NOCA	High	4	4	7	5	8	6
NOCA	All	12	12	22	20	24	22
OLYM	Low	4	4	8	8	8	8
OLYM	Medium	4	3	8	7	8	8
OLYM	High	4	4	7	8	8	8
OLYM	All	12	11	23	23	24	24
All	Low	10	10	20	20	20	20
All	Medium	12	11	23	22	24	24
All	High	12	12	22	21	24	21
All	All	34	33	65	63	68	65

^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 surveyed in 2007.

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

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

^eThe annual panel along with the fourth alternating panel were surveyed in 2010.

Table 4. All species recorded in the three large NCCN parks during the 2010 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
Canada Goose	<i>Branta canadensis</i>
Wood Duck *	<i>Aix sponsa</i>
American Wigeon *	<i>Anas americana</i>
Mallard *	<i>Anas platyrhynchos</i>
Blue-winged Teal *	<i>Anas discors</i>
Cinnamon Teal *	<i>Anas cyanoptera</i>
Northern Shoveler *	<i>Anas clypeata</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>
Hooded Merganser *	<i>Lophodytes cucullatus</i>
Common Merganser *	<i>Mergus merganser</i>
Ruffed Grouse *	<i>Bonasa umbellus</i>
White-tailed Ptarmigan *	<i>Lagopus leucurus</i>
Sooty Grouse	<i>Dendragapus fuliginosus</i>
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>
Turkey Vulture *	<i>Cathartes aura</i>
Osprey	<i>Pandion haliaetus</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Northern Harrier *	<i>Circus cyaneus</i>
Sharp-shinned Hawk *	<i>Accipiter striatus</i>
Cooper's Hawk *	<i>Accipiter cooperii</i>
Red-tailed Hawk *	<i>Buteo jamaicensis</i>
Golden Eagle *	<i>Aquila chrysaetos</i>
American Kestrel *	<i>Falco sparverius</i>
Merlin	<i>Falco columbarius</i>
Peregrine Falcon *	<i>Falco peregrinus</i>
Semipalmated Plover *	<i>Charadrius semipalmatus</i>
Killdeer *	<i>Charadrius vociferus</i>
Spotted Sandpiper	<i>Actitis macularia</i>
Wandering Tattler *	<i>Tringa incana</i>
Greater Yellowlegs *	<i>Tringa melanoleuca</i>
Whimbrel *	<i>Numenius phaeopus</i>
Glaucous-winged Gull *	<i>Larus glaucescens</i>
Marbled Murrelet	<i>Brachyramphus marmoratus</i>
Band-tailed Pigeon	<i>Patagioenas fasciata</i>
Mourning Dove *	<i>Zenaida macroura</i>
Western Screech-Owl *	<i>Megascops kennicottii</i>
Great Horned Owl *	<i>Bubo virginianus</i>
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>

Table 4. All species recorded in the three large NCCN parks during the 2010 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
Spotted Owl *	<i>Strix occidentalis</i>
Barred Owl *	<i>Strix varia</i>
Common Nighthawk *	<i>Chordeiles minor</i>
Black Swift	<i>Cypseloides niger</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>
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>
Western Kingbird *	<i>Tyrannus verticalis</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>
Black-capped Chickadee	<i>Poecile atricapillus</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>
Pacific Wren	<i>Troglodytes pacificus</i>
Marsh Wren *	<i>Cistothorus palustris</i>

Table 4. All species recorded in the three large NCCN parks during the 2010 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 Dipper	<i>Cinclus mexicanus</i>
Golden-crowned Kinglet	<i>Regulus satrapa</i>
Ruby-crowned Kinglet	<i>Regulus calendula</i>
Western Bluebird *	<i>Sialia mexicana</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</i> x <i>occi.</i>
Hermit Warbler	<i>Dendroica occidentalis</i>
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>
Brewer's Sparrow *	<i>Spizella breweri</i>
Savannah Sparrow	<i>Passerculus sandwichensis</i>
Fox Sparrow	<i>Passerella iliaca</i>
Song Sparrow	<i>Melospiza melodia</i>
Lincoln's Sparrow *	<i>Melospiza lincolnii</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Golden-crowned Sparrow *	<i>Zonotrichia atricapilla</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>
Brown-headed Cowbird	<i>Molothrus ater</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>
Red Crossbill	<i>Loxia curvirostra</i>

Table 4. All species recorded in the three large NCCN parks during the 2010 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
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 2010.

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Canada Goose		1		1		1		1
Sooty Grouse	1	6	7	14	1	6	12	19
Common Loon			1	1			3	3
Osprey		1		1		2		2
Bald Eagle			1	1			2	2
Merlin			1	1			2	2
Spotted Sandpiper	1	1		2	1	1		2
Marbled Murrelet			1	1			2	2
Band-tailed Pigeon			2	2			4	4
Northern Pygmy-Owl		1		1		1		1
Black Swift		1		1		1		1
Vaux's Swift	1	4	1	6	2	7	5	14
Rufous Hummingbird	2	9	3	14	5	25	8	38
Belted Kingfisher			1	1			2	2
Red-naped Sapsucker		1		1		1		1
Red-breasted Sapsucker		2		2		4		4
Downy Woodpecker		2	1	3		2	1	3
Hairy Woodpecker	2	5	4	11	3	8	6	17
American Three-toed Woodpecker	1	1	1	3	1	1	1	3
Northern Flicker	2	7	9	18	2	10	16	28
Pileated Woodpecker	3	2	2	7	4	3	2	9
Olive-sided Flycatcher	1	6	5	12	1	21	16	38
Western Wood-Pewee		3	1	4		17	1	18
Willow Flycatcher			1	1			1	1
Hammond's Flycatcher	2	7	7	16	7	55	21	83
Dusky Flycatcher		2		2		4		4
Pacific-slope Flycatcher	6	7	8	21	21	13	96	130
Cassin's Vireo		4		4		11		11
Warbling Vireo	2	7	3	12	3	61	25	89
Red-eyed Vireo		1		1		1		1
Gray Jay	5	4	7	16	15	6	16	37
Steller's Jay	5	8	5	18	7	14	8	29

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 2010 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Clark's Nutcracker	1	1		2	3	7		10
American Crow			2	2			3	3
Common Raven	3	2		5	3	3		6
Barn Swallow	1			1	1			1
Black-capped Chickadee		2		2		2		2
Mountain Chickadee	2	4		6	4	23		27
Chestnut-backed Chickadee	7	8	11	26	31	84	86	201
Red-breasted Nuthatch	8	10	9	27	34	53	44	131
Brown Creeper	5	5	7	17	14	15	13	42
House Wren			1	1			1	1
Pacific Wren	9	6	12	27	47	71	87	205
American Dipper		2	1	3		2	2	4
Golden-crowned Kinglet	8	6	12	26	35	21	54	110
Ruby-crowned Kinglet		2		2		11		11
Townsend's Solitaire		4	2	6		7	5	12
Veery		1		1		2		2
Swainson's Thrush	2	8	3	13	4	97	13	114
Hermit Thrush	6	6	6	18	18	62	34	114
American Robin	5	8	10	23	21	46	54	121
Varied Thrush	6	8	11	25	47	82	81	210
American Pipit	2		3	5	9		6	15
Nashville Warbler		4		4		39		39
Yellow Warbler		5	1	6		46	2	48
Yellow-rumped Warbler	1	9	2	12	2	101	4	107
Black-throated Gray Warbler		3	2	5		11	9	20
Townsend's Warbler	6	10	5	21	31	78	28	137
Hermit Warbler	1			1	1			1
MacGillivray's Warbler		7	3	10		36	5	41
Wilson's Warbler		5	4	9		33	21	54
Western Tanager	3	9	4	16	6	55	6	67
Spotted Towhee	1	2		3	1	2		3
Chipping Sparrow		5		5		33		33

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 2010 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Savannah Sparrow	1			1	1			1
Fox Sparrow	2	2		4	4	6		10
Song Sparrow	1	4	3	8	1	11	3	15
White-crowned Sparrow	1	2	2	5	1	2	6	9
Dark-eyed Junco	10	10	10	30	70	70	143	283
Black-headed Grosbeak		6	1	7		18	1	19
Lazuli Bunting		1		1		3		3
Brown-headed Cowbird	1	1		2	1	8		9
Gray-crowned Rosy-Finch	2			2	22			22
Pine Grosbeak		1	2	3		1	2	3
Purple Finch		1		1		2		2
Cassin's Finch		2		2		15		15
Red Crossbill	3	4	7	14	5	37	83	125
Pine Siskin	8	8	9	25	142	60	48	250
Evening Grosbeak	4	7	3	14	12	164	7	183
All species pooled					644	1,695	1,101	3,440
Detections per point (all species pooled)					4.81	10.46	6.40	7.35

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 2010.

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Canada Goose		2	1	3		3	1	4
Sooty Grouse	2	9	14	25	2	9	29	40
Common Loon			1	1			3	3
Osprey	2	2	1	5	2	3	1	6
Bald Eagle			1	1			2	2
Merlin			1	1			2	2
Spotted Sandpiper	1	1	1	3	1	1	3	5
Marbled Murrelet			4	4			7	7
Band-tailed Pigeon			4	4			7	7
Northern Pygmy-Owl	1	1	1	3	1	1	1	3
Black Swift		1		1		1		1
Vaux's Swift	1	6	3	10	2	11	8	21
Rufous Hummingbird	3	17	8	28	6	53	23	82
Belted Kingfisher		1	2	3		1	3	4
Red-naped Sapsucker		1		1		1		1
Red-breasted Sapsucker		3	1	4		5	1	6
Downy Woodpecker		4	1	5		5	1	6
Hairy Woodpecker	4	8	10	22	5	11	16	32
American Three-toed Woodpecker	1	1	2	4	1	1	2	4
Northern Flicker	4	10	16	30	5	13	26	44
Pileated Woodpecker	4	5	6	15	5	6	8	19
Olive-sided Flycatcher	3	11	10	24	4	33	26	63
Western Wood-Pewee		4	3	7		24	5	29
Willow Flycatcher		1	1	2		1	1	2
Hammond's Flycatcher	4	12	12	28	9	82	35	126
Dusky Flycatcher		2		2		4		4
Pacific-slope Flycatcher	12	10	17	39	54	19	168	241
Cassin's Vireo		6		6		15		15
Warbling Vireo	2	14	8	24	3	99	39	141
Red-eyed Vireo		3		3		6		6
Gray Jay	12	5	10	27	27	8	24	59
Steller's Jay	9	13	8	30	19	23	16	58

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 2010 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Clark's Nutcracker	1	3		4	3	9		12
American Crow	1		3	4	1		10	11
Common Raven	3	2	4	9	3	3	4	10
Horned Lark		1		1		1		1
Violet-green Swallow		2		2		5		5
Northern Rough-winged Swallow			2	2			2	2
Barn Swallow	1			1	1			1
Black-capped Chickadee		2		2		2		2
Mountain Chickadee	5	7		12	8	33		41
Chestnut-backed Chickadee	15	16	20	51	75	130	140	345
Red-breasted Nuthatch	15	18	18	51	72	77	85	234
Brown Creeper	12	9	13	34	22	20	30	72
House Wren			1	1			1	1
Pacific Wren	18	13	22	53	120	85	159	364
American Dipper		3	1	4		3	2	5
Golden-crowned Kinglet	17	11	23	51	68	29	94	191
Ruby-crowned Kinglet		4		4		18		18
Townsend's Solitaire		7	8	15		15	14	29
Veery		1		1		2		2
Swainson's Thrush	4	16	6	26	8	158	28	194
Hermit Thrush	14	12	10	36	41	95	58	194
American Robin	8	14	16	38	25	67	69	161
Varied Thrush	14	13	20	47	99	110	138	347
American Pipit	2	1	5	8	9	5	14	28
Orange-crowned Warbler		1	1	2		1	1	2
Nashville Warbler		9		9		85		85
Yellow Warbler		8	3	11		64	9	73
Yellow-rumped Warbler	4	18	4	26	6	167	7	180
Black-throated Gray Warbler		7	4	11		24	12	36
Townsend's Warbler	14	18	11	43	45	139	56	240
Hermit Warbler	2		1	3	2		3	5
MacGillivray's Warbler		13	5	18		68	9	77

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 2010 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Wilson's Warbler	1	7	8	16	1	41	28	70
Western Tanager	4	18	7	29	7	118	17	142
Spotted Towhee	1	4		5	1	6		7
Chipping Sparrow	1	12		13	1	55		56
Savannah Sparrow	1	1		2	1	1		2
Fox Sparrow	2	5		7	4	13		17
Song Sparrow	1	6	5	12	1	17	8	26
White-crowned Sparrow	1	2	4	7	1	2	12	15
Dark-eyed Junco	17	21	21	59	118	136	249	503
Black-headed Grosbeak		11	2	13		27	3	30
Lazuli Bunting		1	1	2		3	1	4
Brown-headed Cowbird	1	3		4	1	10		11
Gray-crowned Rosy-Finch	2	1	1	4	22	3	2	27
Pine Grosbeak	1	3	4	8	1	4	6	11
Purple Finch		2		2		4		4
Cassin's Finch		4		4		21		21
Red Crossbill	7	8	12	27	24	63	173	260
Pine Siskin	13	16	17	46	180	148	84	412
Evening Grosbeak	5	14	8	27	16	209	19	244
All species pooled					1,133	2,735	2,005	5,873
Detections per point (all species pooled)					4.50	9.95	6.31	6.95
Number of species detected during point counts					49	73	62	83

Table 7. Species of potential management concern recorded on “Rare Bird Detection Forms” in each park in 2010, excluding individuals that were also detected during point counts.

Species	Number of birds detected (excluding individuals also detected during point counts)		
	Mount Rainier	North Cascades	Olympic
Golden Eagle		1	
Peregrine Falcon		1	
Marbled Murrelet			2
Spotted Owl			1

Table 8. Number of points with detections and number of individual detections for each species detected during point counts at LEWI in 2010.

Species	Number of points with detections	Number of individual detections
Pacific Loon	1	1
Brown Pelican	1	19
Double-crested Cormorant	1	18
Canada Goose	6	12
Mallard	2	5
Osprey	1	1
Bald Eagle	1	1
Red-tailed Hawk	1	1
Peregrine Falcon	1	1
Caspian Tern	5	14
Band-tailed Pigeon	2	2
Eurasian-collared Dove	1	1
Rufous Hummingbird	8	8
Downy Woodpecker	2	2
Hairy Woodpecker	4	4
Northern Flicker	4	4
Pileated Woodpecker	3	3
Olive-sided Flycatcher	10	11
Pacific-slope Flycatcher	41	58
Cassin's Vireo	1	1
Hutton's Vireo	3	3
Warbling Vireo	5	6
Steller's Jay	13	15
American Crow	36	54
Common Raven	9	10
Violet-green Swallow	6	11
Northern Rough-winged Swallow	1	1
Barn Swallow	4	14
Black-capped Chickadee	7	12
Chestnut-backed Chickadee	26	36
Red-breasted Nuthatch	7	7
Brown Creeper	9	10
Bewick's Wren	3	4
Winter Wren	52	91
Marsh Wren	9	21
Golden-crowned Kinglet	24	27
Swainson's Thrush	54	100
American Robin	27	42
Varied Thrush	2	2
European Starling	1	3
Orange-crowned Warbler	12	17
Yellow Warbler	11	15
Yellow-rumped Warbler	1	1
Black-throated Gray Warbler	17	24
Townsend's Warbler	3	3
Hermit Warbler	17	28
MacGillivray's Warbler	1	1

Table 8. Number of points with detections and number of individual detections for each species detected during point counts at LEWI in 2010 (continued).

Species	Number of points with detections	Number of individual detections
Common Yellowthroat	7	10
Wilson's Warbler	29	41
Western Tanager	11	15
Spotted Towhee	5	6
Savannah Sparrow	1	3
Song Sparrow	27	41
White-crowned Sparrow	14	23
Dark-eyed Junco	17	28
Black-headed Grosbeak	27	32
Red-winged Blackbird	14	28
Brown-headed Cowbird	14	21
Purple Finch	13	14
Red Crossbill	5	8
Pine Siskin	1	1
American Goldfinch	9	9
Evening Grosbeak	2	3



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, 2009, and 2010 field seasons. The figure includes all species for which we amassed at least 18 point count detections on annual-panel transects over the six 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.

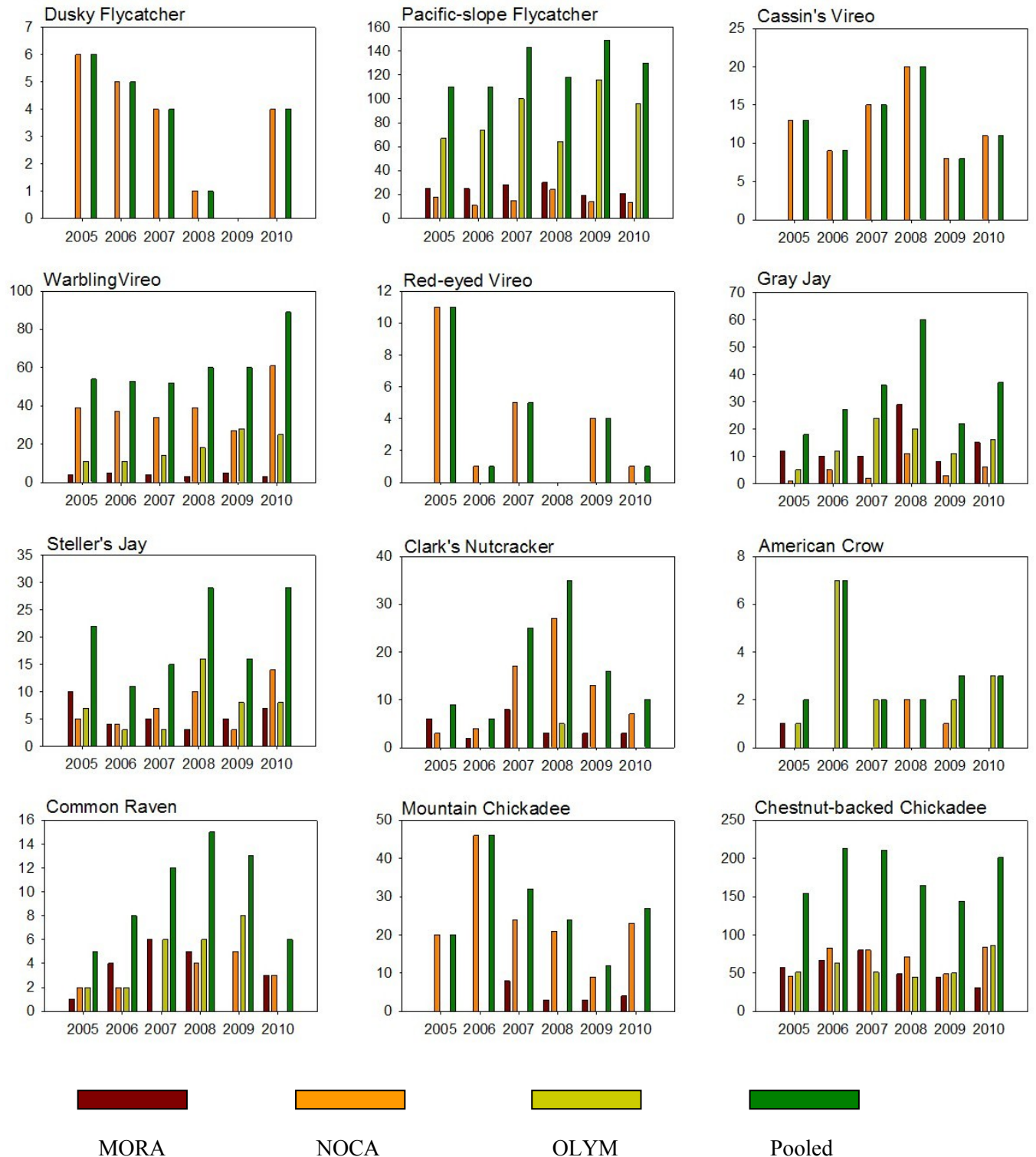


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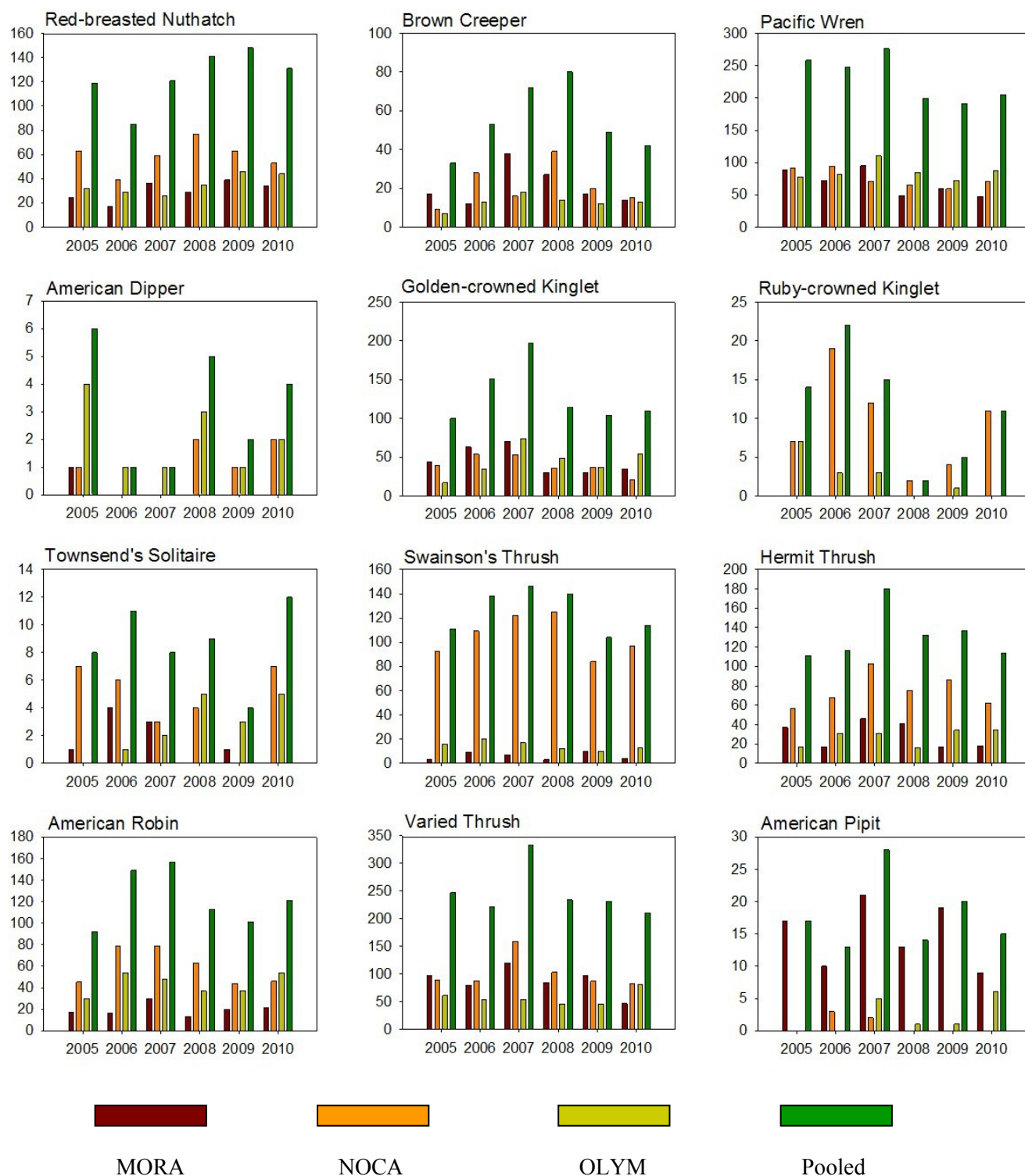


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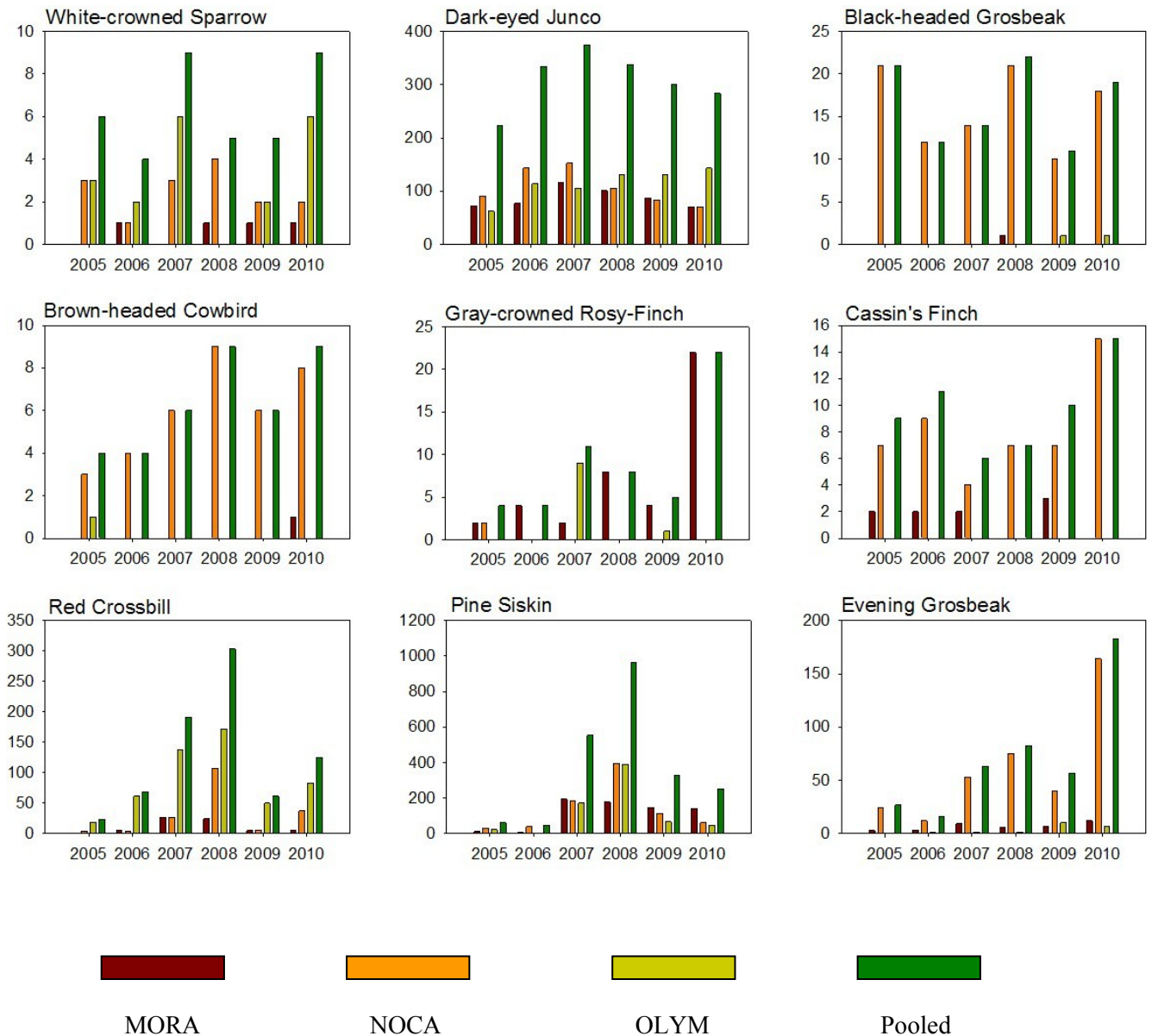


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Discussion

After the overall decrease in the number of birds detected in 2009 in the large parks, 2010 yielded an overall increase in detections, notably at NOCA. More specifically, there was a slight decrease in detections at MORA (averaging 5.41 detections per point on annual-panel transects in 2009, compared with 4.81 detections per point in 2010), a slight increase in detections per point at OLYM (averaging 5.79 detections per point on annual-panel transects in 2009, compared with 6.40 detections per point in 2010), and a substantial increase in detections per point at NOCA (averaging 7.32 detections per point on annual-panel transects in 2009, compared with 10.46 detections per point in 2010). This increase was in large part driven by the increase of evening grosbeaks at NOCA, rising from 40 detections on annual-panel transects in 2009 to 164 detections in 2010 (compared with 53 detections in 2007 and 75 detections in 2008), even with fewer points surveyed in 2010. There was little annual variation in the number of evening grosbeaks detected at OLYM and MORA over the period of study (Siegel et al. 2009b, Siegel et al. 2008, Wilkerson et al. 2009b, Wilkerson et al. 2010).

Another notable preliminary result from 2010 is an increase in detections of Nashville warblers. Between 2005 and 2009 on the annual-panel transects, Nashville warbler detections have consistently been under 14 per season (13 detections in 2009, nine detections in 2008, 10 detections in 2007, one detection in 2006, and five detections in 2005). In 2010 however, there were 39 detections of Nashville warblers on annual-panel transects. This increase was solely at NOCA, as that is the only park where we have detected Nashville warblers during point counts for this project.

In contrast, after pine siskin and red crossbill irruptions in 2008 and their subsequent declines in 2009, detections of each of these species remained relatively low in 2010 with little change from 2009 detection numbers. Pacific wren, golden-crowned kinglet, and varied thrush annual-panel detections have also remained relatively stable after the decline in detections in 2008. 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.

Fieldwork at LEWI was also successful in 2010, though data collection took longer than anticipated due to unfavorable weather nearly every day. Results from this year indicate that high detection rates of common species at LEWI will yield robust results there, and stretch this monitoring project's area of inference significantly further south (Siegel et al. 2009b).

With the experience gained from two pilot field seasons (2005 and 2006) and three previous years of full protocol implementation, our fourth year of fully implementing the NCCN Landbird Monitoring Project proceeded smoothly. Our procedures for season preparation, data collection, data management, data analysis, and reporting (Siegel et al. 2007) have all been well vetted, and required no substantial changes this year. Due to a combination of a pre-season injury (unrelated to the monitoring project activities) preventing one of the technicians from being able to work during the field season and another technician never passing the bird identification evaluation, there were only five crew members who were able to conduct point counts full-time throughout the field season. Adding another challenge was an injury to one of the technicians, who was subsequently unable to wear a pack for the last three weeks of the field season and restricted to

day trips only. However, a variety of qualified people were able to fill in, including former technicians, an IBP Staff Biologist, and a National Park Service Wildlife Biologist. Were it not for late lingering snowpack at medium to high elevations toward the end of the field season, our crew might have been able to survey all of the intended transects. In the end, we were able to survey a total of 65 of the 68 intended transects, missing one transect on the annual panel at NOCA and two transects on the alternating panel (one at NOCA and one at MORA). In 2011, we will have the full eight-person crew that was originally intended for the project. It is our hope that the larger crew will make the field workload more manageable, reduce the likelihood of injuries and provide more flexibility should a technician fail to pass the bird identification exam on time, or miss part of the field season for some other reason. It is also our hope that the fully staffed crew will enable us to better adhere to the intended schedule for data entry. That said, adding three days to the end of the field season in 2010 just for data entry and other post-data collection tasks helped us complete the data entry and verification process in a more timely fashion than in previous years. We plan to have the crew work these extra three days again in 2011.

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.

Conclusions

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 four full years of project implementation (2007, 2008, 2009, and 2010) that includes data collection on the annual panel as well as the first four alternating panels. Preliminary results indicate we will have robust sample sizes for many species in 2012 when we conduct our five-year trend analysis, 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 population dynamics in birds of Pacific Northwest forests, and are likely to spur additional targeted research and help refine management priorities and needs within the parks.

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