



North Coast Cascades Network Landbird Monitoring

Report for the 2008 Field Season

Natural Resource Technical Report NPS/NCCN/NRTR—2009/222



ON THE COVER

Western Tanager (*Piranga ludoviciana*)

Photograph by: J. P. Smith

North Coast Cascades Network Landbird Monitoring

Report for the 2008 Field Season

Natural Resource Technical Report NPS/NCCN/NRTR—2009/222

Robert L. Wilkerson and Rodney B. Siegel
The Institute for Bird Populations
P. O. Box 1346
Point Reyes Station, CA 94956-1346

Robert C. Kuntz II
National Park Service
North Cascades National Park Service Complex
810 State Route 20
Sedro-Woolley, WA 98284

June 2009

U.S. Department of the Interior
National Park Service
Natural Resource Program Center
Fort Collins, Colorado

The Natural Resource Publication series addresses natural resource topics that are of interest and applicability to a broad readership in the National Park Service and to others in the management of natural resources, including the scientific community, the public, and the NPS conservation and environmental constituencies. Manuscripts are peer-reviewed to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and is designed and published in a professional manner.

The Natural Resource Technical Reports series is used to disseminate the peer-reviewed results of scientific studies in the physical, biological, and social sciences for both the advancement of science and the achievement of the National Park Service's mission. The reports provide contributors with a forum for displaying comprehensive data that are often deleted from journals because of page limitations. Current examples of such reports include the results of research that addresses natural resource management issues; natural resource inventory and monitoring activities; resource assessment reports; scientific literature reviews; and peer reviewed proceedings of technical workshops, conferences, or symposia.

Views, statements, findings, conclusions, recommendations and data in this report are solely those of the author(s) and do not necessarily reflect views and policies of the U.S. Department of the Interior, NPS. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the National Park Service.

Printed copies of reports in these series may be produced in a limited quantity and they are only available as long as the supply lasts. This report is also available from the North Coast and Cascades Network (<http://www.nature.nps.gov/im/units/NCCN>) and the Natural Resource Publications Management website (<http://www.nature.nps.gov/publications/NRPM>) on the Internet.

Please cite this publication as:

Wilkerson, R. L., R. B. Siegel, and R. C. Kuntz II. 2009. North Coast and Cascades Network landbird monitoring: Report for the 2008 field season. Natural Resource Technical Report NPS/NCCN/NRTR—2009/222. National Park Service, Fort Collins, Colorado.

Contents

	Page
Figures.....	iv
Tables.....	v
Executive Summary.....	vii
Acknowledgements.....	ix
Introduction.....	1
Study Area.....	3
Methods.....	5
Sample Design.....	5
Crew Training and Certification.....	5
Data Collection.....	10
Data Entry and Validation.....	11
Data Analysis.....	11
Results.....	13
Discussion.....	35
Conclusions.....	37
Literature Cited.....	39

Figures

Page

Figure 1. National Park Service units participating in the landbird monitoring program of the NCCN Landbird Monitoring Program.....	3
Figure 2. Approximate locations of transects conducted at MORA in 2008. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high elevation transects.....	6
Figure 3. Approximate locations of transects conducted at NOCA in 2008. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high elevation transects.....	7
Figure 4. Approximate locations of transects conducted at OLYM in 2008. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high elevation transects.....	8
Figure 5. Locations of individual point counts conducted at Lewis and Clark National Historical Park in 2008.	9
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, and 2008 field seasons.	29

Tables

	Page
Table 1. Observers who conducted point counts in the NCCN in 2008.	10
Table 2. NCCN landbird monitoring transects that were surveyed or intended to be surveyed in 2008.	14
Table 3. Summary history of NCCN landbird monitoring transects completed through 2008. ...	16
Table 4. All species recorded in the three large NCCN parks during the 2008 field season, including the pre-season training session. Asterisks indicate species that were detected only at times other than during point counts.	17
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 2008.	20
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 2008.	23
Table 7. Species of potential management concern recorded on ‘rare bird’ detection forms in each park in 2007, excluding individuals that were also detected during point counts.	26
Table 8. Number of points with detections and number of individual detections for each species detected during point counts at Lewis and Clark National Historical Park in 2008.	27

Executive Summary

2008 was the second year of full implementation for the landbird monitoring program in the North Coast Cascades Network (NCCN). The NCCN landbird monitoring protocol requires annual survey effort consisting of an annual panel (34 transects) plus one of five alternating panels (an additional 34 transects) in the large parks—Mount Rainier National Park (MORA), North Cascades National Park Service Complex (NOCA), or Olympic National Park (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)—which are surveyed in alternating years. In 2008 we surveyed the annual panel along with the second rotating panel in the large parks, along with the point grid in Lewis and Clark National Historical Park.

In 2008 we conducted 910 point counts at point count survey stations located along 63 transects in the three large parks. Five of the 68 intended transects could not be surveyed due to a combination of unusually late lingering snow pack preventing access to survey areas and unseasonably rainy weather slowing survey progress in July. We detected 102 bird species in the three large parks, 85 of which were detected during one or more point counts. For 56 species (all species detected at least 12 times on annual-panel transects between 2005 and 2008), we present the total number of detections on annual-panel transects in each park during the 2005, 2006, 2007 and 2008 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 68 point counts, including 29 at Fort Clatsop, 34 at Cape Disappointment, and five at Sunset Beach. Fifty-seven species were detected during those point counts. We present the number of detections, and the number of points with detections, for each species detected during point counts at LEWI.

The NCCN landbird monitoring program 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 two full years of project implementation (2007 and 2008), including data collection on the annual panel as well as the first two alternating panels. Preliminary results indicate we will have robust sample sizes for many species in 2011 when we conduct our 5-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, may yield interesting and useful findings about the drivers of population trends of birds of Pacific Northwest forests.

Acknowledgements

We thank the 2008 crew members for their hard work and dedication to the project: C. Grattan, M. Holmgren (Field Lead), K. Kuhlman, A. Tillinghast, A. Wicks, and Z. Wallace. 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, J. Schaberl, S. Stonum, and D. Sweeny, 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. This is Contribution No. 366 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; NABCI 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 NPS to take responsibility for monitoring birds in high-elevation areas throughout the Pacific Northwest (Altman and Bart 2001). The Pacific Northwest's migratory landbirds also face additional threats 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 program'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 program 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 program 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 program’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 program (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.

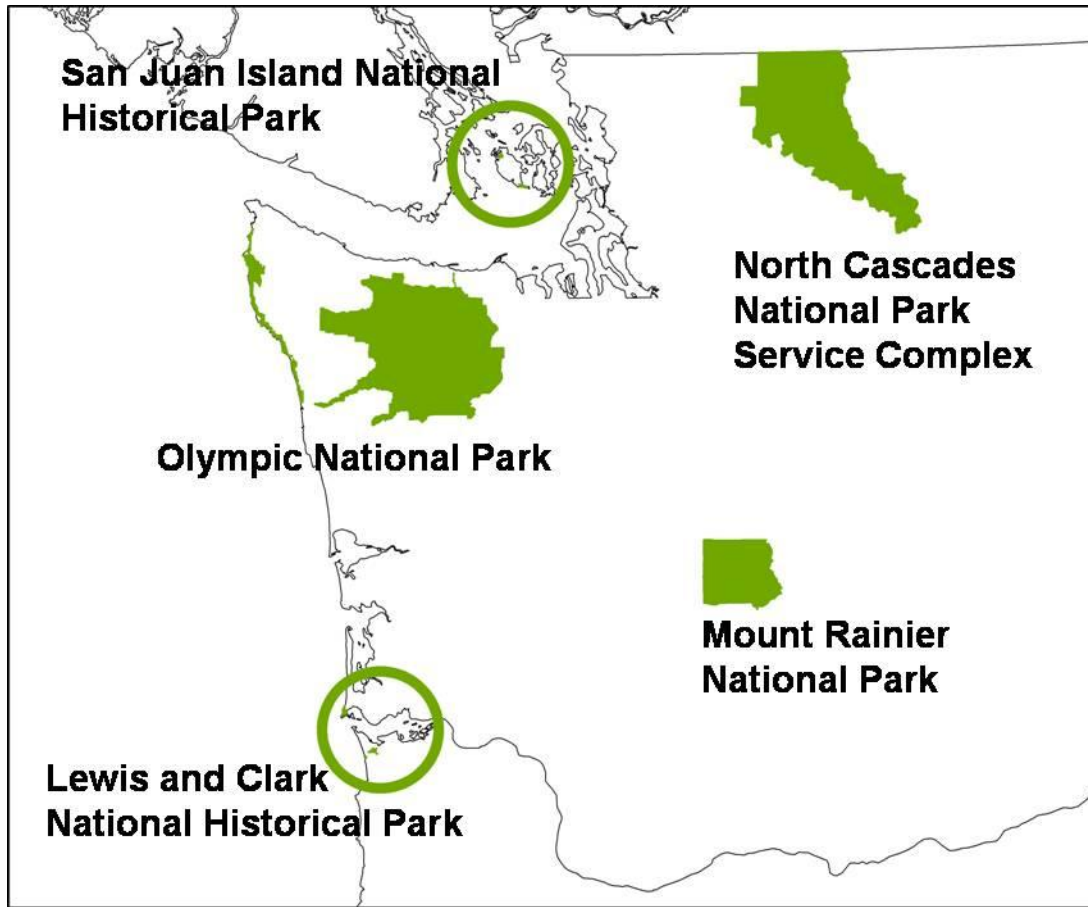


Figure 1. National Park Service units participating in the NCCN Landbird Monitoring Program.

Methods

Sample Design

A detailed description of the sample design for the NCCN landbird monitoring program is provided in the NCCN landbird monitoring protocol (Siegel et al. 2007a). 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, 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 2008 we surveyed the annual panel of transects ('Ann1') and the second alternating panel of transects ('Alt3').

In 2008 we implemented the full study design in the three large parks for the second year, including surveys of the annual panel as well as the second 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).

Our sample design, which requires 68 transects per year to be surveyed in the large parks, was developed under the assumption that the NCCN landbird monitoring program would be staffed by an 8-person field crew. Budgetary constraints have subsequently forced us to trim the field crew to 6 people, making completion of all 68 transects difficult, and nearly impossible in years with challenging weather conditions.

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 2008 we surveyed the grid at LEWI (Figure 5).

Crew Training and Certification

Mandy Holmgren, a contract biologist with The Institute for Bird Populations (IBP) served as the 2008 Field Lead. Mandy began training five 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, four of the five field technicians had passed the rigorous point count certification exam, and were ready to begin collecting data. A few weeks later the fifth field technician was also certified. All individuals who collected data during the 2008 field season (Table 1) were employees, contract biologists, or field biologist interns of The Institute for Bird Populations.

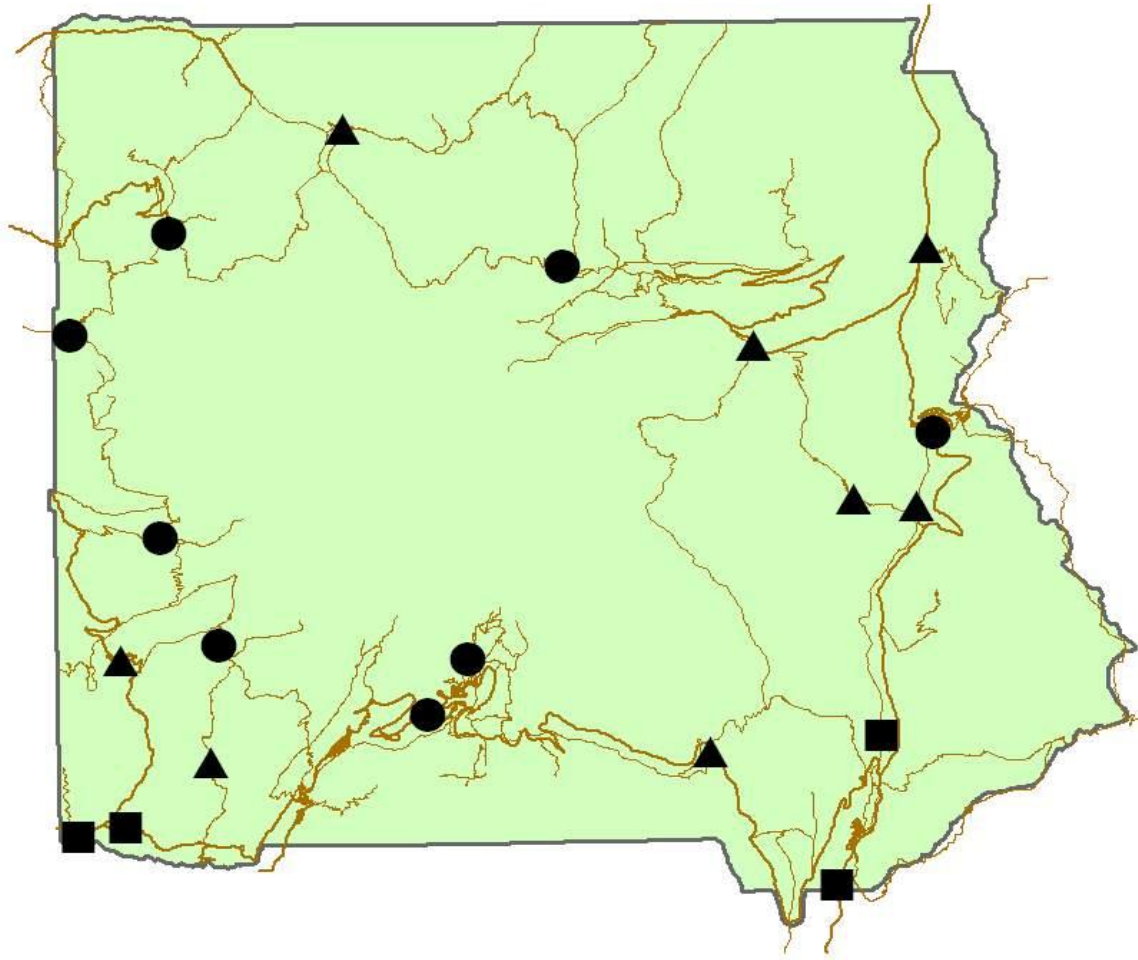


Figure 2. Approximate locations of transects conducted at MORA in 2008. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high elevation transects.

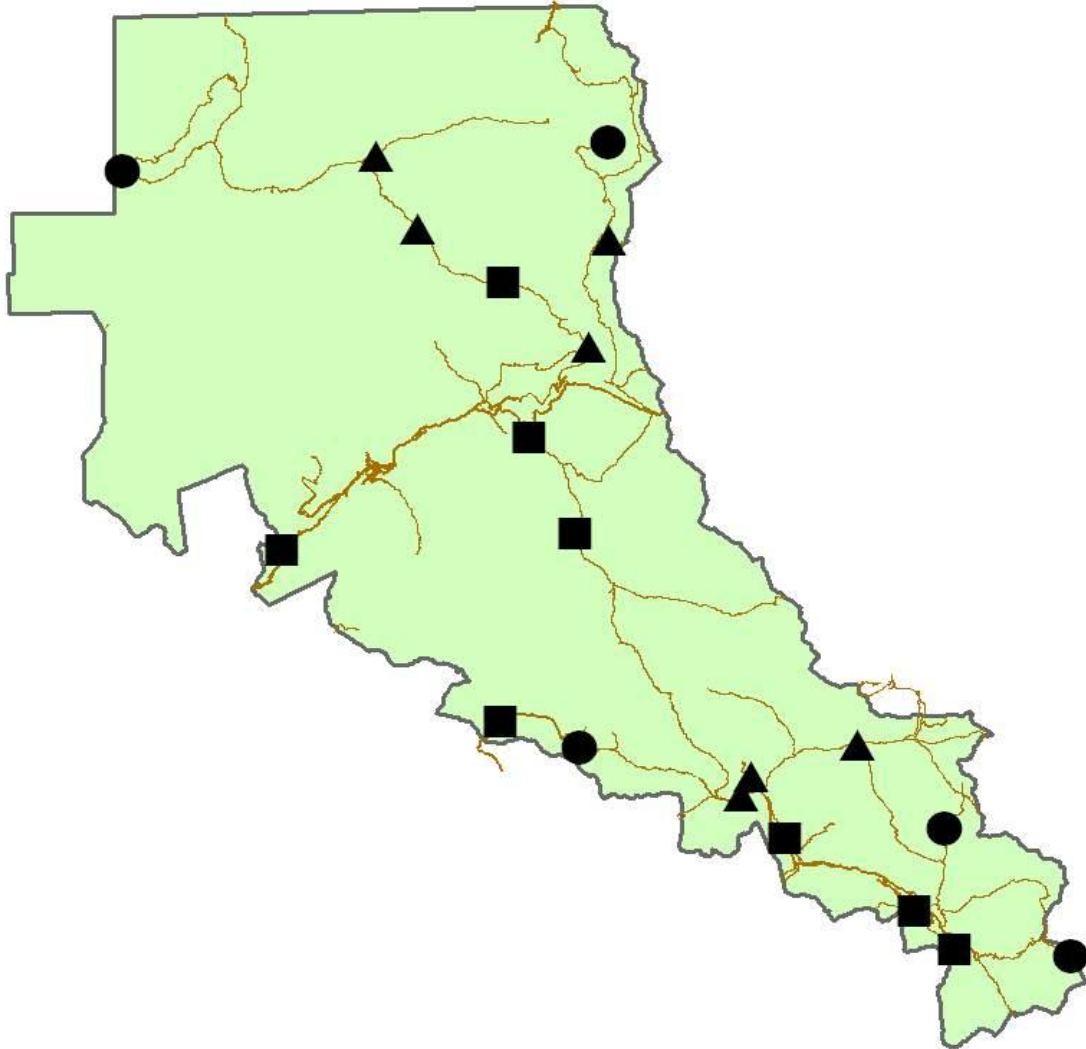


Figure 3. Approximate locations of transects conducted at NOCA in 2008. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high elevation transects.

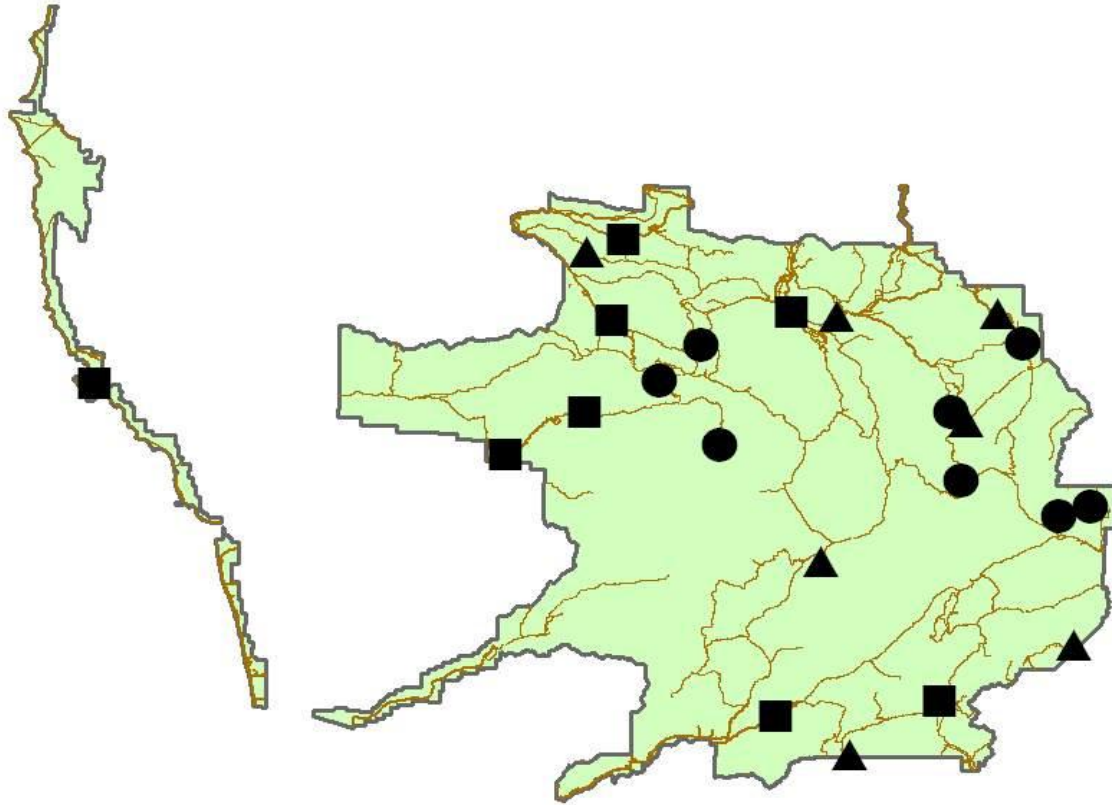
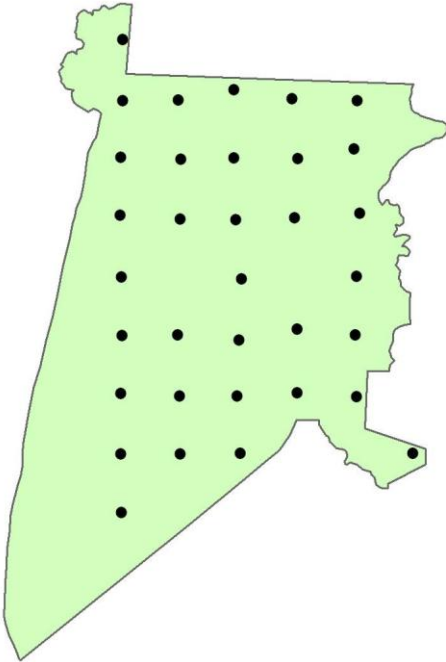
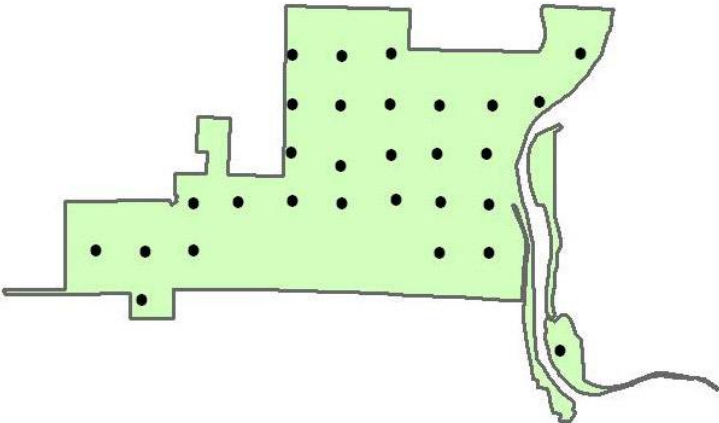


Figure 4. Approximate locations of transects conducted at OLYM in 2008. Squares indicate low-elevation transects, triangles indicate mid-elevation transects, and circles indicate high elevation transects.

Cape Disappointment



Fort Clatsop



Sunset Beach

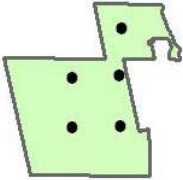


Figure 5. Locations of individual point counts conducted at Lewis and Clark National Historical Park in 2008.

Table 1. Observers who conducted point counts in the NCCN in 2008.

Observer	Role
Cassidy Grattan	Technician
Mandy Holmgren	Field lead
Kara Kuhlman	Technician
Andrew Tillinghast	Technician
Zachary Wallace	Technician
Andrew Wicks	Technician

Data Collection

All point count data were collected between May 24 and May 27 at LEWI, between June 4 and July 24 at MORA, between May 25 and July 29 at NOCA, and between May 28 and July 31 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. 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 min 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). 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, 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, and where necessary, 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 program’s Microsoft Access database throughout the field season. Although the crews were indeed able to enter some of their data during the field season, some early technical glitches combined with a very 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 program, 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). Until that analysis is completed, any results should be viewed as provisional only.

Results

We surveyed 32 of the 34 annual-panel transects in the large parks, and 31 of the 34 transects in the second alternating panel (Table 2), for a total of 63 transects (Table 3). We were unable to sample one transect at OLYM and four transects at NOCA, mainly due to unusually rainy weather and lingering snow pack at higher elevations toward the end of the field season. Appendix 1 provides a detailed multi-year survey history of all transects sampled in the large parks to date. We conducted 288 individual point counts at MORA, 317 point counts at NOCA and 305 point counts at OLYM (Table 2). We also conducted 68 point counts at LEWI. During these 973 point counts we counted 5,397 individual birds. Across the three large parks, we documented the presence of 102 species (Table 4), 85 of which were detected during point counts; the remaining 17 species were recorded only as incidental detections 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 44 bird species during point counts at MORA, 58 species during point counts at NOCA, and 44 species during point counts at OLYM (Table 5). Pooling detections on annual-panel transects across all species, we amassed 824 individual bird detections (5.39 detections/point) at MORA, 2,195 detections (12.54 detections/point) at NOCA, and 1,392 detections (9.04 detections per point) at OLYM (Table 5). The five most frequently detected species on the annual-panel transects in 2008 were: Pine Siskin (553 detections), Dark-eyed Junco (375 detections), Red Crossbill (303 detections), Varied Thrush (234 detections) and Winter Wren (199 detections). Pooling data across the annual-panel transects as well as the transects in the second alternating panel (“Alt2”), 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.

Pooling data across all transects, we detected 55 bird species during point counts at MORA, 69 species during point counts at NOCA, and 55 species during point counts at OLYM (Table 6). Considering data from all 63 surveyed transects, the five most frequently detected species were: Pine Siskin (2,123 detections), Dark-eyed Junco (629 detections), Red Crossbill (526 detections), Varied Thrush (449 detections), and Townsend’s Warbler (368 detections).

Five species of particular conservation interest—Marbled Murrelet, Golden Eagle, Northern Goshawk, Peregrine Falcon and Willow Flycatcher—were detected at times other than during point counts, and were documented on ‘rare bird’ detection forms. These detections are summarized in Table 7.

For 56 species (all species for which we amassed at least 12 point count detections between 2005 and 2008), we present the total number of detections of each species on each park’s annual panel transects during the 2005, 2006, 2007 and 2008 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 68 point counts yielded 753 detections of 57 species (Table 8), a detection rate of 11.07 birds per point. The most frequently detected species was Swainson's Thrush (93 detections), followed by Pacific-slope Flycatcher (75 detections), Winter Wren (65 detections), Wilson's Warbler (57 detections), and American Robin (56 detections).

Table 2. NCCN landbird monitoring transects that were surveyed or intended to be surveyed in 2008.

Park	Panel	Elevation	Transect	No. of points completed
MORA	ann1	Low	4001	12
MORA	ann1	Low	4005	11
MORA	ann1	Medium	4002	13
MORA	ann1	Medium	4004	18
MORA	ann1	Medium	4009	15
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	alt3	Low	4010	13
MORA	alt3	Low	4018	12
MORA	alt3	Medium	4028	11
MORA	alt3	Medium	4042	12
MORA	alt3	Medium	4044	15
MORA	alt3	Medium	4048	13
MORA	alt3	High	4029	14
MORA	alt3	High	4030	12
MORA	alt3	High	4032	15
MORA	alt3	High	4033	18
NOCA	ann1	Low	1013	12
NOCA	ann1	Low	1017	12
NOCA	ann1	Low	1020	15
NOCA	ann1	Low	1023	20
NOCA	ann1	Medium	1015	17
NOCA	ann1	Medium	1018	23
NOCA	ann1	Medium	1022	13
NOCA	ann1	Medium	1024	12
NOCA	ann1	High	1014	0
NOCA	ann1	High	1016	16
NOCA	ann1	High	1019	12
NOCA	ann1	High	1021	23
NOCA	alt3	Low	1027	13
NOCA	alt3	Low	1028	13
NOCA	alt3	Low	1029	13
NOCA	alt3	Low	1034	13
NOCA	alt3	Medium	1025	15
NOCA	alt3	Medium	1026	14

Table 2. NCCN landbird monitoring transects that were surveyed or intended to be surveyed in 2008 (continued).

Park	Panel	Elevation	Transect	No. of points completed
NOCA	alt3	Medium	1030	0
NOCA	alt3	Medium	1031	19
NOCA	alt3	High	1032	0
NOCA	alt3	High	1037	0
NOCA	alt3	High	1039	21
NOCA	alt3	High	1040	21
OLYM	ann1	Low	3001	10
OLYM	ann1	Low	3121	17
OLYM	ann1	Low	3126	13
OLYM	ann1	Low	3134	18
OLYM	ann1	Medium	3122	0
OLYM	ann1	Medium	3123	14
OLYM	ann1	Medium	3130	9
OLYM	ann1	Medium	3200	23
OLYM	ann1	High	3124	11
OLYM	ann1	High	3125	13
OLYM	ann1	High	3127	15
OLYM	ann1	High	3128	11
OLYM	alt3	Low	3146	15
OLYM	alt3	Low	3149	10
OLYM	alt3	Low	3151	12
OLYM	alt3	Low	3153	11
OLYM	alt3	Medium	3143	10
OLYM	alt3	Medium	3150	11
OLYM	alt3	Medium	3152	11
OLYM	alt3	Medium	3154	15
OLYM	alt3	High	3147	19
OLYM	alt3	High	3148	14
OLYM	alt3	High	3156	12
OLYM	alt3	High	3157	11

Table 3. Summary history of NCCN landbird monitoring transects completed through 2008.

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

^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 rotating panel were sampled in 2007.

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

Table 4. All species recorded in the three large NCCN parks during the 2008 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>
Turkey Vulture *	<i>Cathartes aura</i>
Canada Goose	<i>Branta canadensis</i>
Wood Duck *	<i>Aix sponsa</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>
Northern Goshawk	<i>Accipiter gentilis</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Golden Eagle *	<i>Aquila chrysaetos</i>
American Kestrel *	<i>Falco sparverius</i>
Peregrine Falcon *	<i>Falco peregrinus</i>
Prairie Falcon	<i>Falco mexicanus</i>
Ruffed Grouse	<i>Bonasa umbellus</i>
Sooty Grouse	<i>Dendragapus fuliginosus</i>
Spotted Sandpiper	<i>Actitis macularia</i>
Marbled Murrelet	<i>Brachyramphus marmoratus</i>
Band-tailed Pigeon	<i>Patagioenas fasciata</i>
Eurasian Collared-dove *	<i>Streptopelia decaocto</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>
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>
Red-naped Sapsucker *	<i>Sphyrapicus nuchalis</i>
Red-breasted Sapsucker	<i>Sphyrapicus ruber</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>
Cassin's Vireo	<i>Vireo cassinii</i>
Warbling Vireo	<i>Vireo gilvus</i>
Gray Jay	<i>Perisoreus canadensis</i>

Table 4. All species recorded in the three large NCCN parks during the 2008 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
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>
Violet-green Swallow	<i>Tachycineta thalassina</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>
White-breasted Nuthatch *	<i>Sitta carolinensis</i>
Brown Creeper	<i>Certhia americana</i>
Canyon Wren *	<i>Catherpes mexicanus</i>
Bewick's Wren	<i>Thryomanes bewickii</i>
House Wren *	<i>Troglodytes aedon</i>
Winter Wren	<i>Troglodytes troglodytes</i>
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>
Mountain Bluebird	<i>Sialia currucoides</i>
Townsend's Solitaire	<i>Myadestes townsendi</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>
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>
Hermit Warbler	<i>Dendroica occidentalis</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>
Vesper Sparrow *	<i>Pooecetes gramineus</i>
Savannah Sparrow *	<i>Passerculus sandwichensis</i>
Fox Sparrow	<i>Passerella iliaca</i>
Song Sparrow	<i>Melospiza melodia</i>

Table 4. All species recorded in the three large NCCN parks during the 2008 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
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</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>
Cassin's Finch	<i>Carpodacus cassinii</i>
Red Crossbill	<i>Loxia curvirostra</i>
Pine Siskin	<i>Carduelis pinus</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 2008.

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Common Loon		1		1		1		1
Canada Goose		1		1		5		5
Common Merganser			1	1			2	2
Red-tailed Hawk			1	1			1	1
Prairie Falcon	1			1	1			1
Sooty Grouse	1	7	8	16	1	15	21	37
Spotted Sandpiper	1		2	3	1		5	6
Marbled Murrelet			1	1			1	1
Band-tailed Pigeon	1		5	6	1		14	15
Mourning Dove			1	1			1	1
Northern Pygmy-Owl	1		1	2	1		1	2
Barred Owl		1		1		2		2
Black Swift		1		1		1		1
Vaux's Swift	3	2	3	8	4	13	14	31
Rufous Hummingbird	2	6	6	14	3	21	13	37
Red-breasted Sapsucker	1	3		4	1	7		8
Hairy Woodpecker		8	7	15		11	14	25
American Three-toed Woodpecker	1			1	1			1
Northern Flicker		5	7	12		7	12	19
Pileated Woodpecker	2	4		6	2	5		7
Olive-sided Flycatcher	3	6	4	13	5	22	7	34
Western Wood-Pewee		3	1	4		20	1	21
Hammond's Flycatcher	3	8	7	18	8	71	35	114
Dusky Flycatcher		1		1		1		1
Pacific-slope Flycatcher	6	6	7	19	30	24	64	118
Cassin's Vireo		7		7		20		20
Warbling Vireo	2	8	4	14	3	39	18	60
Gray Jay	6	3	6	15	29	11	20	60
Steller's Jay	2	5	4	11	3	10	16	29
Clark's Nutcracker	1	1	1	3	3	27	5	35

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 2008 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
American Crow		2		2		2		2
Common Raven	4	3	3	10	5	4	6	15
Violet-green Swallow	1			1	1			1
Mountain Chickadee	1	2		3	3	21		24
Chestnut-backed Chickadee	8	9	10	27	49	71	45	165
Red-breasted Nuthatch	7	9	6	22	29	77	35	141
Brown Creeper	6	6	9	21	27	39	14	80
Bewick's Wren	1			1	1			1
Winter Wren	8	7	9	24	49	65	85	199
American Dipper		1	2	3		2	3	5
Golden-crowned Kinglet	8	7	9	24	30	36	48	114
Ruby-crowned Kinglet		1		1		2		2
Western Bluebird		1		1		1		1
Townsend's Solitaire		4	3	7		4	5	9
Swainson's Thrush	2	7	4	13	3	125	12	140
Hermit Thrush	6	5	5	16	41	75	16	132
American Robin	4	8	7	19	13	63	37	113
Varied Thrush	8	9	10	27	85	103	46	234
American Pipit	2		1	3	13		1	14
Cedar Waxwing		1		1		7		7
Nashville Warbler		3		3		9		9
Yellow Warbler		5	2	7		79	5	84
Yellow-rumped Warbler	4	8		12	8	75		83
Black-throated Gray Warbler	1	5	2	8	1	12	11	24
Townsend's Warbler	5	9	4	18	31	91	26	148
Hermit Warbler	3			3	8			8
MacGillivray's Warbler		7		7		30		30
Wilson's Warbler		3	4	7		14	16	30
Western Tanager	2	8	3	13	4	76	15	95

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 2008 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Chipping Sparrow		5		5		37		37
Fox Sparrow	2			2	8			8
Song Sparrow		4	2	6		16	5	21
White-crowned Sparrow	1	1		2	1	4		5
Dark-eyed Junco	9	10	11	30	101	106	131	338
Black-headed Grosbeak	1	5		6	1	21		22
Brown-headed Cowbird		3		3		9		9
Gray-crowned Rosy-Finch	2			2	8			8
Pine Grosbeak		1	1	2		1	1	2
Cassin's Finch		2		2		7		7
Red Crossbill	3	6	11	20	24	107	172	303
Pine Siskin	10	11	11	32	177	394	391	962
Evening Grosbeak	3	8	1	12	6	75	1	82
All Species Pooled					824	2,195	1,392	4,411
Detections per Point (All Species Pooled)					5.39	12.54	9.04	9.15

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 2008.

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Common Loon		1		1		1		1
Canada Goose		2		2		19		19
Common Merganser			1	1			2	2
Osprey	1			1	1			1
Bald Eagle			1	1			1	1
Sharp-shinned Hawk		1		1		1		1
Northern Goshawk		1		1		1		1
Red-tailed Hawk			1	1			1	1
Prairie Falcon	1			1	1			1
Ruffed Grouse		1		1		1		1
Sooty Grouse	1	12	14	27	1	32	30	63
Spotted Sandpiper	1	2	2	5	1	2	5	8
Marbled Murrelet			1	1			1	1
Band-tailed Pigeon	3	1	7	11	4	1	16	21
Mourning Dove			1	1			1	1
Northern Pygmy-Owl	1		2	3	1		2	3
Barred Owl		2		2		3		3
Common Nighthawk		1		1		2		2
Black Swift		1		1		1		1
Vaux's Swift	4	6	3	13	6	41	14	61
Calliope Hummingbird	1	2		3	1	6		7
Rufous Hummingbird	3	12	10	25	13	40	24	77
Red-breasted Sapsucker	2	4	1	7	2	8	1	11
Hairy Woodpecker	3	12	10	25	4	20	19	43
American Three-toed Woodpecker	1			1	1			1
Northern Flicker	4	10	10	24	7	17	15	39
Pileated Woodpecker	4	8	1	13	4	9	2	15
Olive-sided Flycatcher	6	11	9	26	10	35	18	63
Western Wood-Pewee		7	1	8		34	1	35
Hammond's Flycatcher	5	16	13	34	10	130	55	195

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 2008 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Dusky Flycatcher		2	1	3		2	1	3
Pacific-slope Flycatcher	13	9	15	37	72	27	117	216
Cassin's Vireo		12		12		34		34
Warbling Vireo	2	16	6	24	3	69	26	98
Gray Jay	13	7	12	32	51	25	27	103
Steller's Jay	8	8	7	23	16	13	25	54
Clark's Nutcracker	1	1	2	4	3	27	6	36
American Crow		2	1	3		2	1	3
Common Raven	7	3	6	16	10	4	13	27
Violet-green Swallow	1			1	1			1
Black-capped Chickadee	1			1	1			1
Mountain Chickadee	3	4		7	5	29		34
Chestnut-backed Chickadee	18	17	20	55	108	107	101	316
Red-breasted Nuthatch	17	17	15	49	82	149	69	300
Brown Creeper	12	14	15	41	39	71	32	142
Bewick's Wren	1			1	1			1
Winter Wren	18	12	17	47	92	98	156	346
American Dipper		2	2	4		3	3	6
Golden-crowned Kinglet	16	14	21	51	62	78	93	233
Ruby-crowned Kinglet		2	1	3		5	4	9
Western Bluebird		1		1		1		1
Mountain Bluebird		1		1		1		1
Townsend's Solitaire	1	8	4	13	1	11	8	20
Swainson's Thrush	3	15	7	25	4	264	16	284
Hermit Thrush	13	8	10	31	77	116	45	238
American Robin	7	14	16	37	18	94	61	173
Varied Thrush	16	16	19	51	186	148	115	449
American Pipit	3		2	5	14		2	16
Cedar Waxwing		1		1		7		7
Orange-crowned Warbler			1	1			2	2

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 2008 (continued).

Species	Number of transects with detections				Number of individual detections			
	MORA	NOCA	OLYM	ALL	MORA	NOCA	OLYM	ALL
Nashville Warbler	1	8		9	1	32		33
Yellow Warbler	1	11	5	17	1	101	17	119
Yellow-rumped Warbler	5	16	3	24	13	175	4	192
Black-throated Gray Warbler	2	9	2	13	5	22	11	38
Townsend's Warbler	11	17	10	38	72	240	56	368
Hermit Warbler	4		1	5	9		1	10
MacGillivray's Warbler	1	12	3	16	1	44	7	52
Common Yellowthroat		1		1		5		5
Wilson's Warbler	3	5	8	16	7	17	23	47
Western Tanager	3	16	6	25	5	197	21	223
Spotted Towhee		2		2		2		2
Chipping Sparrow	1	10		11	2	94		96
Fox Sparrow	2	2		4	8	2		10
Song Sparrow		6	6	12		21	14	35
White-crowned Sparrow	2	2	2	6	2	5	5	12
Dark-eyed Junco	18	19	23	60	180	220	229	629
Black-headed Grosbeak	3	10		13	3	34		37
Red-winged Blackbird		1		1		3		3
Brown-headed Cowbird		4		4		13		13
Gray-crowned Rosy-Finch	2			2	8			8
Pine Grosbeak		1	5	6		1	10	11
Cassin's Finch		3		3		10		10
Red Crossbill	7	11	20	38	36	196	294	526
Pine Siskin	20	19	22	61	412	847	864	2123
Evening Grosbeak	5	13	2	20	9	218	3	230
All Species Pooled					1,687	4,288	2,690	8,665
Detections per Point (All Species Pooled)					5.86	13.53	8.82	9.52
No. of Species Detected During Point Counts					55	69	55	85

Table 7. Species of potential management concern recorded on ‘rare bird’ detection forms in each park in 2007, 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
Golden Eagle			1
Peregrine Falcon			1
Willow Flycatcher		2	

Table 8. Number of points with detections and number of individual detections for each species detected during point counts at Lewis and Clark National Historical Park in 2008.

Species	Number of points with detections	Number of individual detections
Common Loon	2	2
Double-crested Cormorant	1	1
Canada Goose	9	34
Mallard	6	7
Bald Eagle	1	1
Peregrine Falcon	1	1
Killdeer	1	1
Caspian Tern	8	11
Band-tailed Pigeon	8	8
Anna's Hummingbird	1	1
Rufous Hummingbird	6	6
Downy Woodpecker	2	2
Northern Flicker	7	7
Pileated Woodpecker	2	2
Olive-sided Flycatcher	11	15
Western Wood-Pewee	2	2
Pacific-slope Flycatcher	45	75
Hutton's Vireo	12	12
Warbling Vireo	5	6
Steller's Jay	6	7
American Crow	36	55
Common Raven	5	5
Violet-green Swallow	1	1
Barn Swallow	9	14
Black-capped Chickadee	9	11
Chestnut-backed Chickadee	31	39
Red-breasted Nuthatch	6	6
Brown Creeper	5	5
Bewick's Wren	3	3
Winter Wren	38	65
Marsh Wren	8	20
Golden-crowned Kinglet	18	21
Swainson's Thrush	48	93
American Robin	37	56
Varied Thrush	2	3
European Starling	3	13
Cedar Waxwing	1	3
Orange-crowned Warbler	17	24
Yellow-rumped Warbler	1	1
Black-throated Gray Warbler	13	15
Hermit Warbler	14	24
Common Yellowthroat	14	18
Wilson's Warbler	40	57

Table 8. Number of points with detections and number of individual detections for each species detected during point counts at Lewis and Clark National Historical Park in 2008 (continued).

Species	Number of points with detections	Number of individual detections
Western Tanager	12	13
Spotted Towhee	2	2
Savannah Sparrow	1	1
Song Sparrow	27	44
White-crowned Sparrow	10	18
Dark-eyed Junco	16	27
Black-headed Grosbeak	19	19
Red-winged Blackbird	7	17
Brown-headed Cowbird	9	12
Purple Finch	19	23
Red Crossbill	2	3
Pine Siskin	1	2
American Goldfinch	6	13

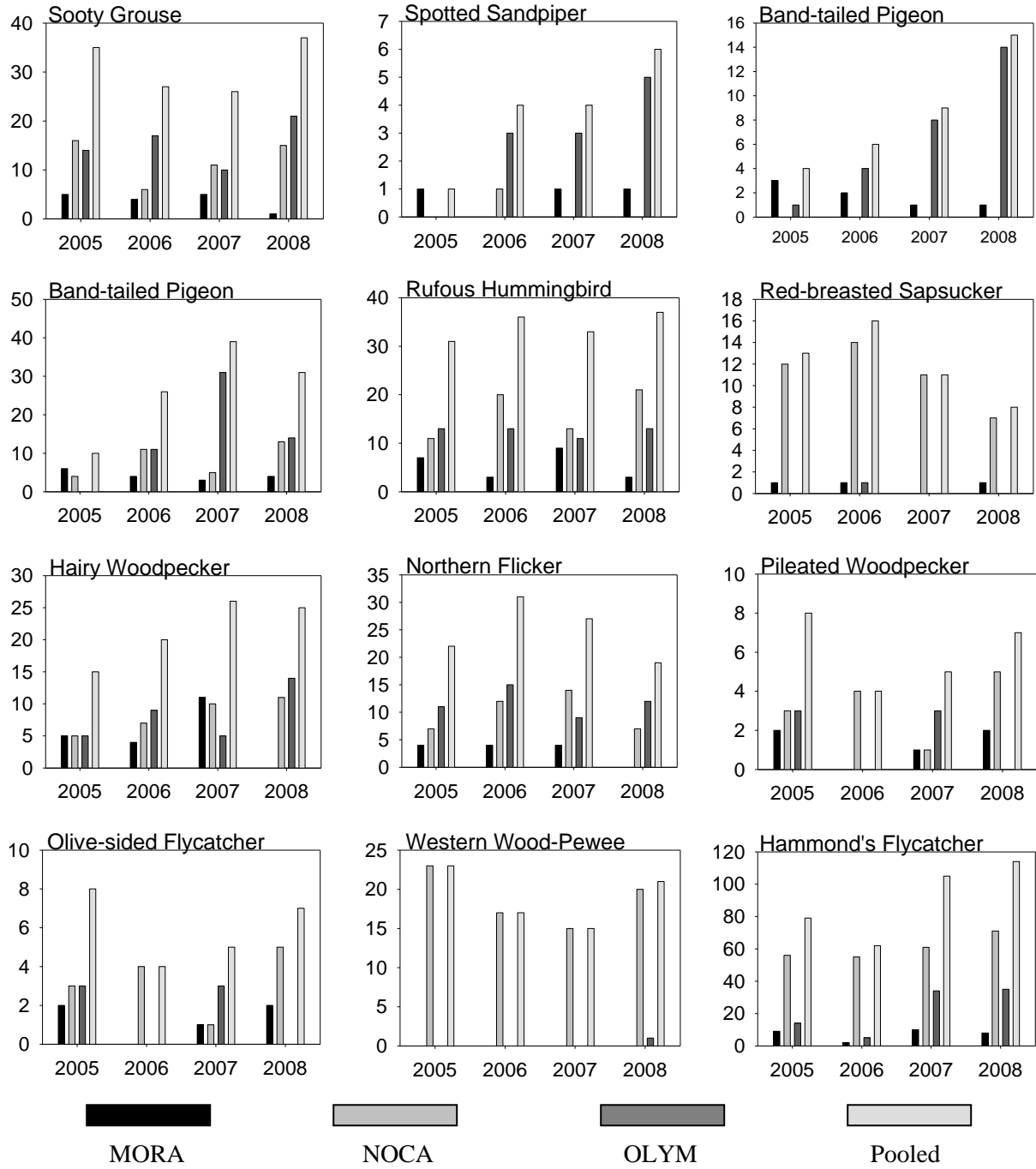


Figure 6. Number of times each species was detected on annual-panel transects at MORA, NOCA, OLYM, and all three parks pooled (always presented in that order) during the 2005, 2006, 2007, and 2008 field seasons. The figure includes all species for which we amassed at least 12 point count detections on annual-panel transects over the three 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.

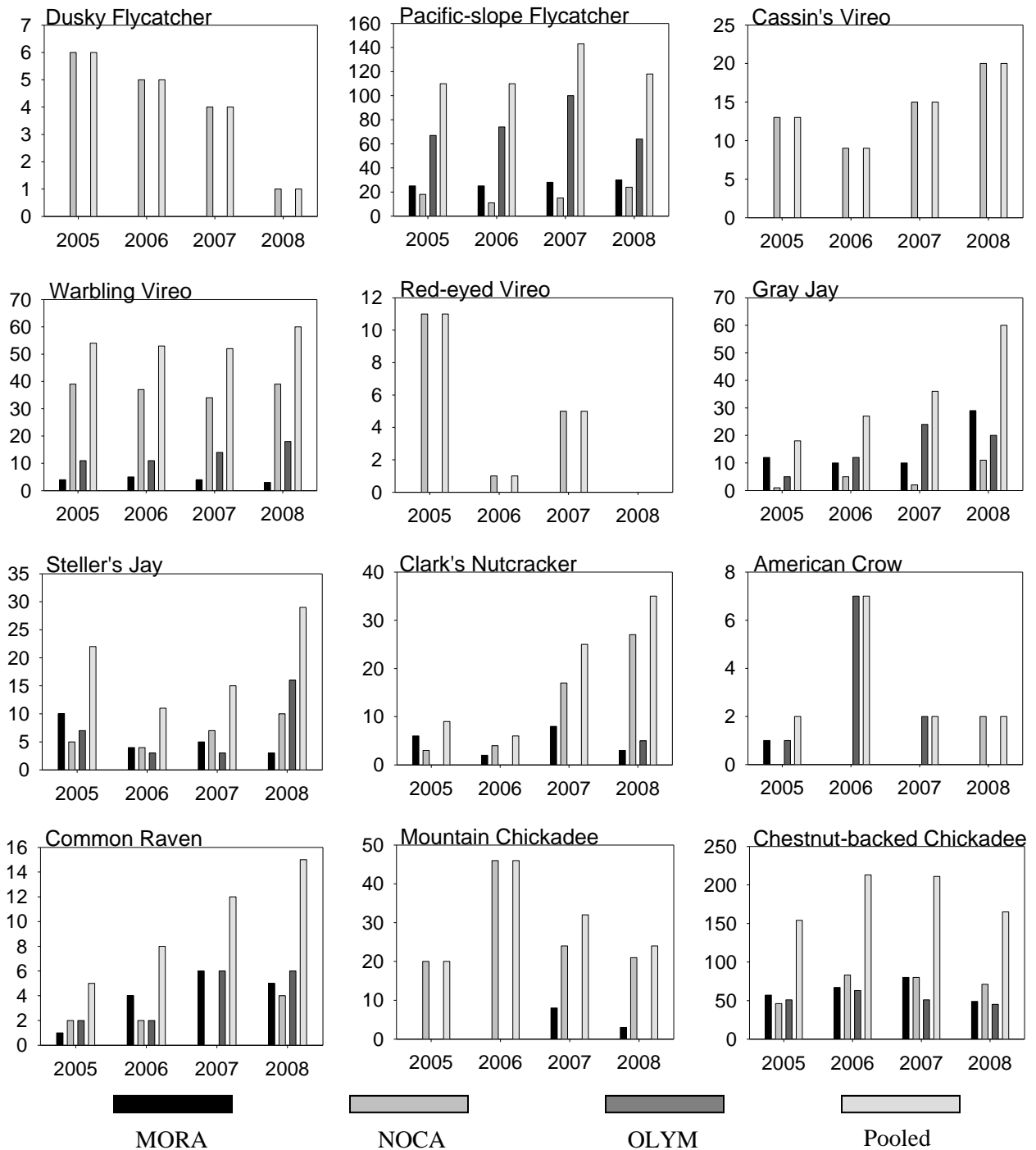


Figure 6. Number of times each species was detected on annual-panel transects at MORA, NOCA, OLYM, and all three parks pooled (always presented in that order) during the 2005, 2006, 2007, and 2008 field seasons. The figure includes all species for which we amassed at least 12 point count detections on annual-panel transects over the three 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).

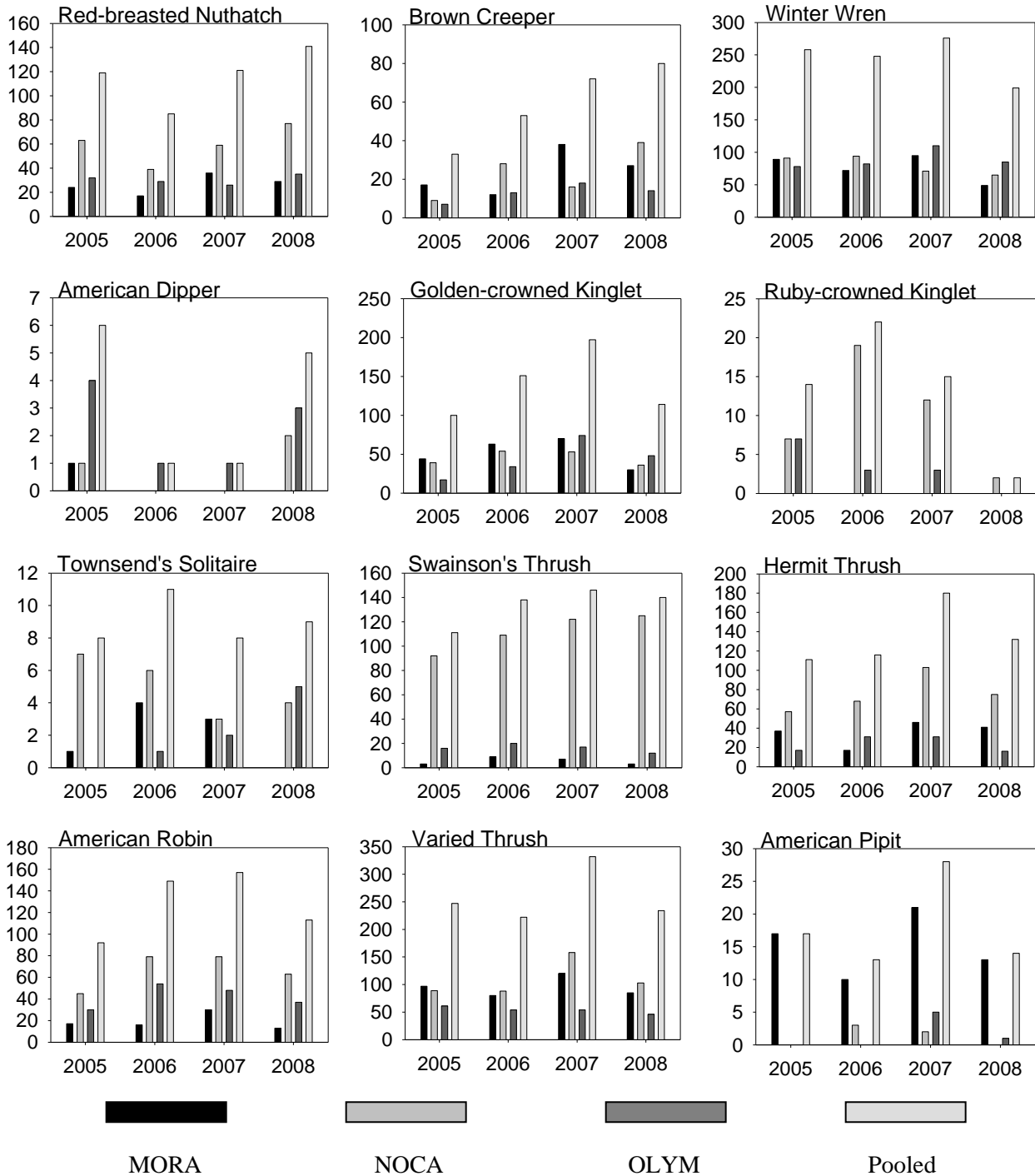


Figure 6. Number of times each species was detected on annual-panel transects at MORA, NOCA, OLYM, and all three parks pooled (always presented in that order) during the 2005, 2006, 2007, and 2008 field seasons. The figure includes all species for which we amassed at least 12 point count detections on annual-panel transects over the three 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).

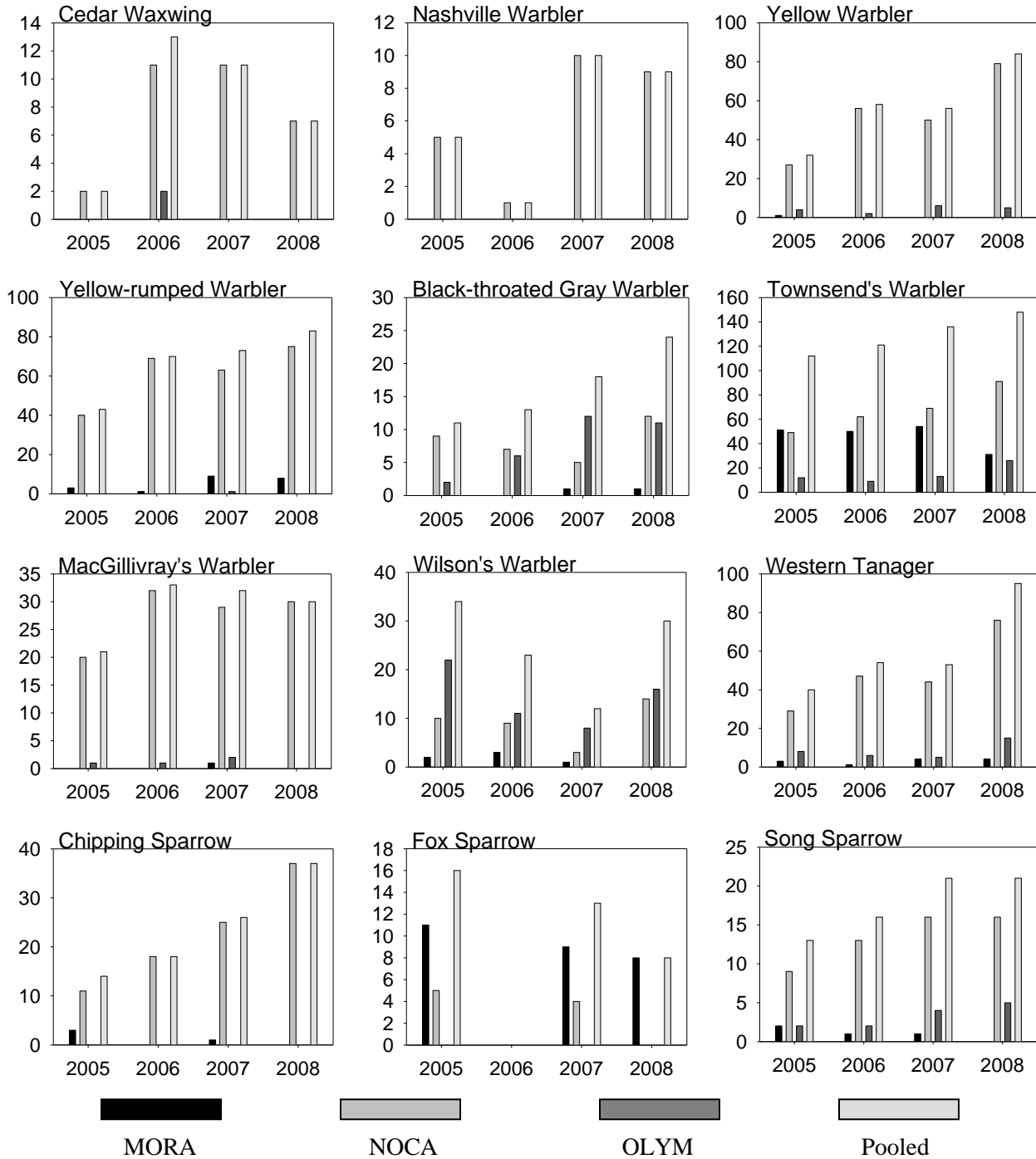


Figure 6. Number of times each species was detected on annual-panel transects at MORA, NOCA, OLYM, and all three parks pooled (always presented in that order) during the 2005, 2006, 2007, and 2008 field seasons. The figure includes all species for which we amassed at least 12 point count detections on annual-panel transects over the three 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).

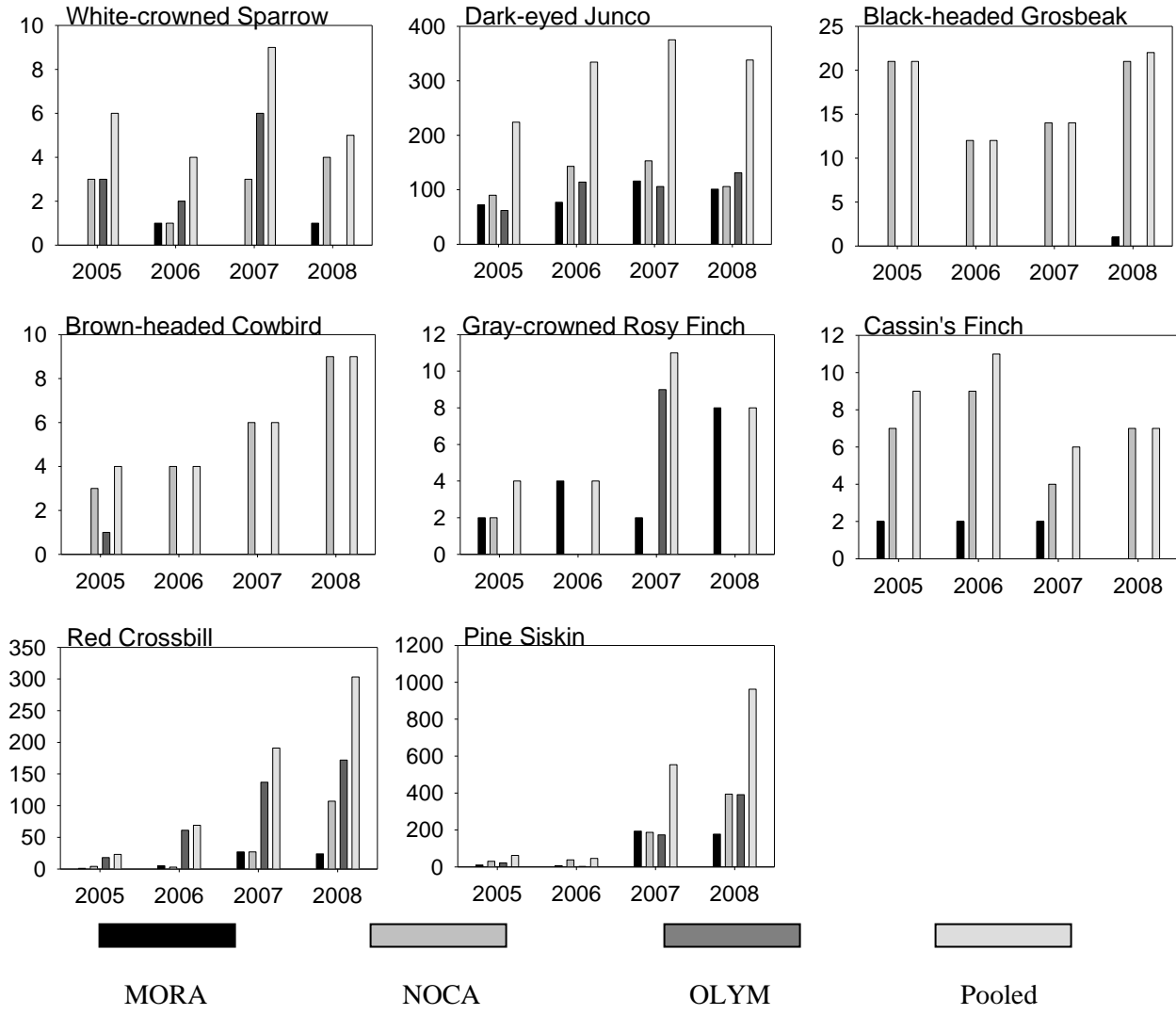


Figure 6. Number of times each species was detected on annual-panel transects at MORA, NOCA, OLYM, and all three parks pooled (always presented in that order) during the 2005, 2006, 2007, and 2008 field seasons. The figure includes all species for which we amassed at least 12 point count detections on annual-panel transects over the three 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), our second year of fully implementing the NCCN landbird monitoring program proceeded very smoothly. 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. However the sample design of 68 transects plus sampling in one of the small parks was originally intended for implementation with an 8-person crew. Financial constraints forced us to reduce the crew to six people. Through hard work and determination, our 6-person crew was able to complete nearly all of the intended sampling, and were it not for unusually rainy conditions and a late lingering snowpack at high elevations towards the end of the field season, might have managed to survey all the intended transects. In the end they were able to sample 63 of the 68 intended transects, missing one transect on the annual panel in NOCA and four transects on the alternating panel (three in NOCA and one in OLYM). In 2009 we plan to add one extra field crew member in the hopes that this will increase our manpower enough to get all 68 of the transects completed. Also, because our field crew spent extra days in the field trying to complete as many transects as possible, they were unable to complete much of the data entry during the field season. We hope that adding an additional crew member will also enable us to better adhere to the intended schedule for data entry.

As stated previously, 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 program 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.

The number of birds detected rose sharply between 2006 and 2007, and this was the case again between 2007 and 2008 at NOCA and OLYM (Siegel et al. 2007b, Siegel et al. 2008). However, at MORA detection rates in 2008 dropped compared to 2007 but were still higher than in 2006 (Siegel et al. 2007b, Siegel et al. 2008). Annual panel detections at MORA declined, mostly due to a decrease (for some species a very substantial decrease) of nearly all commonly breeding species, but particularly Winter Wren, Golden-crowned Kinglet and Varied Thrush which combined account for 42% of the total decrease. Closer examination of the data shows that even at NOCA and OLYM two of these three common species (Golden-crowned Kinglet and Winter Wren) actually decreased between 2007 and 2008 (despite increases in the overall number of birds detected, pooling all species), hinting that possibly a heavy snow pack may have impacted breeding populations across the NCCN parks in 2008. Indeed, the vast majority of the increase in detections at OLYM and NOCA can be attributed to just three species: Pine Siskin, Dark-eyed Junco and Red Crossbill. Increases in Pine Siskins have been particularly dramatic. 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 and 962 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 in 2008 was easier this year than in any previous year, mostly due to unusually favorable weather, but also because we reduced the number of survey points to a level concordant with the field time at LEWI available to our crew. Results from this year indicate that high detection rates of common species at LEWI will yield robust results there, and stretch this monitoring program's area of inference significantly further south.

Conclusions

The NCCN landbird monitoring program 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 two full years of project implementation (2007 and 2008), including data collection on the annual panel as well as the first two alternating panels. We believe that the addition of one more crew member in 2009 will allow us to survey virtually all intended transects, and complete more if not all of the data entry during the field season. Preliminary results indicate we will have robust sample sizes for many species in 2011 when we conduct our 5-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 populations dynamics in birds of Pacific Northwest forests.

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 Department of Natural Resources, Olympia, Washington.
- Andelman, S. J., and A. Stock. 1994b. Management, research, and monitoring priorities for the conservation of Neotropical migratory landbirds that breed in Washington. Washington Department of Natural Resources, Olympia, Washington.
- Atkinson, S., and F. A. Sharpe. 1985. Wild plants of the San Juan Islands. The Mountaineers, Seattle, Washington.
- 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 (editors), 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. (editors), 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, Washington.

- 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 (editor), Proceedings of the symposium on management of forest and rangeland habitats for non-game birds. USDA Forest Service General Technical Report WO-1.
- 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, D.C. 36 pages.
- Pacific Meridian Resources. 1996. Vegetation and landform database development study: final report. Pacific Meridian Resources, Portland, Oregon.
- 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 (editors), 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. General Technical Report 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, Maryland.
- 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, California.
- 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, California.
- 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, California.

- 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, California.
- 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, California.
- 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, Colorado.
- 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, (editor), *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, California.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 963/100099, June 2009

National Park Service
U.S. Department of the Interior



Natural Resource Program Center
1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525

www.nature.nps.gov

EXPERIENCE YOUR AMERICA™