National Park Service
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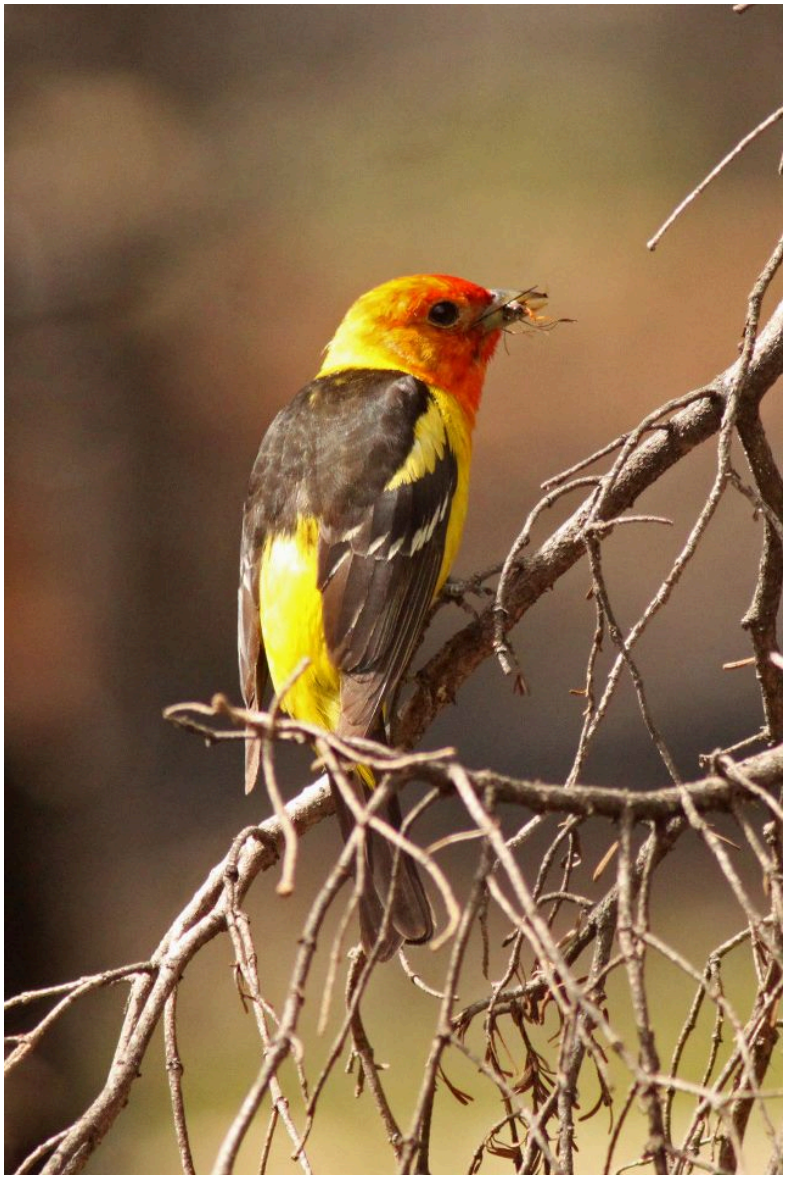
North Coast and Cascades Network Landbird Monitoring

Report for the 2012 Field Season

Natural Resource Data Series NPS/NCCN/NRDS—2013/523



ON THE COVER
Western Tanager (*Piranga ludoviciana*)
Photograph by: Michael McCloy (The Institute for Bird Populations)

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Report for the 2012 Field Season

Natural Resource Data Series NPS/NCCN/NRDS—2013/523

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Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Data Series is intended for the timely release of basic data sets and data summaries. Care has been taken to assure accuracy of raw data values, but a thorough analysis and interpretation of the data has not been completed. Consequently, the initial analyses of data in this report are provisional and subject to change.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner. This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

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

This report is available from the North Coast and Cascades Network Inventory and Monitoring website (http://science.nature.nps.gov/im/units/nccn/reportpubs.cfm) and the Natural Resource Publications Management website (http://www.nature.nps.gov/publications/nrpm/). To receive this report in a format optimized for screen readers, please email irma@nps.gov.

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Contents

Figures

Page

Tables

Page

Executive Summary

In 2012 the North Coast and Cascades Network (NCCN) continued to implement the Network's landbird monitoring protocol, in partnership with The Institute for Bird Populations. The protocol was partially implemented (with data collected from the annual panel only) as part of protocol development (2005-2006), and has subsequently been implemented fully (including data collection on the annual panel as well as all of the five alternating panels) for the past six years (2007-2012). In 2012 we conducted 1,026 point counts at point count survey stations located along 68 transects in the NCCN, including Mount Rainier National Park (MORA), North Cascades National Park Complex (NOCA), and Olympic National Park (OLYM).

We detected 148 bird species in the three large parks, 88 of which were detected during one or more point counts. For 57 species (all species detected at least 25 times on annual-panel transects between 2005 and 2012), we present the total number of detections on annual-panel transects in each park during the 2005-2012 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 our periodic trend analyses.

At Lewis and Clark National Historical Park (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 points with detections, for each species detected during point counts at LEWI.

After an overall decrease in the number of birds detected in the large parks in 2011, 2012 yielded the highest number of detections on annual-panel transects since the start of the monitoring project. The number of bird detections increased at all three large parks, largely due to the increase in pine siskin and red crossbill detections. In 2012 there were 999 pine siskin detections on annual-panel transects, compared to 121 in 2011. In 2008, the year with the greatest number of pine siskin detections prior to 2012, there were 962 pine siskin detections on annual-panel transects, indicating similar irruptions in 2008 and 2012. Red crossbill numbers also substantially increased, rising from 90 detections on annual-panel transects in 2011 to 503 in 2012. In 2008, also the year with the greatest number of red crossbill detections prior to 2012, there were 303 detections on the annual panel. While pine siskin and red crossbill numbers clearly ticked upward in 2012, it should also be noted that we conducted more point counts on both annual and alternating-panel transects across the large parks than in any previous year, which likely affected the number of birds we detected. Our next periodic trend analyses will explicitly account for annual variation in survey effort.

Acknowledgments

We thank the 2012 crew members for their hard work and dedication to the project: S. Alger, M. Cejtin, G. Cotterill, C. Mulvey, E. Reading, and A. Tyson. 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, B. Boekelheide, and M. Salvadalena for assistance during training. We thank First Aid instructor and backcountry ranger C. Conley for volunteering his time to instruct the crew in First Aid; P. Happe and M. Reid for providing program oversight at the respective parks; N. Antonova and K. Beirne for GIS training and support and for providing maps for this report; J. Boetsch for extensive help with data management; L. Grace for help with formatting this report to National Park Service standards; M. Huff, NCCN Inventory and Monitoring Program Coordinator, for his support of the project; and the ESRI Conservation Program for software support provided to The Institute for Bird Populations. This is Contribution No. 457 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).

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 Service 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 contains substantial tracts of conifer forest typical of the east side of the Cascades, which hosts a somewhat distinct avifauna (Altman 2000). San Juan Island National Historical Park (SAJH), in the rain shadow of the Olympic Mountains, contains 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) contains 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 at all five parks (Siegel et al. 2009e, Siegel et al. 2009a, Siegel et al. 2009d, Wilkerson et al. 2009a, Siegel et al. 2009c), have provided baseline information for assessing changes in bird abundance and distribution over time due to climate change or other factors, as well as reference information for assessing the effects of more intensive land management practices elsewhere in the region (Siegel et al. 2012).

National parks in the NCCN and elsewhere fulfill vital roles as both refuges for bird species dependent on late-successional forest conditions (American Bird Conservation Initiative, U.S. Committee 2011), and as reference sites for assessing the effects of climate change, land use, and land cover changes on bird populations throughout the larger Pacific Northwest region (Silsbee and Peterson 1991, Siegel et al. 2012). Monitoring population trends at reference 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 influence 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 periodic detailed trend analyses.

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 one km of a road or trail, as well as all of SAJH (including both American Camp and English Camp) and portions of LEWI.

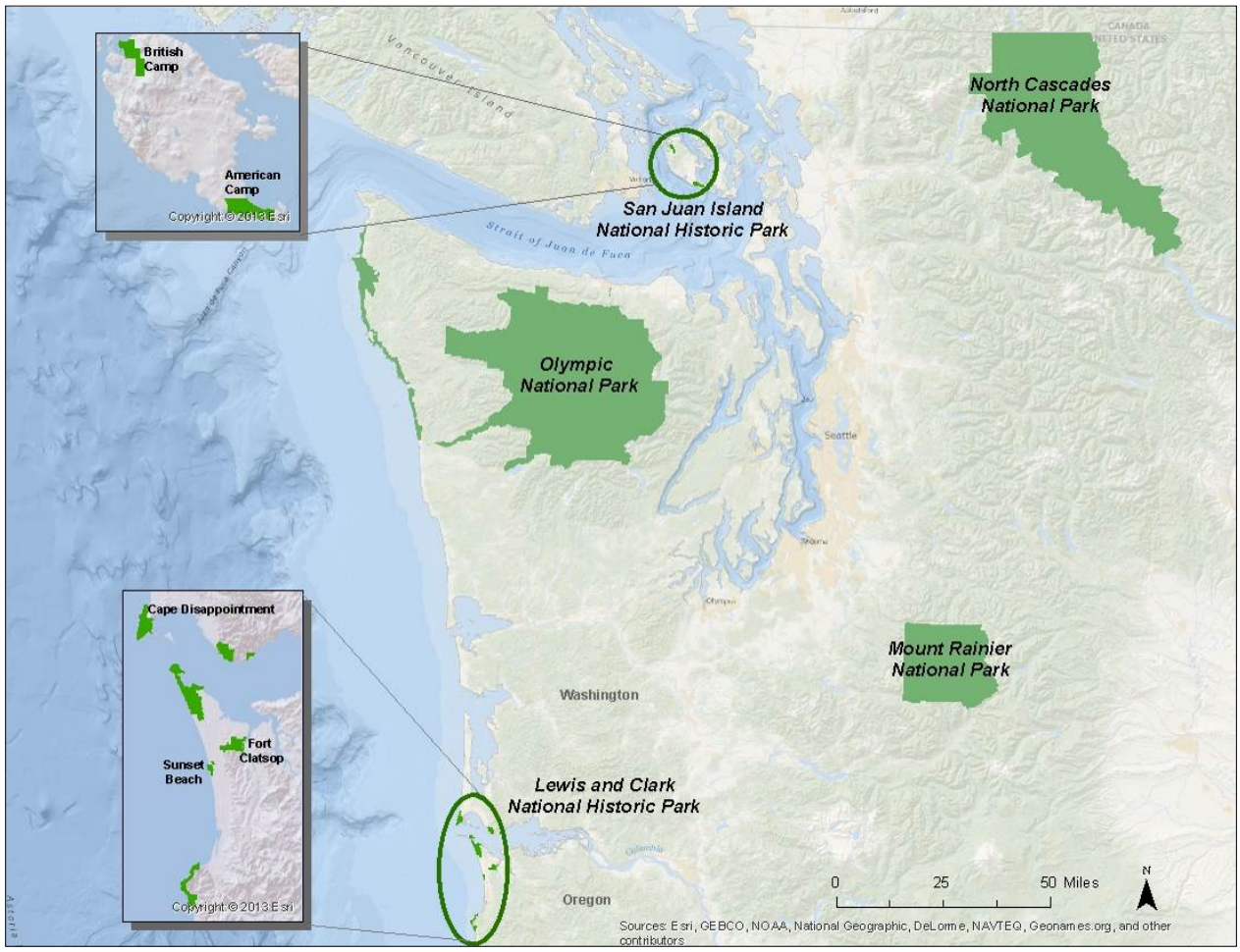

Figure 1. National Park Service units participating in the North Coast and Cascades Network landbird monitoring project.

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 points 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 2012 we implemented the full study design in the three large parks for the sixth consecutive year, including surveys of the annual panel ('Ann1') as well as the first alternating panel ('Alt2') (Figures 2-4). This year marked the beginning of the second round of sampling the alternating panels. 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 five years of full implementation in Siegel et al. (2008), Wilkerson et al. (2009b, 2010), and Holmgren et al. (2011, 2012).

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 2012 we surveyed the grid at LEWI (Figure 5).

Crew Training and Certification

Mandy Holmgren, a Staff Biologist with The Institute for Bird Populations (IBP), served as the 2012 Field Lead. Mandy began training six field technicians on May 1, with assistance from IBP Staff Biologist Bob Wilkerson, NPS Project Lead Bob Kuntz, and NPS Biologist Scott Gremel. 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, four of the six field technicians had passed the rigorous point count certification exam, and were ready to begin collecting data. The other two technicians were certified during the following week. All individuals who collected data during the 2012 field season (Table 1) were employees or field biologist interns of The Institute for Bird Populations.

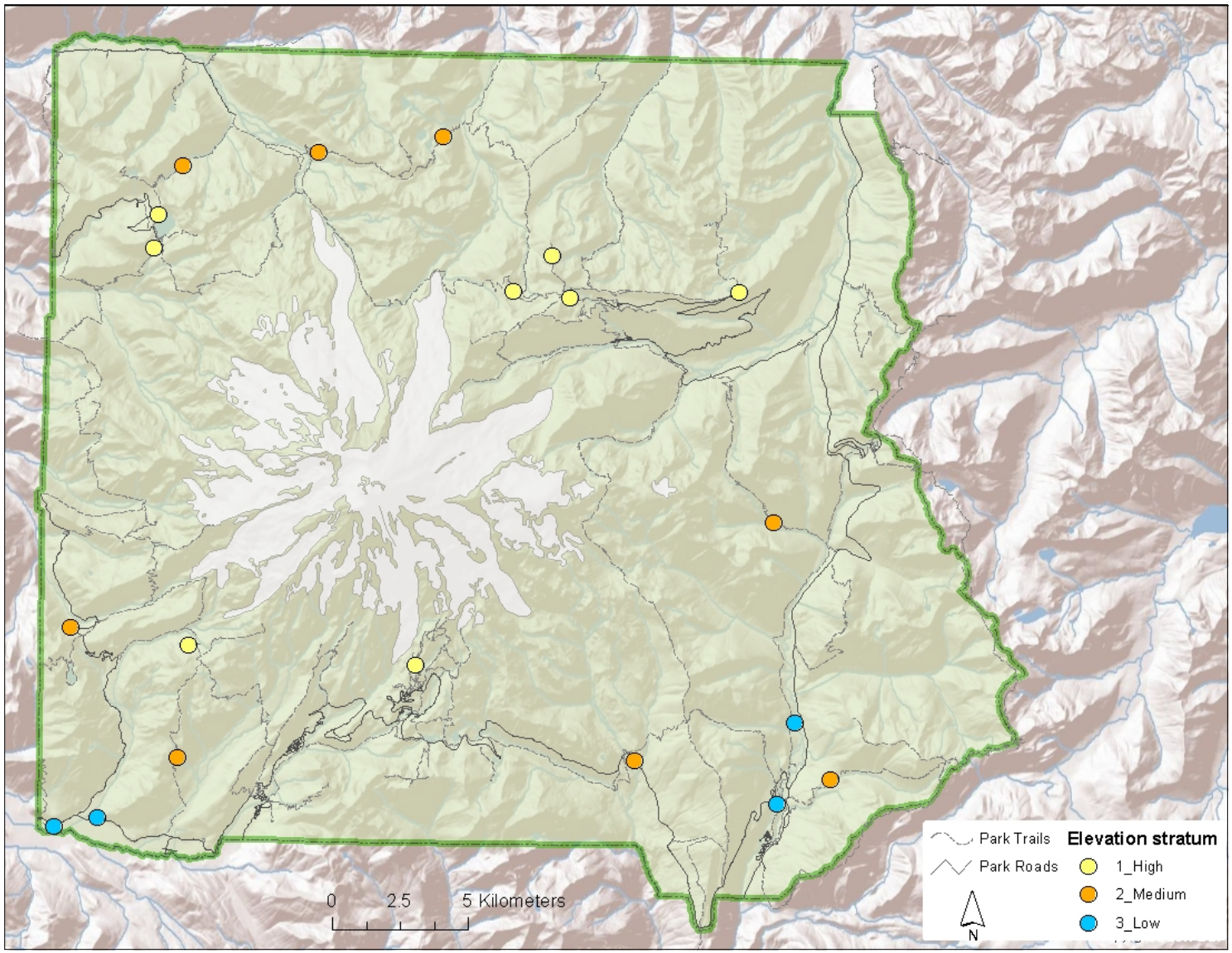

Figure 2. Approximate locations of transects conducted at Mount Rainier National Park in 2012.

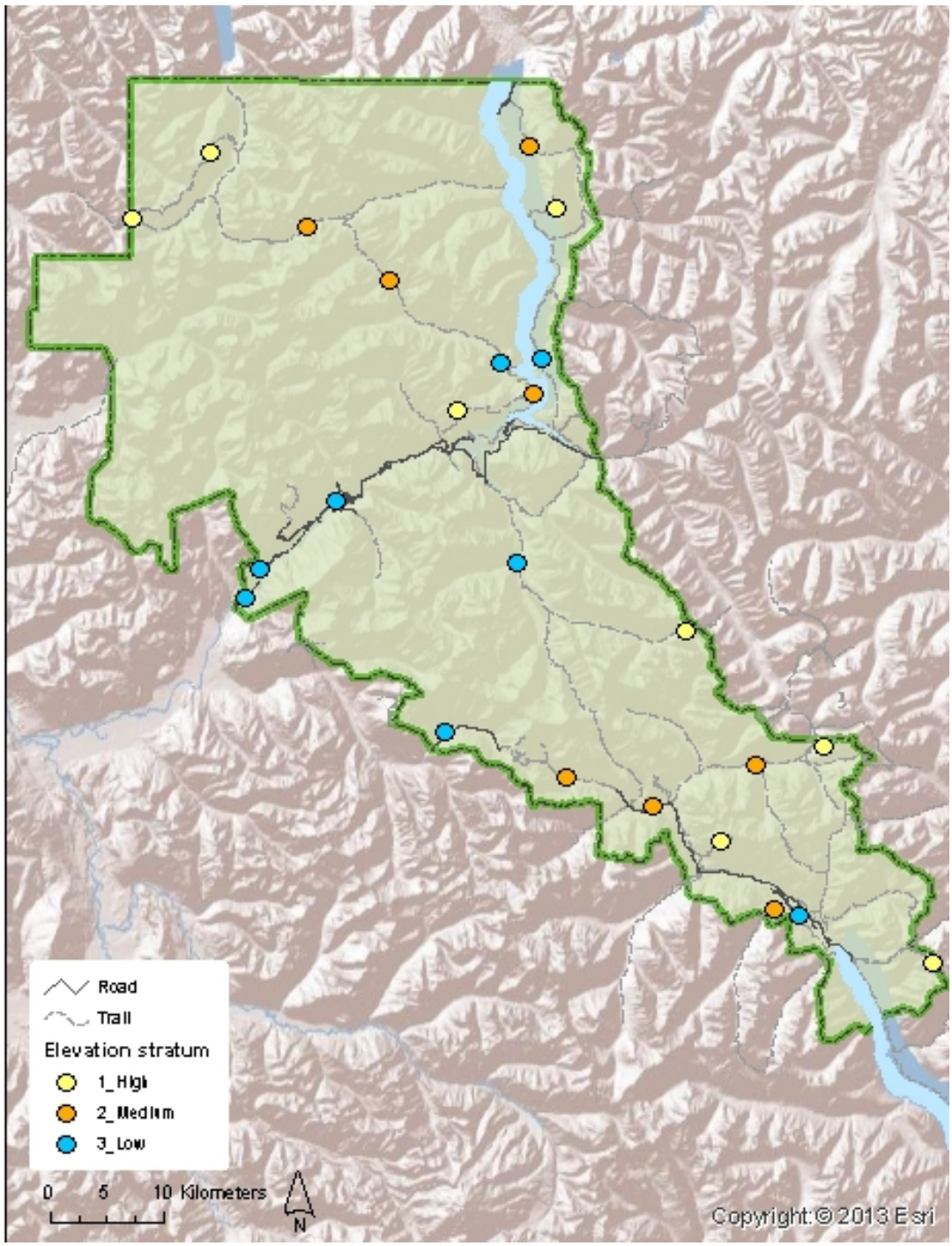

Figure 3. Approximate locations of transects conducted at North Cascades National Park Service Complex in 2012.

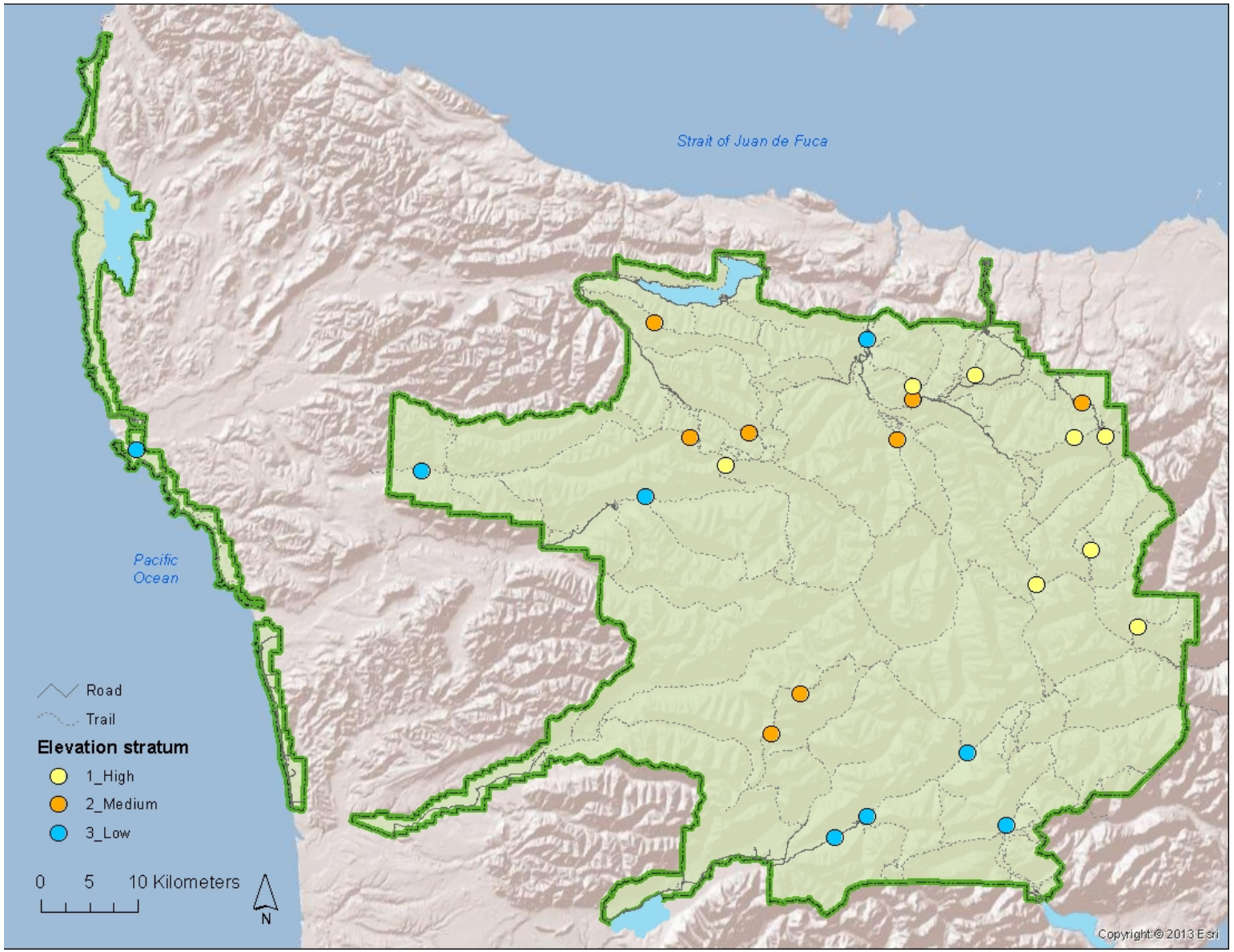

Figure 4. Approximate locations of transects conducted at Olympic National Park in 2012.

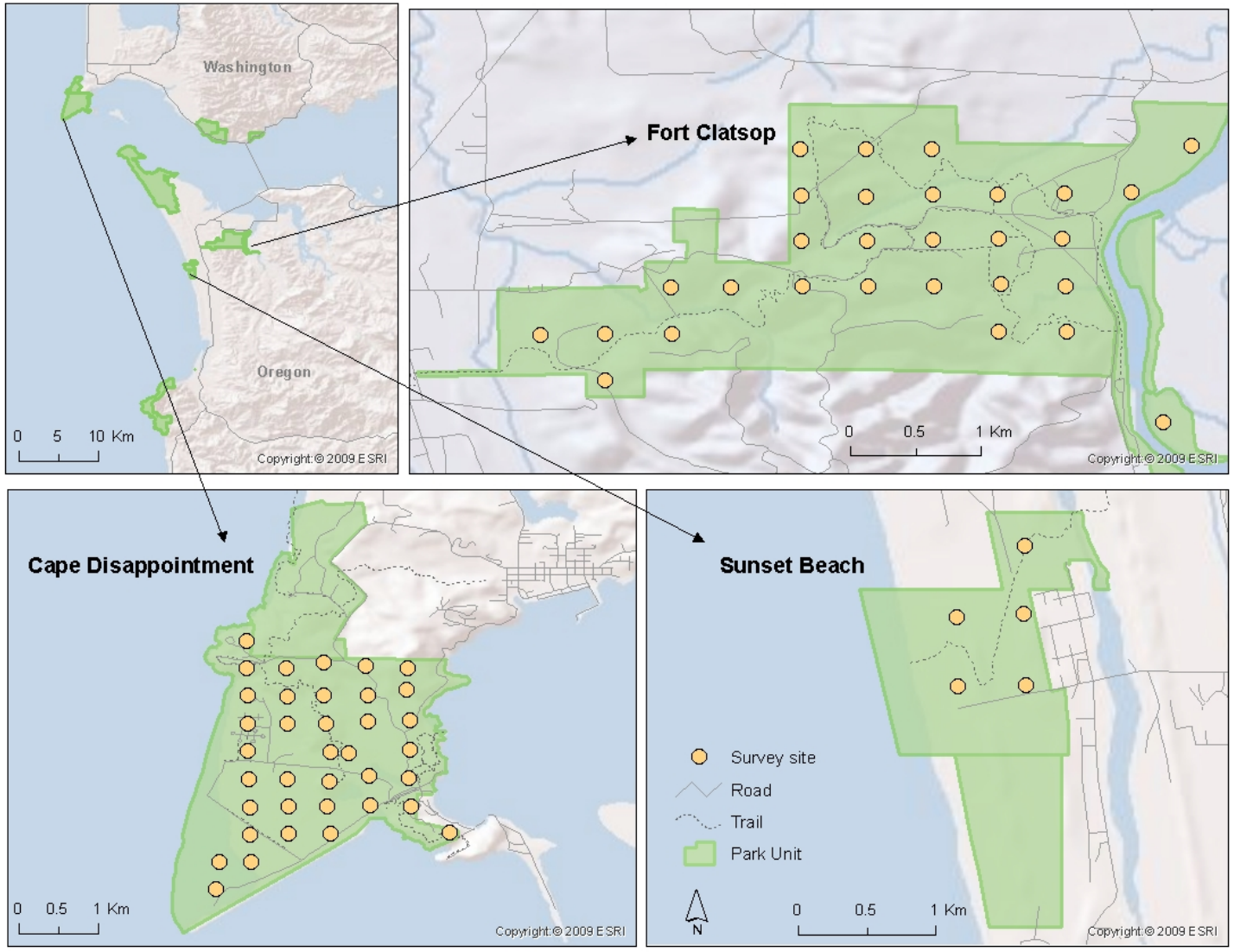

Figure 5. Locations of point count stations surveyed at Lewis and Clark National Historical Park in 2012; adjacent point count stations are 350 m apart.

Table 1. Observers who conducted point counts in the North Coast and Cascades Network in 2012.

Observer	Role
Samantha Alger	Technician
Mikael Cejtin	Technician
Gavin Cotterill	Technician
Mandy Holmgren	Field Lead
Christopher Mulvey	Technician
Erin Reading	Technician
Anya Tyson	Technician

Data Collection

All point count data were collected between May 24 and May 27 at LEWI, between June 2 and July 26 at MORA, between May 29 and July 30 at NOCA, and between May 25 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' for those transects that had not yet been established (NOCA-1008, NOCA-1009, and OLYM-3140), the starting points lying directly on trails or roads. There were three transects that had not been established before 2012 due to weather and logistical issues in 2007. Crew members were also provided maps and coordinates of all point count station locations on the already-established transects, 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 already-established transects, crew members used the maps and narrative descriptions to locate the same point count stations that were established and surveyed in previous years. When surveying transects that had not yet been established, 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 seven-minute point count. The point count was broken into three time intervals (0-3:00, 3:01-5:00, and 5:01-7:00). Observers noted each time interval in which they detected each individual bird. Birds observed in the first three minutes 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. Prior to 2011 we used point count with durations of only five minutes broken into two time intervals (0-3:00, 3:01-5:00), but in 2011 we added the third time interval to make the data more useful for possible future analyses conducted in an occupancy modeling framework.

After completing their last point count each morning, observers retraced their steps back to the starting point. Along the way, they conducted a brief habitat assessment at each of the survey points. The brief 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 Management

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 three additional days at the end of the field season to complete data entry and verification. The remaining data were 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. After entering the data, the database records were verified for complete and accurate transcription by retrieving and visually comparing the data associated with each sampling event against the original forms.

Once all data for the season were entered and verified, a rigorous quality review was conducted on the data set by running a set of pre-built validation queries to check for completeness, missing or out-of-range values, logical consistency, and structural integrity. Errors identified during this review were corrected where possible, and annotations related to specific issues raised by each query were stored within the project database as needed and appropriate. The data set was then certified as complete and ready for use. Output for this report was generated using standard summary queries in the project database.

At the end of the field season, field forms were scanned and stored with digital records. Photographic images were processed to remove poor quality or duplicative files, given names according to convention, and organized according to project requirements. GPS data associated with sampling events were downloaded and processed, and the resulting coordinate data were then uploaded into the project database.

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 periodic trend analyses for this monitoring project, factors affecting detectability of birds during point counts will be assessed quantitatively, allowing for annual results to be adjusted to account for variable detectability (Buckland et al. 2001, Nichols et al. 2009). Until that analysis is completed, any results should be viewed as provisional only.

Results

We surveyed all of the 34 annual-panel transects in the large parks, and all of the 34 transects in the first alternating panel (Table 2), for a total of 68 transects surveyed (Table 3). Appendix 1 provides a detailed multi-year survey history of all transects sampled in the large parks to date. We conducted 287 individual point counts at MORA, 396 point counts at NOCA and 343 point counts at OLYM (Table 2). We also conducted 71 point counts at LEWI, including 37 at Cape Disappointment, 29 at Fort Clatsop, and five at Sunset Beach. During the 1,026 point counts in the three large parks, we counted 10,154 individual birds. Across the three large parks, we documented the presence of 148 species (Table 4), 88 of which were detected during point counts; the remaining 60 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 42 bird species during point counts at MORA, 60 species during point counts at NOCA, and 48 species during point counts at OLYM (Table 5). Pooling detections on annual-panel transects across all species, we amassed 1,042 individual bird detections (6.64 detections/point) at MORA, 2,425 detections (11.6 detections/point) at NOCA, and 1,781 detections (9.89 detections per point) at OLYM (Table 5). The five most frequently detected species on the annual-panel transects in 2012 were: pine siskin (999 detections), red crossbill (503 detections), varied thrush (372 detections), dark-eyed junco (359 detections), and Pacific wren (297 detections).

Pooling data across the annual-panel transects as well as the transects in the first 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. Using data pooled across all transects, we detected 49 bird species during point counts at MORA, 75 species during point counts at NOCA, and 54 species during point counts at OLYM (Table 6). Considering data from all 68 surveyed transects, the five most frequently detected species were: pine siskin (1,545 detections), red crossbill (1,213 detections), dark-eyed junco (732 detections), varied thrush (725 detections), and Pacific wren (619 detections).

Marbled murrelet and spotted owl, the two bird species occurring in these parks that are listed under the Endangered Species Act, were not detected outside of point counts this year.

For 57 species (all species for which we amassed at least 25 point count detections over the period between 2005 and 2012), we present the total number of detections of each species on each park's annual panel transects during the 2005-2012 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 a future multi-year report.

At LEWI our 71 point counts yielded 1,318 detections of 69 species (Table 8), a detection rate of 18.56 birds per point. The most frequently detected species was Swainson's thrush (112 detections), followed by Pacific wren (95 detections), song sparrow (59 detections), golden-crowned kinglet (58 detections), and American robin (also 58 detections).

Table 2. North Coast and Cascades Network landbird monitoring transects at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks that were surveyed in 2012.

Park	Panel	Elevation	Transect	No. of points surveyed
MORA	Ann1	Low	4001	14
MORA	Ann1	Low	4005	13
MORA	Ann1	Medium	4002	15
MORA	Ann1	Medium	4004	17
MORA	Ann1	Medium	4009	15
MORA	Ann1	Medium	4012	17
MORA	Ann1	High	4003	13
MORA	Ann1	High	4007	20
MORA	Ann1	High	4011	16
MORA	Ann1	High	4014	17
MORA	Alt2	Low	4006	9
MORA	Alt2	Low	4008	12
MORA	Alt2	Medium	4015	12
MORA	Alt2	Medium	4017	13
MORA	Alt2	Medium	4020	8
MORA	Alt2	Medium	4026	11
MORA	Alt2	High	4016	20
MORA	Alt2	High	4019	20
MORA	Alt2	High	4027	14
MORA	Alt2	High	4075	11
NOCA	Ann1	Low	1013	15
NOCA	Ann1	Low	1017	14
NOCA	Ann1	Low	1020	17
NOCA	Ann1	Low	1023	21
NOCA	Ann1	Medium	1015	17
NOCA	Ann1	Medium	1018	23
NOCA	Ann1	Medium	1022	15
NOCA	Ann1	Medium	1024	13
NOCA	Ann1	High	1014	20
NOCA	Ann1	High	1016	17
NOCA	Ann1	High	1019	13
NOCA	Ann1	High	1021	24
NOCA	Alt2	Low	1001	13
NOCA	Alt2	Low	1005	15
NOCA	Alt2	Low	1006	12
NOCA	Alt2	Low	1010	16
NOCA	Alt2	Medium	1003	15
NOCA	Alt2	Medium	1004	14
NOCA	Alt2	Medium	1009	16
NOCA	Alt2	Medium	1011	19
NOCA	Alt2	High	1002	20
NOCA	Alt2	High	1007	14
NOCA	Alt2	High	1008	14
NOCA	Alt2	High	1012	19

Table 2. North Coast and Cascades Network landbird monitoring transects at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks that were surveyed in 2012 (continued).

Park	Panel	Elevation	Transect	No. of points surveyed
OLYM	Ann1	Low	3001	13
OLYM	Ann1	Low	3121	15
OLYM	Ann1	Low	3126	15
OLYM	Ann1	Low	3134	19
OLYM	Ann1	Medium	3122	16
OLYM	Ann1	Medium	3123	15
OLYM	Ann1	Medium	3130	10
OLYM	Ann1	Medium	3200	23
OLYM	Ann1	High	3124	12
OLYM	Ann1	High	3125	14
OLYM	Ann1	High	3127	15
OLYM	Ann1	High	3128	13
OLYM	Alt2	Low	3138	12
OLYM	Alt2	Low	3142	14
OLYM	Alt2	Low	3144	13
OLYM	Alt2	Low	3145	14
OLYM	Alt2	Medium	3133	16
OLYM	Alt2	Medium	3135	13
OLYM	Alt2	Medium	3137	11
OLYM	Alt2	Medium	3141	15
OLYM	Alt2	High	3132	19
OLYM	Alt2	High	3136	11
OLYM	Alt2	High	3139	13
OLYM	Alt2	High	3140	12

Table 3. Summary history of North Coast and Cascades Network landbird monitoring transects at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks completed through 2012.

	Elevation	Number of transects completed							
Park	**Stratum**	**2005[a]**	**2006[a]**	**2007[b]**	**2008[c]**	**2009[d]**	**2010[e]**	**2011[f]**	**2012[b]**
MORA	Low	2	2	4	4	4	4	4	4
MORA	Medium	4	4	8	8	8	8	6	8
MORA	High	4	4	8	8	8	7	3	8
MORA	All	10	10	20	20	20	19	13	20
NOCA	Low	4	4	8	8	8	8	8	8
NOCA	Medium	4	4	7	7	8	8	8	8
NOCA	High	4	4	7	5	8	6	5	8
NOCA	All	12	12	22	20	24	22	21	24
OLYM	Low	4	4	8	8	8	8	8	8
OLYM	Medium	4	3	8	7	8	8	7	8
OLYM	High	4	4	7	8	8	8	8	8
OLYM	All	12	11	23	23	24	24	23	24
ALL	Low	10	10	20	20	20	20	20	20
ALL	Medium	12	11	23	22	24	24	21	24
ALL	High	12	12	22	21	24	21	16	24
ALL	All	34	33	65	63	68	65	57	68

[a]Only the annual panel transects were surveyed in 2005 and 2006, during the protocol development phase of the project.

[b]The annual panel along with the first alternating panel were surveyed in 2007 and 2012.

[c]The annual panel along with the second alternating panel were surveyed in 2008.

[d]The annual panel along with the third alternating panel were surveyed in 2009.

[e]The annual panel along with the fourth alternating panel were surveyed in 2010.

[f]The annual panel along with the fifth alternating panel were surveyed in 2011.

Table 4. All species recorded in the three large North Coast and Cascades Network parks during the 2012 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*	*Branta canadensis*
Wood Duck*	*Aix sponsa*
Mallard*	*Anas platyrhynchos*
Northern Shoveler*	*Anas clypeata*
Green-winged Teal*	*Anas crecca*
Ring-necked Duck*	*Aythya collaris*
Harlequin Duck	*Histrionicus histrionicus*
Bufflehead*	*Bucephala albeola*
Barrow's Goldeneye*	*Bucephala islandica*
Common Merganser*	*Mergus merganser*
Ruffed Grouse	*Bonasa umbellus*
White-tailed Ptarmigan*	*Lagopus leucura*
Sooty Grouse	*Dendragapus fuliginosus*
Common Loon	*Gavia immer*
Pied-billed Grebe*	*Podilymbus podiceps*
American White Pelican*	*Pelecanus erythrorhynchos*
Great Blue Heron*	*Ardea herodias*
Turkey Vulture*	*Cathartes aura*
Osprey*	*Pandion haliaetus*
Bald Eagle*	*Haliaeetus leucocephalus*
Sharp-shinned Hawk*	*Accipiter striatus*
Cooper's Hawk*	*Accipiter cooperii*
Northern Goshawk*	*Accipiter gentilis*
Red-tailed Hawk*	*Buteo jamaicensis*
Golden Eagle*	*Aquila chrysaetos*
Killdeer*	*Charadrius vociferus*
Spotted Sandpiper	*Actitis macularius*
Greater Yellowlegs*	*Tringa melanoleuca*
Western Sandpiper*	*Calidris mauri*
Least Sandpiper*	*Calidris minutilla*
Short-billed Dowitcher*	*Limnodromus griseus*
Ring-billed Gull*	*Larus delawarensis*
Western Gull*	*Larus occidentalis*
Glaucous-winged Gull*	*Larus glaucescens*
Pigeon Guillemot*	*Cepphus columba*
Marbled Murrelet	*Brachyramphus marmoratus*
Tufted Puffin*	*Fratercula cirrhata*
Band-tailed Pigeon	*Patagioenas fasciata*
Eurasian Collared-dove	*Streptopelia decaocto*
Mourning Dove*	*Zenaida macroura*
Barn Owl*	*Tyto alba*
Great Horned Owl*	*Bubo virginianus*
Northern Pygmy-Owl*	*Glaucidium gnoma*
Spotted Owl*	*Strix occidentalis*
Barred Owl	*Strix varia*
Northern Saw-whet Owl*	*Aegolius acadicus*

Table 4. All species recorded in the three large North Coast and Cascades Network parks during the 2012 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
Common Nighthawk	*Chordeiles minor*
Black Swift	*Cypseloides niger*
Vaux's Swift	*Chaetura vauxi*
Rufous Hummingbird	*Selasphorus rufus*
Calliope Hummingbird	*Selasphorus calliope*
Belted Kingfisher	*Megaceryle alcyon*
Red-naped Sapsucker	*Sphyrapicus nuchalis*
Red-breasted Sapsucker	*Sphyrapicus ruber*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
American Three-toed Woodpecker	*Picoides dorsalis*
Black-backed Woodpecker*	*Picoides arcticus*
Northern Flicker	*Colaptes auratus*
Pileated Woodpecker	*Dryocopus pileatus*
American Kestrel	*Falco sparverius*
Peregrine Falcon*	*Falco peregrinus*
Prairie Falcon*	*Falco mexicanus*
Olive-sided Flycatcher	*Contopus cooperi*
Western Wood-Pewee	*Contopus sordidulus*
Willow Flycatcher	*Empidonax traillii*
Hammond's Flycatcher	*Empidonax hammondii*
Dusky Flycatcher	*Empidonax oberholseri*
Pacific-slope Flycatcher	*Empidonax difficilis*
Say's Phoebe	*Sayornis saya*
Western Kingbird*	*Tyrannus verticalis*
Cassin's Vireo	*Vireo cassinii*
Hutton's Vireo*	*Vireo huttoni*
Warbling Vireo	*Vireo gilvus*
Red-eyed Vireo	*Vireo olivaceus*
Gray Jay	*Perisoreus canadensis*
Steller's Jay	*Cyanocitta stelleri*
Clark's Nutcracker	*Nucifraga columbiana*
American Crow*	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*
Horned Lark	*Eremophila alpestris*
Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*Tachycineta thalassina*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Cliff Swallow*	*Petrochelidon pyrrhonota*
Barn Swallow*	*Hirundo rustica*
Black-capped Chickadee	*Poecile atricapillus*
Mountain Chickadee	*Poecile gambeli*
Chestnut-backed Chickadee	*Poecile rufescens*
Bushtit	*Psaltriparus minimus*
Red-breasted Nuthatch	*Sitta canadensis*
Brown Creeper	*Certhia americana*

Table 4. All species recorded in the three large North Coast and Cascades Network parks during the 2012 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
Canyon Wren	*Catherpes mexicanus*
House Wren*	*Troglodytes aedon*
Pacific Wren	*Troglodytes pacificus*
American Dipper	*Cinclus mexicanus*
Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned Kinglet	*Regulus calendula*
Western Bluebird*	*Sialia mexicana*
Mountain Bluebird*	*Sialia currucoides*
Townsend's Solitaire	*Myadestes townsendi*
Veery	*Catharus fuscescens*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
American Robin	*Turdus migratorius*
Varied Thrush	*Ixoreus naevius*
Gray Catbird*	*Dumetella carolinensis*
European Starling*	*Sturnus vulgaris*
American Pipit	*Anthus rubescens*
Cedar Waxwing	*Bombycilla cedrorum*
Orange-crowned Warbler	*Oreothlypis celata*
Nashville Warbler	*Oreothlypis ruficapilla*
MacGillivray's Warbler	*Geothlypis tolmiei*
Common Yellowthroat*	*Geothlypis trichas*
American Redstart*	*Setophaga ruticilla*
Yellow Warbler	*Setophaga petechia*
Yellow-rumped Warbler	*Setophaga coronata*
Black-throated Gray Warbler	*Setophaga nigrescens*
Townsend's Warbler	*Setophaga townsendi*
Hermit Warbler	*Setophaga occidentalis*
Wilson's Warbler	*Cardellina pusilla*
Yellow-breasted Chat*	*Icteria virens*
Spotted Towhee	*Pipilo maculatus*
Chipping Sparrow	*Spizella passerina*
Savannah Sparrow	*Passerculus sandwichensis*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow*	*Melospiza lincolnii*
White-crowned Sparrow	*Zonotrichia leucophrys*
Golden-crowned Sparrow*	*Zonotrichia atricapilla*
Dark-eyed Junco	*Junco hyemalis*
Western Tanager	*Piranga ludoviciana*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Lazuli Bunting	*Passerina amoena*
Bobolink*	*Dolichonyx oryzivorus*
Red-winged Blackbird*	*Agelaius phoeniceus*
Yellow-headed Blackbird*	*Xanthocephalus xanthocephalus*
Brown-headed Cowbird	*Molothrus ater*

Table 4. All species recorded in the three large North Coast and Cascades Network parks during the 2012 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
Bullock's Oriole*	*Icterus bullockii*
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*
Pine Grosbeak	*Pinicola enucleator*
Purple Finch	*Haemorhous purpureus*
Cassin's Finch	*Haemorhous cassinii*
House Finch*	*Haemorhous mexicanus*
Red Crossbill	*Loxia curvirostra*
Pine Siskin	*Spinus pinus*
American Goldfinch	*Spinus tristis*
Evening Grosbeak	*Coccothraustes vespertinus*

Table 5. Number of transects with detections and number of individual detections for each species detected during point counts on annual-panel transects at Mount Rainier (MORA), North Cascades (NOCA) and Olympic (OLYM) National Parks in 2012.

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Harlequin Duck	1			1	2			2
Ruffed Grouse			1	1			1	1
Sooty Grouse	3	9	7	19	4	16	30	50
Spotted Sandpiper		1		1		1		1
Marbled Murrelet			1	1			2	2
Band-tailed Pigeon			2	2			2	2
Eurasian Collared-dove			1	1			1	1
Barred Owl		1		1		1		1
Common Nighthawk			1	1			1	1
Black Swift		2		2		5		5
Vaux's Swift	1	1	3	5	4	5	40	49
Rufous Hummingbird	1	8	6	15	1	23	7	31
Calliope Hummingbird		3		3		7		7
Belted Kingfisher			1	1			2	2
Red-breasted Sapsucker		4		4		20		20
Downy Woodpecker		1	2	3		2	3	5
Hairy Woodpecker	2	6	4	12	2	11	4	17
Northern Flicker	2	4	6	12	2	7	11	20
Pileated Woodpecker	1	3	2	6	1	3	3	7
American Kestrel			1	1			3	3
Olive-sided Flycatcher	4	5	5	14	6	15	12	33
Western Wood-Pewee		4		4		19		19
Hammond's Flycatcher	3	8	7	18	12	61	28	101
Dusky Flycatcher		4		4		12		12
Pacific-slope Flycatcher	6	3	10	19	20	16	84	120
Say's Phoebe		1		1		1		1
Cassin's Vireo		5		5		21		21

Table 5. Number of transects with detections and number of individual detections for each species detected during point counts on annual-panel transects at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks in 2012 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Warbling Vireo	2	8	2	12	2	70	8	80
Red-eyed Vireo		4		4		7		7
Gray Jay	8	2	7	17	18	10	19	47
Steller's Jay	3	3	3	9	4	9	14	27
Clark's Nutcracker	1	1		2	2	6		8
Common Raven		2	4	6		4	6	10
Tree Swallow			1	1			1	1
Violet-green Swallow	1			1	3			3
Mountain Chickadee		3		3		11		11
Chestnut-backed Chickadee	8	10	12	30	53	114	93	260
Bushtit			1	1			1	1
Red-breasted Nuthatch	9	10	8	27	35	40	32	107
Brown Creeper	8	7	8	23	28	25	18	71
Canyon Wren		1		1		1		1
Pacific Wren	9	10	11	30	92	91	114	297
American Dipper	2		2	4	3		2	5
Golden-crowned Kinglet	8	10	11	29	63	57	69	189
Ruby-crowned Kinglet		2		2		2		2
Townsend's Solitaire			7	7			10	10
Veery	1	1		2	1	4		5
Swainson's Thrush	3	7	6	16	10	100	22	132
Hermit Thrush	8	6	7	21	49	29	43	121
American Robin	8	9	12	29	16	54	76	146
Varied Thrush	10	9	12	31	165	122	85	372
American Pipit	2		2	4	30		4	34
Cedar Waxwing		3		3		10		10
Nashville Warbler		4		4		19		19

Table 5. Number of transects with detections and number of individual detections for each species detected during point counts on annual-panel transects at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks in 2012 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
MacGillivray's Warbler		7	3	10		40	4	44
Yellow Warbler		5	2	7		58	4	62
Yellow-rumped Warbler	1	10	3	14	3	102	6	111
Black-throated Gray Warbler	1	5	1	7	1	12	1	14
Townsend's Warbler	8	8	4	20	62	115	27	204
Hermit Warbler	1			1	1			1
Wilson's Warbler		5	2	7		9	18	27
Spotted Towhee		1		1		2		2
Chipping Sparrow		6		6		60		60
Savannah Sparrow	1			1	3			3
Fox Sparrow	1	2		3	9	12		21
Song Sparrow		6	2	8		15	4	19
Dark-eyed Junco	10	10	11	31	85	92	182	359
Western Tanager	2	9	3	14	3	84	12	99
Black-headed Grosbeak	1	6		7	2	30		32
Brown-headed Cowbird		1		1		7		7
Gray-crowned Rosy-Finch	2			2	14			14
Pine Grosbeak	1	2	5	8	1	8	7	16
Purple Finch		1		1		3		3
Cassin's Finch	1	4		5	1	17		18
Red Crossbill	6	8	10	24	74	110	319	503
Pine Siskin	8	9	9	26	151	506	342	999
Evening Grosbeak	3	11	3	17	4	112	4	120
All species pooled					1,042	2,425	1,781	5,248
Detections per point (all species pooled)					6.64	11.6	9.89	9.61

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) at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks in 2012.

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Harlequin Duck	1			1	2			2
Ruffed Grouse			3	3			3	3
Sooty Grouse	4	17	13	34	5	32	44	81
Common Loon		1		1		1		1
Spotted Sandpiper		2		2		2		2
Marbled Murrelet			1	1			2	2
Band-tailed Pigeon			6	6			7	7
Eurasian Collared-dove			1	1			1	1
Barred Owl		3	1	4		6	1	7
Common Nighthawk		1	1	2		1	1	2
Black Swift		4		4		8		8
Vaux's Swift	3	3	5	11	8	14	45	67
Rufous Hummingbird	3	14	9	26	9	48	11	68
Calliope Hummingbird		5		5		16		16
Belted Kingfisher			1	1			2	2
Red-naped Sapsucker		1		1		1		1
Red-breasted Sapsucker	1	8	4	13	1	28	6	35
Downy Woodpecker		1	3	4		2	4	6
Hairy Woodpecker	5	13	6	24	6	22	7	35
American Three-toed Woodpecker			1	1			1	1
Northern Flicker	3	5	15	23	4	8	27	39
Pileated Woodpecker	3	4	6	13	3	4	7	14
American Kestrel			1	1			3	3
Olive-sided Flycatcher	9	11	10	30	16	40	25	81
Western Wood-Pewee		6		6		28		28
Willow Flycatcher		1		1		4		4
Hammond's Flycatcher	5	16	13	34	15	137	50	202

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) at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks in 2012 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Dusky Flycatcher		7		7		19		19
Pacific-slope Flycatcher	10	6	19	35	37	46	165	248
Say's Phoebe		1		1		1		1
Cassin's Vireo		13		13		52		52
Warbling Vireo	3	18	5	26	3	145	23	171
Red-eyed Vireo		5		5		8		8
Gray Jay	17	7	15	39	46	27	38	111
Steller’s Jay	4	7	7	18	7	16	28	51
Clark’s Nutcracker	4	2		6	10	8		18
Common Raven	1	3	7	11	1	5	10	16
Horned Lark	1		2	3	4		2	6
Tree Swallow			1	1			1	1
Violet-green Swallow	2	1		3	4	4		8
Northern Rough-winged Swallow		1		1		1		1
Black-capped Chickadee	1	1		2	1	1		2
Mountain Chickadee	2	7		9	11	21		32
Chestnut-backed Chickadee	14	21	23	58	84	191	195	470
Bushtit			1	1			1	1
Red-breasted Nuthatch	15	19	17	51	66	71	59	196
Brown Creeper	15	14	15	44	47	38	32	117
Canyon Wren		1		1		1		1
Pacific Wren	17	22	22	61	166	206	247	619
American Dipper	3	1	3	7	4	1	3	8
Golden-crowned Kinglet	14	22	19	55	90	136	107	333
Ruby-crowned Kinglet		3		3		3		3
Townsend’s Solitaire		5	10	15		6	16	22

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) at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks in 2012 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Veery	1	2		3	1	6		7
Swainson's Thrush	3	18	10	31	10	201	42	253
Hermit Thrush	15	11	15	41	83	68	82	233
American Robin	11	18	21	50	22	127	136	285
Varied Thrush	20	19	23	62	262	222	241	725
American Pipit	4	2	4	10	43	3	7	53
Cedar Waxwing		5		5		18		18
Orange-crowned Warbler	1		2	3	1		2	3
Nashville Warbler		12		12		66		66
MacGillivray's Warbler		15	5	20		80	7	87
Yellow Warbler		12	2	14		135	4	139
Yellow-rumped Warbler	4	20	7	31	15	191	26	232
Black-throated Gray Warbler	1	9	2	12	1	57	6	64
Townsend's Warbler	13	18	10	41	75	243	61	379
Hermit Warbler	2			2	2			2
Wilson's Warbler		8	4	12		16	29	45
Spotted Towhee		3		3		6		6
Chipping Sparrow	1	12		13	1	103		104
Savannah Sparrow	1	1		2	3	4		7
Fox Sparrow	4	4		8	29	30		59
Song Sparrow		8	4	12		17	9	26
White-crowned Sparrow		2	1	3		3	3	6
Dark-eyed Junco	19	22	21	62	209	204	319	732
Western Tanager	4	20	6	30	6	173	20	199
Black-headed Grosbeak	1	12		13	2	59		61
Lazuli Bunting		1		1		3		3

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) at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks in 2012 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Brown-headed Cowbird		2		2		9		9
Gray-crowned Rosy-Finch	4	1		5	17	1		18
Pine Grosbeak	2	5	7	14	3	14	9	26
Purple Finch		2		2		4		4
Cassin's Finch	4	7		11	11	33		44
Red Crossbill	11	14	17	42	232	296	685	1213
Pine Siskin	16	17	17	50	281	701	563	1545
American Goldfinch		2		2		3		3
Evening Grosbeak	6	21	4	31	31	225	9	265
All species pooled					1,990	4,730	3,434	10,154
Detections per point (all species pooled)					6.93	11.94	10.01	9.9
Number of species detected during point counts					49	75	54	88

Table 7. 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 2012.

Species	Number of points with detections	Number of individual detections
Canada Goose	5	23
Mallard	6	9
Pied-billed Grebe	1	1
Double-crested Cormorant	4	26
Pelagic Cormorant	1	10
Brown Pelican	2	42
Great Blue Heron	2	2
Turkey Vulture	1	1
Osprey	1	1
Bald Eagle	4	7
Red-tailed Hawk	1	1
Virginia Rail	2	2
Whimbrel	3	49
Caspian Tern	9	53
Band-tailed Pigeon	3	3
Eurasian Collared-dove	2	2
Anna's Hummingbird	3	3
Rufous Hummingbird	4	4
Downy Woodpecker	3	3
Hairy Woodpecker	3	3
Northern Flicker	3	3
Pileated Woodpecker	1	1
Peregrine Falcon	1	2
Olive-sided Flycatcher	8	8
Western Wood-Pewee	1	1
Pacific-slope Flycatcher	38	57
Cassin's Vireo	1	1
Hutton's Vireo	9	11
Warbling Vireo	5	5
Steller's Jay	5	6
American Crow	30	50
Common Raven	11	16
Tree Swallow	3	3
Violet-green Swallow	6	12
Barn Swallow	4	8
Black-capped Chickadee	8	10
Chestnut-backed Chickadee	28	43
Bushtit	1	2
Red-breasted Nuthatch	5	6

Table 7. 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 2012 (continued).

Species	Number of points with detections	Number of individual detections
Brown Creeper	9	12
Pacific Wren	47	95
Marsh Wren	12	27
Bewick's Wren	10	12
Golden-crowned Kinglet	40	58
Swainson's Thrush	55	112
American Robin	34	58
Varied Thrush	1	1
European Starling	4	7
Cedar Waxwing	4	12
Orange-crowned Warbler	13	24
MacGillivray's Warbler	1	1
Common Yellowthroat	15	23
Yellow Warbler	7	10
Black-throated Gray Warbler	12	14
Hermit Warbler	14	25
Wilson's Warbler	32	51
Spotted Towhee	4	5
Savannah Sparrow	2	3
Song Sparrow	35	59
White-crowned Sparrow	14	19
Dark-eyed Junco	14	15
Western Tanager	18	21
Black-headed Grosbeak	21	24
Red-winged Blackbird	14	24
Brown-headed Cowbird	14	21
Purple Finch	20	26
Red Crossbill	1	35
American Goldfinch	13	18
Evening Grosbeak	2	16

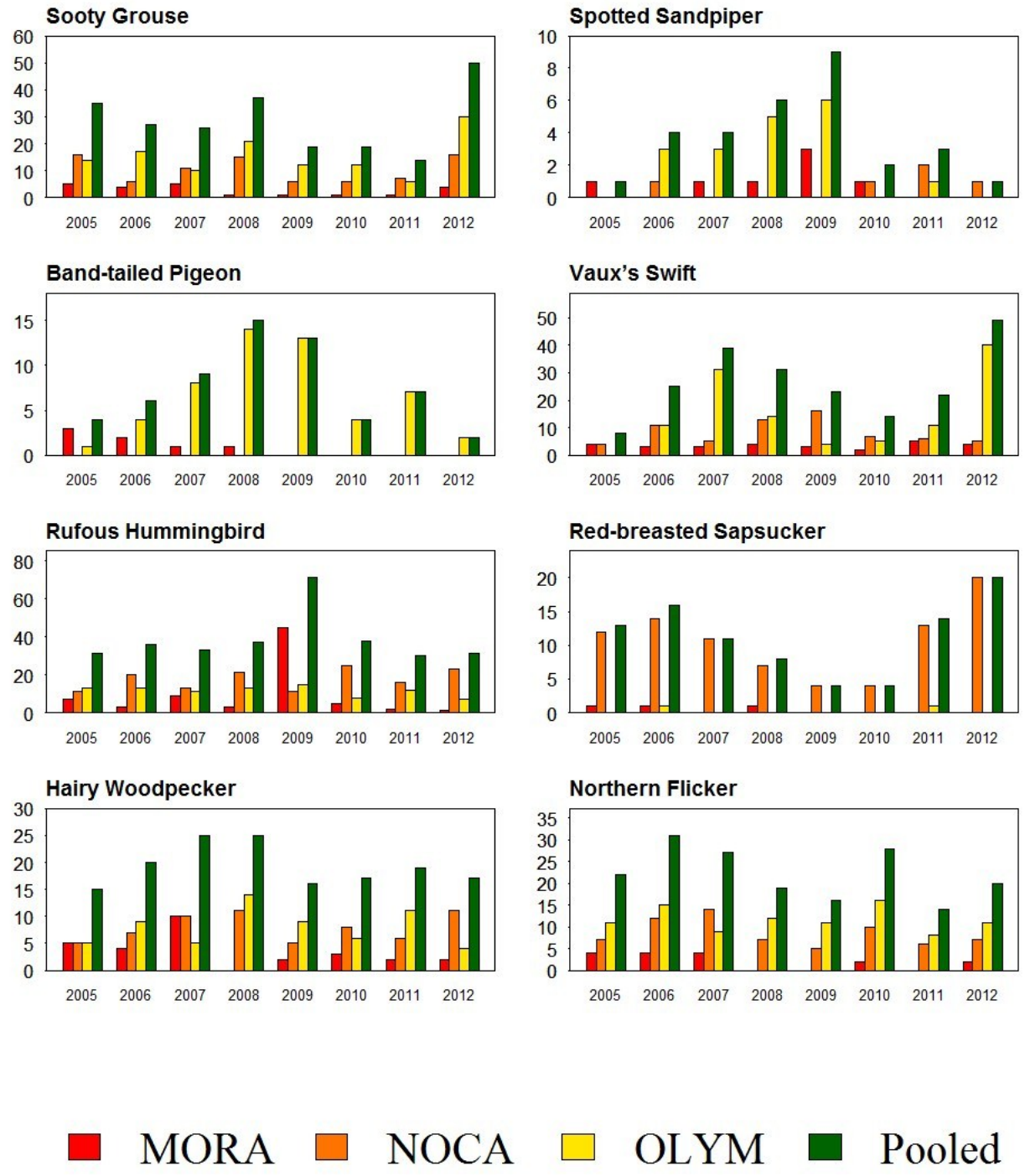

Figure 6. Number of times each species was detected on annual-panel transects at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks, and all three parks pooled (always presented in that order) during the 2005-2012 field seasons. The figure includes all species for which we amassed at least 25 point count detections on annual-panel transects over the eight 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 our periodic trend analyses.

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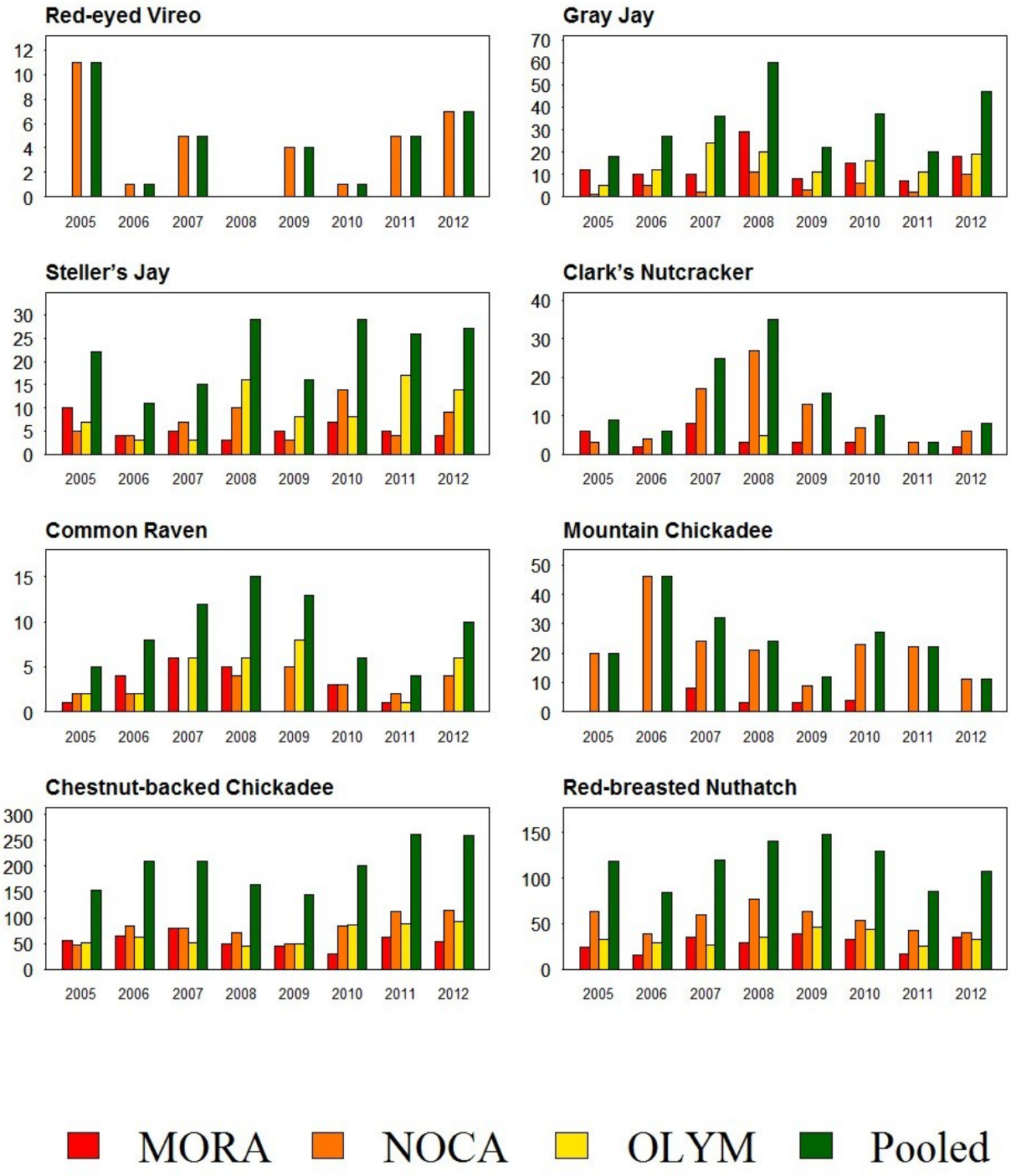

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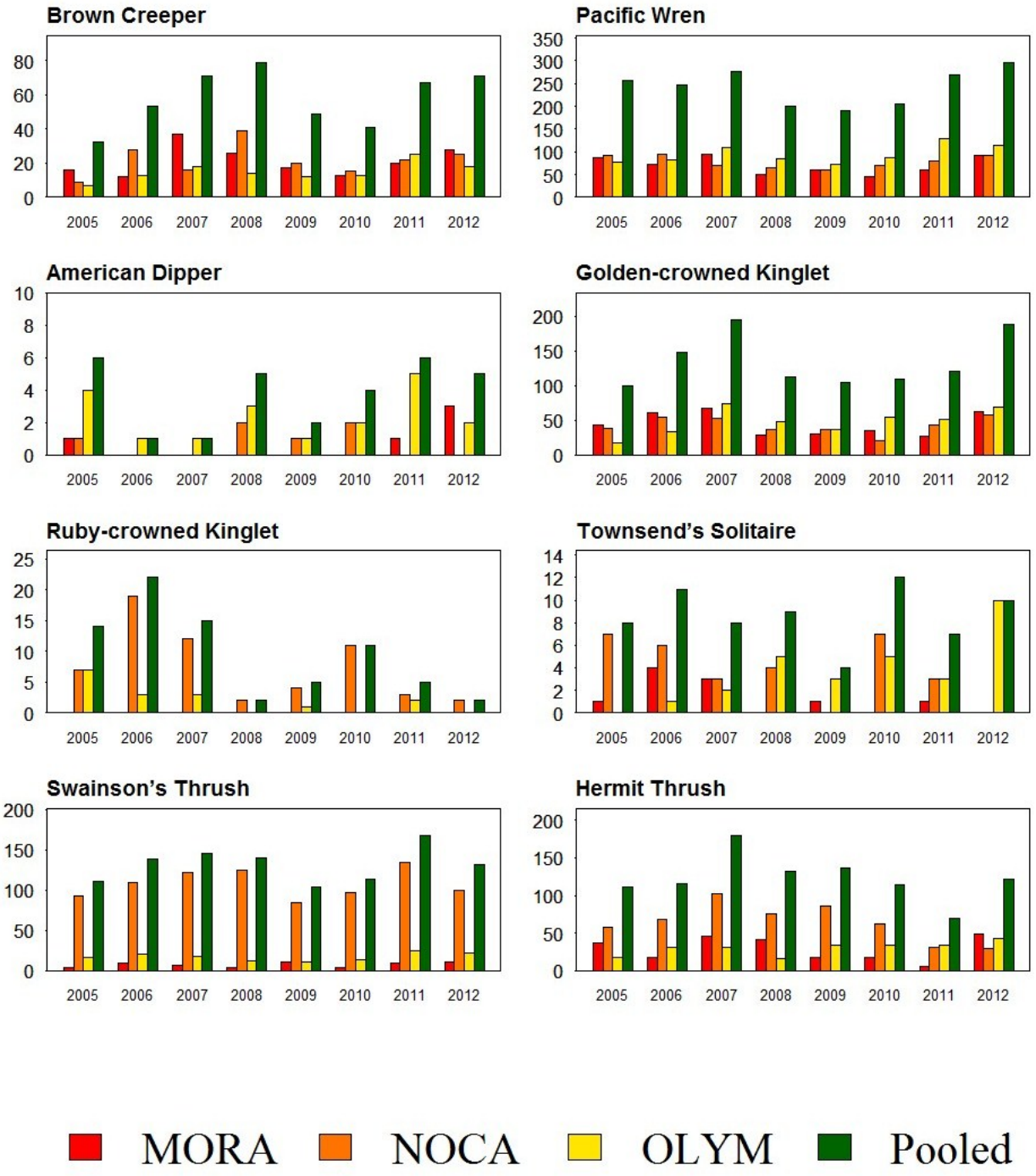

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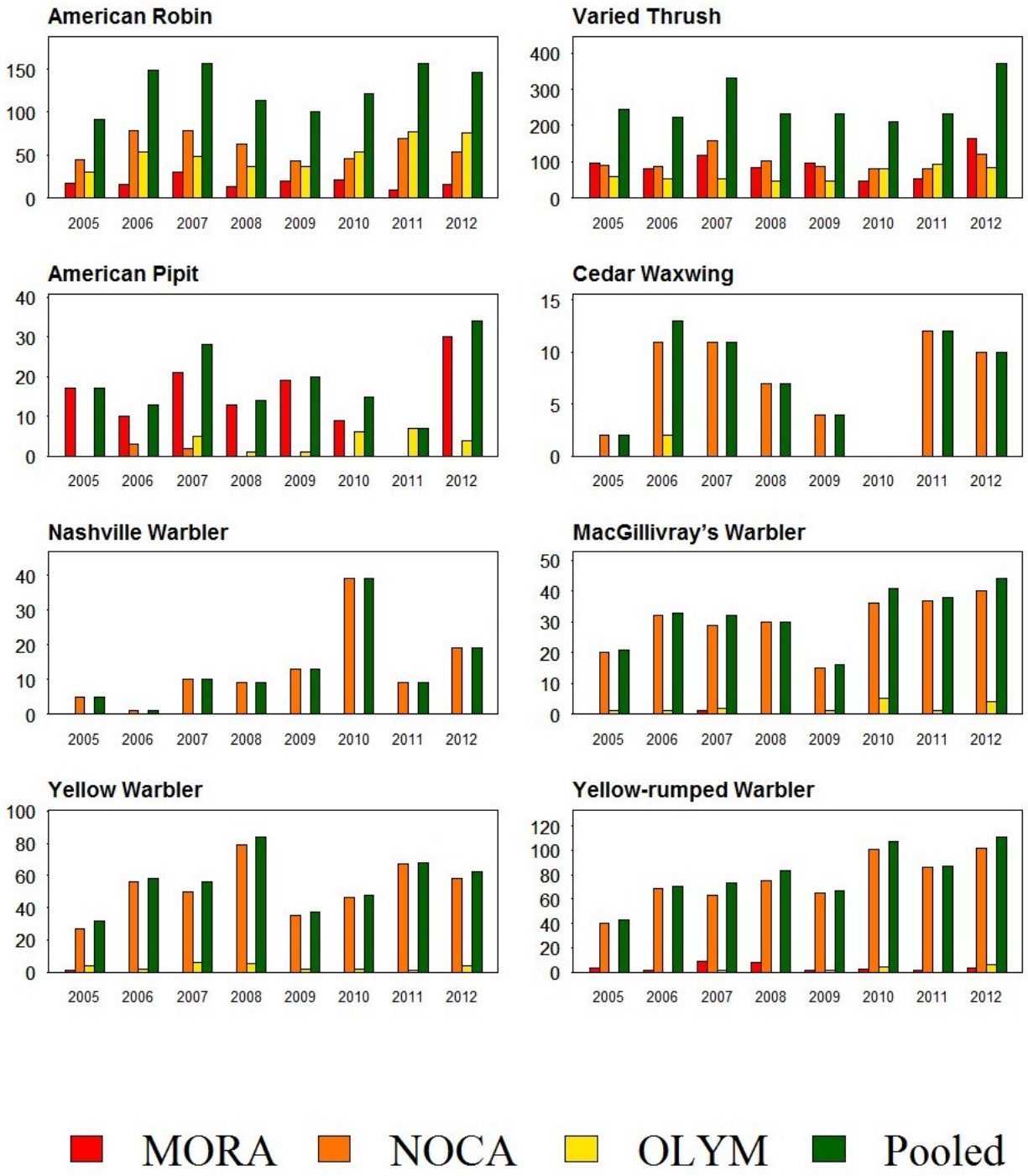

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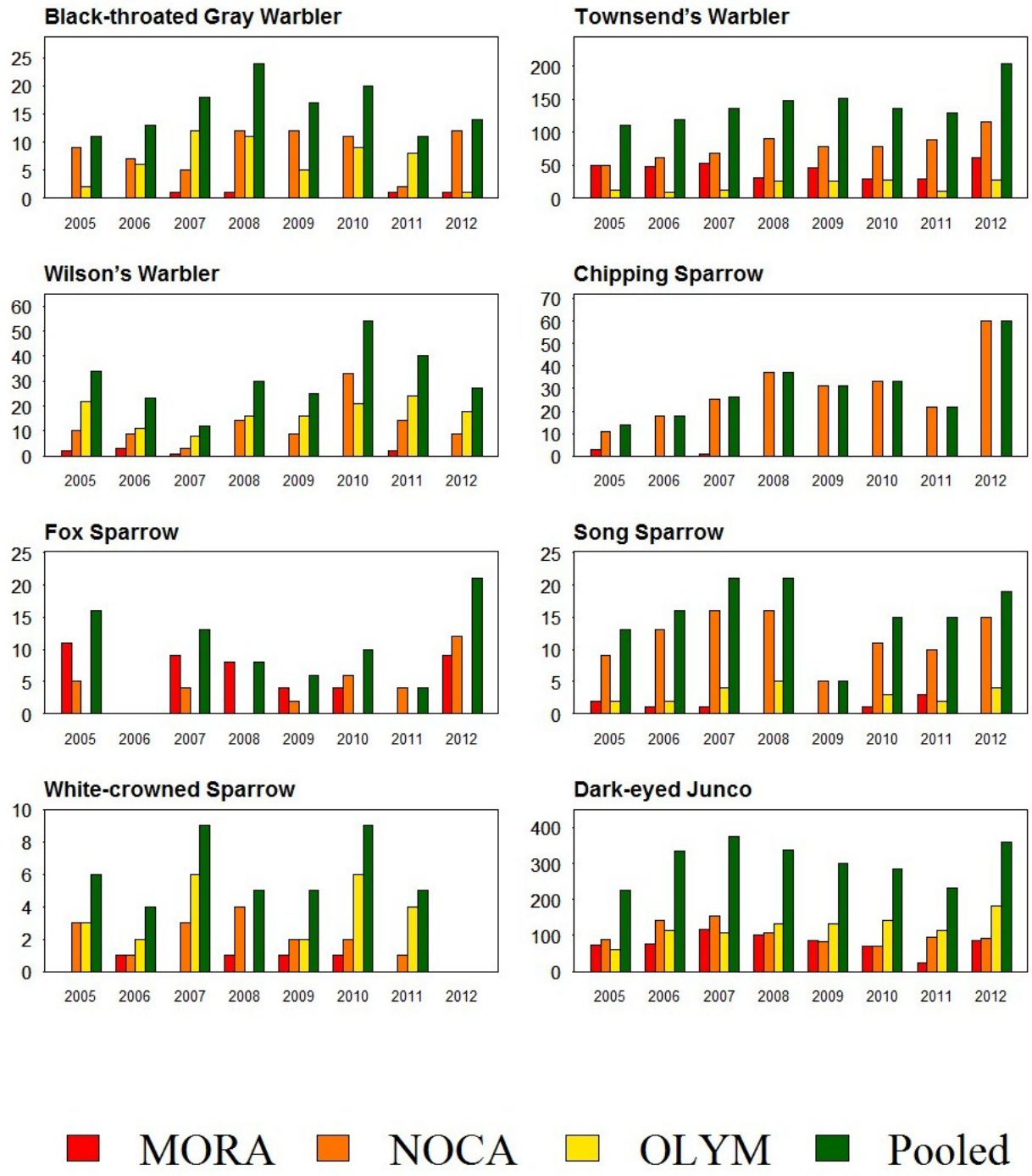

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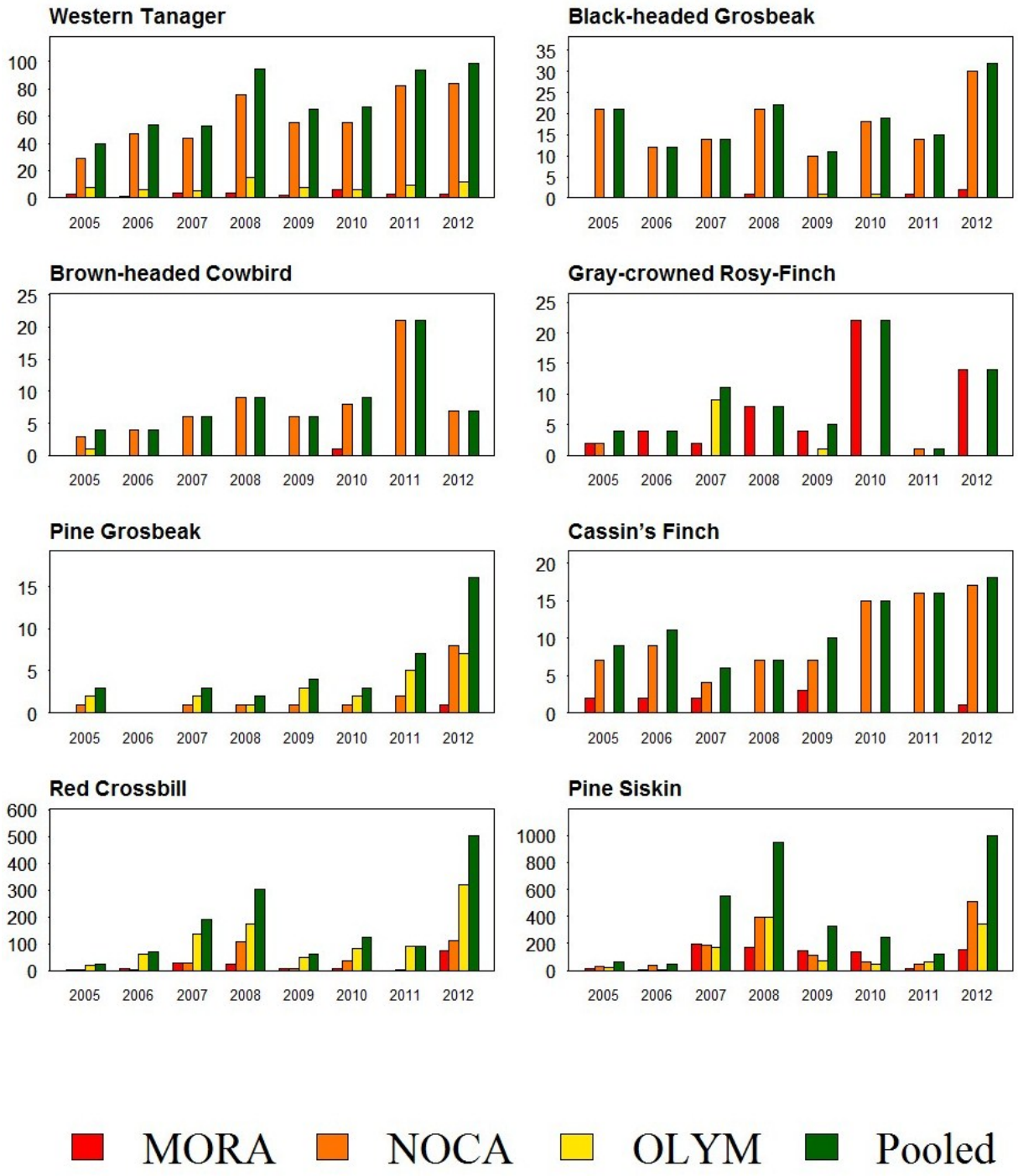

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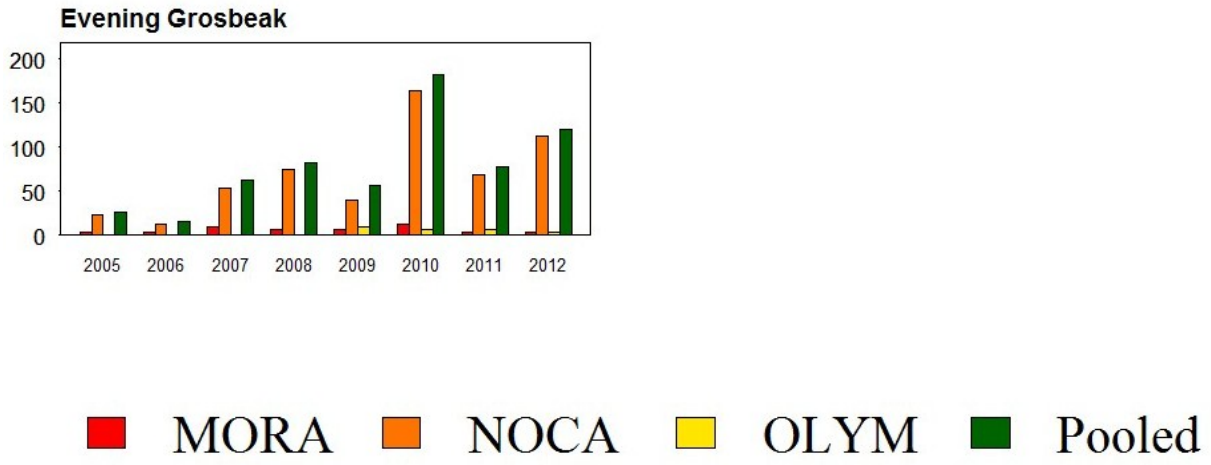

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Discussion

With the experience gained from two pilot field seasons (2005 and 2006) and five previous years of full protocol implementation, our sixth year of fully implementing the NCCN Landbird Monitoring Project proceeded very 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. We were able to survey all 68 of the intended transects, despite an above-average snowpack throughout the season. There were several procedural changes implemented this season to address logistic difficulties encountered during 2011. These included improved communication between field crews, field lead, park leads, and NPS lead, and assigning one staff member to provide biweekly updates to communicate sampling progress to all team members. The combination of the improved communication as well as all of the crew members passing the bird identification evaluation in a timely manner contributed to the success of the season.

After the overall decrease in the number of birds detected in the large parks in 2011, 2012 yielded the highest number of detections on annual-panel transects since the start of the monitoring project. The number of bird detections increased at all three of the large parks, largely due to the increase in pine siskin and red crossbill detections. In 2012 there were 999 pine siskin detections on annual-panel transects, compared to 121 in 2011. In 2008, the year with the greatest number of pine siskin detections prior to 2012, there were 962 pine siskin annual-panel detections, indicating a similar irruptions in 2008 and 2012. Red crossbill numbers also substantially increased, rising from 90 detections on annual-panel transects in 2011 to 503 in 2012. In 2008, also the year with the greatest number of red crossbill detections prior to 2012, there were 303 detections on the annual panel (Wilkerson et al. 2009b, Holmgren et al. 2012).

While much of the increase in number of birds detected was due to the increases in pine siskins and red crossbills, many species were detected in slightly or moderately greater numbers than in previous years. A few of these species include Townsend's warbler, chipping sparrow, and varied thrush. Each of these species had more detections in 2012 than in any of the previous seven years. While many of these upticks in numbers of birds counted likely reflect real population increases in 2012, it should also be noted that we conducted more point counts across the large parks than in any previous year, which would affect the number of birds we detected. The Landbird Monitoring Project's periodic trend analyses will explicitly account for annual variation in survey effort.

There are several other interesting preliminary results, including the decrease in brown-headed cowbird detections back to totals seen before 2011, when there was a sharp increase in detections. White-crowned Sparrows, detected every year on the annual panels in two or more parks, were not detected in 2012. Evening grosbeak detections rose in 2012 from 2011, but did not reach totals seen in 2010. Golden-crowned kinglet detections also increased, nearly to the high detection totals of 2007 (Siegel et al. 2009b, Siegel et al. 2008, Wilkerson et al. 2009b, Wilkerson et al. 2010, Holmgren et al. 2011, Holmgren et al. 2012). Periodic trend analyses that adjust for sampling effort and estimate detection probability will allow rigorous assessment of apparent changes like these and will facilitate generating and testing hypotheses about their causes.

We detected our first Eurasian collared-dove on a large park point count this year, on the Graves Creek Road in the Quinault at OLYM. While this is not the first year we have detected the doves in the large parks, it is the first year we have detected one on a point count. The range of this non-native bird has expanded rapidly across North America. Breeding Bird Survey data from 1966 to 2010 have showed increases in numbers everywhere the species has been recorded. The success of this species can be attributed to widespread seed availability in the form of backyard feeders as well as increased tree planting in urban and suburban areas (Romagosa 2012). While the doves are less common in more rural or natural areas, they will inhabit such areas if there is food available (Romagosa 2012). The areas we have detected them over the past several years have been in more developed parts of the parks (near campgrounds or roads), but this project presents a good opportunity to monitor this species and whether it expands into more natural areas.

Fieldwork at LEWI also yielded a notable overall increase in detections, averaging 18.56 birds per point compared to 14.20 birds per point in 2010 during our most recent previous survey at LEWI. Results from LEWI this year indicate that high detection rates of common species will yield robust results for many common breeding species and stretch this monitoring project's area of inference significantly further south (Siegel et al. 2009b).

Detailed interpretation of 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 our periodic trend analyses.

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 (2005-2006), and six full years of project implementation (2007- 2012) that includes data collection on the annual panel as well as all five of the alternating panels. We were particularly pleased to be able to survey all 68 of the intended transects in 2012, despite an above-average snowpack throughout the season. This success was due in part to several procedural changes implemented this season, which will be retained in 2013. Preliminary analysis indicates a substantial uptick in numbers of many bird species in 2012, but interpretation of this result will need to wait until our multi-year trend analysis, which accounts for annual variation in survey effort and detection probability, is complete.

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Appendix A: Detailed survey history of each transect sampled in the large parks to date.

Park	Panel	Elevation class	Transect	Number of points surveyed							
				2005	2006	2007	2008	2009	2010	2011	2012
MORA	Ann1	Low	4001	10	12	12	12	12	10	11	14
MORA	Ann1	Low	4005	11	11	11	11	12	9	10	13
MORA	Ann1	Medium	4002	11	11	11	12	11	13	13	15
MORA	Ann1	Medium	4004	18	17	18	18	13	15	10	17
MORA	Ann1	Medium	4009	14	14	15	15	11	13	10	15
MORA	Ann1	Medium	4012	16	16	14	19	19	13	0	17
MORA	Ann1	High	4003	12	12	12	12	12	10	12	13
MORA	Ann1	High	4007	20	20	20	20	20	20	0	20
MORA	Ann1	High	4011	13	11	14	17	17	15	0	16
MORA	Ann1	High	4014	10	16	14	16	16	15	0	17
MORA	Alt2	Low	4006	0	0	10	0	0	0	0	9
MORA	Alt2	Low	4008	0	0	9	0	0	0	0	12
MORA	Alt2	Medium	4015	0	0	11	0	0	0	0	12
MORA	Alt2	Medium	4017	0	0	12	0	0	0	0	13
MORA	Alt2	Medium	4020	0	0	9	0	0	0	0	8
MORA	Alt2	Medium	4026	0	0	10	0	0	0	0	11
MORA	Alt2	High	4016	0	0	19	0	0	0	0	20
MORA	Alt2	High	4019	0	0	20	0	0	0	0	20
MORA	Alt2	High	4027	0	0	13	0	0	0	0	14
MORA	Alt2	High	4075	0	0	14	0	0	0	0	11
MORA	Alt3	Low	4010	0	0	0	13	0	0	0	0
MORA	Alt3	Low	4018	0	0	0	12	0	0	0	0
MORA	Alt3	Medium	4028	0	0	0	11	0	0	0	0
MORA	Alt3	Medium	4042	0	0	0	12	0	0	0	0
MORA	Alt3	Medium	4044	0	0	0	15	0	0	0	0
MORA	Alt3	Medium	4048	0	0	0	13	0	0	0	0
MORA	Alt3	High	4029	0	0	0	14	0	0	0	0
MORA	Alt3	High	4030	0	0	0	12	0	0	0	0
MORA	Alt3	High	4032	0	0	0	15	0	0	0	0
MORA	Alt3	High	4033	0	0	0	18	0	0	0	0

Appendix A: Detailed survey history of each transect sampled in the large parks to date (continued).

Park	Panel	Elevation class	Transect	Number of points surveyed							
				2005	2006	2007	2008	2009	2010	2011	2012
MORA	Alt4	Low	4021	0	0	0	0	12	0	0	0
MORA	Alt4	Low	4022	0	0	0	0	17	0	0	0
MORA	Alt4	Medium	4057	0	0	0	0	10	0	0	0
MORA	Alt4	Medium	4060	0	0	0	0	24	0	0	0
MORA	Alt4	Medium	4061	0	0	0	0	15	0	0	0
MORA	Alt4	Medium	4065	0	0	0	0	13	0	0	0
MORA	Alt4	High	4035	0	0	0	0	12	0	0	0
MORA	Alt4	High	4036	0	0	0	0	14	0	0	0
MORA	Alt4	High	4039	0	0	0	0	11	0	0	0
MORA	Alt4	High	4043	0	0	0	0	18	0	0	0
MORA	Alt5	Low	4024	0	0	0	0	0	25	0	0
MORA	Alt5	Low	4025	0	0	0	0	0	9	0	0
MORA	Alt5	Medium	4068	0	0	0	0	0	9	0	0
MORA	Alt5	Medium	4073	0	0	0	0	0	13	0	0
MORA	Alt5	Medium	4074	0	0	0	0	0	13	0	0
MORA	Alt5	Medium	4076	0	0	0	0	0	15	0	0
MORA	Alt5	High	4045	0	0	0	0	0	12	0	0
MORA	Alt5	High	4046	0	0	0	0	0	10	0	0
MORA	Alt5	High	4052	0	0	0	0	0	12	0	0
MORA	Alt5	High	4055	0	0	0	0	0	0	0	0
MORA	Alt6	Low	4031	0	0	0	0	0	0	10	0
MORA	Alt6	Low	4034	0	0	0	0	0	0	10	0
MORA	Alt6	Medium	4077	0	0	0	0	0	0	12	0
MORA	Alt6	Medium	4078	0	0	0	0	0	0	9	0
MORA	Alt6	Medium	4081	0	0	0	0	0	0	10	0
MORA	Alt6	Medium	4084	0	0	0	0	0	0	0	0
MORA	Alt6	High	4058	0	0	0	0	0	0	0	0
MORA	Alt6	High	4062	0	0	0	0	0	0	0	0
MORA	Alt6	High	4064	0	0	0	0	0	0	10	0
MORA	Alt6	High	4067	0	0	0	0	0	0	13	0

Appendix A: Detailed survey history of each transect sampled in the large parks to date (continued).

Park	Panel	Elevation class	Transect	Number of points surveyed							
				2005	2006	2007	2008	2009	2010	2011	2012
NOCA	Ann1	Low	1013	12	11	14	12	11	9	13	15
NOCA	Ann1	Low	1017	13	12	9	12	12	12	13	14
NOCA	Ann1	Low	1020	15	12	13	15	16	12	16	17
NOCA	Ann1	Low	1023	18	19	19	20	21	20	21	21
NOCA	Ann1	Medium	1015	12	16	17	17	15	15	16	17
NOCA	Ann1	Medium	1018	16	21	21	23	22	25	25	23
NOCA	Ann1	Medium	1022	13	13	11	13	14	13	14	15
NOCA	Ann1	Medium	1024	9	10	11	12	10	11	10	13
NOCA	Ann1	High	1014	15	19	19	0	20	0	0	20
NOCA	Ann1	High	1016	14	15	14	16	15	14	15	17
NOCA	Ann1	High	1019	12	12	10	12	12	12	12	13
NOCA	Ann1	High	1021	18	21	22	23	22	19	17	24
NOCA	Alt2	Low	1001	0	0	11	0	0	0	0	13
NOCA	Alt2	Low	1005	0	0	13	0	0	0	0	15
NOCA	Alt2	Low	1006	0	0	10	0	0	0	0	12
NOCA	Alt2	Low	1010	0	0	12	0	0	0	0	16
NOCA	Alt2	Medium	1003	0	0	12	0	0	0	0	15
NOCA	Alt2	Medium	1004	0	0	13	0	0	0	0	14
NOCA	Alt2	Medium	1009	0	0	0	0	0	0	0	16
NOCA	Alt2	Medium	1011	0	0	19	0	0	0	0	19
NOCA	Alt2	High	1002	0	0	18	0	0	0	0	20
NOCA	Alt2	High	1007	0	0	13	0	0	0	0	14
NOCA	Alt2	High	1008	0	0	0	0	0	0	0	14
NOCA	Alt2	High	1012	0	0	15	0	0	0	0	19
NOCA	Alt3	Low	1027	0	0	0	13	0	0	0	0
NOCA	Alt3	Low	1028	0	0	0	13	0	0	0	0
NOCA	Alt3	Low	1029	0	0	0	13	0	0	0	0
NOCA	Alt3	Low	1034	0	0	0	13	0	0	0	0
NOCA	Alt3	Medium	1025	0	0	0	15	0	0	0	0
NOCA	Alt3	Medium	1026	0	0	0	14	0	0	0	0

Appendix A: Detailed survey history of each transect sampled in the large parks to date (continued).

Park	Panel	Elevation class	Transect	Number of points surveyed							
				2005	2006	2007	2008	2009	2010	2011	2012
NOCA	Alt3	Medium	1030	0	0	0	0	0	0	0	0
NOCA	Alt3	Medium	1031	0	0	0	19	0	0	0	0
NOCA	Alt3	High	1032	0	0	0	0	0	0	0	0
NOCA	Alt3	High	1037	0	0	0	0	0	0	0	0
NOCA	Alt3	High	1039	0	0	0	21	0	0	0	0
NOCA	Alt3	High	1040	0	0	0	21	0	0	0	0
NOCA	Alt4	Low	1036	0	0	0	0	20	0	0	0
NOCA	Alt4	Low	1046	0	0	0	0	0	0	0	0
NOCA	Alt4	Low	1054	0	0	0	0	11	0	0	0
NOCA	Alt4	Low	1061	0	0	0	0	10	0	0	0
NOCA	Alt4	Medium	1033	0	0	0	0	20	0	0	0
NOCA	Alt4	Medium	1035	0	0	0	0	16	0	0	0
NOCA	Alt4	Medium	1038	0	0	0	0	13	0	0	0
NOCA	Alt4	Medium	1041	0	0	0	0	14	0	0	0
NOCA	Alt4	High	1048	0	0	0	0	11	0	0	0
NOCA	Alt4	High	1049	0	0	0	0	12	0	0	0
NOCA	Alt4	High	1050	0	0	0	0	13	0	0	0
NOCA	Alt4	High	1052	0	0	0	0	11	0	0	0
NOCA	Alt5	Low	1062	0	0	0	0	0	8	0	0
NOCA	Alt5	Low	1063	0	0	0	0	0	9	0	0
NOCA	Alt5	Low	1065	0	0	0	0	0	11	0	0
NOCA	Alt5	Low	1067	0	0	0	0	0	8	0	0
NOCA	Alt5	Medium	1042	0	0	0	0	0	15	0	0
NOCA	Alt5	Medium	1043	0	0	0	0	0	9	0	0
NOCA	Alt5	Medium	1044	0	0	0	0	0	11	0	0
NOCA	Alt5	Medium	1045	0	0	0	0	0	10	0	0
NOCA	Alt5	High	1055	0	0	0	0	0	13	0	0
NOCA	Alt5	High	1058	0	0	0	0	0	0	0	0
NOCA	Alt5	High	1060	0	0	0	0	0	9	0	0
NOCA	Alt5	High	1064	0	0	0	0	0	10	0	0

Appendix A: Detailed survey history of each transect sampled in the large parks to date (continued).

Park	Panel	Elevation class	Transect	Number of points surveyed							
				2005	2006	2007	2008	2009	2010	2011	2012
NOCA	Alt6	Low	1068	0	0	0	0	0	0	13	0
NOCA	Alt6	Low	1070	0	0	0	0	0	0	12	0
NOCA	Alt6	Low	1074	0	0	0	0	0	0	14	0
NOCA	Alt6	Low	1075	0	0	0	0	0	0	11	0
NOCA	Alt6	Medium	1047	0	0	0	0	0	0	13	0
NOCA	Alt6	Medium	1051	0	0	0	0	0	0	11	0
NOCA	Alt6	Medium	1053	0	0	0	0	0	0	13	0
NOCA	Alt6	Medium	1056	0	0	0	0	0	0	13	0
NOCA	Alt6	High	1072	0	0	0	0	0	0	0	0
NOCA	Alt6	High	1088	0	0	0	0	0	0	12	0
NOCA	Alt6	High	1090	0	0	0	0	0	0	0	0
NOCA	Alt6	High	1092	0	0	0	0	0	0	14	0
OLYM	Ann1	Low	3001	11	10	8	10	11	12	12	13
OLYM	Ann1	Low	3121	11	15	17	17	17	14	17	15
OLYM	Ann1	Low	3126	9	10	11	13	13	13	15	15
OLYM	Ann1	Low	3134	16	16	18	18	18	18	19	19
OLYM	Ann1	Medium	3122	14	12	14	0	16	16	0	16
OLYM	Ann1	Medium	3123	10	10	12	14	14	15	15	15
OLYM	Ann1	Medium	3130	9	9	8	9	9	9	9	10
OLYM	Ann1	Medium	3200	0	0	22	23	21	23	22	23
OLYM	Ann1	High	3124	9	10	10	11	11	11	11	12
OLYM	Ann1	High	3125	9	11	13	13	14	15	11	14
OLYM	Ann1	High	3127	7	9	13	15	14	15	15	15
OLYM	Ann1	High	3128	10	11	11	11	10	11	12	13
OLYM	Alt2	Low	3138	0	0	10	0	0	0	0	12
OLYM	Alt2	Low	3142	0	0	14	0	0	0	0	14
OLYM	Alt2	Low	3144	0	0	13	0	0	0	0	13
OLYM	Alt2	Low	3145	0	0	13	0	0	0	0	14
OLYM	Alt2	Medium	3133	0	0	8	0	0	0	0	16

Appendix A: Detailed survey history of each transect sampled in the large parks to date (continued).

Park	Panel	Elevation class	Transect	Number of points surveyed							
				2005	2006	2007	2008	2009	2010	2011	2012
OLYM	Alt2	Medium	3135	0	0	11	0	0	0	0	13
OLYM	Alt2	Medium	3137	0	0	10	0	0	0	0	11
OLYM	Alt2	Medium	3141	0	0	14	0	0	0	0	15
OLYM	Alt2	High	3132	0	0	19	0	0	0	0	19
OLYM	Alt2	High	3136	0	0	11	0	0	0	0	11
OLYM	Alt2	High	3139	0	0	16	0	0	0	0	13
OLYM	Alt2	High	3140	0	0	0	0	0	0	0	12
OLYM	Alt3	Low	3146	0	0	0	15	0	0	0	0
OLYM	Alt3	Low	3149	0	0	0	10	0	0	0	0
OLYM	Alt3	Low	3151	0	0	0	12	0	0	0	0
OLYM	Alt3	Low	3153	0	0	0	11	0	0	0	0
OLYM	Alt3	Medium	3143	0	0	0	10	0	0	0	0
OLYM	Alt3	Medium	3150	0	0	0	11	0	0	0	0
OLYM	Alt3	Medium	3152	0	0	0	11	0	0	0	0
OLYM	Alt3	Medium	3154	0	0	0	15	0	0	0	0
OLYM	Alt3	High	3147	0	0	0	19	0	0	0	0
OLYM	Alt3	High	3148	0	0	0	14	0	0	0	0
OLYM	Alt3	High	3156	0	0	0	12	0	0	0	0
OLYM	Alt3	High	3157	0	0	0	11	0	0	0	0
OLYM	Alt4	Low	3155	0	0	0	0	10	0	0	0
OLYM	Alt4	Low	3159	0	0	0	0	11	0	0	0
OLYM	Alt4	Low	3161	0	0	0	0	11	0	0	0
OLYM	Alt4	Low	3163	0	0	0	0	15	0	0	0
OLYM	Alt4	Medium	3160	0	0	0	0	10	0	0	0
OLYM	Alt4	Medium	3167	0	0	0	0	11	0	0	0
OLYM	Alt4	Medium	3168	0	0	0	0	10	0	0	0
OLYM	Alt4	Medium	3174	0	0	0	0	14	0	0	0
OLYM	Alt4	High	3158	0	0	0	0	14	0	0	0
OLYM	Alt4	High	3164	0	0	0	0	14	0	0	0
OLYM	Alt4	High	3171	0	0	0	0	12	0	0	0

Appendix A: Detailed survey history of each transect sampled in the large parks to date (continued).

Park	Panel	Elevation class	Transect	Number of points surveyed							
				2005	2006	2007	2008	2009	2010	2011	2012
OLYM	Alt4	High	3173	0	0	0	0	10	0	0	0
OLYM	Alt5	Low	3165	0	0	0	0	0	10	0	0
OLYM	Alt5	Low	3166	0	0	0	0	0	12	0	0
OLYM	Alt5	Low	3169	0	0	0	0	0	8	0	0
OLYM	Alt5	Low	3170	0	0	0	0	0	11	0	0
OLYM	Alt5	Medium	3178	0	0	0	0	0	11	0	0
OLYM	Alt5	Medium	3183	0	0	0	0	0	13	0	0
OLYM	Alt5	Medium	3184	0	0	0	0	0	16	0	0
OLYM	Alt5	Medium	3185	0	0	0	0	0	9	0	0
OLYM	Alt5	High	3175	0	0	0	0	0	12	0	0
OLYM	Alt5	High	3179	0	0	0	0	0	16	0	0
OLYM	Alt5	High	3180	0	0	0	0	0	16	0	0
OLYM	Alt5	High	3188	0	0	0	0	0	12	0	0
OLYM	Alt6	Low	3172	0	0	0	0	0	0	14	0
OLYM	Alt6	Low	3177	0	0	0	0	0	0	10	0
OLYM	Alt6	Low	3181	0	0	0	0	0	0	16	0
OLYM	Alt6	Low	3182	0	0	0	0	0	0	16	0
OLYM	Alt6	Medium	3187	0	0	0	0	0	0	20	0
OLYM	Alt6	Medium	3190	0	0	0	0	0	0	14	0
OLYM	Alt6	Medium	3195	0	0	0	0	0	0	12	0
OLYM	Alt6	Medium	3198	0	0	0	0	0	0	11	0
OLYM	Alt6	High	3189	0	0	0	0	0	0	16	0
OLYM	Alt6	High	3191	0	0	0	0	0	0	15	0
OLYM	Alt6	High	3192	0	0	0	0	0	0	14	0
OLYM	Alt6	High	3196	0	0	0	0	0	0	15	0