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Natural Resource Stewardship and Science

North Coast and Cascades Network Landbird Monitoring

Report for the 2015 Field Season

Natural Resource Report NPS/NCCN/NRR—2016/1241

ON THIS PAGE
Technicians Makie Matsumoto-Hervol, Graham Montgomery, Natalie Okun, and Kim Edgington at North Cascades National Park Complex
Photograph by: Richard Roush (The Institute for Bird Populations)

ON THE COVER
White-crowned Sparrow (*Zonotrichia leucophrys*)
Photograph by: Graham Montgomery (The Institute for Bird Populations)

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Report for the 2015 Field Season

Natural Resource Report NPS/NCCN/NRR—2016/1241

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Contents

Page

Figures....iv

Tables....v

Executive Summary....vi

Acknowledgments....vii

Introduction....1

Study Area....3

Methods....4

Sample Design....4

Crew Training and Certification....4

Data Collection....9

Data Management....10

Data Analysis....11

Results....12

Discussion....41

Conclusions....43

Literature Cited....44

Appendix A: Detailed survey history of each transect sampled in the large parks to date....48

Figures

Page

Figure 1. National Park Service units participating in the North Coast and Cascades Network Landbird Monitoring Project. 3

Figure 2. Approximate locations of transects conducted at Mount Rainier National Park in 2015. 5

Figure 3. Approximate locations of transects conducted at North Cascades National Park Complex in 2015. 6

Figure 4. Approximate locations of transects conducted at Olympic National Park in 2015. 7

Figure 5. Locations of point count stations surveyed at San Juan Island National Historical Park in 2015; adjacent point count stations are 350 m apart. 8

Figure 6. Number of times each species was detected on annual-panel transects at Mount Rainier, North Cascades, and Olympic National Parks, and all three parks pooled during the 2005–2015 field seasons. 31

Tables

Page

Table 1. Observers who conducted point counts in the North Coast and Cascades Network in 2015. 9

Table 2. North Coast and Cascades Network landbird monitoring transects at Mount Rainier, North Cascades, and Olympic National Parks that were surveyed in 2015. 13

Table 3. Summary history of North Coast and Cascades Network landbird monitoring transects at Mount Rainier, North Cascades, and Olympic National Parks completed through 2015. 15

Table 4. All species recorded in the three large North Coast and Cascades Network parks during the 2015 field season, including the pre-season training session. 16

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, North Cascades, and Olympic National Parks in 2015. 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) at Mount Rainier, North Cascades, and Olympic National Parks in 2015. 24

Table 7. Species listed under the Endangered Species Act recorded on “Rare Bird Detection Forms” in each park in 2015, excluding individuals that were also detected during point counts. 29

Table 8. Number of points with detections and number of individual detections for each species detected during point counts at San Juan Island National Historical Park in 2015. 29

Executive Summary

In 2015 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 nine years (2007–2015). In 2015 we conducted 1,103 point counts at point count survey stations located along 67 transects in the large wilderness parks of the NCCN, including Mount Rainier National Park (MORA), North Cascades National Park Complex (NOCA), and Olympic National Park (OLYM).

We detected 153 bird species and one hybrid in the three large parks, 104 of which were detected during one or more point counts. For 57 species (all species detected at least 47 times on annual-panel transects between 2005 and 2015), we present the total number of detections on annual-panel transects in each park during the 2005–2015 field seasons. We caution, however, that these detection totals have not been adjusted for differences in survey effort, observer effects, or potential differences in detectability of birds between years; such adjustments will be made in conjunction with our periodic trend analyses (e.g., Saracco et al. 2014).

We also conducted 54 point counts at San Juan Island National Historical Park (SAJH) in 2015, including 38 at American Camp and 16 at English Camp. Our field crew detected 89 bird species while in the park, 72 of which were detected during point counts. We present the number of detections, and the number of points with detections, for each species detected during point counts at SAJH.

The 2015 season yielded the highest number of bird detections on annual-panel transects in the three large parks since the start of the monitoring project, about 2,700 (21%) more than the previous high count in 2014. Part of this increase was due to a spike in red crossbill and evening grosbeak detections, both species being at an all-time high across annual-panel transects since the start of the monitoring project.

There were many other species detected in slightly or moderately greater numbers in the three large parks in 2015 than in previous years. While many of these upticks in numbers of birds counted may reflect real population increases in 2015, it should also be noted that we conducted more point counts across the large parks than in all previous years except for 2014 (Appendix A), which likely accounts for at least a portion of the increased detections.

Acknowledgments

We thank the 2015 crew members for their hard work and dedication to the project: J. Ajani, K. Edgington, M. Frye, J. Love, M. Matsumoto-Hervol, G. Montgomery, N. Okun, R. Roush, and D. Rousseau. 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 and guiding its implementation. We thank T. Chestnut, P. Happe, and J. Weaver for providing program oversight at the respective parks; S. Gremel and B. Boekelheide for assistance during training; and R. Chistophersen for help with logistics during the field season. We thank K. Beirne and N. Antonova for GIS training and support and K. Beirne 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 Manager, for his support of the project; P. Happe and R. Christophersen for reviews of the draft report; and the ESRI Nonprofit Organization Program for software support provided to The Institute for Bird Populations. This is Contribution No. 534 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 have been 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). Pacific Northwest migratory landbirds also face additional threats on their wintering grounds and along migration routes, including loss or alteration of stopover habitat.

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 more arid conifer forest typical of the east side of the Cascades, which hosts a somewhat distinct avifauna (Altman 2000) compared to other areas in the three large parks. 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, are conducted in conjunction with periodic detailed trend analyses. For the first trend analysis report, which summarizes data from 2005–2012, see Saracco et al. 2014. The next trend report is scheduled to be produced after the 2016 field season.

Study Area

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

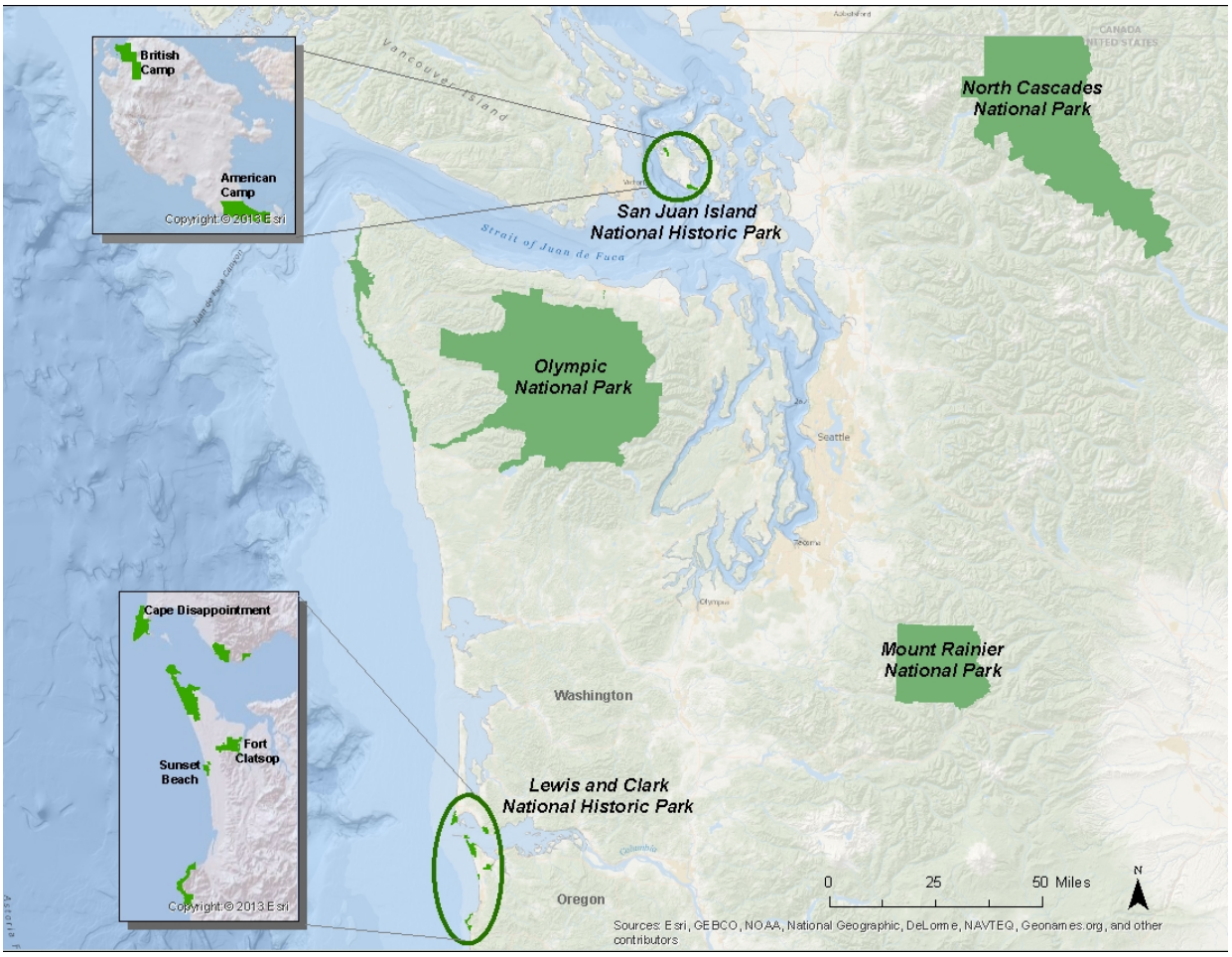


Figure 1. National Park Service units participating in the North Coast and Cascades Network Landbird Monitoring Project.

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 10–15 points, extending perpendicularly (or as close to perpendicularly as topographic and physiographic features allow) in both directions away from the trail.

In 2015 we implemented the full study design in the three large parks for the ninth consecutive year, including surveys of the annual panel (‘Ann1’) as well as the fourth alternating panel (‘Alt5’) (Figures 2–4). During the first two years of protocol development (2005–2006) we surveyed only the annual panel (Siegel et al. 2006, 2009b). We provide results from each of the first eight years of full implementation in Siegel et al. (2008), Wilkerson et al. (2009b, 2010), and Holmgren et al. (2011, 2012, 2013, 2014, and 2015).

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 2015 we surveyed the grid at SAJH (Figure 5).

Crew Training and Certification

Mandy Holmgren, a Staff Biologist with The Institute for Bird Populations, served as the 2015 Field Lead. Mandy began training six field technicians on April 30, with assistance from 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 18, three of the five field technicians had passed the rigorous point count certification exam, and were ready to begin collecting data. Two technicians never passed the exam and consequently did not conduct any point counts during the field season. Instead, they worked on other field tasks and data entry. Four former IBP field technicians were able to fill in at points during the season, each able to work for two mornings. All individuals who collected data during the 2015 field season (Table 1) were employees or volunteers of The Institute for Bird Populations.

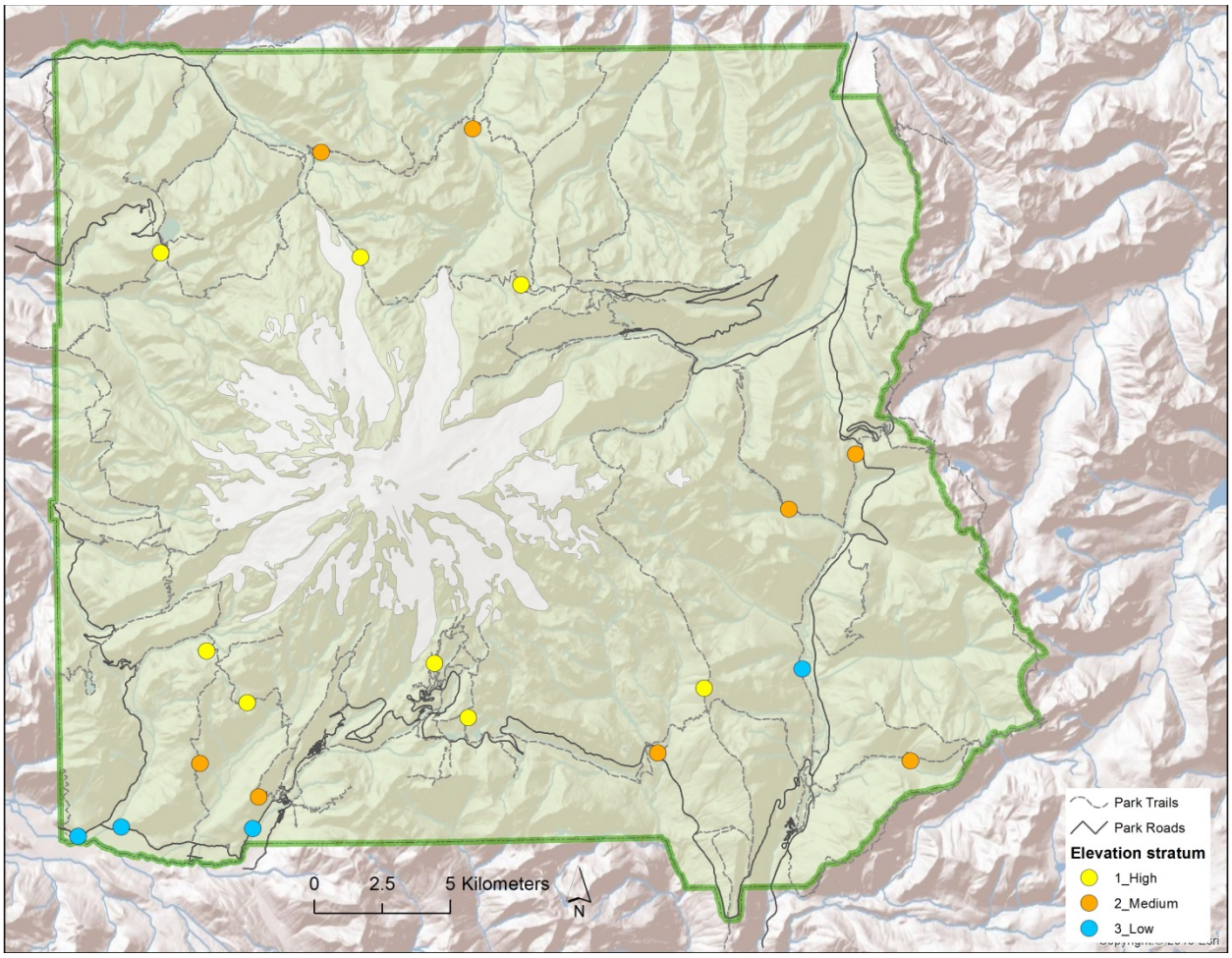


Figure 2. Approximate locations of transects conducted at Mount Rainier National Park in 2015.

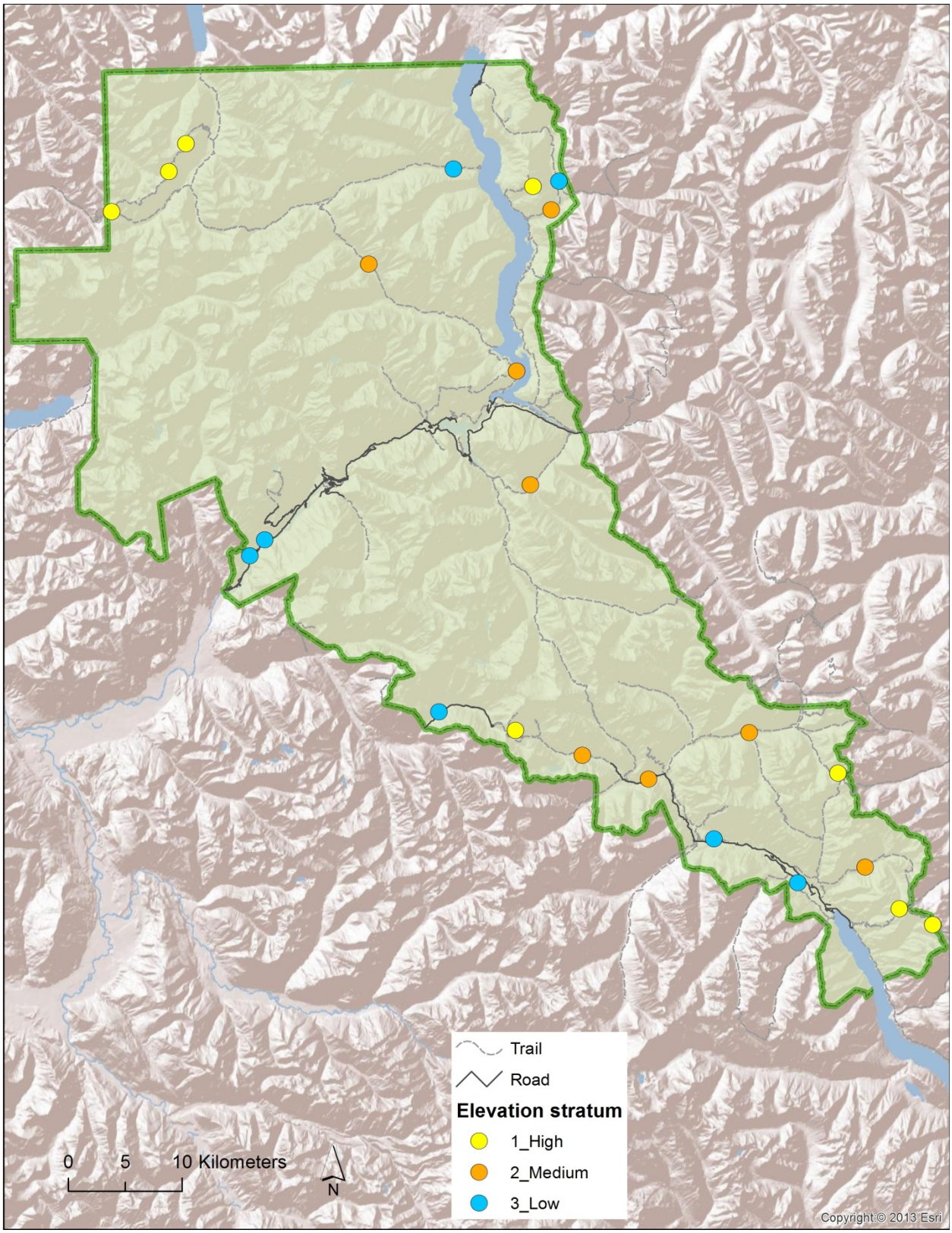


Figure 3. Approximate locations of transects conducted at North Cascades National Park Complex in 2015.

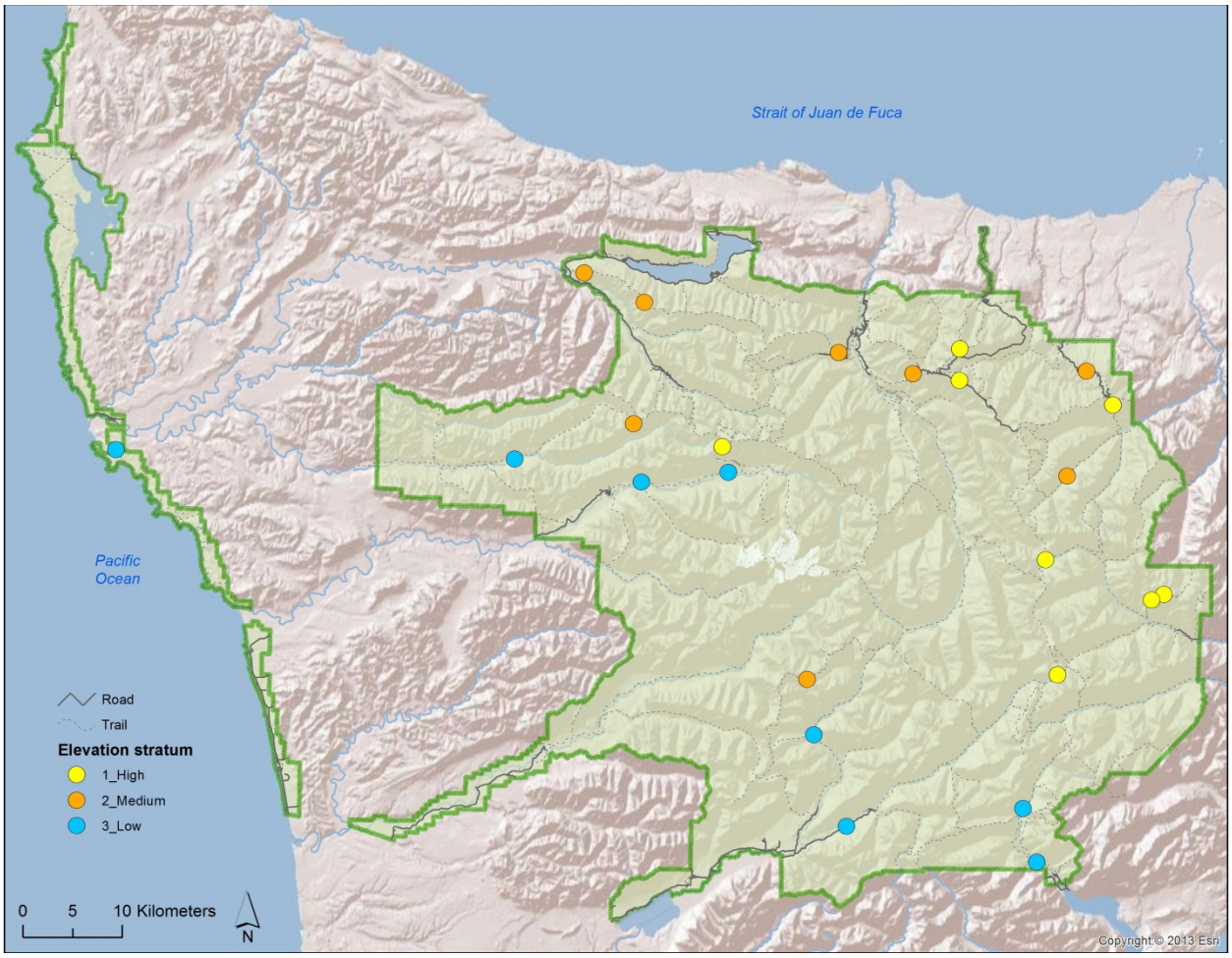


Figure 4. Approximate locations of transects conducted at Olympic National Park in 2015.

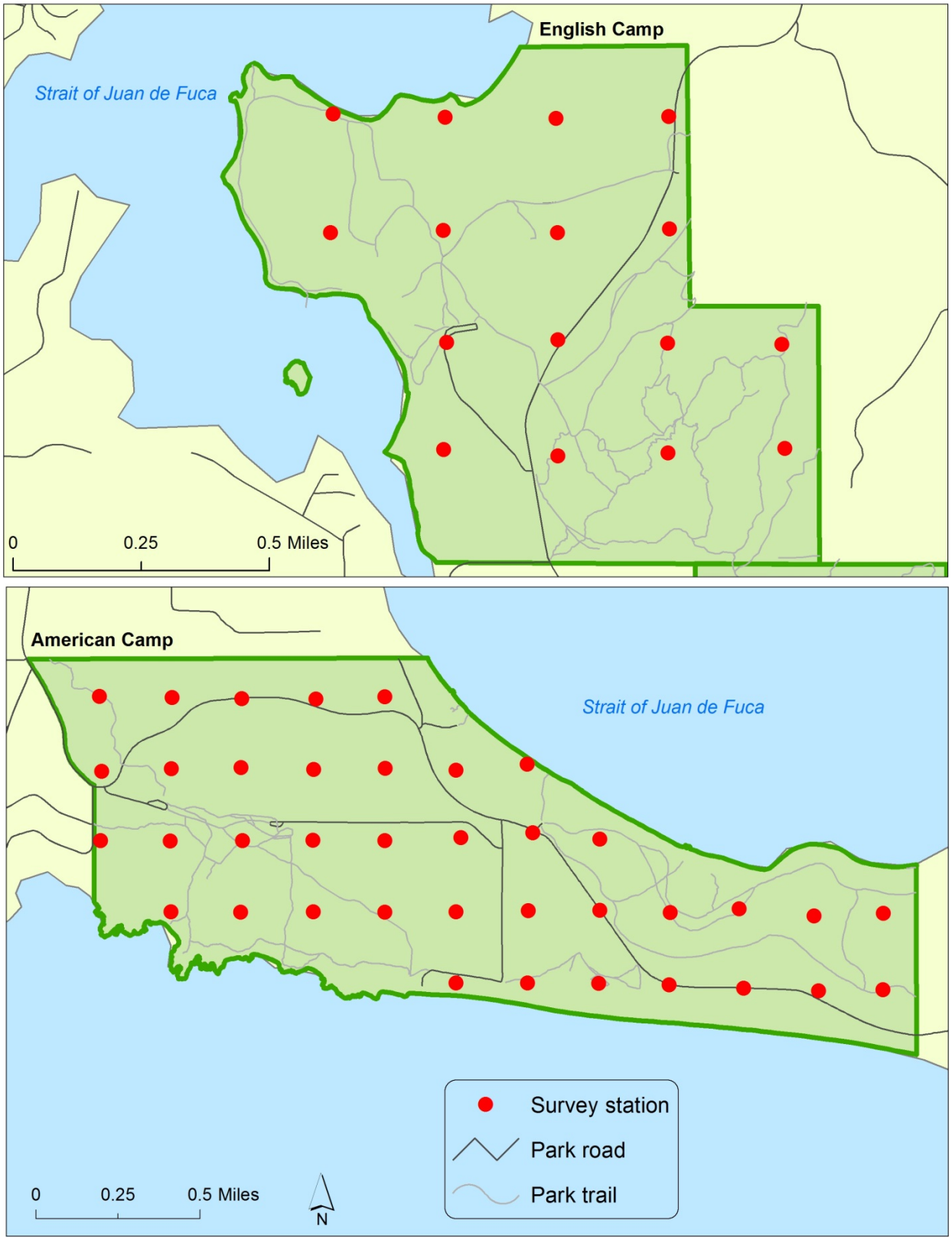


Figure 5. Locations of point count stations surveyed at San Juan Island National Historical Park in 2015; adjacent point count stations are 350 m apart.

Table 1. Observers who conducted point counts in the North Coast and Cascades Network in 2015.

Observer	Role
Jade Ajani	Technician
Martin Frye	Technician
Mandy Holmgren	Field Lead
Jay Love	Technician
Makie Matsumoto-Hervol	Technician
Graham Montgomery	Technician
Richard Roush	Technician
Dan Rousseau	Technician

Data Collection

All point count data were collected between May 25 and May 27 at SAJH, between June 14 and July 21 at MORA, between May 28 and July 28 at NOCA, and between May 20 and July 27 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. They were provided with maps and coordinates indicating the location of transect 'starting points' for those transects that had not yet been established, the starting points lying directly on trails or roads. There were two transects (NOCA-1058 and MORA-4083) that had not been established before 2015 due to snow and logistical issues in 2010, when the Alt5 panel of transects was previously sampled. Crew members were also provided maps and coordinates of all point count station locations on the transects, as well as narrative descriptions of point count stations and the travel routes between successive stations. These were used to locate the same point count stations that were previously established and surveyed. 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.

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 partitioned 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 analysis within an occupancy modeling framework that relies on detection or non-detection of individual birds within multiple time intervals to estimate detection probability.

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. Additionally, crew members recorded a complete list of all incidental bird species detected in the park throughout the field season, including common species that might not have been recorded during point counts or were not rare enough to warrant a rare bird report.

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

The Landbird Monitoring Protocol for national parks in the North Coast and Cascades Network (Siegel et al. 2007) 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 work on data entry and verification. The Field Lead finished verifying the remaining data 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 crew members verified the database records 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, the Field Lead conducted a rigorous quality review 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 are assessed quantitatively, allowing for annual results to be adjusted to account for variable detectability (Buckland et al. 2001, Nichols et al. 2009). Results in this report that have not yet been adjusted to account for detectability should be viewed as provisional only.

Results

In 2015 we surveyed 67 of the 68 intended transects in the large parks, including 33 annual-panel, and 34 fourth-alternating-panel transects (Table 2-3). The only transect not sampled in 2015 was annual panel 1013, a low-elevation NOCA transect. Appendix 1 provides a detailed multi-year survey history of all transects sampled in the large parks to date. We conducted 355 individual point counts at MORA, 374 point counts at NOCA and 374 point counts at OLYM (Table 2). We also conducted 54 point counts at SAJH, including 38 at American Camp and 16 at English Camp. During the 1,103 point counts in the three large parks, we counted 13,183 individual birds. Across the three large parks, we documented the presence of 153 species and one hybrid (Table 4), 104 of which were detected during point counts; the remaining 49 species were recorded only as incidental detections or on "Rare Bird Report Forms". At SAJH our field crew detected 89 species while in the park, 72 of which were detected during point counts.

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 62 bird species during point counts at MORA, 75 species during point counts at NOCA, and 57 species during point counts at OLYM (Table 5). Pooling detections on annual-panel transects across all species, we amassed 1,943 individual bird detections (average of 10.73 detections/point) at MORA, 2,309 detections (average of 11.37 detections/point) at NOCA, and 2,762 detections (average of 14.39 detections per point) at OLYM (Table 5). The five most frequently detected species on the annual-panel transects in 2015 were: varied thrush (571 detections), dark-eyed junco (565 detections), red crossbill (553 detections), pine siskin (478 detections), and Pacific wren (463 detections).

Pooling data across the annual-panel transects as well as the transects in the fourth alternating panel ("Alt5"), the number of individuals of each species detected during point counts (unlimited radius) and the number of transects on which each species was detected are provided in Table 6. Using data pooled across all transects, we detected 69 bird species during point counts at MORA, 84 species during point counts at NOCA, and 58 species during point counts at OLYM (Table 6). Considering data from the 67 surveyed transects, the five most frequently detected species were: red crossbill (1,103 detections), varied thrush (1,010 detections), dark-eyed junco (975 detections), pine siskin (884 detections), and Pacific wren (864 detections).

Marbled murrelet and spotted owl, the two bird species occurring in these parks that are listed under the Endangered Species Act, were both detected at times other than point counts this year and were documented on "Rare Bird Report Forms." Marbled murrelet was also detected during point counts. Detections of these species at times other than point counts are summarized in Table 7.

For 57 species (all species for which we amassed at least 47 point count detections over the period between 2005 and 2015), we present the total number of detections of each species on each park's annual panel transects during the 2005–2015 field seasons (Figure 6). We caution, however, that these detection totals have not been adjusted for differences in survey effort, observer effects, 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 SAJH our 54 point counts yielded 1,330 detections of 72 species (Table 8), a detection rate of 24.63 birds per point. The most frequently detected species was red crossbill (96 detections), followed by American robin (92 detections), Pacific-slope flycatcher (66 detections), house wren (64 detections), and savannah sparrow (63 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 2015.

Park	Panel	Elevation	Transect	No. of points surveyed
MORA	Ann1	Low	4001	15
MORA	Ann1	Low	4005	14
MORA	Ann1	Medium	4002	16
MORA	Ann1	Medium	4004	18
MORA	Ann1	Medium	4009	16
MORA	Ann1	Medium	4012	23
MORA	Ann1	High	4003	15
MORA	Ann1	High	4007	25
MORA	Ann1	High	4011	17
MORA	Ann1	High	4014	22
MORA	Alt5	Low	4024	25
MORA	Alt5	Low	4025	15
MORA	Alt5	Medium	4068	15
MORA	Alt5	Medium	4073	19
MORA	Alt5	Medium	4074	15
MORA	Alt5	Medium	4076	17
MORA	Alt5	High	4045	21
MORA	Alt5	High	4046	13
MORA	Alt5	High	4052	16
MORA	Alt5	High	4083	18
NOCA	Ann1	Low	1013	0
NOCA	Ann1	Low	1017	14
NOCA	Ann1	Low	1020	18
NOCA	Ann1	Low	1023	22
NOCA	Ann1	Medium	1015	18
NOCA	Ann1	Medium	1018	24
NOCA	Ann1	Medium	1022	16
NOCA	Ann1	Medium	1024	14
NOCA	Ann1	High	1014	22
NOCA	Ann1	High	1016	17
NOCA	Ann1	High	1019	14

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 2015 (continued).

Park	Panel	Elevation	Transect	No. of points surveyed
NOCA	Ann1	High	1021	24
NOCA	Alt5	Low	1062	11
NOCA	Alt5	Low	1063	16
NOCA	Alt5	Low	1065	13
NOCA	Alt5	Low	1067	13
NOCA	Alt5	Medium	1042	17
NOCA	Alt5	Medium	1043	13
NOCA	Alt5	Medium	1044	15
NOCA	Alt5	Medium	1045	10
NOCA	Alt5	High	1055	16
NOCA	Alt5	High	1058	18
NOCA	Alt5	High	1060	14
NOCA	Alt5	High	1064	15
OLYM	Ann1	Low	3001	13
OLYM	Ann1	Low	3121	19
OLYM	Ann1	Low	3126	15
OLYM	Ann1	Low	3134	18
OLYM	Ann1	Medium	3122	18
OLYM	Ann1	Medium	3123	17
OLYM	Ann1	Medium	3130	10
OLYM	Ann1	Medium	3200	23
OLYM	Ann1	High	3124	14
OLYM	Ann1	High	3125	15
OLYM	Ann1	High	3127	16
OLYM	Ann1	High	3128	14
OLYM	Alt5	Low	3165	12
OLYM	Alt5	Low	3166	15
OLYM	Alt5	Low	3169	13
OLYM	Alt5	Low	3170	11
OLYM	Alt5	Medium	3178	14
OLYM	Alt5	Medium	3183	15
OLYM	Alt5	Medium	3184	20
OLYM	Alt5	Medium	3185	11
OLYM	Alt5	High	3175	15
OLYM	Alt5	High	3179	19
OLYM	Alt5	High	3180	19
OLYM	Alt5	High	3188	18

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 2015.

	Elevation	Number of transects completed										
Park	**Stratum**	**2005[a]**	**2006[a]**	**2007[b]**	**2008[c]**	**2009[d]**	**2010[e]**	**2011[f]**	**2012[b]**	**2013[c]**	**2014[d]**	**2015[e]**
MORA	Low	2	2	4	4	4	4	4	4	4	4	4
MORA	Medium	4	4	8	8	8	8	6	8	8	8	8
MORA	High	4	4	8	8	8	7	3	8	8	8	8
MORA	All	10	10	20	20	20	19	13	20	20	20	20
NOCA	Low	4	4	8	8	7	8	8	8	8	8	7
NOCA	Medium	4	4	7	7	8	8	8	8	7	8	8
NOCA	High	4	4	7	5	8	6	5	8	8	8	8
NOCA	All	12	12	22	20	23	22	21	24	24	24	23
OLYM	Low	4	4	8	8	8	8	8	8	8	8	8
OLYM	Medium	4	3	8	7	8	8	7	8	8	8	8
OLYM	High	4	4	7	8	8	8	8	8	8	8	8
OLYM	All	12	11	23	23	24	24	23	24	24	24	24
ALL	Low	10	10	20	20	20	20	20	20	20	20	19
ALL	Medium	12	11	23	22	24	24	21	24	24	24	24
ALL	High	12	12	22	21	24	21	16	24	24	24	24
ALL	All	34	33	65	63	68	65	57	68	68	68	67

[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 and 2013.

[d]The annual panel along with the third alternating panel were surveyed in 2009 and 2014.

[e]The annual panel along with the fourth alternating panel were surveyed in 2010 and 2015.

[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 2015 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*
Trumpeter Swan *	*Cygnus buccinator*
Wood Duck *	*Aix sponsa*
American Wigeon *	*Anas americana*
Mallard	*Anas platyrhynchos*
Ring-necked Duck *	*Aythya collaris*
Greater Scaup *	*Aythya marila*
Harlequin Duck *	*Histrionicus histrionicus*
White-winged Scoter *	*Melanitta fusca*
Black Scoter *	*Melanitta nigra*
Bufflehead *	*Bucephala albeola*
Barrow's Goldeneye *	*Bucephala islandica*
Hooded Merganser *	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Red-breasted Merganser *	*Mergus serrator*
Ruffed Grouse	*Bonasa umbellus*
White-tailed Ptarmigan	*Lagopus leucurus*
Sooty Grouse	*Dendragapus fuliginosus*
Red-throated Loon *	*Gavia stellata*
Common Loon *	*Gavia immer*
Pied-billed Grebe *	*Podilymbus podiceps*
Western Grebe *	*Aechmophorus occidentalis*
Sooty Shearwater *	*Puffinus griseus*
Double-crested Cormorant *	*Phalacrocorax auritus*
Pelagic Cormorant *	*Phalacrocorax pelagicus*
Turkey Vulture *	*Cathartes aura*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
Cooper's Hawk *	*Accipiter cooperii*
Northern Goshawk	*Accipiter gentilis*
Red-tailed Hawk *	*Buteo jamaicensis*
Golden Eagle *	*Aquila chrysaetos*
Black Oystercatcher *	*Haematopus bachmani*
Killdeer *	*Charadrius vociferus*
Spotted Sandpiper	*Actitis macularia*
Greater Yellowlegs	*Tringa melanoleuca*
Dunlin *	*Calidris alpina*
Red-necked Phalarope *	*Phalaropus lobatus*
Pigeon Guillemot *	*Cepphus columba*
Marbled Murrelet	*Brachyramphus marmoratus*
Bonaparte's Gull *	*Larus philadelphia*
Mew Gull *	*Larus canus*
Ring-billed Gull *	*Larus delawarensis*
Western Gull *	*Larus occidentalis*
California Gull *	*Larus californicus*
Glaucous-winged Gull *	*Larus glaucescens*

Table 4. All species recorded in the three large North Coast and Cascades Network parks during the 2015 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
Band-tailed Pigeon	*Patagioenas fasciata*
Eurasian Collared-dove *	*Streptopelia decaocto*
Western Screech-Owl *	*Megascops kennicottii*
Great Horned Owl *	*Bubo virginianus*
Northern Pygmy-Owl	*Glaucidium gnoma*
Spotted Owl *	*Strix occidentalis*
Barred Owl	*Strix varia*
Common Nighthawk	*Chordeiles minor*
Black Swift	*Cypseloides niger*
Vaux's Swift	*Chaetura vauxi*
Rufous Hummingbird	*Selasphorus rufus*
Calliope Hummingbird	*Stellula calliope*
Belted Kingfisher	*Ceryle alcyon*
Red-naped Sapsucker *	*Sphyrapicus nuchalis*
Red-breasted Sapsucker	*Sphyrapicus ruber*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
White-headed Woodpecker *	*Picoides albolarvatus*
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*
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*

Table 4. All species recorded in the three large North Coast and Cascades Network parks during the 2015 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
Barn Swallow	*Hirundo rustica*
Mountain Chickadee	*Poecile gambeli*
Chestnut-backed Chickadee	*Poecile rufescens*
Bushtit *	*Psaltriparus minimus*
Red-breasted Nuthatch	*Sitta canadensis*
Brown Creeper	*Certhia americana*
Rock Wren	*Salpinctes obsoletus*
Canyon Wren	*Catherpes mexicanus*
House Wren	*Troglodytes aedon*
Pacific Wren	*Troglodytes pacificus*
Marsh Wren *	*Cistothorus palustris*
American Dipper	*Cinclus mexicanus*
Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned Kinglet	*Regulus calendula*
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	*Vermivora celata*
Nashville Warbler	*Vermivora ruficapilla*
MacGillivray's Warbler	*Oporornis 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*
Townsend's x Hermit Warbler hybrid	*Setophaga townsendi x occidentalis*
Hermit Warbler	*Setophaga occidentalis*
Wilson's Warbler	*Wilsonia pusilla*
Spotted Towhee	*Pipilo maculatus*
Chipping Sparrow	*Spizella passerina*
Vesper Sparrow	*Pooecetes gramineus*
Savannah Sparrow	*Passerculus sandwichensis*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
White-crowned Sparrow	*Zonotrichia leucophrys*

Table 4. All species recorded in the three large North Coast and Cascades Network parks during the 2015 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
Golden-crowned Sparrow *	*Zonotrichia atricapilla*
Dark-eyed Junco	*Junco hyemalis*
Western Tanager	*Piranga ludoviciana*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Lazuli Bunting	*Passerina amoena*
Red-winged Blackbird	*Agelaius phoeniceus*
Brown-headed Cowbird	*Molothrus ater*
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*
Pine Grosbeak	*Pinicola enucleator*
Purple Finch	*Haemorhous purpureus*
Cassin's Finch	*Haemorhous cassinii*
Red Crossbill	*Loxia curvirostra*
Pine Siskin	*Carduelis pinus*
American Goldfinch *	*Carduelis 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 2015.

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Canada Goose		1		1		1		1
Common Merganser			1	1			2	2
White-tailed Ptarmigan		1		1		1		1
Sooty Grouse	1	7	11	19	1	16	49	66
Bald Eagle			1	1			2	2
Northern Goshawk		1		1		1		1
Spotted Sandpiper	1	1		2	2	2		4
Greater Yellowlegs			1	1			1	1
Marbled Murrelet			1	1			4	4
Band-tailed Pigeon	1	2	5	8	6	3	17	26
Northern Pygmy-Owl		1		1		1		1
Common Nighthawk	1			1	1			1
Black Swift		1		1		4		4
Vaux's Swift	7	3	2	12	10	9	14	33
Rufous Hummingbird	3	6	5	14	7	16	9	32
Calliope Hummingbird		4		4		4		4
Belted Kingfisher			2	2			2	2
Red-breasted Sapsucker	1	6		7	1	38		39
Downy Woodpecker		1		1		1		1
Hairy Woodpecker	8	9	10	27	14	19	28	61
American Three-toed Woodpecker		1	1	2		1	1	2
Northern Flicker	3	3	9	15	13	11	34	58
Pileated Woodpecker	2	3	3	8	2	4	4	10
Prairie Falcon	1			1	1			1
Olive-sided Flycatcher	2	5	7	14	4	25	20	49
Western Wood-Pewee	1	4		5	5	19		24
Willow Flycatcher		1	1	2		1	1	2

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 2015 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Hammond's Flycatcher	6	7	9	22	34	129	57	220
Dusky Flycatcher		2		2		3		3
Pacific-slope Flycatcher	5	4	11	20	40	20	181	241
Say's Phoebe		1		1		2		2
Cassin's Vireo		5		5		20		20
Hutton’s Vireo			1	1			1	1
Warbling Vireo	3	7	5	15	11	57	41	109
Red-eyed Vireo		3		3		10		10
Gray Jay	9	4	8	21	27	18	40	85
Steller’s Jay	3	3	6	12	32	9	21	62
Clark’s Nutcracker	1	2		3	2	30		32
American Crow		1		1		1		1
Common Raven	5	5	4	14	5	7	8	20
Horned Lark	1		1	2	3		1	4
Tree Swallow		1		1		1		1
Violet-green Swallow		1		1		9		9
Northern Rough-winged Swallow			1	1			2	2
Barn Swallow	1			1	13			13
Mountain Chickadee	4	3		7	11	25		36
Chestnut-backed Chickadee	8	9	10	27	101	104	164	369
Red-breasted Nuthatch	10	10	9	29	65	76	115	256
Brown Creeper	7	7	9	23	27	15	33	75
Canyon Wren		1		1		1		1
House Wren		2		2		5		5
Pacific Wren	9	8	12	29	149	127	187	463
American Dipper	2		1	3	4		1	5
Golden-crowned Kinglet	10	10	12	32	100	52	137	289

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 2015 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Ruby-crowned Kinglet		2	1	3		2	1	3
Mountain Bluebird	1	1		2	13	2		15
Townsend's Solitaire	1	2	6	9	1	5	19	25
Veery		1		1		1		1
Swainson's Thrush	2	6	5	13	14	149	39	202
Hermit Thrush	9	6	7	22	107	59	95	261
American Robin	8	11	10	29	56	89	99	244
Varied Thrush	10	9	12	31	245	117	209	571
American Pipit	2		2	4	23		4	27
Cedar Waxwing	1	5	2	8	3	31	3	37
Orange-crowned Warbler		2	2	4		2	2	4
Nashville Warbler	1	4		5	1	9		10
MacGillivray's Warbler		7	1	8		66	5	71
American Redstart		1		1		2		2
Yellow Warbler	1	5	2	8	2	56	12	70
Yellow-rumped Warbler	2	8	3	13	10	114	8	132
Black-throated Gray Warbler	1	2	3	6	1	13	24	38
Townsend's Warbler	8	8	7	23	48	90	103	241
Townsend's x Hermit Warbler	1		1	2	1		1	2
Hermit Warbler	1		1	2	10		2	12
Wilson's Warbler	2	2	6	10	7	7	38	52
Spotted Towhee		1		1		1		1
Chipping Sparrow	3	7	1	11	23	55	2	80
Vesper Sparrow	1			1	1			1
Savannah Sparrow	1			1	1			1
Fox Sparrow	2	1		3	2	3		5
Song Sparrow	1	4	3	8	3	11	7	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 2015 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
White-crowned Sparrow	1		2	3	1		6	7
Dark-eyed Junco	10	8	11	29	135	75	355	565
Western Tanager	4	9	3	16	16	96	25	137
Black-headed Grosbeak	1	5	3	9	3	19	11	33
Lazuli Bunting	1	1		2	4	1		5
Red-winged Blackbird	1			1	1			1
Brown-headed Cowbird		1		1		3		3
Gray-crowned Rosy-Finch	1			1	6			6
Pine Grosbeak	1	1	4	6	1	1	7	9
Purple Finch		1		1		1		1
Cassin's Finch	2	3		5	2	36		38
Red Crossbill	9	6	12	27	181	143	229	553
Pine Siskin	9	9	9	27	205	96	177	478
Evening Grosbeak	10	9	9	28	125	56	102	283
All species pooled					1,943	2,309	2,762	7,014
Detections per point (all species pooled)					10.73	11.37	14.39	12.18

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 2015.

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Canada Goose		3		3		5		5
Mallard		1		1		2		2
Common Merganser	1		1	2	1		2	3
Ruffed Grouse		1	1	2		1	1	2
White-tailed Ptarmigan		2		2		2		2
Sooty Grouse	4	17	18	39	7	39	79	125
Osprey			1	1			1	1
Bald Eagle			1	1			2	2
Northern Goshawk		1		1		1		1
Spotted Sandpiper	4	3	3	10	7	4	8	19
Greater Yellowlegs			1	1			1	1
Marbled Murrelet			4	4			7	7
Band-tailed Pigeon	2	2	10	14	9	3	30	42
Northern Pygmy-Owl		1	1	2		1	1	2
Barred Owl			1	1			1	1
Common Nighthawk	2			2	3			3
Black Swift	2	3	1	6	3	9	1	13
Vaux's Swift	10	7	4	21	30	28	22	80
Rufous Hummingbird	6	12	14	32	13	35	32	80
Calliope Hummingbird		5		5		6		6
Belted Kingfisher			2	2			2	2
Red-breasted Sapsucker	3	10	2	15	4	46	3	53
Downy Woodpecker		1		1		1		1
Hairy Woodpecker	13	15	20	48	23	32	46	101
American Three-toed Woodpecker	1	1	1	3	1	1	1	3
Black-backed Woodpecker		2		2		6		6
Northern Flicker	9	11	17	37	26	33	70	129

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 2015 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Pileated Woodpecker	3	4	6	13	3	5	11	19
American Kestrel		1		1		3		3
Peregrine Falcon		1		1		1		1
Prairie Falcon	1			1	1			1
Olive-sided Flycatcher	6	9	13	28	16	40	48	104
Western Wood-Pewee	1	6	1	8	5	35	1	41
Willow Flycatcher		2	2	4		2	2	4
Hammond's Flycatcher	11	15	18	44	82	210	116	408
Dusky Flycatcher		4		4		7		7
Pacific-slope Flycatcher	11	5	21	37	116	21	347	484
Say's Phoebe		1		1		2		2
Cassin's Vireo		9		9		30		30
Hutton’s Vireo			2	2			3	3
Warbling Vireo	4	13	9	26	12	111	66	189
Red-eyed Vireo		6		6		16		16
Gray Jay	19	5	18	42	80	20	73	173
Steller’s Jay	9	9	11	29	47	29	35	111
Clark’s Nutcracker	3	6		9	6	51		57
American Crow		1	2	3		1	5	6
Common Raven	13	6	6	25	20	8	10	38
Horned Lark	1	1	2	4	3	1	4	8
Tree Swallow		1		1		1		1
Violet-green Swallow	1	1		2	2	9		11
Northern Rough-winged Swallow			2	2			4	4
Barn Swallow	2			2	14			14
Mountain Chickadee	7	6		13	26	63		89

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 2015 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Chestnut-backed Chickadee	17	16	21	54	255	141	277	673
Red-breasted Nuthatch	20	20	21	61	260	123	193	576
Brown Creeper	14	12	18	44	57	21	74	152
Rock Wren			1	1			1	1
Canyon Wren		2		2		2		2
House Wren		4	1	5		11	1	12
Pacific Wren	19	15	23	57	317	182	365	864
American Dipper	4	3	3	10	7	5	3	15
Golden-crowned Kinglet	20	21	23	64	183	106	239	528
Ruby-crowned Kinglet	1	5	1	7	1	11	1	13
Mountain Bluebird	2	3		5	20	4		24
Townsend's Solitaire	3	6	7	16	8	18	32	58
Veery		2		2		2		2
Swainson's Thrush	3	15	8	26	15	242	57	314
Hermit Thrush	19	15	16	50	219	141	138	498
American Robin	16	22	21	59	93	166	182	441
Varied Thrush	20	16	24	60	452	178	380	1010
American Pipit	3	2	4	9	27	16	13	56
Cedar Waxwing	2	10	3	15	9	58	5	72
Orange-crowned Warbler	1	3	4	8	1	3	5	9
Nashville Warbler	1	7		8	1	54		55
MacGillivray's Warbler		12	2	14		96	14	110
American Redstart		1		1		2		2
Yellow Warbler	1	7	5	13	2	98	21	121
Yellow-rumped Warbler	5	17	6	28	43	207	17	267
Black-throated Gray Warbler	1	4	4	9	1	29	38	68

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 2015 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Townsend's Warbler	15	18	16	49	80	185	162	427
Townsend's x Hermit Warbler	1		1	2	1		1	2
Hermit Warbler	1		3	4	10		7	17
Wilson's Warbler	3	2	11	16	8	7	64	79
Spotted Towhee		3		3		10		10
Chipping Sparrow	5	15	2	22	42	105	3	150
Vesper Sparrow	1			1	1			1
Savannah Sparrow	1			1	1			1
Fox Sparrow	3	4		7	3	21		24
Song Sparrow	1	5	7	13	3	12	17	32
Lincoln's Sparrow	3			3	5			5
White-crowned Sparrow	1		4	5	1		12	13
Dark-eyed Junco	20	18	23	61	284	145	546	975
Western Tanager	10	17	11	38	29	196	57	282
Black-headed Grosbeak	2	10	7	19	4	31	18	53
Lazuli Bunting	1	5		6	4	6		10
Red-winged Blackbird	1			1	1			1
Brown-headed Cowbird		2		2		7		7
Gray-crowned Rosy-Finch	1	2	1	4	6	12	3	21
Pine Grosbeak	4	3	5	12	11	3	8	22
Purple Finch		1		1		1		1
Cassin's Finch	4	7		11	10	63		73
Red Crossbill	19	11	22	52	538	213	352	1103

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 2015 (continued).

	Number of transects with detections				Number of individual detections			
Species	**MORA**	**NOCA**	**OLYM**	**ALL**	**MORA**	**NOCA**	**OLYM**	**ALL**
Pine Siskin	18	16	20	54	404	203	277	884
Evening Grosbeak	20	16	21	57	245	101	187	533
All species pooled					4,222	4,158	4,805	13,185
Detections per point (all species pooled)					11.89	11.12	12.85	11.95
Number of species detected during point counts					69	84	58	104

Table 7. Species listed under the Endangered Species Act recorded on "Rare Bird Detection Forms" in each park in 2015, excluding individuals that were also detected during point counts.

	Number of birds detected (excluding individuals also detected during point counts)		
Species	**Mount Rainier**	**North Cascades**	**Olympic**
Spotted Owl	-	1	1
Marbled Murrelet	-	-	4

Table 8. Number of points with detections and number of individual detections for each species detected during point counts at San Juan Island National Historical Park in 2015.

Species	Number of points with detections	Number of individual detections
Canada Goose	11	18
Mallard	1	10
Blue-winged Teal	1	2
Green-winged Teal	1	1
Surf Scoter	1	6
California Quail	6	8
Pacific Loon	1	1
Common Loon	1	1
Double-crested Cormorant	1	4
Pelagic Cormorant	5	22
Great Blue Heron	1	1
Turkey Vulture	1	4
Bald Eagle	15	19
Red-tailed Hawk	3	3
Killdeer	2	4
Rhinoceros Auklet	3	14
Glaucous-winged Gull	13	46
Band-tailed Pigeon	1	2
Eurasian Collared-dove	3	3
Mourning Dove	6	6
Anna's Hummingbird	1	1
Rufous Hummingbird	10	10
Belted Kingfisher	2	2
Hairy Woodpecker	3	3
Northern Flicker	5	5
Pileated Woodpecker	4	4
Olive-sided Flycatcher	17	21
Western Wood-Pewee	1	1
Pacific-slope Flycatcher	28	66
Cassin's Vireo	8	9
Hutton's Vireo	4	4
Warbling Vireo	16	20
American Crow	16	23
Common Raven	10	14
Northern Rough-winged Swallow	2	3
Barn Swallow	8	17

Table 8. Number of points with detections and number of individual detections for each species detected during point counts at San Juan Island National Historical Park in 2015 (continued).

Species	Number of points with detections	Number of individual detections
Chestnut-backed Chickadee	21	35
Bushtit	1	3
Red-breasted Nuthatch	21	23
Brown Creeper	13	18
House Wren	29	64
Pacific Wren	10	12
Bewick's Wren	4	4
Golden-crowned Kinglet	15	21
Swainson's Thrush	29	58
American Robin	46	92
Varied Thrush	5	8
European Starling	1	12
Cedar Waxwing	5	11
Orange-crowned Warbler	31	52
Common Yellowthroat	7	9
Yellow Warbler	2	3
Yellow-rumped Warbler	4	4
Black-throated Gray Warbler	8	10
Townsend's Warbler	10	18
Wilson's Warbler	13	17
Spotted Towhee	26	39
Chipping Sparrow	2	2
Savannah Sparrow	22	63
Song Sparrow	17	25
White-crowned Sparrow	29	51
Golden-crowned Sparrow	1	1
Dark-eyed Junco	11	15
Western Tanager	8	10
Black-headed Grosbeak	7	8
Red-winged Blackbird	10	13
Brown-headed Cowbird	25	49
House Finch	11	21
Purple Finch	6	8
Red Crossbill	13	96
Pine Siskin	12	19
American Goldfinch	21	58

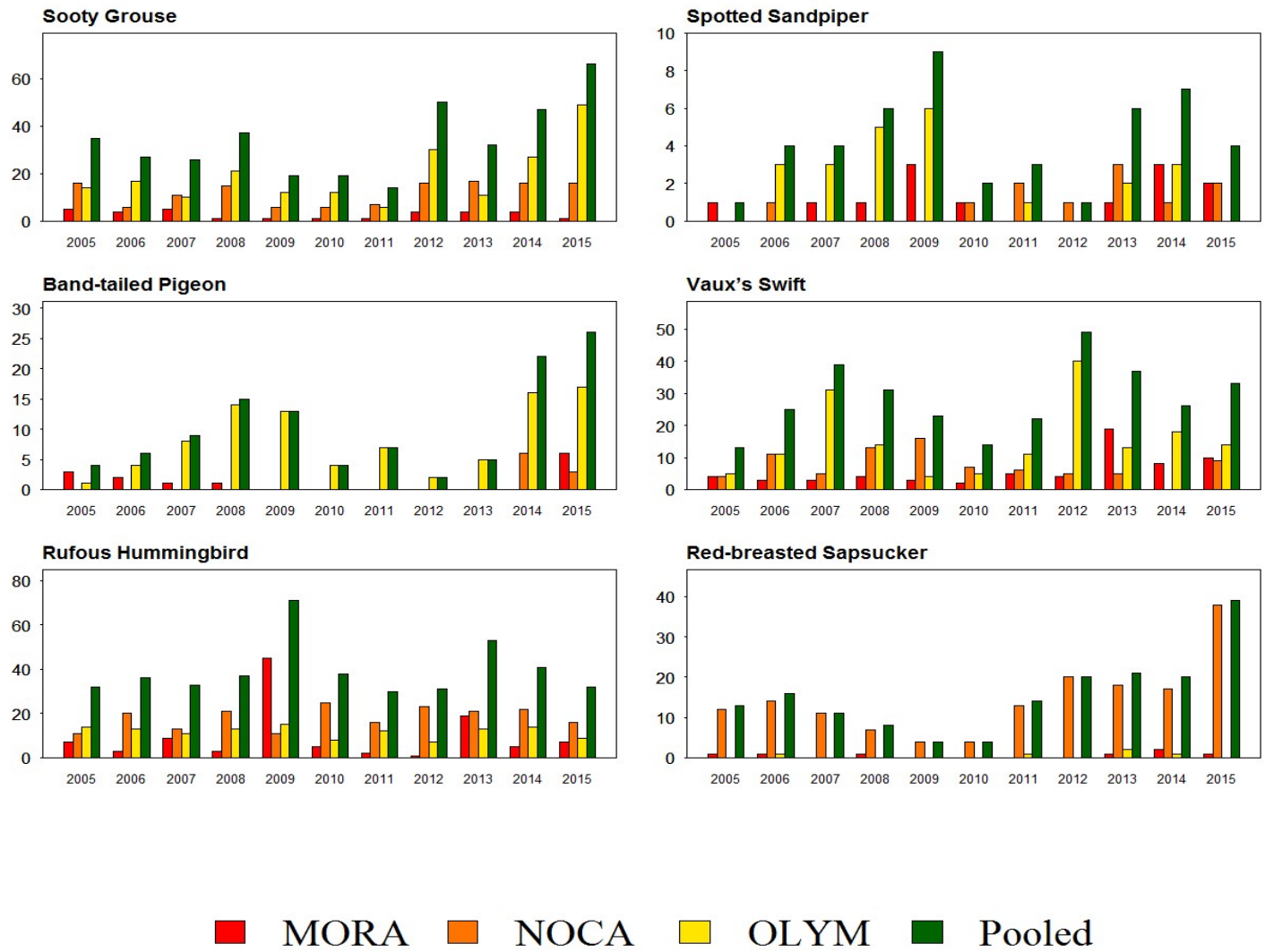
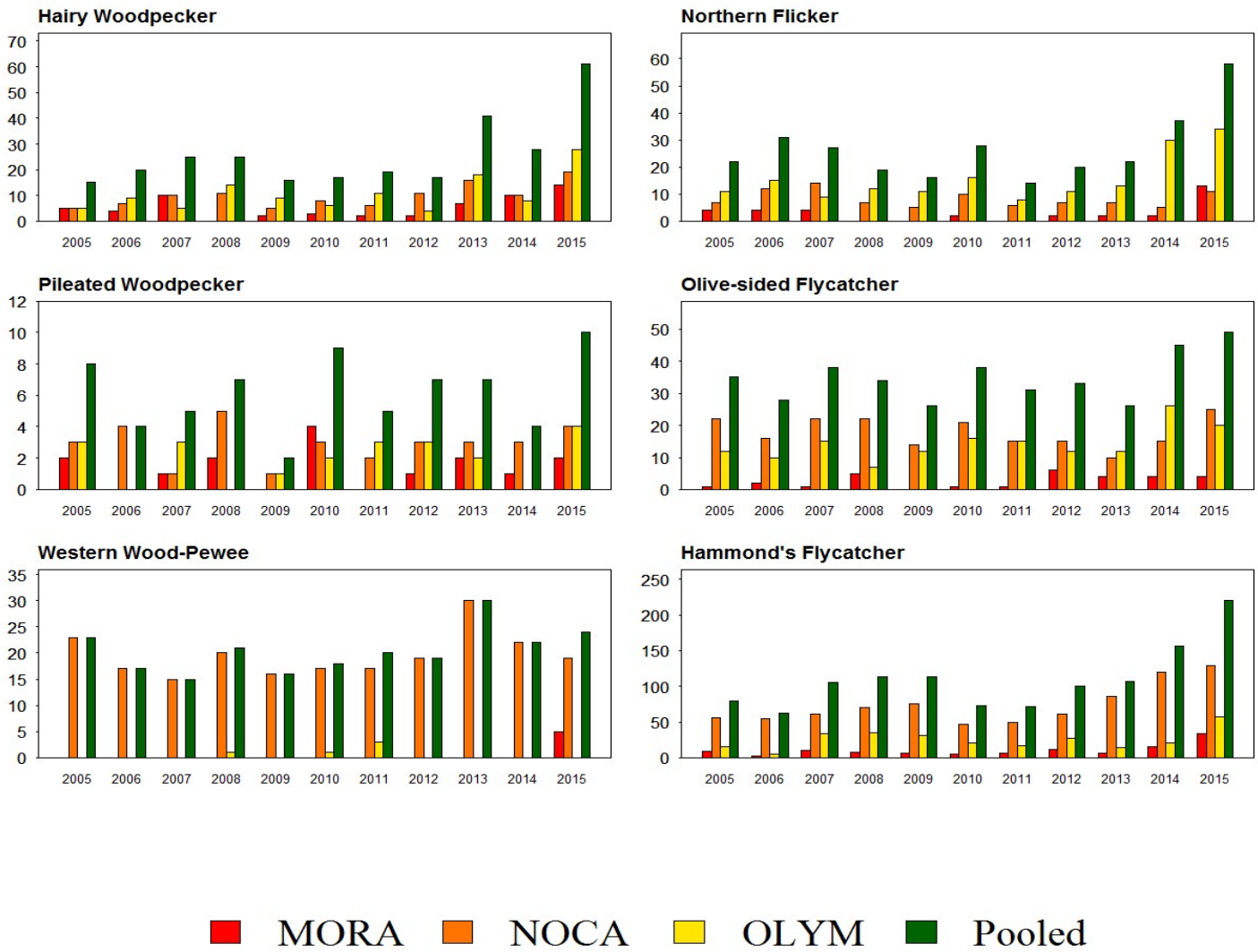


Figure 6. Number of times each species was detected on annual-panel transects at Mount Rainier (MORA), North Cascades (NOCA), and Olympic (OLYM) National Parks, and all three parks pooled (always presented in that order) during the 2005–2015 field seasons. The figure includes all species for which we amassed at least 47 point count detections on annual-panel transects over the 11 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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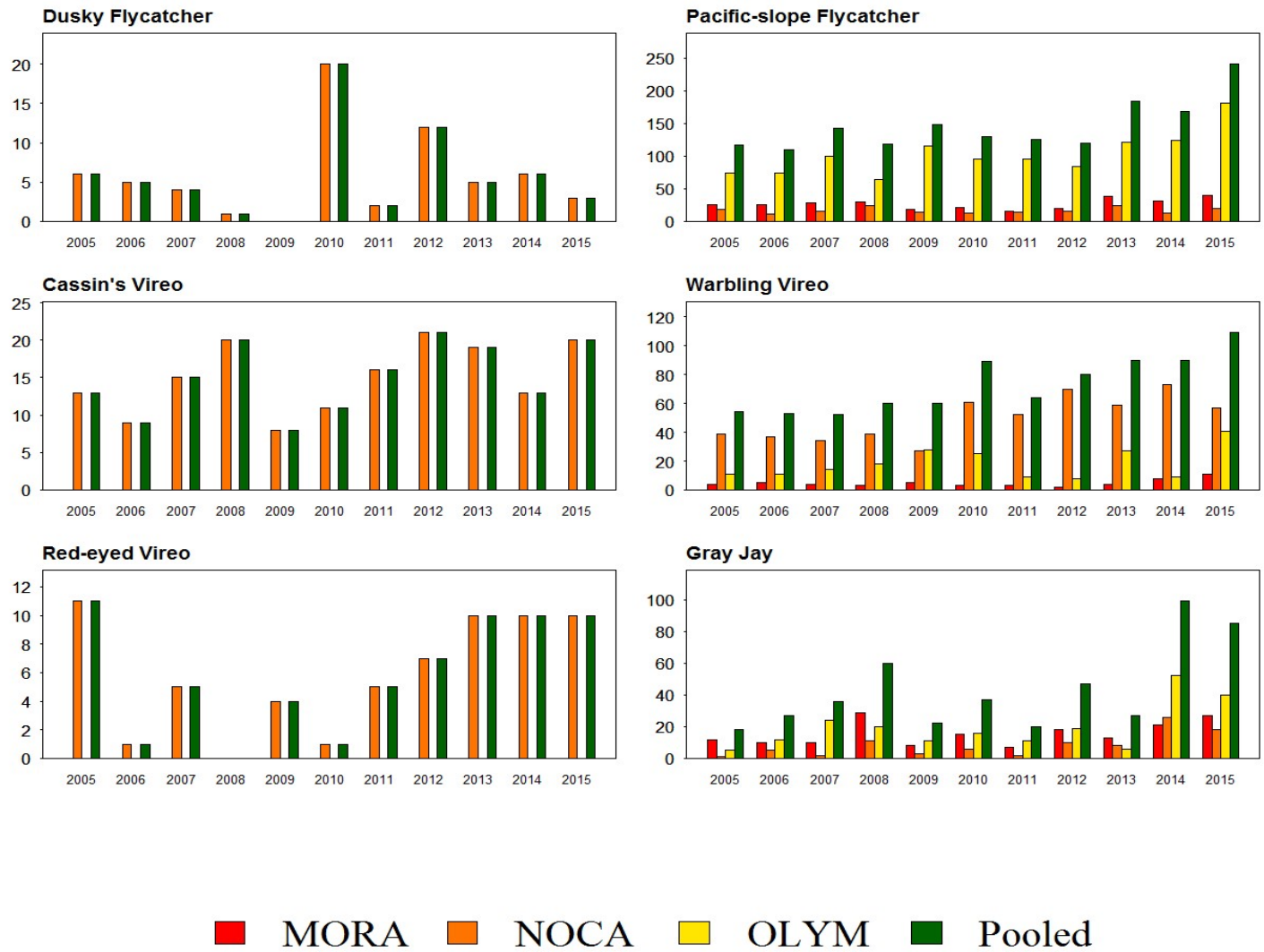

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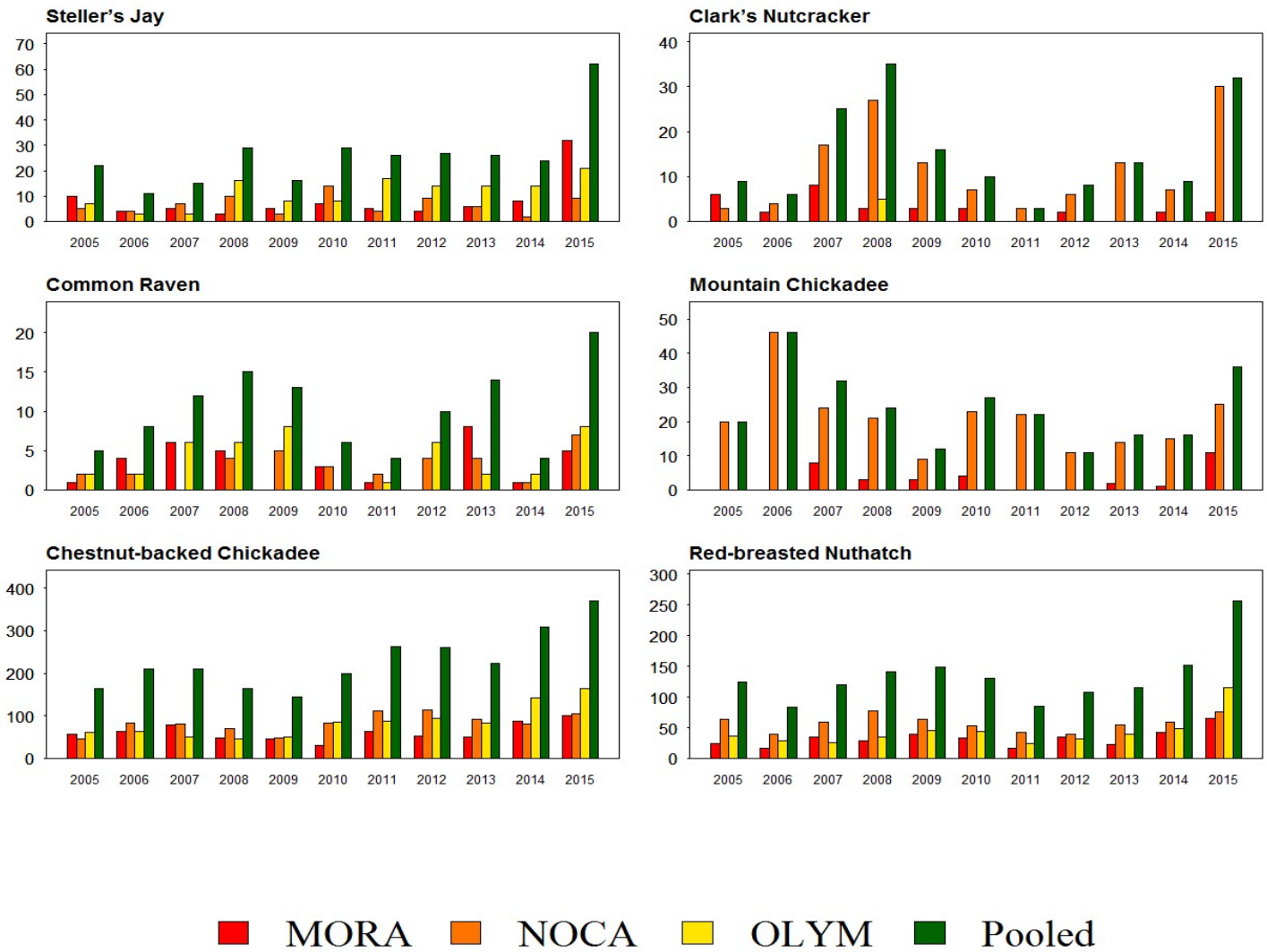

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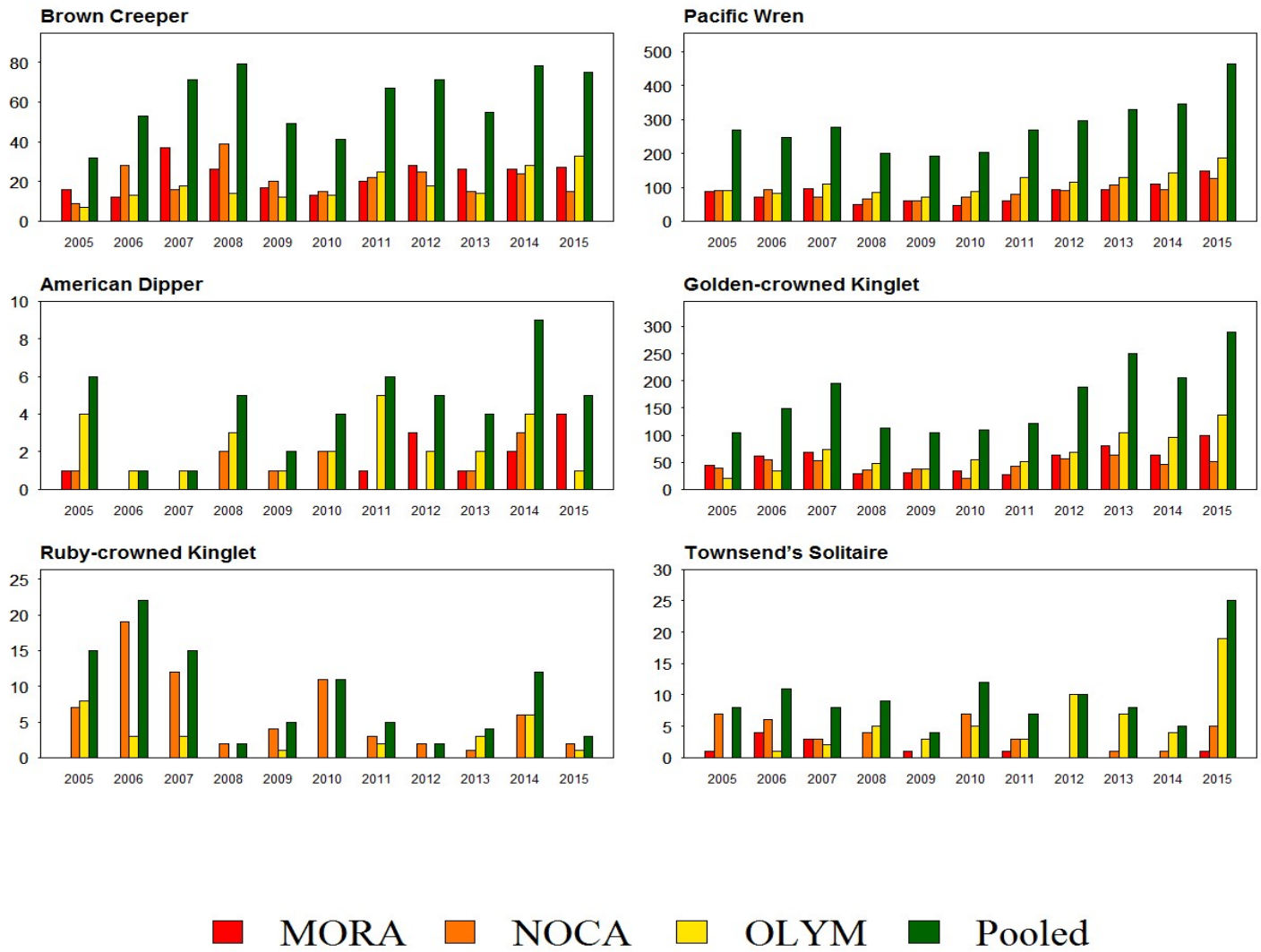

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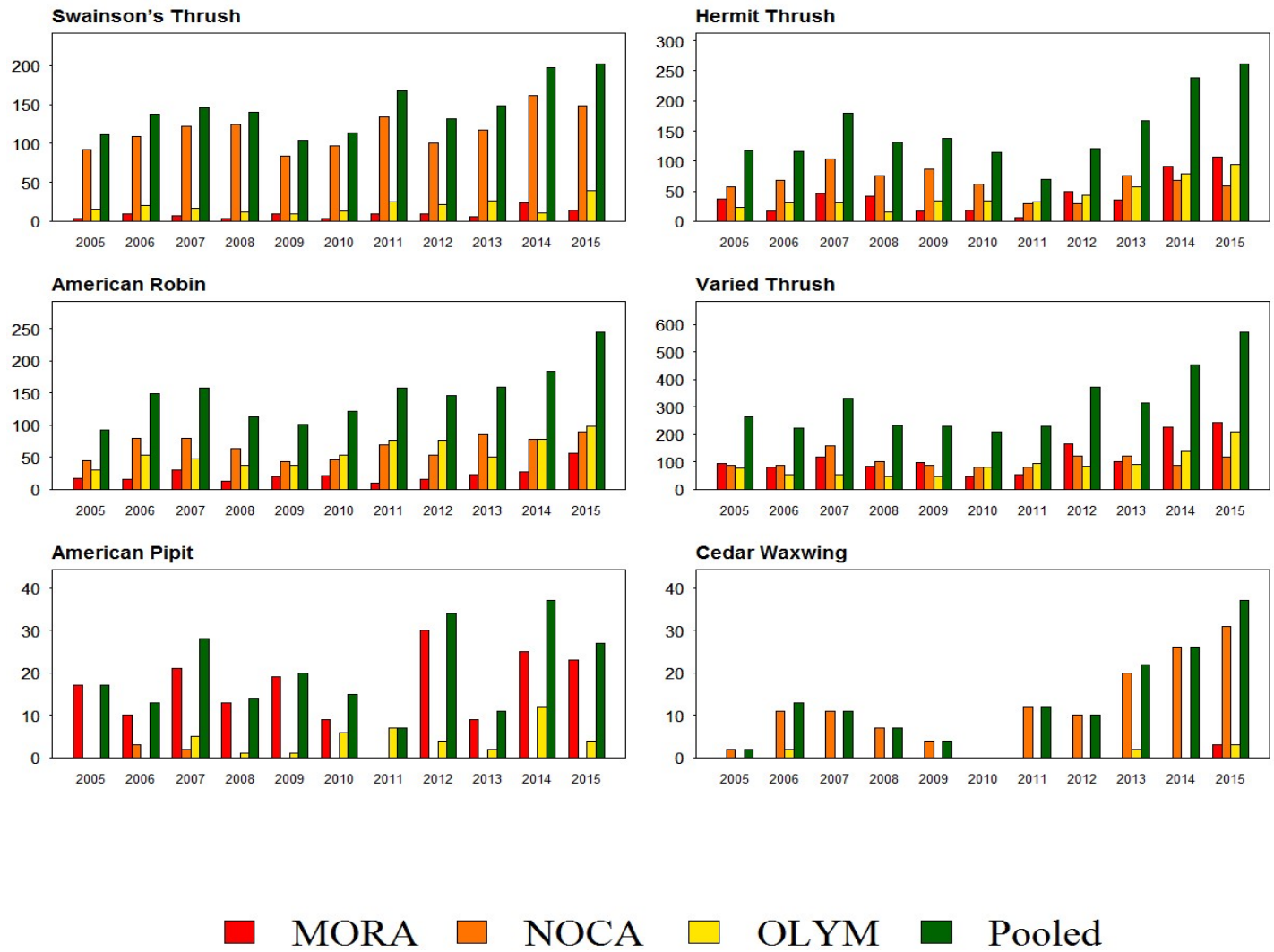

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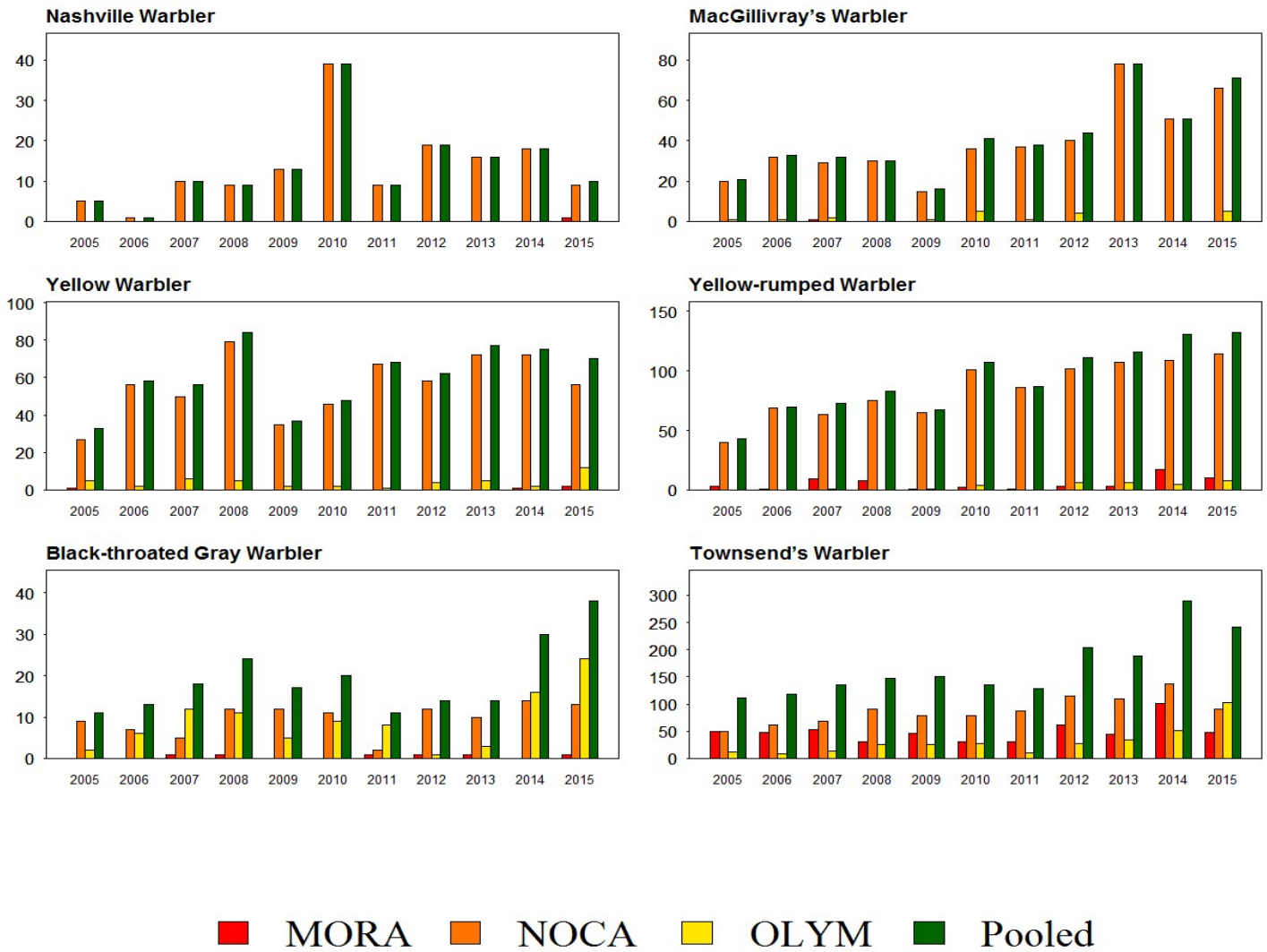

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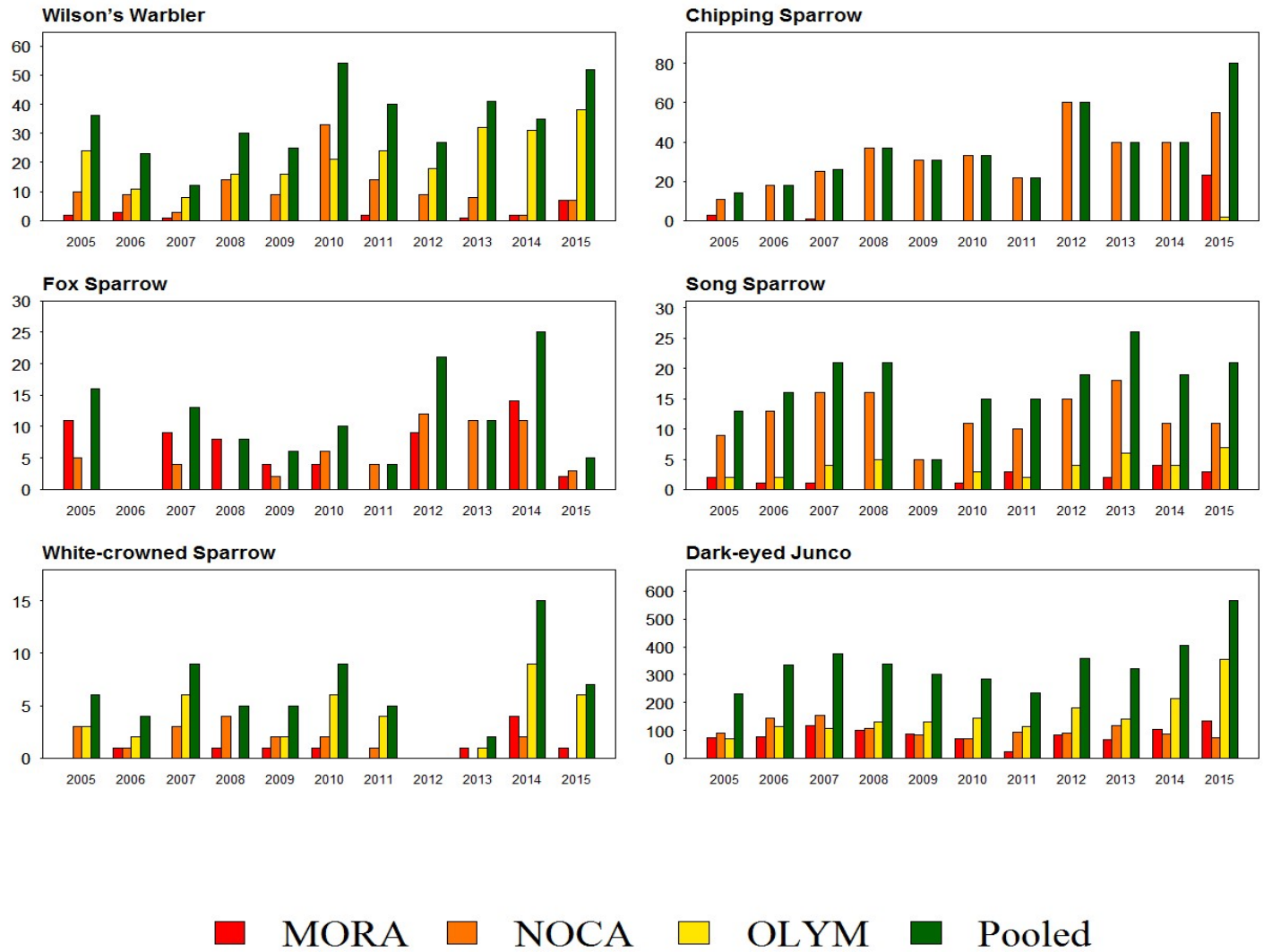

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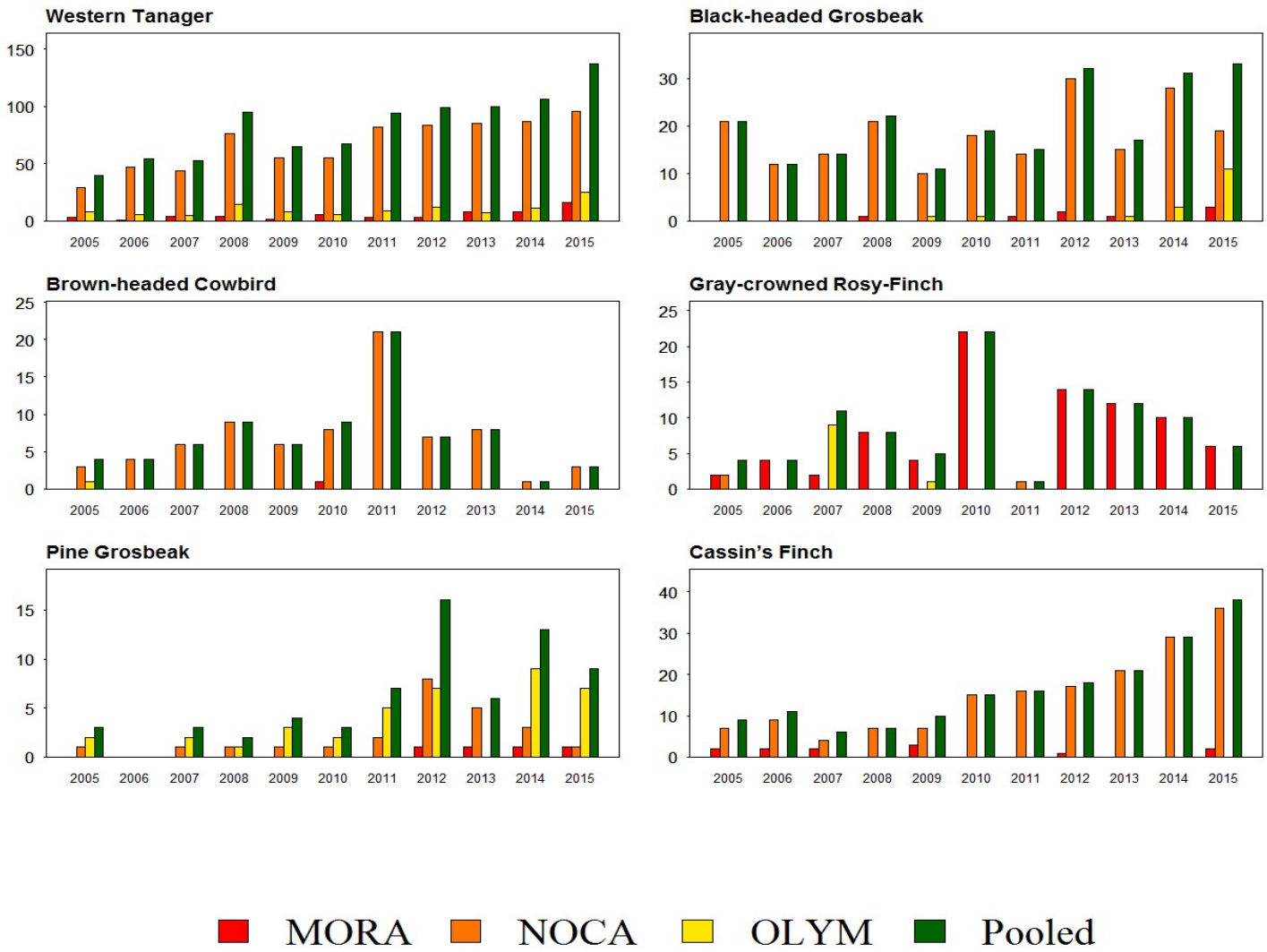

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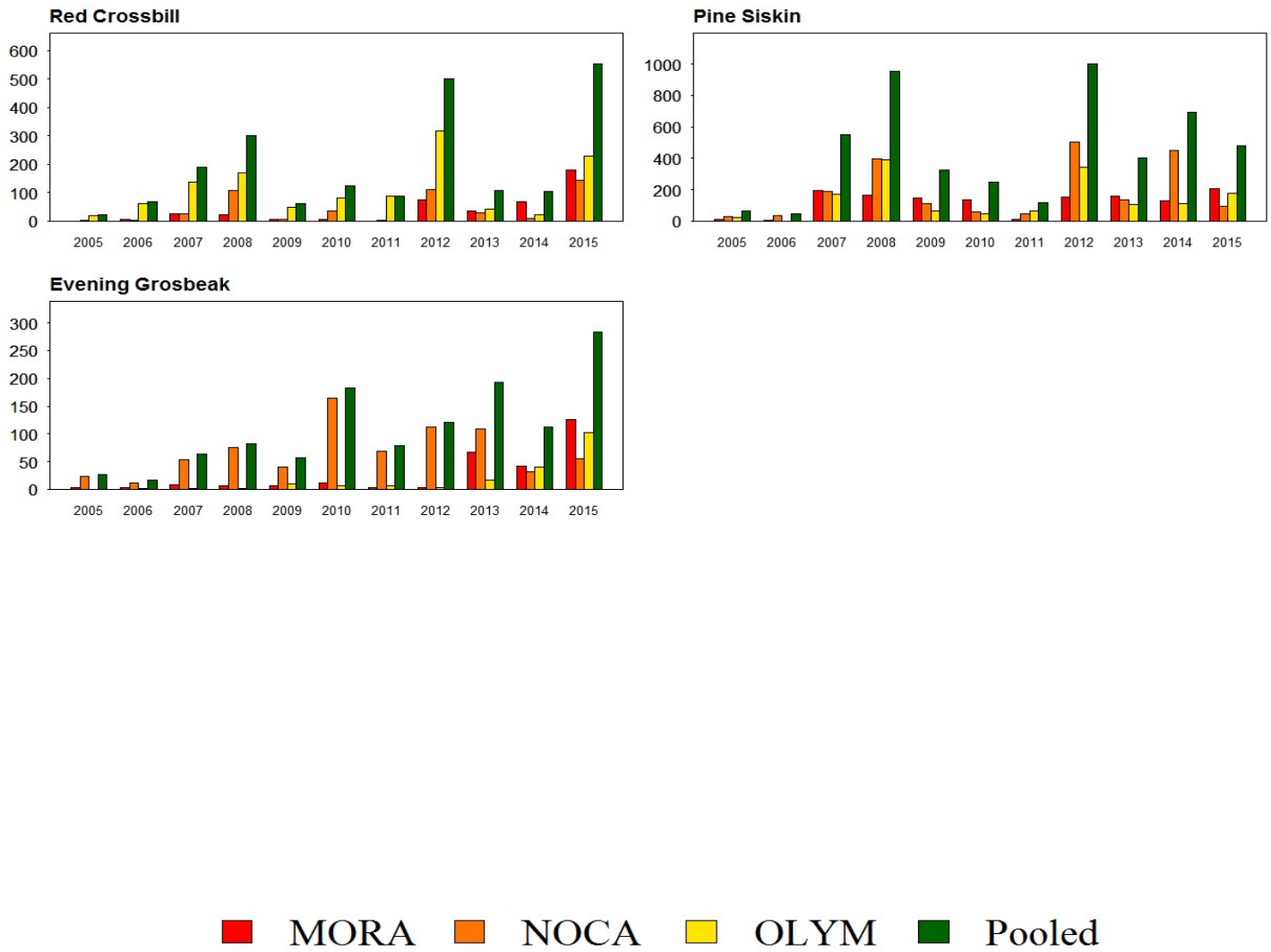

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Discussion

We completed our ninth year of full implementation of the NCCN Landbird Monitoring Project with the experience gained from two pilot field seasons (2005 and 2006) and eight previous years of full protocol implementation. Our procedures for season preparation, data collection, data management, data analysis, and reporting (Siegel et al. 2007) have all been well vetted, and required no substantial changes this year. Due to one technician backing out two days before training started as well as two of the technicians never passing the bird identification evaluation, there were only four crew members who were able to conduct point counts full-time throughout the field season. However, several qualified people were able to fill in for portions of the field season, all of whom were former technicians from The Institute for Bird Populations.

In the three large parks we were able to survey 67 of the 68 intended transects this year, missing one due to a trail closure related to the Thunder Creek Fire at NOCA. There was a record-low snowpack in the spring of 2015, which enabled relatively easy access to most of our transects throughout the season, but the hot, dry spring led to several early-season wildfires in NOCA and OLYM, and prevented access to certain areas of the parks. However, access to only one of our transects ended up being prevented by the fires.

The 2015 season yielded the highest number of bird detections on annual-panel transects in the three large parks since the start of the monitoring project, about 2,700 (21%) more than the previous high count in 2014. Part of this increase was due to a spike in red crossbill and evening grosbeak detections, numbers of both species being at an all-time high across annual-panel transects since the start of the monitoring project. Cassin's finch detections also continued their upward trend, with the highest number of detections in 2015. In contrast to these high finch numbers, pine siskin detections were actually much lower in 2015 than in 2014, but were similar to 2013 numbers (478 detections on annual-panel transects in 2015, compared to 691 detections in 2014 and 403 detections in 2013) (Holmgren et al. 2015).

There were many other species detected in slightly or moderately greater numbers in the three large parks in 2015 than in previous years. A few of these species include Hammond's flycatcher, Steller's jay, red-breasted nuthatch, Townsend's solitaire, chipping sparrow, and dark-eyed junco. Each of these species had more detections in 2015 than in any of the previous ten years. In general, woodpecker and thrush detections also increased in 2015, each of these families having higher numbers of detections than any of the previous ten years. While many of these upticks in numbers of birds counted may reflect real population increases in 2015, it should also be noted that we conducted more point counts across the large parks than in all previous years except for 2014 (Appendix A), which likely accounts for at least a portion of the increased detections. The reason for this is that more 'additional' points were added to already-established transects this year. In addition, the data presented here are not corrected for factors such as detectability, or annual variation in survey effort or observer effects. The Landbird Monitoring Project's periodic trend analyses will explicitly account for this variation.

We also observed a few relatively rare species in greater numbers than in previous years. For example, we saw an increase in lazuli bunting detections across all three parks. Normally detected by our crews only east of the Cascade crest in NOCA, we found many of these birds at OLYM and MORA, all singing males in June and July. We saw increases in detections of several other species as well. These included Lincoln's sparrows at MORA and NOCA, a species we did not encounter frequently in any of the parks in previous years; rock wrens at OLYM, a species that typically prefers the drier habitat of central and eastern WA; and chipping sparrows at OLYM, a bird we generally only see in very restricted locations in the park. However, many of these increases in detections of rarer species are not reflected in our point count data, as they were observations that we made while hiking between sites, or outside of point count periods.

Several species either showed a decrease in detections or remained low in 2015, including fox sparrow, which dropped down to five detections on annual-panel transects in 2015 after its recent spike to 25 detections in 2014 (Holmgren et al. 2015). Brown-headed cowbird detections also remained low, up slightly from the low number of detections observed in 2014.

No Eurasian collared-doves were detected in MORA, NOCA, or OLYM during point counts in 2015, but they were detected at OLYM at times or locations outside of point counts. 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 detected them were in more developed parts of the parks (near campgrounds or roads), but we will continue to take particular note of them, as this project presents a good opportunity to monitor this species and whether it expands its range into more natural areas.

At SAJH, overall detections remained high in 2015, after having increased in 2013 (we survey the park only in alternating years). There were notable increases in detections of a few species, including Pacific-slope flycatcher, olive-sided flycatcher, and house wren. There were also decreases in detections of a few species, including red crossbill and pine siskin. There was no substantial change in brown-headed cowbird detections, which decreased by six detections from 2013 numbers. Three Eurasian collared-doves were detected in point counts in SAJH in 2015, down from four detections in the 2013 surveys (Holmgren et al. 2014).

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 nine full years of project implementation (2007–2015) that includes data collection on the annual panel as well as all five of the alternating panels. We were able to survey 67 of the 68 intended transects in 2015. Preliminary analysis indicates a substantial uptick in numbers of many bird species in 2015, but interpretation of this result will need to wait until our next multi-year trend analysis, which will account for annual variation in survey effort, observer effects, and detection probability.

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

		Elevation		Number of points surveyed										
Park	**Panel**	**class**	**Transect**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
MORA	Ann1	Low	4001	10	12	12	12	12	10	11	14	16	16	15
MORA	Ann1	Low	4005	11	11	11	11	12	9	10	13	13	14	14
MORA	Ann1	Medium	4002	11	11	11	12	11	13	13	15	15	15	16
MORA	Ann1	Medium	4004	18	17	18	18	13	15	10	17	17	18	18
MORA	Ann1	Medium	4009	14	14	15	15	11	13	10	15	15	15	16
MORA	Ann1	Medium	4012	16	16	14	19	19	13	0	17	19	20	23
MORA	Ann1	High	4003	12	12	12	12	12	10	12	13	14	15	15
MORA	Ann1	High	4007	20	20	20	20	20	20	0	20	20	20	25
MORA	Ann1	High	4011	13	11	14	17	17	15	0	16	16	17	17
MORA	Ann1	High	4014	10	16	14	16	16	15	0	17	17	18	22
MORA	Alt2	Low	4006	0	0	10	0	0	0	0	9	0	0	0
MORA	Alt2	Low	4008	0	0	9	0	0	0	0	12	0	0	0
MORA	Alt2	Medium	4015	0	0	11	0	0	0	0	12	0	0	0
MORA	Alt2	Medium	4017	0	0	12	0	0	0	0	13	0	0	0
MORA	Alt2	Medium	4020	0	0	9	0	0	0	0	8	0	0	0
MORA	Alt2	Medium	4026	0	0	10	0	0	0	0	11	0	0	0
MORA	Alt2	High	4016	0	0	19	0	0	0	0	20	0	0	0
MORA	Alt2	High	4019	0	0	20	0	0	0	0	20	0	0	0
MORA	Alt2	High	4027	0	0	13	0	0	0	0	14	0	0	0
MORA	Alt2	High	4075	0	0	14	0	0	0	0	11	0	0	0
MORA	Alt3	Low	4010	0	0	0	13	0	0	0	0	14	0	0
MORA	Alt3	Low	4018	0	0	0	12	0	0	0	0	14	0	0
MORA	Alt3	Medium	4028	0	0	0	11	0	0	0	0	12	0	0
MORA	Alt3	Medium	4042	0	0	0	12	0	0	0	0	13	0	0
MORA	Alt3	Medium	4044	0	0	0	15	0	0	0	0	16	0	0
MORA	Alt3	Medium	4048	0	0	0	13	0	0	0	0	12	0	0
MORA	Alt3	High	4029	0	0	0	14	0	0	0	0	14	0	0
MORA	Alt3	High	4030	0	0	0	12	0	0	0	0	15	0	0
MORA	Alt3	High	4032	0	0	0	15	0	0	0	0	15	0	0
MORA	Alt3	High	4033	0	0	0	18	0	0	0	0	19	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	2013	2014	2015
MORA	Alt4	Low	4021	0	0	0	0	12	0	0	0	0	13	0
MORA	Alt4	Low	4022	0	0	0	0	17	0	0	0	0	17	0
MORA	Alt4	Medium	4057	0	0	0	0	10	0	0	0	0	14	0
MORA	Alt4	Medium	4060	0	0	0	0	24	0	0	0	0	24	0
MORA	Alt4	Medium	4061	0	0	0	0	15	0	0	0	0	17	0
MORA	Alt4	Medium	4065	0	0	0	0	13	0	0	0	0	15	0
MORA	Alt4	High	4035	0	0	0	0	12	0	0	0	0	14	0
MORA	Alt4	High	4036	0	0	0	0	14	0	0	0	0	16	0
MORA	Alt4	High	4039	0	0	0	0	11	0	0	0	0	13	0
MORA	Alt4	High	4043	0	0	0	0	18	0	0	0	0	19	0
MORA	Alt5	Low	4024	0	0	0	0	0	25	0	0	0	0	25
MORA	Alt5	Low	4025	0	0	0	0	0	9	0	0	0	0	15
MORA	Alt5	Medium	4068	0	0	0	0	0	9	0	0	0	0	15
MORA	Alt5	Medium	4073	0	0	0	0	0	13	0	0	0	0	19
MORA	Alt5	Medium	4074	0	0	0	0	0	13	0	0	0	0	15
MORA	Alt5	Medium	4076	0	0	0	0	0	15	0	0	0	0	17
MORA	Alt5	High	4045	0	0	0	0	0	12	0	0	0	0	21
MORA	Alt5	High	4046	0	0	0	0	0	10	0	0	0	0	13
MORA	Alt5	High	4052	0	0	0	0	0	12	0	0	0	0	16
MORA	Alt5	High	4083	0	0	0	0	0	0	0	0	0	0	18
MORA	Alt6	Low	4031	0	0	0	0	0	0	10	0	0	0	0
MORA	Alt6	Low	4034	0	0	0	0	0	0	10	0	0	0	0
MORA	Alt6	Medium	4077	0	0	0	0	0	0	12	0	0	0	0
MORA	Alt6	Medium	4078	0	0	0	0	0	0	9	0	0	0	0
MORA	Alt6	Medium	4081	0	0	0	0	0	0	10	0	0	0	0
MORA	Alt6	Medium	4084	0	0	0	0	0	0	0	0	0	0	0
MORA	Alt6	High	4058	0	0	0	0	0	0	0	0	0	0	0
MORA	Alt6	High	4062	0	0	0	0	0	0	0	0	0	0	0
MORA	Alt6	High	4064	0	0	0	0	0	0	10	0	0	0	0
MORA	Alt6	High	4067	0	0	0	0	0	0	13	0	0	0	0

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

		Elevation		Number of points surveyed										
Park	**Panel**	**class**	**Transect**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
NOCA	Ann1	Low	1013	12	11	14	12	11	9	13	15	15	15	0
NOCA	Ann1	Low	1017	13	12	9	12	12	12	13	14	14	15	14
NOCA	Ann1	Low	1020	15	12	13	15	16	12	16	17	17	18	18
NOCA	Ann1	Low	1023	18	19	19	20	21	20	21	21	21	21	22
NOCA	Ann1	Medium	1015	12	16	17	17	15	15	16	17	17	19	18
NOCA	Ann1	Medium	1018	16	21	21	23	22	25	25	23	25	25	24
NOCA	Ann1	Medium	1022	13	13	11	13	14	13	14	15	15	17	16
NOCA	Ann1	Medium	1024	9	10	11	12	10	11	10	13	13	13	14
NOCA	Ann1	High	1014	15	19	19	0	20	0	0	20	21	21	22
NOCA	Ann1	High	1016	14	15	14	16	15	14	15	17	17	17	17
NOCA	Ann1	High	1019	12	12	10	12	12	12	12	13	13	13	14
NOCA	Ann1	High	1021	18	21	22	23	22	19	17	24	24	24	24
NOCA	Alt2	Low	1001	0	0	11	0	0	0	0	13	0	0	0
NOCA	Alt2	Low	1005	0	0	13	0	0	0	0	15	0	0	0
NOCA	Alt2	Low	1006	0	0	10	0	0	0	0	12	0	0	0
NOCA	Alt2	Low	1010	0	0	12	0	0	0	0	16	0	0	0
NOCA	Alt2	Medium	1003	0	0	12	0	0	0	0	15	0	0	0
NOCA	Alt2	Medium	1004	0	0	13	0	0	0	0	14	0	0	0
NOCA	Alt2	Medium	1009	0	0	0	0	0	0	0	16	0	0	0
NOCA	Alt2	Medium	1011	0	0	19	0	0	0	0	19	0	0	0
NOCA	Alt2	High	1002	0	0	18	0	0	0	0	20	0	0	0
NOCA	Alt2	High	1007	0	0	13	0	0	0	0	14	0	0	0
NOCA	Alt2	High	1008	0	0	0	0	0	0	0	14	0	0	0
NOCA	Alt2	High	1012	0	0	15	0	0	0	0	19	0	0	0
NOCA	Alt3	Low	1027	0	0	0	13	0	0	0	0	16	0	0
NOCA	Alt3	Low	1028	0	0	0	13	0	0	0	0	14	0	0
NOCA	Alt3	Low	1029	0	0	0	13	0	0	0	0	15	0	0
NOCA	Alt3	Low	1034	0	0	0	13	0	0	0	0	14	0	0
NOCA	Alt3	Medium	1025	0	0	0	15	0	0	0	0	15	0	0
NOCA	Alt3	Medium	1026	0	0	0	14	0	0	0	0	15	0	0

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

		Elevation		Number of points surveyed										
Park	Panel	class	Transect	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
NOCA	Alt3	Medium	1057	0	0	0	0	0	0	0	0	16	0	0
NOCA	Alt3	Medium	1031	0	0	0	19	0	0	0	0	20	0	0
NOCA	Alt3	High	1032	0	0	0	0	0	0	0	0	13	0	0
NOCA	Alt3	High	1037	0	0	0	0	0	0	0	0	20	0	0
NOCA	Alt3	High	1039	0	0	0	20	0	0	0	0	20	0	0
NOCA	Alt3	High	1040	0	0	0	21	0	0	0	0	19	0	0
NOCA	Alt4	Low	1036	0	0	0	0	20	0	0	0	0	25	0
NOCA	Alt4	Low	1054	0	0	0	0	11	0	0	0	0	16	0
NOCA	Alt4	Low	1061	0	0	0	0	10	0	0	0	0	13	0
NOCA	Alt4	Low	1122	0	0	0	0	0	0	0	0	0	22	0
NOCA	Alt4	Medium	1033	0	0	0	0	20	0	0	0	0	23	0
NOCA	Alt4	Medium	1035	0	0	0	0	16	0	0	0	0	18	0
NOCA	Alt4	Medium	1038	0	0	0	0	13	0	0	0	0	18	0
NOCA	Alt4	Medium	1041	0	0	0	0	14	0	0	0	0	17	0
NOCA	Alt4	High	1048	0	0	0	0	11	0	0	0	0	13	0
NOCA	Alt4	High	1049	0	0	0	0	12	0	0	0	0	17	0
NOCA	Alt4	High	1050	0	0	0	0	13	0	0	0	0	16	0
NOCA	Alt4	High	1052	0	0	0	0	11	0	0	0	0	13	0
NOCA	Alt5	Low	1062	0	0	0	0	0	8	0	0	0	0	11
NOCA	Alt5	Low	1063	0	0	0	0	0	9	0	0	0	0	16
NOCA	Alt5	Low	1065	0	0	0	0	0	11	0	0	0	0	13
NOCA	Alt5	Low	1067	0	0	0	0	0	8	0	0	0	0	13
NOCA	Alt5	Medium	1042	0	0	0	0	0	15	0	0	0	0	17
NOCA	Alt5	Medium	1043	0	0	0	0	0	9	0	0	0	0	13
NOCA	Alt5	Medium	1044	0	0	0	0	0	11	0	0	0	0	15
NOCA	Alt5	Medium	1045	0	0	0	0	0	10	0	0	0	0	10
NOCA	Alt5	High	1055	0	0	0	0	0	13	0	0	0	0	16
NOCA	Alt5	High	1058	0	0	0	0	0	0	0	0	0	0	18
NOCA	Alt5	High	1060	0	0	0	0	0	9	0	0	0	0	14
NOCA	Alt5	High	1064	0	0	0	0	0	10	0	0	0	0	15

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

		Elevation		Number of points surveyed										
Park	**Panel**	**class**	**Transect**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
NOCA	Alt6	Low	1068	0	0	0	0	0	0	13	0	0	0	0
NOCA	Alt6	Low	1070	0	0	0	0	0	0	12	0	0	0	0
NOCA	Alt6	Low	1074	0	0	0	0	0	0	14	0	0	0	0
NOCA	Alt6	Low	1075	0	0	0	0	0	0	11	0	0	0	0
NOCA	Alt6	Medium	1047	0	0	0	0	0	0	13	0	0	0	0
NOCA	Alt6	Medium	1051	0	0	0	0	0	0	11	0	0	0	0
NOCA	Alt6	Medium	1053	0	0	0	0	0	0	13	0	0	0	0
NOCA	Alt6	Medium	1056	0	0	0	0	0	0	13	0	0	0	0
NOCA	Alt6	High	1072	0	0	0	0	0	0	0	0	0	0	0
NOCA	Alt6	High	1088	0	0	0	0	0	0	12	0	0	0	0
NOCA	Alt6	High	1090	0	0	0	0	0	0	0	0	0	0	0
NOCA	Alt6	High	1092	0	0	0	0	0	0	14	0	0	0	0
OLYM	Ann1	Low	3001	11	10	8	10	11	12	12	13	12	13	13
OLYM	Ann1	Low	3121	11	15	17	17	17	14	17	15	17	17	19
OLYM	Ann1	Low	3126	9	10	11	13	13	13	15	15	15	14	15
OLYM	Ann1	Low	3134	16	16	18	18	18	18	19	19	19	19	18
OLYM	Ann1	Medium	3122	14	12	14	0	16	16	0	16	17	18	18
OLYM	Ann1	Medium	3123	10	10	12	14	14	15	15	15	15	16	17
OLYM	Ann1	Medium	3130	9	9	8	9	9	9	9	10	10	10	10
OLYM	Ann1	Medium	3200	0	0	22	23	21	23	22	23	23	22	23
OLYM	Ann1	High	3124	9	10	10	11	11	11	11	12	12	13	14
OLYM	Ann1	High	3125	9	11	13	13	14	15	11	14	12	15	15
OLYM	Ann1	High	3127	7	9	13	15	14	15	15	15	15	15	16
OLYM	Ann1	High	3128	10	11	11	11	10	11	12	13	12	14	14
OLYM	Alt2	Low	3138	0	0	10	0	0	0	0	12	0	0	0
OLYM	Alt2	Low	3142	0	0	14	0	0	0	0	14	0	0	0
OLYM	Alt2	Low	3144	0	0	13	0	0	0	0	13	0	0	0
OLYM	Alt2	Low	3145	0	0	13	0	0	0	0	14	0	0	0
OLYM	Alt2	Medium	3133	0	0	8	0	0	0	0	16	0	0	0
OLYM	Alt2	Medium	3135	0	0	11	0	0	0	0	13	0	0	0

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

		Elevation		Number of points surveyed										
Park	Panel	class	Transect	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
OLYM	Alt2	Medium	3137	0	0	10	0	0	0	0	11	0	0	0
OLYM	Alt2	Medium	3141	0	0	14	0	0	0	0	15	0	0	0
OLYM	Alt2	High	3132	0	0	19	0	0	0	0	19	0	0	0
OLYM	Alt2	High	3136	0	0	11	0	0	0	0	11	0	0	0
OLYM	Alt2	High	3139	0	0	16	0	0	0	0	13	0	0	0
OLYM	Alt2	High	3140	0	0	0	0	0	0	0	12	0	0	0
OLYM	Alt3	Low	3146	0	0	0	15	0	0	0	0	15	0	0
OLYM	Alt3	Low	3149	0	0	0	10	0	0	0	0	12	0	0
OLYM	Alt3	Low	3151	0	0	0	12	0	0	0	0	17	0	0
OLYM	Alt3	Low	3153	0	0	0	11	0	0	0	0	16	0	0
OLYM	Alt3	Medium	3143	0	0	0	10	0	0	0	0	11	0	0
OLYM	Alt3	Medium	3150	0	0	0	11	0	0	0	0	12	0	0
OLYM	Alt3	Medium	3152	0	0	0	11	0	0	0	0	13	0	0
OLYM	Alt3	Medium	3154	0	0	0	15	0	0	0	0	16	0	0
OLYM	Alt3	High	3147	0	0	0	19	0	0	0	0	19	0	0
OLYM	Alt3	High	3148	0	0	0	14	0	0	0	0	16	0	0
OLYM	Alt3	High	3156	0	0	0	10	0	0	0	0	11	0	0
OLYM	Alt3	High	3157	0	0	0	11	0	0	0	0	12	0	0
OLYM	Alt4	Low	3155	0	0	0	0	10	0	0	0	0	12	0
OLYM	Alt4	Low	3159	0	0	0	0	11	0	0	0	0	12	0
OLYM	Alt4	Low	3161	0	0	0	0	11	0	0	0	0	12	0
OLYM	Alt4	Low	3163	0	0	0	0	15	0	0	0	0	15	0
OLYM	Alt4	Medium	3160	0	0	0	0	10	0	0	0	0	12	0
OLYM	Alt4	Medium	3167	0	0	0	0	11	0	0	0	0	14	0
OLYM	Alt4	Medium	3168	0	0	0	0	10	0	0	0	0	15	0
OLYM	Alt4	Medium	3174	0	0	0	0	14	0	0	0	0	15	0
OLYM	Alt4	High	3158	0	0	0	0	14	0	0	0	0	18	0
OLYM	Alt4	High	3164	0	0	0	0	14	0	0	0	0	17	0
OLYM	Alt4	High	3171	0	0	0	0	12	0	0	0	0	15	0
OLYM	Alt4	High	3173	0	0	0	0	10	0	0	0	0	12	0

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

		Elevation		Number of points surveyed										
Park	**Panel**	**class**	**Transect**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
OLYM	Alt5	Low	3165	0	0	0	0	0	10	0	0	0	0	12
OLYM	Alt5	Low	3166	0	0	0	0	0	12	0	0	0	0	15
OLYM	Alt5	Low	3169	0	0	0	0	0	8	0	0	0	0	13
OLYM	Alt5	Low	3170	0	0	0	0	0	11	0	0	0	0	11
OLYM	Alt5	Medium	3178	0	0	0	0	0	11	0	0	0	0	14
OLYM	Alt5	Medium	3183	0	0	0	0	0	13	0	0	0	0	15
OLYM	Alt5	Medium	3184	0	0	0	0	0	16	0	0	0	0	20
OLYM	Alt5	Medium	3185	0	0	0	0	0	9	0	0	0	0	11
OLYM	Alt5	High	3175	0	0	0	0	0	12	0	0	0	0	15
OLYM	Alt5	High	3179	0	0	0	0	0	16	0	0	0	0	19
OLYM	Alt5	High	3180	0	0	0	0	0	16	0	0	0	0	19
OLYM	Alt5	High	3188	0	0	0	0	0	12	0	0	0	0	18
OLYM	Alt6	Low	3172	0	0	0	0	0	0	14	0	0	0	0
OLYM	Alt6	Low	3177	0	0	0	0	0	0	10	0	0	0	0
OLYM	Alt6	Low	3181	0	0	0	0	0	0	16	0	0	0	0
OLYM	Alt6	Low	3182	0	0	0	0	0	0	16	0	0	0	0
OLYM	Alt6	Medium	3187	0	0	0	0	0	0	20	0	0	0	0
OLYM	Alt6	Medium	3190	0	0	0	0	0	0	14	0	0	0	0
OLYM	Alt6	Medium	3195	0	0	0	0	0	0	12	0	0	0	0
OLYM	Alt6	Medium	3198	0	0	0	0	0	0	11	0	0	0	0
OLYM	Alt6	High	3189	0	0	0	0	0	0	16	0	0	0	0
OLYM	Alt6	High	3191	0	0	0	0	0	0	15	0	0	0	0
OLYM	Alt6	High	3192	0	0	0	0	0	0	14	0	0	0	0
OLYM	Alt6	High	3196	0	0	0	0	0	0	15	0	0	0	0

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.

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