



Klamath Network Landbird Monitoring Annual Report

2013 results from Crater Lake National Park and Oregon Caves National Monument

Natural Resource Data Series NPS/KLMN/NRDS—2014/689



ON THE COVER

Mountain Chickadee

Photograph by: James Livaudais ©2014

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August 2014

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

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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.

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Please cite this publication as:

Stephens, J. L. 2014. Klamath Network landbird monitoring annual report: 2013 results from Crater Lake National Park and Oregon Caves National Monument. Natural Resource Data Series NPS/KLMN/NRDS—2014/689. National Park Service, Fort Collins, Colorado.

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Abstract

In 2013, the Klamath Inventory and Monitoring Network, in partnership with the Klamath Bird Observatory, implemented the sixth year of our long-term landbird monitoring protocol. Multiple standard avian sampling methods were employed, including variable circular plot point counts, area search surveys, mist netting, species checklists, and habitat surveys. In 2013, a second year of point counts were completed, along with corresponding species checklists and habitat surveys, at 35 locations within Crater Lake National Park and four locations within Oregon Caves National Monument. The operation of an ongoing constant effort monitoring station, which included mist netting, point counts, area searches, species checklists, and habitat surveys, also continued at Oregon Caves National Monument during the breeding and fall migration seasons. Relative abundance (birds/station), as measured by using point count and area search methods were calculated for all species at each park. Total captures, by season, were calculated using constant effort mist netting data. Species of conservation importance were among the most abundant species at each park. Results are presented along with conservation status of individual species based on Partners in Flight state and continental plans and the Oregon Wildlife Conservation Strategy. This sixth year of implementation continues to lay the groundwork for improved understanding of landbird status and long-term trends in each park. In addition, when the data are analyzed in the framework of the Klamath Bird Monitoring Network, the contribution of Network parks to bird conservation in this region will help to inform landbird conservation in the west.

Acknowledgments

We thank Daniel Sarr at the Klamath Network and John Alexander at Klamath Bird Observatory (KBO) for their contributions to the landbird monitoring protocol. Implementation of the monitoring program would not have been possible without the help of the staff at both the parks and the Klamath Network. Special thanks to Eric Dinger and John Roth for their logistical support in 2013. We would like to acknowledge several KBO Biologists for their assistance, Karen Hussey coordinated the point count field season and Josée Rouseau and Sarah Rockwell completed data analyses for this report. The dedication of the field crews made this season successful. Point count surveys were completed by Jim DeStaebler and Frank Lospalluto. The Constant Effort Monitoring Station was run by Robert Frey, KBO Biologist and Banding Project Lead and KBO Interns Hugo Ceja, Mike Ellis, Catalina González, Daniel Gusset, Lucy Landis, Juan Lopez, Andrés Murillo, Liberato Pop, Teresa Skiba, Billy Smith, Tatiana Straatmann, Tori Swift, and Brandt Thibodeaux.

Introduction

In 2013, the Klamath Inventory and Monitoring Network (KLMN) of the National Park Service implemented the sixth year of their long-term landbird monitoring protocol (Stephens et al. 2010c). Klamath Bird Observatory, in partnership with the KLMN, developed the protocol and has completed the monitoring since 2008. This annual report provides a summary of 2013 efforts, including (1) a summary of the monitoring protocol, (2) a summary of point count and area search surveys and constant effort monitoring, and (3) a summary of birds detected at each of the park units where monitoring occurred.

The KLMN, located in southern Oregon and northern California, includes Crater Lake National Park (CRLA), Lassen Volcanic National Park (LAVO), Lava Beds National Monument (LBE), Oregon Caves National Monument (ORCA), Redwood National and State Parks (RNSP), and Whiskeytown National Recreation Area (WHIS). These park units fall within the Klamath Region which includes a broad range of topography, elevation, and corresponding climate and vegetation. The region is recognized for its rich biodiversity, which is represented by diverse avifauna (Trail et al. 1997, Della Sala et al. 1999).

Landbird monitoring contributes to the vital signs monitoring program that has been developed by the KLMN (Sarr et al. 2007). A landbird monitoring protocol was designed to yield important information about avian community composition, status of landbirds in a given year, and long-term population trends of specific species for each KLMN park unit (Stephens et al. 2010c). The avian sampling methods incorporated in this protocol include point count surveys, constant effort mist netting, area search surveys, and a compilation of species checklists at specific sites. The methodology selected for each park was based on park unit size, habitat composition, historic bird monitoring efforts, and logistical and budget constraints (Stephens et al. 2010c).

The KLMN landbird monitoring effort is informed by and contributes to the Partners in Flight (PIF) landbird conservation initiative. Regional and continental PIF habitat-based bird conservation objectives are met through the implementation of the NPS mission to preserve natural resources unimpaired for future generations. Partners in Flight conservation plans and state wildlife conservation strategies provide a framework for understanding landbird status in the parks. We therefore use these resources to help develop our landbird protocol and to frame the results of the KLMN landbird monitoring efforts.

The KLMN landbird monitoring contributes to regional and continental bird monitoring programs and aligns with the U.S. North American Bird Conservation Initiative Monitoring Subcommittee recommendations for improving avian monitoring (US NABCI 2007). In addition, KLMN landbird monitoring is integrated with an extensive regional bird monitoring network (Frey and Stephens 2013, Stephens and Alexander 2012). The Klamath Bird Monitoring Network is a bird monitoring partnership that extends across the Klamath-Siskiyou Bioregion (Alexander et al. 2004). It has been coordinated by the Klamath Bird Observatory and U.S. Forest Service Redwood Sciences Laboratory for over 15 years. This effort has yielded a substantial regional dataset with information about landbird distribution, population trends, and population demographics (Alexander et al. 2004). The

KLMN landbird monitoring program also fits within continental monitoring programs including the Landbird Monitoring Network of the Americas (Alexander and Ralph 2005) and the Monitoring Avian Productivity and Survivorship program (DeSante et al. 2004).

The objectives of the Klamath Network Landbird Monitoring Protocol are to:

1. Monitor breeding landbird richness, relative abundance, and density.
2. Co-sample habitat parameters and integrate bird and vegetation monitoring to aid in interpretation of landbird status and trends.
3. Determine status and trends in demographic parameters (productivity, adult survival, and recruitment) for selected landbird species in a mixed-conifer and riparian habitat at Oregon Caves National Monument.

This annual report provides an overview of methodology and implementation of yearly field surveys. Results presented in this report are limited to general information about bird presence and abundance. Additional analysis and synthesis reports will be completed every third year. Two reports have been produced to date, *Estimating bird density and detection probability at five national park units in southern Oregon and northern California* (Stephens et al. 2013a) which provides results of species detectability and density and *Bird-habitat associations at five national park units in southern Oregon and northern California* (Stephens et al. 2013b) which focuses on bird habitat relationships within each park unit.

Methods

Sampling Design

The KLMN Landbird Monitoring Protocol incorporates multiple standard avian sampling methods (Ralph et al. 1993), including variable circular plot point counts, area search surveys, mist netting, species checklists, and habitat surveys. The use of these complementary methods, which gather information about multiple bird species, optimizes the amount of information collected about birds in each park. Twenty-five to 35 point count routes were established at each park unit corresponding to park unit size, with the exception of Oregon Caves National Monument. Due to the relatively small size of the Monument, monitoring includes a constant effort mist net station and four point count routes (Stephens et al. 2010a).

The sampling frames for Crater Lake National Park, Lassen Volcanic National Park, Lava Beds National Monument, and Redwood National and State Parks include locations between 100 m and 1000 m from a road or trail. The roads and trails within KLMN park units bisect most environmental gradients. Further refinement of sampling frames considered three potential elevation and habitat-associated frames (high elevation; riparian; and matrix, which includes all non-high elevation and non-riparian areas) and varied by park (Sarr et al. 2007). At Whiskeytown National Recreation Area, the sampling frame was limited to roads, trails, and power lines for safety reasons. At Oregon Caves National Monument, the sampling frame included locations between 100 m and 1000 m from a road or trail within the proposed expansion. Within the existing Monument, the sampling frame included locations between 100 m and 1000 m from a road and within 1000 m of a trail (i.e., locations could be established within 100 m of a trail). Because of the high density of trails, this sampling frame was necessary in order to place a point count route within the existing Monument (Stephens et al. 2010a).

We used the Generalized Random Tessellation Stratified method (Stevens and Olsen 2004) to develop spatially balanced sampling locations of point count sites within each sampling frame. At each point count site, a series of stations are surveyed in a single morning, referred to as a point count route. The number of point count stations on a route is typically determined by time constraints; optimally, 12 stations are surveyed within each route. Stations were placed 250 m apart, which nearly eliminates the likelihood of double counting birds (Scott et al. 1981). Point count stations were sampled during the breeding season (early May through early July) using 5-minute count periods following the variable circular plot (VCP) methodology that incorporates distance sampling (Reynolds et al. 1980, Fancy 1997, Nelson and Fancy 1999). At Oregon Caves National Monument, operation of an ongoing constant effort monitoring station following standard protocols (Ralph et al. 2004) continued during the breeding season (early May through early August) as well as during the fall dispersal and migration seasons (mid August through mid October). This is a sentinel site, which was selected subjectively as a location of special interest due to habitat characteristics. Specifically, this site was selected because of riparian habitat and accessibility by trail (Stephens et al. 2010a).

Field Surveys

Monitoring Schedule

In accord with the KLMN Landbird Monitoring Protocol, each of the six park units is to be monitored every third year using point counts and associated methodologies. From 2008–2010 the first round of visits was completed at each park. The second round of visits began in 2011, when surveys were completed at Lava Beds National Monument and Redwood National and State Parks. In 2012, we completed the second round of visits at Lassen Volcanic National Monument and Whiskeytown National Recreation Area. We completed the second round of visits using point count surveys at Crater Lake National Park and Oregon Caves National Monument in 2013. In addition, the constant effort monitoring station, which is operated annually at Oregon Caves National Monument, was operated again in 2013.

Training

Point count surveyors participated in a two to three day training session at the onset of the field season. Point count surveyors who had implemented the KLMN Landbird Monitoring Protocol in previous years received two days of training and new surveyors received an additional training day. During this training, point count surveyors were instructed on protocol implementation. Training exercises included group calibration for distance estimation and simultaneous point count and vegetation surveys in the field. A certification test, which included both a visual and aural bird identification quiz and review of the protocol, was implemented in 2012. Interns that operated the constant effort monitoring stations underwent ongoing training throughout the season. Benchmarks were noted for proficiency with bird extraction and handling, bird identification, and data collection. A primary bander who had undergone certification operated the station, with the assistance of interns who were at varying levels within the training program.

Variable Circular Plot Point Count

Point count surveys begin within 15 minutes of sunrise. The observer uses a digital rangefinder to establish distance reference points at each station prior to conducting the survey. During a 5-minute count period, all birds detected by sight or sound are identified to species and recorded on data forms, along with the horizontal distance to each bird, estimated as accurately as possible, and rounded to the nearest meter. In addition, for each individual, the time of detection (rounded to the nearest minute), detection type (e.g., visual, song, call), and breeding status are recorded. Point count surveys are completed within 4 hours of sunrise.

Constant Effort Monitoring Station

The constant effort monitoring station incorporates a variety of survey methods to sample avian species including mist netting, area searches, point counts, species checklists, and habitat surveys. The mist netting station at Oregon Caves National Monument has 10 nets set in an array. This arrangement optimizes bird capture and meets logistical constraints. Mist nets are opened within 15 minutes of sunrise and operated for 5 hours. Nets are not operated during inclement weather conditions that might affect capture rates or bird safety. All birds that are captured are identified to species, aged and sexed according to Pyle (1997), and checked for signs of breeding condition (i.e., cloacal protuberances and brood patches), plus additional biometrics are collected. All captured

birds, excluding hummingbirds and game birds, are banded with a U.S. Geological Survey Bird Banding Laboratory aluminum butt-end leg band.

Two area search surveys are completed at the mist net site on each day the site is operated. This method provides additional information, such as presence and breeding status of most of the birds occurring at the site, including those not often captured in the nets (e.g., canopy dwelling warblers). During an area search, the surveyor moves around the designated area for a 20 minute period, recording all birds seen or heard.

Species Checklists

Species checklists are completed in conjunction with all bird monitoring efforts, including point count, habitat, and area search surveys and mist netting. Species checklists add value to survey data by documenting encounters of all species during an effort. Checklists enable surveyors to record information on common and rare species that may or may not have been detected using the other survey techniques.

Habitat Surveys

In addition to avian surveys, habitat surveys are completed at each point count station and at the constant effort monitoring station following a standard methodology (Ralph et al. 1993). The surveys are designed specifically to account for habitat aspects associated with the feeding and nesting requirement of birds. The habitat sampling is conducted using a vegetation relevé method that is suitable for any vegetation type and provides an efficient assessment of vegetation composition and structure. Ocular estimates of cover and height for all vegetation layers, tree and shrub species, and other plant forms are recorded, along with snag counts, presence of water, evidence of burns, and tree size and height.

Data

Data Delivery

Data were entered into relational databases to store the variety of information collected in the field. Six databases are used, each one associated with a survey methodology (Point Count, Mist Net and Net Hours, Vegetation, Area Search, and Checklist), and an additional database is used to store location information for each site. The verified, validated, and certified data were submitted to the KLMN, where they were uploaded into one relational database designed using the NPS natural resource database template. The data and reports for this project are made available to NPS staff by going to the KLMN landbird project record in the NPS Integrated Resource Management Applications (IRMA) portal at:

<https://irma.nps.gov/App/Reference/Profile/2171791>

Data Analysis

Relative abundance (mean birds/station), as measured by point counts and area search surveys, was calculated for all survey points combined within each park. Only species detected within 50 m of point count survey stations and within the established area search plot were included in abundance

calculations. In the analysis and synthesis report, *Bird-Habitat Associations at Five National Park Units in Southern Oregon and Northern California*, Stephens et al. (2013b) found that one observer at Crater Lake in 2010 appeared to consistently underestimate the distance to each individual bird, falsely inflating the relative abundance estimates of species detected on their surveys. We performed a data correction by doubling all of this observer's detection distances before analysis, thereby making the 2010 Crater Lake results more comparable to 2013. Total captures, by season, were calculated using constant effort mist net data. Partners in Flight focal species, which are indicative of a variety of ecosystem components (Altman and Alexander 2012, 2000; CalPIF 2002; RHJV 2004; Rich et al. 2004), and conservation status from the Oregon and California State Wildlife Conservation Strategies (CDFG 2005, ODFW 2005) are highlighted in the results where applicable.

Results

Crater Lake National Park

In 2013 we surveyed 35 permanent point count survey routes at Crater Lake National Park, each consisting of 12 survey stations (Figure 1). The sampling frame at Crater Lake National Park includes both matrix and alpine areas. The 2013 point count surveys recorded 30 species within 50 m of the stations (Table 1). An additional 21 species were detected. These were recorded outside of 50 m during point count surveys or encountered between bird surveys or during vegetation surveys and accounted for on species checklists (Table 2).

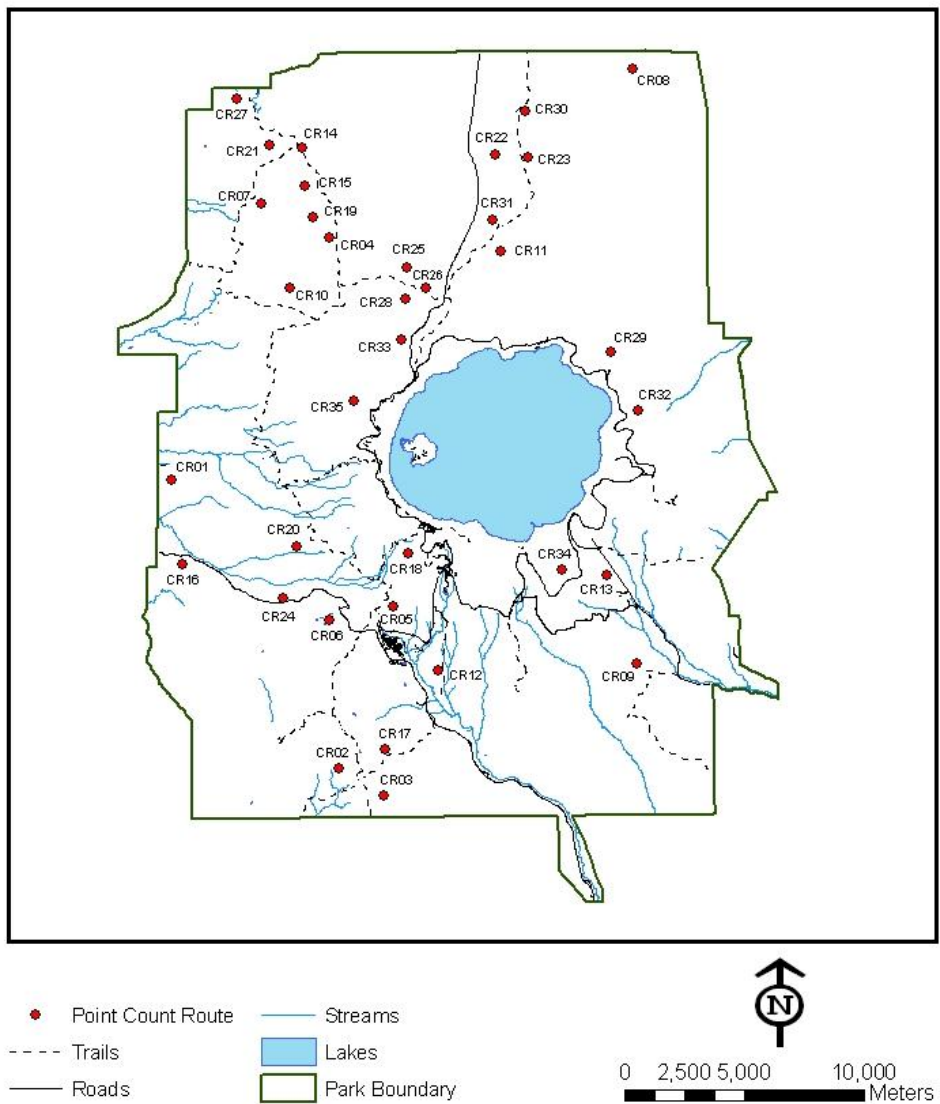


Figure 1. Location of point count routes at Crater Lake National Park.

Table 1. Mean relative abundance (birds within 50 m/point) for species detected during 2010 and 2013 point count surveys at Crater Lake National Park. We performed a data correction for a single observer in 2010 who appeared to consistently underestimate distance (Stephens et al. 2013b) by doubling all of this observer's detection distances before analysis, thereby making the 2010 Crater Lake results more comparable to 2013. Species ordered in decreasing order of abundance for 2013 with conservation status.

Common Name	Scientific Name	Relative Abundance		OR/WA PIF		Cont. PIF ³		ODFW ⁴	
		2010	2013	Conifer ¹	Eastslope ²	Intermountain West	Pacific	West Cascades	East Cascades
Oregon Junco	<i>Junco hyemalis oregonus</i>	0.373	0.331						
Audubon's Warbler ⁵	<i>Setophaga coronata auduboni</i>	0.275	0.212						
Golden-crowned Kinglet	<i>Regulus satrapa</i>	0.181	0.188						
Red-breasted Nuthatch	<i>Sitta canadensis</i>	0.223	0.179						
Pine Siskin	<i>Spinus pinus</i>	2.674	0.110						
Mountain Chickadee	<i>Poecile gambeli</i>	0.485	0.093						
American Robin	<i>Turdus migratorius</i>	0.140	0.071						
Brown Creeper	<i>Certhia americana</i>	0.260	0.057	X	X				
Hermit Thrush	<i>Catharus guttatus</i>	0.034	0.050	X	X				
Gray Jay	<i>Perisoreus canadensis</i>	0.064	0.048						
Cassin's Finch	<i>Carpodacus cassinii</i>	0.020	0.031						
Black-backed Woodpecker	<i>Picoides arcticus</i>	0.025	0.029		X				X
Red Crossbill	<i>Loxia curvirostra</i>	0.331	0.026						
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	0.020	0.024				X		
Western Tanager	<i>Piranga ludoviciana</i>	0.100	0.021	X					
Steller's Jay	<i>Cyanocitta stelleri</i>	0.039	0.017				X		
Chipping Sparrow	<i>Spizella passerina</i>	0.032	0.017		X				
Clark's Nutcracker	<i>Nucifraga columbiana</i>	0.098	0.014		X	X			
Townsend's Solitaire	<i>Myadestes townsendi</i>	0.039	0.014						
Hairy Woodpecker	<i>Picoides villosus</i>	0.029	0.012						
Hermit Warbler ⁵	<i>Setophaga occidentalis</i>	0.066	0.007				X		
Mountain Bluebird	<i>Sialia currucoides</i>	0.044	0.007			X			
Rufous Hummingbird	<i>Selasphorus rufus</i>	0.025	0.005	X		X	X		
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0.002	0.005	X					
American Three-toed Woodpecker	<i>Picoides dorsalis</i>	0.000	0.005						
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	0.000	0.005						
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	0.002	0.002	X			X		
Varied Thrush	<i>Ixoreus naevius</i>	0.000	0.002	X			X		
Pacific Wren ⁶	<i>Troglodytes pacificus</i>	0.002	0.002	X			X		
Red-shafted Flicker	<i>Colaptes auratus</i>	0.000	0.002	X					
Lesser Goldfinch	<i>Spinus psaltria</i>	0.103	0.000						
Horned Lark	<i>Eremophila alpestris</i>	0.039	0.000						
Dusky Flycatcher	<i>Empidonax oberholseri</i>	0.020	0.000			X			
House Finch	<i>Carpodacus mexicanus</i>	0.002	0.000						
Cassin's Vireo	<i>Vireo cassinii</i>	0.005	0.000						

Table 1 (continued). Mean relative abundance (birds within 50 m/point) for species detected during 2010 and 2013 point count surveys at Crater Lake National Park. We performed a data correction for a single observer in 2010 who appeared to consistently underestimate distance (Stephens et al. 2013b) by doubling all of this observer's detection distances before analysis, thereby making the 2010 Crater Lake results more comparable to 2013. Species ordered in decreasing order of abundance for 2013 with conservation status.

Common Name	Scientific Name	Relative Abundance		OR/WA PIF		Cont. PIF ³	ODFW ⁴		
		2010	2013	Conifer ¹	Eastlope ²		Intermountain West	Pacific	West Cascades
Hammond's Flycatcher	<i>Empidonax hammondii</i>	0.007	0.000	X					
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	0.007	0.000	X	X				
Western Wood-Pewee	<i>Contopus sordidulus</i>	0.002	0.000						
Olive-sided Flycatcher	<i>Contopus cooperi</i>	0.002	0.000	X	X	X	X	X	X
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0.002	0.000						
Common Nighthawk	<i>Chordeiles minor</i>	0.002	0.000						
Fox Sparrow	<i>Passerella iliaca</i>	0.002	0.000	X			X		
Violet-green Swallow	<i>Tachycineta thalassina</i>	0.002	0.000						

¹Altman and Alexander 2012, ²Altman 2000, ³Rich 2004, ⁴ODFW 2005

⁵classification of *Parulidae* species has been revised based on recent genetic work (Chesser et al. 2011)

⁶previously grouped with eastern North American and Eurasian species as the Winter Wren, *Troglodytes troglodytes* (Chesser et al. 2011)

Table 2. List of additional species detected at Crater Lake National Park in 2013 (not counted within 50 m during VCP point count surveys) and conservation status.

Common Name	Scientific Name	OR/WA PIF		Continental PIF ³		ODFW ⁴	
		Conifer ¹	Eastslope ²	Intermountain West	Pacific	West Cascades	East Cascades
Cassin's Vireo	<i>Vireo cassinii</i>						
Common Nighthawk	<i>Chordeiles minor</i>						
Common Raven	<i>Corvus corax</i>						
Dusky Flycatcher	<i>Empidonax oberholseri</i>			X			
Fox Sparrow	<i>Passerella iliaca</i>	X			X		
Golden Eagle	<i>Aquila chrysaetos</i>						
Gray-crowned Rosy-Finch	<i>Leucosticte tephrocotis</i>						
Hammond's Flycatcher	<i>Empidonax hammondii</i>	X					
Horned Lark	<i>Eremophila alpestris</i>						
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	X					
MacGillivray's Warbler	<i>Geothlypis tolmiei</i>						
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>						
Olive-sided Flycatcher	<i>Contopus cooperi</i>	X	X	X	X	X	X
Red-tailed Hawk	<i>Buteo jamaicensis</i>						
Ruby-crowned Kinglet	<i>Regulus calendula</i>						
Savannah Sparrow	<i>Passerculus sandwichensis</i>						
Sooty Grouse	<i>Dendragapus fuliginosus</i>						
Turkey Vulture	<i>Cathartes aura</i>						
Vesper Sparrow	<i>Pooecetes gramineus</i>						
Violet-green Swallow	<i>Tachycineta thalassina</i>						
Western Scrub-Jay	<i>Aphelocoma californica</i>				X		
White-breasted Nuthatch	<i>Sitta carolinensis</i>						
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>		X	X			

¹Altman and Alexander 2012, ²Altman 2000, ³Rich 2004, ⁴ODFW 2005

Oregon Caves National Monument Point Counts

In 2013 we surveyed 4 permanent point count survey routes at Oregon Caves National Monument, each consisting of 12 survey stations (Figure 3). The sampling frame at Oregon Caves National Monument included matrix areas. The 2013 point count surveys recorded 35 species within 50 m of the stations (Table 3). An additional 16 species were detected outside of 50 m during point count surveys or encountered between bird surveys or during vegetation surveys and accounted for on species checklists (Table 4).

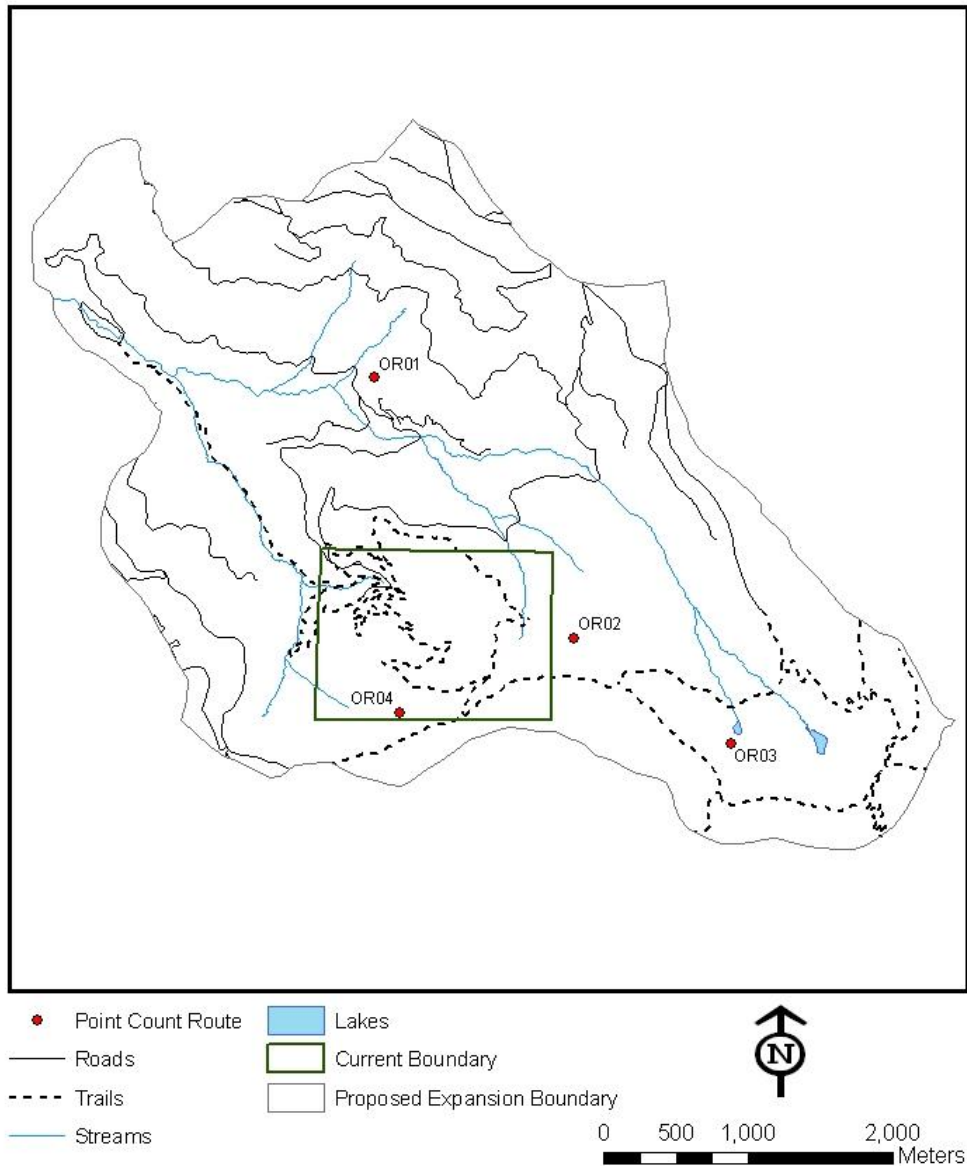


Figure 2. Location of point count routes at Oregon Caves National Monument.

Table 3. Mean relative abundance (birds within 50 m/point) for species detected during 2010 and 2013 point count surveys at Oregon Caves National Monument. Species ordered in decreasing order of abundance for 2013 with conservation status.

Common Name	Scientific Name	Relative Abundance		OR/WA PIF	Continental PIF ²	ODFW ³
		2010	2013	Conifer ¹	Pacific	Klamath Mts
Hermit Warbler ⁴	<i>Setophaga occidentalis</i>	0.229	0.438		X	
Golden-crowned Kinglet	<i>Regulus satrapa</i>	0.292	0.375			
Nashville Warbler ⁴	<i>Oreothlypis ruficapilla</i>	0.000	0.292	X		
Chestnut-backed Chickadee	<i>Poecile rufescens</i>	0.188	0.271		X	
Red-breasted Nuthatch	<i>Sitta canadensis</i>	0.188	0.271			
Pine Siskin	<i>Spinus pinus</i>	0.125	0.250			
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	0.042	0.250	X	X	
Brown Creeper	<i>Certhia americana</i>	0.104	0.188	X		
Audubon's Warbler ⁴	<i>Setophaga coronata auduboni</i>	0.229	0.167			
Hammond's Flycatcher	<i>Empidonax hammondii</i>	0.000	0.167	X		
Lazuli Bunting	<i>Passerina amoena</i>	0.000	0.146	X		
Hermit Thrush	<i>Catharus guttatus</i>	0.063	0.125	X		
American Robin	<i>Turdus migratorius</i>	0.021	0.125			
Steller's Jay	<i>Cyanocitta stelleri</i>	0.104	0.104		X	
Rufous Hummingbird	<i>Selasphorus rufus</i>	0.063	0.104	X	X	
Mountain Chickadee	<i>Poecile gambeli</i>	0.042	0.104			
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	0.042	0.104		X	
Varied Thrush	<i>Ixoreus naevius</i>	0.000	0.104	X	X	
Dusky Flycatcher	<i>Empidonax oberholseri</i>	0.063	0.083			
Fox Sparrow	<i>Passerella iliaca</i>	0.104	0.063	X	X	
Hairy Woodpecker	<i>Picoides villosus</i>	0.042	0.063			
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	0.000	0.063			
Warbling Vireo	<i>Vireo gilvus</i>	0.000	0.063			
Gray Jay	<i>Perisoreus canadensis</i>	0.021	0.042			
MacGillivray's Warbler ⁴	<i>Geothlypis tolmiei</i>	0.021	0.042			
Sooty Grouse	<i>Dendragapus fuliginosus</i>	0.021	0.042			
Green-tailed Towhee	<i>Pipilo chlorurus</i>	0.000	0.042			
Western Wood-Pewee	<i>Contopus sordidulus</i>	0.000	0.042			
Red Crossbill	<i>Loxia curvirostra</i>	0.083	0.021			
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	0.042	0.021	X		
Pacific Wren ⁵	<i>Troglodytes pacificus</i>	0.021	0.021	X	X	
Bushtit	<i>Psaltriparus minimus</i>	0.000	0.021			
Chipping Sparrow	<i>Spizella passerina</i>	0.000	0.021			
Olive-sided Flycatcher	<i>Contopus cooperi</i>	0.000	0.021	X	X	
Purple Finch	<i>Carpodacus purpureus</i>	0.000	0.021	X		
Oregon Junco	<i>Junco hyemalis oregonus</i>	0.250	0.000			
Black-throated Gray Warbler	<i>Setophaga nigrescens</i>	0.167	0.000			
Mountain Quail	<i>Oreortyx pictus</i>	0.021	0.000		X	
Pileated Woodpecker	<i>Dryocopus pileatus</i>	0.021	0.000	X		
Red-shafted Flicker	<i>Colaptes auratus</i>	0.021	0.000	X		

¹Altman and Alexander 2012, ²Rich 2004, ³ODFW 2005

⁴classification of *Parulidae* species has been revised based on recent genetic work (Chesser et al. 2011)

⁵previously grouped with eastern North American and Eurasian species as the Winter Wren, *Troglodytes troglodytes* (Chesser et al. 2011)

Table 4. List of additional species detected at Oregon Caves National Monument 2013 (not counted within 50 m during VCP point count surveys) and conservation status.

Common Name	Scientific Name	OR/WA	Continental	
		PIF	PIF ²	ODFW ³
		Conifer ¹	Pacific	Klamath Mts
American Dipper	<i>Cinclus mexicanus</i>			
Band-tailed Pigeon	<i>Patagioenas fasciata</i>	X	X	
Common Raven	<i>Corvus corax</i>			
House Wren	<i>Troglodytes aedon</i>			
Hutton's Vireo	<i>Vireo huttoni</i>			
Mallard	<i>Anas platyrhynchos</i>			
Mountain Quail	<i>Oreortyx pictus</i>		X	
Mourning Dove	<i>Zenaida macroura</i>			
Oregon Junco	<i>Junco hyemalis oregonus</i>			
Pileated Woodpecker	<i>Dryocopus pileatus</i>	X		
Red-shafted Flicker	<i>Colaptes auratus</i>	X		
Townsend's Solitaire	<i>Myadestes townsendi</i>			
Vaux's Swift	<i>Chaetura vauxi</i>	X		
Western Tanager	<i>Piranga ludoviciana</i>	X		
White-headed Woodpecker	<i>Picoides albolarvatus</i>		X	X
Wrentit	<i>Chamaea fasciata</i>		X	

¹Altman and Alexander 2012, ²Rich 2004, ³ODFW 2005

Oregon Caves National Monument Ecological Monitoring Station

The ecological monitoring station at Oregon Caves National Monument was run 15 times during 2012. Nine visits occurred during the breeding season (3 June to 21 August) and 4 visits during the fall dispersal and migration season (3 September to 26 September). The site was inaccessible during a federal government routine operations curtailment during 1-16 October 2013, and two monitoring efforts were missed in October. On all visits, two area searches were completed.

In 2013, 48 species were detected at Oregon Caves National Monument at the ecological monitoring station (Table 6). Thirty-one species were captured during mist-netting, 25 during the breeding season and 14 during the migration season. During area searches 27 species were detected, 24 during the breeding season and 12 during the migration season. Overall, the number of species surveyed aligns with past efforts, with a slightly increased number of species detected on area searches.

During 2008 - 2012, 38, 59, 49, 41, and 50 species were detected, 27, 32, 30, 34, and 33 species were captured during mist-netting, and 19, 22, 31, 17, and 28 species were detected on area search surveys respectively (Stephens et al. 2009, Stephens et al. 2010b, Stephens et al. 2011, Stephens and Mohren 2012, Stephens and Mohren 2013).

Table 5. Results from the ecological monitoring station at Oregon Caves National Monument; total mist net captures and relative abundance (birds/area search plot) during breeding (3 June to 21 August) and migration (3 September to 26 September), and conservation status. Species included in this table with no capture or abundance values were detected at the site, but not within a search area or captured in a mist-net.

Common Name	Scientific Name	Total captures breeding season	Total captures migration season	Relative abundance breeding season	Relative abundance migration season	ORWA PIF Conifer ¹	Continental PIF Pacific ²	ODFW OR Cons. Strategy ³
Allen's Hummingbird	<i>Selasphorus sasin</i>	2					X	
American Goldfinch	<i>Spinus tristis</i>							
American Robin	<i>Turdus migratorius</i>	3			0.125			
Audubon's Warbler ⁴	<i>Setophaga coronata auduboni</i>	8	1	0.056				
Band-tailed Pigeon	<i>Patagioenas fasciata</i>					X	X	
Black-capped Chickadee	<i>Poecile atricapillus</i>							
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	8		0.056				
Brown Creeper	<i>Certhia americana</i>		1	0.611		X		
Cedar Waxwing	<i>Bombycilla cedrorum</i>			0.444				
Chestnut-backed Chickadee	<i>Poecile rufescens</i>	13		0.056			X	
Common Raven	<i>Corvus corax</i>			0.389	0.625			
Dusky Flycatcher	<i>Empidonax oberholseri</i>	2						
Fox Sparrow	<i>Passerella iliaca</i>		6		0.125	X	X	
Golden-crowned Kinglet	<i>Regulus satrapa</i>	39	5	0.333				
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>		3				X	
Gray Jay	<i>Perisoreus canadensis</i>			0.111				
Green-tailed Towhee	<i>Pipilo chlorurus</i>	1						
Hairy Woodpecker	<i>Picoides villosus</i>	1		0.111				
Hammond's Flycatcher	<i>Empidonax hammondii</i>	1				X		

Table 5 (continued). Results from the ecological monitoring station at Oregon Caves National Monument; total mist net captures and relative abundance (birds/area search plot) during breeding (3 June to 21 August) and migration (3 September to 26 September), and conservation status. Species included in this table with no capture or abundance values were detected at the site, but not within a search area or captured in a mist-net.

Common Name	Scientific Name	Total captures breeding season	Total captures migration season	Relative abundance breeding season	Relative abundance migration season	ORWA PIF Conifer ¹	Continental PIF Pacific ²	ODFW OR Cons. Strategy ³
Hermit Thrush	<i>Catharus guttatus</i>		3			X		
Hermit Warbler ⁴	<i>Setophaga occidentalis</i>	19		0.944	0.500		X	
Lazuli Bunting	<i>Passerina amoena</i>	1		0.389		X		
MacGillivray's Warbler ⁴	<i>Geothlypis tolmiei</i>	8	3	0.111				
Mountain Chickadee	<i>Poecile gambeli</i>			1.611	1.500			
Mountain Quail	<i>Oreortyx pictus</i>						X	
Nashville Warbler ⁴	<i>Oreothlypis ruficapilla</i>	31		0.111		X		
Orange-crowned Warbler ⁴	<i>Oreothlypis celata</i>	6	5			X		
Oregon Junco	<i>Junco hyemalis oregonus</i>	81	31	0.167	0.125			
Pacific Wren ⁵	<i>Troglodytes pacificus</i>	3		0.944	1.875	X	X	
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	5			0.250	X	X	
Pileated Woodpecker	<i>Dryocopus pileatus</i>					X		
Red-breasted Nuthatch	<i>Sitta canadensis</i>	5		1.333	1.125			
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>			0.556	0.250		X	
Red-shafted Flicker	<i>Colaptes auratus</i>	1		0.111	0.125	X		
Red-tailed Hawk	<i>Buteo jamaicensis</i>							
Ruby-crowned Kinglet	<i>Regulus calendula</i>		1					
Ruffed Grouse	<i>Bonasa umbellus</i>							
Rufous Hummingbird	<i>Selasphorus rufus</i>	9				X	X	
Song Sparrow	<i>Melospiza melodia</i>			0.167	0.125			
Steller's Jay	<i>Cyanocitta stelleri</i>	6		0.056			X	
Swainson's Thrush	<i>Catharus ustulatus</i>	2	2					
Townsend's Warbler ⁴	<i>Setophaga townsendi</i>	1	1					
Varied Thrush	<i>Ixoreus naevius</i>			0.056		X	X	
Western Scrub-Jay	<i>Aphelocoma californica</i>						X	
White-headed Woodpecker	<i>Picoides albolarvatus</i>						X	X
Wilson's Warbler ⁴	<i>Cardellina pusilla</i>	23	12	0.278		X		
Yellow Warbler ⁴	<i>Setophaga petechia</i>		3	0.056				

¹Altman and Alexander 2012, ²Rich 2004, ³ODFW 2005

⁴ classification of *Parulidae* species has been revised based on recent genetic work (Chesser et al. 2011)

⁵ previously grouped with eastern North American and Eurasian species as the Winter Wren, *Troglodytes troglodytes* (Chesser et al. 2011)

Discussion

This sixth year of the KLMN landbird monitoring provided information on avian community composition and the status of landbirds at Crater Lake National Park and Oregon Caves National Monument. In addition, the monitoring at Oregon Caves National Monument contributed to the long-term demographic information that has been gathered at this park unit since 2002. Over time, the KLMN landbird monitoring program will yield important information about avian community composition shifts and long-term population trends of specific species for each KLMN park. These monitoring efforts contribute to both Oregon-Washington and California Partners in Flight long-term monitoring programs and align with both Oregon and California State Wildlife Conservation Strategies.

At Crater Lake National Park, of the 10 most abundant species, two are Partners in Flight focal species (Table 1). Both of these species are coniferous forest focal species (Brown Creeper, Hermit Thrush) (Altman and Alexander 2012). Relative abundance appeared to be lower in 2013 compared with 2010 for many species. Factors that may have influenced the differences in relative abundance are the survey dates and weather patterns. In 2010, surveys were completed between 13 June and 20 July (with only 2 surveys completed before June 24), the earliest that survey routes could be accessed due to snowpack. In 2013, surveys were completed between 13 June and 12 July. However, this would suggest the potential for greater relative abundance in 2013, which was not the case. We expect these survey dates will represent the early and late ends of a 14 day window, in which we will complete surveys in the future. Long-term monitoring will add to our understanding of relative abundance estimates in these first two years.

The most abundant species detected during point count surveys at Oregon Caves National Monument represent a variety of habitats and many are of continental importance (Table 6). Of the ten most abundant species detected during point count surveys, six are PIF focal species in coniferous forest (Brown Creeper, Chestnut-backed Chickadee, Hammond's Flycatcher, Hermit Warbler, Nashville Warbler, Pacific-slope Flycatcher) (Altman and Alexander 2012). Three of those species are of continental importance; Chestnut-backed Chickadee, Hermit Warbler, and Pacific-slope Flycatcher, all of which have >90% of their breeding population within the Pacific Avifunal Biome (Rich et al. 2004).

Oregon Junco was the most frequently captured species at Oregon Caves National Monument ecological monitoring station during both breeding and migration seasons. Golden-crowned Kinglet was the second most frequently captured species during the combined breeding and migration seasons in 2013. Oregon Caves National Monument contains important forest ecosystems; in total, 24 conifer and mixed-forest Partners in Flight focal species and species of continental importance were detected at the ecological monitoring station (Altman and Alexander 2012, Rich et al. 2004).

Implementation of the KLMN Landbird Monitoring Protocol began in 2008. Landbird status and community composition results from this sixth year of monitoring will provide information to park managers at Crater Lake National Park and Oregon Caves National Monument, and will contribute to avian trend monitoring in the parks. In addition, continuation of the constant effort monitoring station

at Oregon Caves National Monument contributes to long-term demographic information for that park. This information will inform management decisions at the parks and over time will yield important information on the status and trends of birds in the KLMN.

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NPS 106/126089, 150/126089, August 2014

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