

Klamath Bird Observatory's 2017 Long-term Constant Effort Monitoring Station and Bird Banding Efforts in the Klamath-Siskiyou Bioregion

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Background

Klamath Bird Observatory (KBO) continued its comprehensive, long-term bird monitoring program in the Klamath-Siskiyou Bioregion in 2017. The objectives of this program are to collect data that provide an index to Neotropical migratory and resident bird species diversity and abundance, to evaluate reproductive success, survivorship, and population health, and to track trends over time in abundance and demographics using a suite of avian monitoring methodologies (Alexander et al. 2004). KBO also continued its role as a support source for collaborative capture and banding-associated research and monitoring projects by providing technical assistance, community and professional training, and consultation to cooperating individuals, organizations, and agencies.

KBO works with the U.S. Forest Service Pacific Southwest Research Station Arcata and partners in the Klamath-Siskiyou Bioregion to fulfill monitoring goals defined by the National Partners in Flight (PIF) Inventory and Monitoring Working Group (Hussell and Ralph 1998, Rosenberg et al. 2016). The Klamath-Siskiyou Bioregion lies within the PIF Pacific and Intermountain West Avifaunal Biomes. The Bioregion includes true fir, mixed conifer, mixed conifer hardwood, oak woodland, and riparian forest habitat types for which PIF conservation plans recommend monitoring efforts be targeted for habitat-associated focal bird species (Altman 2000, Altman and Alexander 2012, CalPIF 2002, RHJV 2004, Rosenberg et al. 2016). KBO has established a network of constant effort monitoring stations at which bird distribution, abundance, and demographic information are gathered for over 130 species annually, including 76 designated as PIF habitat focal and Watch List (Altman 2000, Altman and Alexander 2012, CalPIF 2002, RHJV 2004, Rosenberg et al. 2016), California Department of Fish and Wildlife Species of Concern (Shuford and Gardali 2008), Oregon Department of Fish and Wildlife Sensitive Species (ODFW 2016), North American Bird Conservation Initiative Birds in Steep Decline (NABCI 2014), and/or U.S. Fish and Wildlife Service Species of Concern (USFWS 2008) (Table 1).

This report provides a summary of monitoring at constant effort mist netting stations (CES), public demonstration and target-species netting, sampling efforts completed, and associated community and professional training accomplished in 2017.

Monitoring at Constant Effort Stations

KBO's long-term constant effort monitoring station protocol is designed to provide bird distribution, abundance, and demographic information. Standardized methods are followed for mist netting and banding, area search survey, vegetation survey, and tissue sampling (for DNA and stable isotope study) (Ralph et al. 1993 and 2012, Stephens et al. 2010). In 2017, KBO conducted this integrated bird monitoring at 10 CES—nine operated 16-25 years and one newly-established station during the period May-October (Table 2).

Monitoring began at the onset of the landbird breeding season in southern Oregon and northern California, varying by altitudinal location, and continued through the fall migration season. CES efforts were scheduled for the five hours following sunrise except the Wildlife Images station scheduled for six. From May through August (breeding season), stations were scheduled once every 10-day period (period 1 beginning on 1 May). In September and October (fall migration season), CES station efforts were scheduled once per week, except the Rocky Point Cabin station scheduled thrice weekly. The previous once per three-day fall schedule for the Wildlife Images station was discontinued following the 2016 season and since operated once per week.

A new CES was established at Munson Valley within Crater Lake National Park and operated beginning July 12. The delayed startup was due to an exceptional and persistent snow cover on the Munson Valley meadows chosen for the CES location.

Numerous wildfires in our region created widespread smoky air conditions, occasionally reaching hazardous health levels. These conditions caused several scheduled CES efforts to be postponed or cancelled. Affected CES included Rocky Point Cabin, Johnson Creek, Oregon Caves National Monument, Frain Ranch/Topsy Grade, Willow Wind, and Wood River Wetland. Several scheduled CES efforts at the Sevenmile Guard Station were cancelled due to a wildfire-related area closure.

Beginning May 2017 area search surveys were replaced with an incidental observations count completed during the operations period at all CES except Oregon Caves National Monument; area searches continued at that site. This programmatic transition provides similar information in a more practical procedure for field workers concurrently managing a mist netting operation. The incidental observations procedure involved compiling total encounters by species (by sight or sound, captured birds excluded). These data were contributed to eBird, the international checklist network (<http://ebird.org/>). CES plant phenological surveys begun in 2014 were continued. These data were contributed to National Phenology Network, the U.S.-wide monitoring network (<https://www.usanpn.org/>).

Combined 2017 CES monitoring totals from all stations include 6,084 birds of 87 species captured during 7,328 net hours (number of 12-meter mist nets operated multiplied by time operated in hours) during 148 efforts (Table 3). The 10 most numerous-captured species were Song Sparrow (543), Yellow-rumped (Audubon's) Warbler (516), Dark-eyed (Oregon) Junco (498), Orange-crowned Warbler (372), Yellow Warbler (257), Purple Finch (240), Hermit Thrush (227), Spotted Towhee (218), Golden-crowned Sparrow (214), and Fox Sparrow. During CES

efforts, 144 species were encountered (i.e., captured, observed during area search survey, or incidentally observed), including 57 detected and not captured, and 10 species captured but not otherwise observed.

Banding Demonstration, Target-Species Netting & Auxiliary Marking, and Sampling Efforts

In addition to constant effort monitoring station operations, mist netting and banding efforts were conducted for education and public outreach demonstrations and target-species netting and auxiliary marking for two species. Demonstrations were presented at the City of Ashland's Rogue Valley Bird Festival at North Mountain Park, during KBO's Fundamentals of Bird Banding Workshop at Odessa Creek Campground, and at the Western Bird Banding Association Annual Meeting at the Deer Creek Center. Target-species auxiliary marking was completed for two partnership-driven projects. Genetics and stable isotope sampling continued for our altitudinal migration research and in collaboration with University of California Los Angeles' Center for Tropical Research and their migratory bird genetics studies.

Banding Demonstrations

In partnership with the City of Ashland's North Mountain Park Nature Center and several other organizations, KBO presented a bird banding demonstration on May 13 as part of the Rogue Valley Bird Festival, a local celebration of International Migratory Bird Day. The festival's theme, *Helping Birds Along the Way* celebrated the migration of nearly 350 bird species between their nesting habitats in North America and wintering grounds in Latin America, Mexico, and the Caribbean. Our banding team, including international interns, shared that message with many festival visitors, while interpreting how results from banding help inform bird and habitat conservation efforts, and provided close-up views of birds being banded.

As a field-practical segment of our *Fundamentals of Bird Banding Workshop* July 24-28, mist netting and banding techniques were demonstrated at the former KBO CES at Odessa Creek Campground July 27.

We hosted a banding demonstration for project partners during CES operations at our Rocky Point Field Station CES on September 6. Guests for the demonstration, presented by KBO biologists and directors, included National Park Service staff from Crater Lake National Park and US Forest Service staff from Fremont-Winema National Forest and International Programs. Participants saw birds up close and learned how our long-term monitoring program contributes to land management planning and regional, national, and international bird conservation.

A banding demonstration was presented as part of the Western Bird Banding Association's Annual Meeting at the Siskiyou Field Institute's Deer Creek Center on September 29. Approximately 30 meeting field trip attendants joined us for wide-ranging discussions of mist netting and banding techniques (Table 4).

Target-Species Auxiliary Marking in Migratory Connectivity Projects

In the fourth year of a tri-national partnership with Environment and Climate Change Canada, University of British Columbia, University of Guadalajara, and San Pancho Bird Observatory, KBO target-netted Yellow-breasted Chats using audio-lure at two previous netting sites on the Trinity River. Individual-identifying color bands were attached to two newly-captured chats and light-level geolocators retrieved from three returned and recaptured previously marked chats. Data retrieved from the geolocators will be used to map breeding chats to their migration pathways and wintering areas. This project was expanded in 2017 to include a pilot study that included target netting wintering chats in Nayarit, Mexico and color-banding breeding chats at our Wildlife Images-Rogue River CES. Goals of the pilot efforts were to assess feasibility for further geocator studies, specifically, winter capture feasibility and return rate, and summer passive capture feasibility and return rate.

KBO joined with many partners in a North America-wide Common Nighthawk migration connectivity project begun in 2017. In coordination with the University of Alberta and Smithsonian Migratory Bird Center's Migratory Connectivity Project (<http://www.migratoryconnectivityproject.org/>), we captured Common Nighthawks using mist nets and audio-lure to attach satellite tag tracking devices at Wright's Meadows on Fremont-Winema National Forest (Table 4). Data from this project will increase our understanding of Common Nighthawk connectivity, migration pathways, and wintering areas.

Genetic and Stable Isotope Sampling

Since 2008, KBO has investigated long distance migratory connectivity and regional altitudinal migration in selected species using stable isotopes. Isotopic ratios of carbon, hydrogen, and deuterium in inert keratin tissues of feathers and toe-claw samples are used as indicators of the location where these were grown. Using isotope analyses, we seek to uncover finer detail of Klamath-Siskiyou Bioregion populations' full life cycle movements and habitat use. We collected 94 paired feather and claw samples from Yellow-breasted Chat, Song Sparrow, and Purple Finch during CES operations.

Since 1999, KBO has contributed feather samples to the University of California, Los Angeles Center for Tropical Research's (CTR) Population, Structure, and Conservation of Neotropical Migratory Birds program. The CTR is investigating the genetic structure of migratory bird populations in order to connect breeding areas in North America with wintering areas in Latin America and the Caribbean. Using molecular genetic techniques (utilizing genetic material and stable isotopes obtained from a feather), CTR researchers have documented breeding and wintering population connections of several migrant songbird species (available at <http://www.ioe.ucla.edu/CTR/>). CTR's findings provide conservation biologists with the means of correlating habitat changes with declining populations. Demographic data contributed by KBO and other monitoring programs are integral to the CTR's research efforts. In 2017, KBO collected and contributed 274 feather samples to this project.

Training

KBO's long-term monitoring is integrated with our academic bird banding internship program, providing specialized training in the latest and most effective bird monitoring techniques for students and biologists. In addition to on-going instruction through the internship program, KBO provided a number of bird banding techniques training days for volunteers and professionals from academia, our local community, and federal land management agencies in 2017.

Seven student volunteer interns received experiential instruction in advanced bird banding and survey techniques. The instruction is supplemented with study materials, published by the North American Banding Council (NABC), pertinent scientific literature, and regular seminars presented by KBO staff. Continuing our commitment to international capacity building through technical training, two of these student volunteer interns were from Brazil and others from Canada, Mexico, and New Zealand. These international internships were made possible through our partnerships with the U.S. Forest Service International Programs' Wings Across the Americas and Oregon State University's Division of International Studies.

Toward the fulfillment of the NABC mission of promoting sound and ethical banding principles and techniques, KBO hosted a NABC-sanctioned bander and bander trainer certification evaluation session in October where four KBO interns were certified at the Bander level.

Experiential training in banding techniques during monitoring efforts at CES and targeted-species sites was provided to partnering biologists, graduate students, and local volunteers from the Bureau of Land Management, National Park Service, U.S. Forest Service, Oregon State University, and Portland State University. These professional-level training sessions totaled 12 person days.

In July, we hosted a fee-based *Fundamentals of Bird Banding Workshop* at our Upper Klamath Field Station. The 5-day workshop presented seminars and practical skills instruction to 10 participants.

Conclusion

Klamath Bird Observatory's long-term bird monitoring program utilizes multiple methods, at local and landscape scales, to monitor bird populations during the breeding and migration seasons. Integral components of this monitoring program are technical training and outreach efforts. Our program includes lands that are managed by the U.S. Department of Agriculture Forest Service, US Department of Interior Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service, and Ashland School District. Data resulting from these efforts are contributed to several databases including the U.S. Geological Survey North American Bird Banding Laboratory, Institute for Bird Populations' Monitoring Avian Productivity and Survivorship Program, eBird, National Phenology Network, University of California Los Angeles Center for Tropical Research's migratory bird genetics projects, and Avian Knowledge Northwest—a regional node of the Avian Knowledge Network.

In 2017 we published two papers that analyzed our long-term CES data: *Spatial variation in songbird demographic trends from a regional network of banding stations in the Pacific Northwest* (Rockwell et al. 2017) and *Post-breeding elevational movements of western songbirds in northern California and southern Oregon* (Wiegardt et al. 2017). Results from KBO's long-term monitoring, in combination with our applied and theoretical research programs, inform multiple audiences about both bird population status and health and species response to natural and anthropogenic habitat change. This work contributes to bird conservation locally, regionally, and at the national and international levels. KBO will continue working with our partners to maintain this long-term monitoring program contributing towards implementing our mission to advance bird and habitat conservation through science, education, and effective partnerships.

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Table 1. Species with elevated conservation status for which Klamath Bird Observatory gathers distribution, abundance, and demographic information at constant effort monitoring stations in southern Oregon and northern California and associated Partners in Flight, and state and federal agency conservation plans (Altman 2000, Altman and Alexander 2012, CalPIF 2002, NABCI 2014, ODFW 2016, RHJV 2004, Rosenberg et al. 2016, Shuford and Gardali 2008, USFWS 2008).

Common Name	California Partners in Flight Coniferous Forests (CalPIF 2002)	California Partners in Flight Riparian Habitats (RHJV 2004)	California Department of Fish & Wildlife Species of Concern (Shuford and Gardali 2008)	Oregon-Washington Partners in Flight Coniferous Forests (Altman and Alexander 2012)	Oregon-Washington Partners in Flight East-slope Cascades Mtns (Altman 2000)	Oregon Department of Fish & Wildlife Sensitive Species (ODFW 2016)	Partners in Flight Continental Plan Prevent Decline Watch List - Western Forest (Rosenberg et al. 2016)	Partners in Flight Continental Plan Reverse Decline Watch List - Western Forest (Rosenberg et al. 2016)	United States Fish & Wildlife Service Species of Concern (USFWS 2008)	State of the Birds 2014 Common Birds in Steep Decline (NABCI 2014)
American Wigeon										x
Cinnamon Teal										x
Mountain Quail	x					x				
Blue (Sooty) Grouse				x				x		
Pied-billed Grebe									x	
Western Grebe									x	
American White Pelican						x				
American Bittern									x	
Sandhill Crane					x					
Bald Eagle									x	
American Kestrel									x	
Black Tern			x						x	x
Band-tailed Pigeon				x				x		
Flammulated Owl	x				x	x	x		x	
Common Nighthawk						x				x
Vaux's Swift	x		x		x					

Table 1 (continued). Species with elevated conservation status for which Klamath Bird Observatory gathers distribution, abundance, and demographic information at constant effort monitoring stations in southern Oregon and northern California and associated Partners in Flight, and state and federal agency conservation plans (Altman 2000, Altman and Alexander 2012, CalPIF 2002, NABCI 2014, ODFW 2016, RHJV 2004, Rosenberg et al. 2016, Shuford and Gardali 2008, USFWS 2008).

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Steller's Jay	x									
Clark's Nutcracker	x				x					
Tree Swallow		x								
Bank Swallow		x								x
Black-capped Chickadee									x	
Oak Titmouse								x	x	
Red-breasted Nuthatch	x									
Pygmy Nuthatch					x					
Brown Creeper	x			x	x					
Bewick's Wren									x	
Winter (Pacific) Wren				x						
Marsh Wren									x	
Golden-crowned Kinglet	x									
Swainson's Thrush		x								
Hermit Thrush				x	x					
Varied Thrush				x						x

Table 1 (continued). Species with elevated conservation status for which Klamath Bird Observatory gathers distribution, abundance, and demographic information at constant effort monitoring stations in southern Oregon and northern California and associated Partners in Flight, and state and federal agency conservation plans (Altman 2000, Altman and Alexander 2012, CalPIF 2002, NABCI 2014, ODFW 2016, RHJV 2004, Rosenberg et al. 2016, Shuford and Gardali 2008, USFWS 2008).

Common Name	California Partners in Flight Coniferous Forests (CalPIF 2002)	California Partners in Flight Riparian Habitats (RHJV 2004)	California Department of Fish & Wildlife Species of Concern (Shuford and Gardali 2008)	Oregon-Washington Partners in Flight Coniferous Forests (Altman and Alexander 2012)	Oregon-Washington Partners in Flight East-slope Cascades Mtns (Altman 2000)	Oregon Department of Fish & Wildlife Sensitive Species (ODFW 2016)	Partners in Flight Continental Plan Prevent Decline Watch List - Western Forest (Rosenberg et al. 2016)	Partners in Flight Continental Plan Reverse Decline Watch List - Western Forest (Rosenberg et al. 2016)	United States Fish & Wildlife Service Species of Concern (USFWS 2008)	State of the Birds 2014 Common Birds in Steep Decline (NABCI 2014)
Nashville Warbler				x	x					
Orange-crowned Warbler				x						
Yellow Warbler		x	x						x	
Yellow-rumped Warbler	x									
Black-throated Gray Warbler	x			x					x	
Townsend's Warbler				x						
Hermit Warbler				x						
MacGillivray's Warbler	x									
Common Yellowthroat		x							x	
Wilson's Warbler		x		x						x
Yellow-breasted Chat		x				x				
Western Tanager	x			x						
Green-tailed Towhee									x	
Spotted Towhee									x	
Chipping Sparrow	x				x	x				
Brewer's Sparrow						x			x	

Table 2. Location of Klamath Bird Observatory constant effort monitoring stations (CES), banding demonstration sites (DEMO), and targeted-species netting sites (TARG) operated in 2017 by station name, code, ownership, year CES established, and geospatial information. [USFS = U.S. Department of Agriculture U.S. Forest Service; BLM = U.S. Department of Interior Bureau of Land Management; USFWS = U.S. Department of Interior U.S. Fish and Wildlife Service; NPS = U.S. Department of Interior National Park Service.]

Station Name	Ownership	Year CES		Latitude	Longitude	Location
		Established				
Antelope Creek (CES)	USFS, Klamath NF	1993		41° 29' 32"	121° 56' 21"	Antelope Creek, 7 miles SSW of Tennant, Siskiyou Co., CA
Frain Ranch Campground (CES)	BLM, Lakeview District	1998		42° 01' 30"	122° 06' 05"	Frain Ranch Camp./Topsy Grade, 10.2 miles NW of Dorris, CA, Klamath Co., OR
Johnson Creek (CES)	BLM, Lakeview District	1997		42° 14' 53"	122° 14' 02"	Johnson Creek, 19.2 miles ENE of Ashland, Klamath Co., OR
North Mountain Park (DEMO)	City of Ashland	N/A		42° 12' 08"	122° 41' 51"	North Mountain Park, City of Ashland, Jackson Co., OR
Munson Valley (CES)	Crater Lake NP	2017	✓	42° 53' 28"	122° 08' 17"	Crater Lake NP, Munson Valley, 14 miles NNW of Fort Klamath, Klamath Co., OR
Odessa Creek Campground (DEMO)	USFS, Fremont-Winema NF	N/A		42° 25' 45"	122° 03' 28"	Odessa Creek Camp., 19.6 miles NW of Klamath Falls, Klamath Co., OR
Oregon Caves (CES)	NPS, Oregon Caves NM	2002		42° 05' 37"	123° 23' 47"	Oregon Caves NM, 14.0 miles SE of Cave Junction, Josephine Co., OR
Rocky Point Cabin (CES)	USFWS, Klamath Basin Refuge Network	1996		42° 29' 49"	122° 04' 47"	Rocky Point, 23.0 miles NW of Klamath Falls, Klamath Co., OR
Sevenmile Guard Station (DEMO, CES)	USFS, Fremont-Winema NF	1996		42° 42' 18"	122° 04' 26"	Sevenmile Guard Station, 6 miles W of Ft. Klamath, Klamath Co., OR
Trinity River (TARG)	USFS, Shasta-Trinity NF	N/A		40° 41' 00"	123° 01' 41"	TRRP Reference Plot 2, 10 mi SW of Weaverville, Trinity Co., CA
Trinity River (TARG)	BLM, Redding Field Office	N/A		40° 42' 54"	122° 50' 12"	TRRP Reference Plot 4, 5.5 mi E of Weaverville, Trinity Co., CA
Wildlife Images (CES)	BLM, Medford District	1994		42° 29' 25"	123° 28' 48"	Rogue River at Wildlife Images, 3.5 miles SW of Merlin, Josephine Co., OR
Willow Wind (CES)	Ashland School District	2001		42° 11' 59"	122° 41' 26"	Willow Wind Community Learning Center, Ashland, Jackson Co., OR
Wood River Wetland (CES)	BLM, Lakeview District	1997		42° 35' 12"	121° 55' 48"	Wood River Wetland, Agency Lake, 3.3 miles W of Chiloquin, Klamath Co., OR
Wright's Meadows (TARG)	USFS, Fremont-Winema NF	N/A		42° 31' 4"	121° 44' 26"	Wright's Meadows, 11 miles SE of Chiloquin, Klamath Co., OR

Table 3. Summary of Klamath Bird Observatory's constant effort monitoring station (CES) efforts in 2017. [STATION (ASD = Ashland School District, BLM = U.S. Department of Interior Bureau of Land Management, NPS = U.S. Department of Interior National Park Service, USFS = U.S. Department of Agriculture Forest Service, USFWS = U.S. Department of Interior Fish and Wildlife Service); EFFORTS = number of station visits; RECAP, NEW, UNBANDED and TOTAL = number of previously banded birds recaptured, newly banded birds, birds released without being banded, and total number of birds captured respectively; NET HOURS = number of 12-meter mist nets operated multiplied by the time operated in hours]

STATION CODE	STATION (Ownership)	EFFORTS	CAPTURES				NET HOURS
			RECAP	NEW	UNBANDED	TOTAL	
7MIL	Sevenmile Guard Station CES (USFS)	12	75	512	30	617	638
ANT1	Antelope Creek CES (USFS)	14	97	508	31	636	606
CABN	Rocky Point Field Station CES (USFWS)	22	105	1,102	63	1,270	1,108
JOHN	Johnson Creek CES (BLM)	14	36	331	24	391	739
MUVA	Munson Valley/Crater Lake National Park (NPS)	11	4	116	13	133	594
ORCA	Oregon Caves National Monument CES (NPS)	14	43	150	13	206	663
TOPS	Frain Ranch Campground/Topsy Grade CES (BLM)	13	82	580	38	700	635
WIIM	Wildlife Images CES (BLM)	18	141	692	69	902	954
WIWI	Willow Wind CES (ASD)	15	91	408	45	544	651
WOOD	Wood River Wetland CES (BLM)	15	136	518	31	685	740
Totals		148	810	4,917	357	6,084	7,328

Table 4. Summary of Klamath Bird Observatory's demonstration and target-species netting efforts in 2017, including Fundamentals of Banding Workshop, Rogue Valley Bird Festival and Western Bird Banding Association (WBBA) Annual Meeting demonstrations, Yellow-breasted Chat (color-banding and geolocator retrieval) and Common Nighthawk (satellite tag application) migration connectivity projects targeted-species efforts. [RECAP, NEW, UNBANDED and TOTAL = number of previously banded birds recaptured, newly banded birds, birds released without being banded, and total number of birds captured respectively]

Project	STATION (Ownership)	CAPTURES			
		RECAP	NEW	UNBANDED	TOTAL
Fundamentals of Banding Workshop	Odessa Creek Campground (USFS, Fremont-Winema NF)	3	16	0	19
Rogue Valley Bird Festival	North Mountain Park (City of Ashland)	3	10	1	14
WBBA Annual Meeting	Deer Creek Center (Siskiyou Field Institute)	0	30	0	30
Yellow-breasted Chat	Multiple along Trinity River, (USFS, Shasta-Trinity NF & BLM, Redding Field Office)	3	2	0	5
Common Nighthawk	Wright's Meadows (USFS, Fremont-Winema NF)	0	5	0	5
Demonstration & Target-Species Netting Effort Totals		9	63	1	73