

2024 Oregon Vesper Sparrow Working Group Meeting

UPDATES & MEETING MINUTES

Date:	10 October 2024
Location:	ODFW South Willamette Watershed District Office
Notetaking:	Anita Michalak, Ecostudies Institute

Text in boxes was provided as a written update.

ATTENDEES

Ecostudies Institute (ESI): Anita Michalak, Elspeth Kim, Stephanie Augustine, Gary Slater

Greenbelt Land Trust (GLT): Lisa Millbank

Independent: Bob Altman, Joel Geier

Joint Base Lewis-McChord (JBLM): Jim Lynch, Tim Leque

Klamath Bird Observatory (KBO): Jaime Stephens, Sarah Rockwell

Oregon Department of Fish & Wildlife (ODFW): Martin Nugent, Anne Mary Myers

Pacific Birds Habitat Joint-Venture: Sara Evans-Peters

US Fish & Wildlife Service (USFWS): Kris Sclafani, Zach Radmer, Gabrielle Robinson, Zachary Cravens, Jose Carranza

Washington Department of Fish & Wildlife (WDFW): Christa LeGrande, Adrian Frediani

REGULATORY & RANGEWIDE UPDATES

Population Modeling Updates & Discussion – USFWS

- A couple of USFWS folks couldn't make it today (Judy and Robin, both modelers) but are working on developing population models for regional populations for future projection.
- Hoping to have discussions with managers to help shape recommendations with respect to criteria definitions/framework to provide a better sense of what the current OVSP status is and what it's likely to translate to in the future given current threats, projected modeling, etc.
 - Most interested at abundance and thresholds that make up "good" vs "ok" vs "poor" trends
- The model is not tracking future threats, since it only incorporates current demographic rates.
- Things to consider: Are habitat and availability accounted for? Is there a carrying capacity issue. Thresholds vary depending on the location in question, but there could still be trends even if you aren't dealing with a specific number.
- There is a lot of literature regarding population sizes for lots of taxa, but not necessarily for vespers.
- It would be helpful for Judy and Robin to be provided with a quasi-extinction threshold(s) for OVSP. In other words, at what point is population considered "recovered enough" to be a viable population?
 - 40 is the number identified as a threshold; fewer than 40 individuals would effectively result in local extirpation.
 - Still, we will need to define and specify more than one threshold (e.g., good, fair, poor, very poor, etc.)
- Imperiled species targets were included in the "[Conservation of Landbirds and Associated Habitats and Ecosystems in the East Cascade Mountains of Oregon and Washington](#)" plan published by Bob Altman and Jaime Stephens in 2022. This document has been used as a framework for OR-WA Partners in Flight.
 - The population threshold used for other species depended on how wide-ranging the species is.
 - The best information is often expert opinion.
- When talking about "conditions" we are usually referring to resiliency of a population, but also range-wide viability using habitat as a proxy.

- The process could be as simple as rating populations relative to one another, rather than assigning specific thresholds for each.
- The six sites for which population number goals are desirable are: (1) Greater Puget Sound, (2) South Puget Sound, (3) Umpqua, (4) Oregon Coast, (5) Columbia River, and (6) Willamette Valley.
 - The easiest approach would be to get expert opinion on the target number of each region.
 - Still, it's important to consider situations like those in Umpqua and the WV, where the (target) numbers may be bigger, but are these numbers considered "good"? What constitutes a stable number that would cause no worry?
- Rather than looking at just a target number, another option could be looking at lambda to instead characterize the rate of decline.
- Ultimately, we need to determine the most appropriate way to use abundance data to list the species.
 - OVSP cannot be considered "ok/good" range-wide until all population trends are positive rather than declining (which is the current state).

Listing & Review Process Updates – Kris Sclafani (USFWS)

- The draft of the species status assessment (SSA) that we've been working on for over a year is almost ready for peer/technical review and will go out this December.

USFWS WA State Updates – Kris Sclafani, Zach Radmer, Kim Flotlin (USFWS)

- Maddie McGroarty is no longer an OVSP lead; Jose Carranza is assisting with the SSA.
- USFWS received funding to conduct surveys off-base to get a better idea for SSA presence/absence.
 - Pretty good surveys have been conducted in the past but wanted to be as up to date as possible with new surveys.
 - This funding also extends to next year; hoping to survey more private lands (e.g., Christmas tree farms).
 - This year only two males were found on San Juan Island.
- In the context of JBLM, OVSP is part of the new biological opinion as a "conference species" (aka a species that is being discussed/considered for potential protection or management actions).
 - The current JBLM goal for OVSP is 350 individuals (which is quite a bit more than currently occur on JBLM); this number includes population size counts both on and off the installation.
 - Additionally, ACUB/REPI is back, with \$10.8 million being set aside for natural resources projects.

Oregon vesper sparrow surveys in 2024, funded by USFWS-Army Interagency Agreement

USFWS collaborated with WDFW to survey multiple sites in Washington (outside of JBLM) for OVSP in 2024. The purpose was to visit places that recently or currently were assumed to have OVSP to better understand the statewide status of species and JBLM's role within that status. Presence/absence surveys with song playback only found OVSP still present at the LaFarge Open Space (a County property) on San Juan Island. Unfortunately, further surveys at that site documented just two males and no females or nests. WDFW and USFWS will be jointly developing a report on this work. Surveys will continue in 2025 and pivot primarily to private lands where survey access is granted.

JBLM/USFWS Conservation Policy Initiative Pilot Project - Has created a product we now call the "Mission Sustainment Program" programmatic biological opinion

In 2020, JBLM was chosen to be a Pilot Project for implementing the Conservation Policy Initiative (CPI) (a sub-project of the DOD – DOI Recovery and Sustainment Partnership). The CPI is intended to explore new regulatory approaches that simultaneously incentivize species recovery and increase training flexibility through the establishment of 'defined conservation commitment.' This Pilot Project would be solidified through a new programmatic biological opinion (and revised INRMP) that would replace the 2017 programmatic biological opinion. The Pilot Project and the Conservation Crediting Program are designed to be complementary. Long story short, JBLM will receive regulatory certainty and flexibility in exchange for an improved status of larks both on and off the installation. The revised INRMP and programmatic biological opinion are complete but not yet signed; pending approval from Army Installation Management Command (INRMP and PBO) and then WDFW (for

the INRMP). Oregon vesper sparrows are included as a conference opinion. The OVSP defined conservation commitment for JBLM is 350 sparrows. For more information, contact Zach Radmer: Zachary_Radmer@fws.gov.

HCP Updates

City of Yelm HCP – City of Yelm is in the process of developing an HCP that will include OVSP as a covered species. OVSP habitat does occur within the City's Project Area, though no known OVSP nesting occurs there. The City's covered actions include City operations and maintenance actions such as road maintenance, park maintenance, utilities maintenance, and their development permit program. The City anticipates mitigating for potential OVSP habitat impacts through off-site mitigation elsewhere in Thurston County. The City has not yet completed their draft HCP. Final HCP completion schedule and National Environmental Policy Act (NEPA) process are still to be determined. For more information, contact Erin Adams at Erin_Adams@fws.gov.

Bush Prairie HCP – The Port of Olympia (including the Olympia Airport) and the City of Tumwater are developing an HCP with the USFWS WA-ES office that will include OVSP as a covered species. HCP actions include expansion of infrastructure (hangers, buildings, businesses) at the Olympia Airport, where OVSP were last known to occur in 2015. Suitable OVSP habitat occurs elsewhere in the Plan Area, but OVSP are not known to occur (currently or historically) in other locations in the Plan Area. The USFWS and the HCP applicants are developing an OVSP conservation strategy (coordinated with the Federal Aviation Administration) that will be incorporated in the HCP. Impacts to OVSP habitat due to HCP activities will likely be mitigated via permanent protection and management of OVSP habitat elsewhere in the Plan Area. The location of that site (or sites) has not yet been determined. Final HCP completion schedule and National Environmental Policy Act (NEPA) process are still to be determined. For more information, contact Rebecca Currin at Rebecca_Currin@fws.gov.

WDFW WA State Updates – Christa LeGrande (WDFW)

- See written updates below for detailed info.
 - WDFW will start working on a state recovery plan this upcoming year, with hopes of finishing at the end of 2025.
 - WDFW also surveyed several sites throughout South Puget Sound.
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- **OVSP surveys 2024** – WDFW and USFWS implemented a pilot methodology using conspecific playback on set transects at various sites in Western Washington to assess OVSP presence. Altogether, we surveyed West Rocky Prairie, Glacial Heritage Preserve, Violet Prairie, Cavness Ranch, Deschutes Prairie Preserve, Scatter Creek North and South, Wolf Haven Preserve, Olympia Airport, and Shelton Airport (and surrounding Port of Shelton property) in the South Sound and American Camp and Lafarge Open Space on San Juan Island. No Oregon vesper sparrows were detected on surveys in the South Sound. USFWS detected two male OVSP singing at the Lafarge Open Space (the “gravel pit”) on San Juan Island.
 - **Coastal OVSP detections** – Incidentally, two observations of Oregon vesper sparrow were made on the coast at Copalis Beach/Griffiths-Priddy State Park, one from a birder visiting the Park (photo verified) and one by WDFW personnel during snowy plover surveys. Follow-up visits by multiple entities to the coast to conduct playback and listen for the bird(s) did not yield any new detections.
 - **State recovery plan** – WDFW is developing a state recovery plan in coordination with USFWS to evaluate threats and potential recovery options. Anticipated completion of this plan is late 2025.

ODFW OR State Updates – Martin Nugent (ODFW)

- At the Oregon state level, OVSP are considered “sensitive critical”—the same designation they’ve had since the early 2000s and which doesn’t confer any specific legal protections.
- Revisions of the state plan need be completed a year from now for “strategy species,” but ODFW doesn’t anticipate any changes for OVSP.
 - More information is available now but it will primarily be woven into the conservation strategy.
- Management of OVSP in OR is more site-specific, with conservation opportunity areas that are small and specific to each ecoregion.
- Additionally, the agency has gone through reorganization and there is now a habitat division and a new director.

- Any action implementation goes through locally based regional habitat biologists, which is a new development that will hopefully lead to larger capacity, more efficient delivery, etc.

RESEARCH UPDATES

General KBO Updates – Jaime Stephens and Sarah Rockwell (KBO)

- In field season 2024, we conducted resighting at our main study site at Lily Glen County Park, and redeployed two GPS tags whose batteries were still testing well.
- Our main focus this year was an inventory of population size and distribution of Oregon Vesper Sparrow in the Cascade-Siskiyou National Monument. We completed transect surveys on 54 meadows in the Monument, and 27 of them had at least one OVSP detection. We estimate 40-50 pairs at each of the most densely populated meadows (Lily Glen, Vesper Meadow, and Owen's Meadow), and we counted 116 individuals outside of those meadows – a minimum estimate as we're mostly counting singing males by this method. Only 4 meadow sites had ≥ 10 individuals detected (not including the above-mentioned 3 best sites, one of which is partially in the Monument boundary). 75% of occupied sites had 1-5 individuals detected.
- We put up Motus nodes at several "satellite" meadows near Lily Glen in 2022-2024. We have yet to detect a Motus-tagged fledgling away from the site where it was tagged. One has been detected the following year.
- We published a paper with Bob Altman and Joel Geier on post-fledging survival in the Willamette Valley: [Altman, B., J. Geier, and S. M. Rockwell. 2024. High post-fledging survival and site persistence using mark-resight methodology for Oregon Vesper Sparrows in the Willamette Valley, Oregon. Avian Conservation and Ecology 19\(2\):8.](#)
- We are drafting a manuscript describing the GPS-tagging results for publication in a journal.
- We have a grant pending for additional GPS-tagging in the Klamath Mtns (Rogue Basin and Umpqua) in 2025, which would also include abundance surveys at North Bank Habitat Management Area and Kanipe Park.
- Klamath Bird Observatory, Willamette Valley/American Bird Conservancy, and Ecostudies Institute will continue to work together on range-wide analyses of nest success, nest site selection, and annual survival through 2024-2026.

Non-Breeding Season Movement & GPS Tagging Updates – Sarah Rockwell (KBO)

Please contact Sarah Rockwell at KBO (smr@klamathbird.org) for presentation slides.

- A total of 40 GPS tags were put out in Lily Glenn and WV from 2020-2022.
- Recently also did a first pass on a land cover area analysis
 - Retrieved 8 tags with data (20%); some feel off, others didn't return data.
- Results showed that fall migration duration has a huge range (5-69 days, depending on the individual).
 - For WV individuals, April 15 is a bit unusual/outside the typical range.
- Land cover and land ownership analyses were also conducted; hoping to look more at preferences of available vs used habitat in future analyses.
 - Land ownership analysis creates an avenue to think about outreach to private landowners (55 county properties).
 - All protected lands will vary in the amount of conservation protection allotted.
- No new GPS tags were put out this year, but KBO has a grant pending to put some tags out next year (2025).
- Q&A:
 - Decided not to tag in South Puget Sound because of how small and sensitive the populations are.

Klamath Meadow Inventory – Sarah Rockwell (KBO)

Please contact Sarah Rockwell at KBO (smr@klamathbird.org) for presentation slides.

- In 2024, KBO conducted a fuller inventory of the Cascade-Siskiyou National Monument (CSNM), with the objective of obtaining an index/idea of abundance and occupancy of certain meadows.
 - For this survey, well-occupied sites were not resurveyed.
- The definition of "occupied" here is loose and essentially just refers to where OVSP were detected.
 - 28 of 55 meadows were considered occupied, with counts ranging from 1 to 34 OVSP per site.

- 174 total OVSP counted; 75% of sites had fewer than 5 birds counted.
- No fledglings were found away from where they were tagged.
- Q&A:
 - Playbacks were not helpful.
 - Feathered edges are better than hard edges for OVSP. Fire is not an issue because none of the sites have been recently burned.
 - Some sites do have feathered edges with encroachment, but the OVSP don't mind it.
 - One conclusion may be that it's worth only focusing on a couple of these sites.
 - Fall grazing isn't much of an issue but spring grazing may be.
 - Birds tend to be associated with edges when the center of the meadow has a depression and/or is wet.
 - What is the relationship between the size of the meadow, amount of interior meadow that's less suitable because of wetness, and the presence of birds?
 - This level of micro-suitability is not currently taken into account.
 - Vesper meadow is currently undergoing a lot of in-spring work so we'll see how much that impacts what proportion of the meadow is wet.

Corvallis Metapopulation Conservation Overview – Bob Altman

[See PowerPoint](#)

- Habitat type is almost exclusively Christmas tree farms and pasture sites.
- The plan is to do a more integrated/robust analysis over the next year or so that can integrate all the collected demographic metrics.
- Color-banded a total of 901 individuals with 8,000 resights.
- Found 275 nests
 - Eggs hatch rate was 86%; nestlings don't get factored into eggs hatch rate.
- There are a lot of green flags when it comes to survival, especially when you compare with other grassland birds that all have different threats.
- Bob, Joel Geier, and Sarah Rockwell recently published a paper that modeled post-fledging survival estimates (see link above).
 - Post-fledge survival was 56-63% based on 152 resights.
 - Mark-resight estimates were similar to modeled estimates and present the highest post-fledge survival estimates (in the literature) for a grassland bird.
- Seeing both between-season and within-season dispersal.
- A clear red flag is the reduction in the size of this population, especially over the last 3-4 years; numbers have declined from 170 to 125 pairs.
- One take-away may be putting emphasis on large populations.
- Q&A:
 - Is there evidence of breeding at new sites with adult dispersal? (Yes)
 - Is reduced population a result of reduced productivity?
 - Survival has been high except for 2023 males, which is probably in response to multiple things, productivity being one of them.
 - It would be interesting to see if dispersal distances are non-random/if you would get the same distribution.

MANAGEMENT/HABITAT UPDATES

Creswell Oaks Preserve

The Creswell Oaks property supports the largest known Oregon vesper sparrow population in the Willamette Valley Ecoregion and has been monitored since 2021 with the goal of maintaining or increasing the population within five years. We completed 252 surveys of 21 transects over four years and used 130 singing male Oregon vesper sparrow detections in a distance sampling framework to estimate annual population density and abundance. Model estimates indicate a potential population decline from 35 (95% confidence interval 22 – 56) male Oregon vesper

sparrows in 2021 to only 14(5 – 39) in 2024. Further monitoring will be critical to distinguish interannual variation and model uncertainty from long-term demographic declines.

South Sound Updates – Stephanie Augustine, Gary Slater (ESI)

Population Monitoring: Joint Base Lewis-McChord

Since 2015, Ecostudies staff has coordinated standardized line transect surveys for breeding birds across prairie habitat on Joint Base Lewis-McChord as part of the requirements for streaked horned lark conservation and monitoring. In the last eight years we completed 2,632 surveys of 115 unique transects. We used the 434 detections of Oregon vesper sparrows on these surveys in a distance sampling modeling framework to estimate annual population size on occupied sites. Within our sampling area, which doesn't include the center of the Artillery Impact Area, we estimated there were 80 (95% confidence interval: 42 – 157) Oregon vesper sparrows on base in the 2023 breeding season. We observed evidence of a potential overall decline on the Artillery Impact Area, the site which hosts the largest population in the South Puget Sound; the population trend for the Weir Prairie population appeared stable. In 2024, we conducted an additional 297 surveys of 99 transects and detected 29 Oregon vesper sparrows; these data will be used to update the distance sampling model.

Population Monitoring: Off-base surveys

Ecostudies staff has surveyed South Puget Sound prairie sites for Oregon vesper sparrows through several projects since 2015. Surveys in 2018-2019 were the most intensive, and used conspecific playback along transects at sites that were historically occupied or were the recipient of prairie enhancement activities. Sites were managed by a variety of public and private entities and included: Cavness, Deschutes Prairie, Glacial Heritage Preserve, Scatter Creek Wildlife Management Area, Tenalquot Preserve and adjacent pastureland, Violet Prairie-Scatter Creek Preserve, West Rocky Prairie Wildlife Management Area, Wolf Haven, Sanderson Airfield, and Olympia Airfield. Of these sites, we detected one pair at Sanderson airfield in both years, and 1-5 pairs at Tenalquot and adjacent pasturelands. Tenalquot is adjacent to the Weirs Prairies on Joint Base Lewis-McChord, which supports the second largest known population of Oregon vesper sparrows in the South Puget Sound and has continued to host a handful of pairs up to 2023. Additional bird monitoring of grassland sites in the South Puget Sound has continued in concert with other projects (e.g., see conspecific attraction), including 2023-2024 surveys at Mima Mounds and Glacial Heritage Preserve; none of these surveys have encountered new Oregon vesper sparrows in the region. Most work was funded by Competitive State Wildlife Grants.

Demographic Monitoring: Joint Base Lewis-McChord

Since 2016, Ecostudies staff has been conducting demographic monitoring of Oregon vesper sparrow populations to understand limiting factors and help inform recovery actions. Most work occurred on Joint Base Lewis-McChord, focusing on the Weirs Prairie (and adjacent Tenalquot Prairie) due to access limitations to the other JBLM population in the Artillery Impact Area. During 2024, we located and monitored 16 breeding territories at the Weirs Prairie, and located 14 nests. We also assisted in monitoring at Range 76, where 18 pairs were monitored. Not including 2024 data, modeled nest success probability was 0.401 (95% credible interval: 0.154 – 0.681). Nest survival and productivity models incorporating multiple years and additional factors such as nest vegetation will be part of a forthcoming analysis. We used 2016-2023 color-banding and resight data to model annual apparent survival; adults at 0.607 (0.514 – 0.698) were more than double juveniles at 0.215 (0.144 – 0.302) but is confounded by lack of data regarding dispersal to other sites. While we have too few confirmed female records to estimate sex-specific survival, in 2023-2024 we began collecting feather samples from banded nestlings, which will enable us to estimate sex and age-specific survival probabilities in the future. This work has been supported with funds from American Bird Conservancy, DoD-JBLM, USFWS, WDFW, and Wildlife Forever Fund.

Conspecific Attraction

Conspecific attraction is a process wherein individuals use social cues such as song and calls from other individuals of the same species to assess suitability and quality of habitat. Capitalizing on this natural process using artificial means, e.g., speaker playback of auditory cues, can lead individuals dispersing from existing populations to colonize currently unoccupied sites. During the 2022-2024 breeding seasons, Ecostudies established conspecific attraction playback sites on conservation lands in the South Puget Sound with apparently

suitable habitat that are unoccupied by breeding Oregon vesper sparrows. Sites were selected within 20 miles of existing populations, with some sites having historical detections of birds during the breeding or migration seasons. We established playback at Mazama Meadows Conservation Bank and Deschutes Prairie in 2022, Glacial Heritage Preserve and Scatter Creek Wildlife Management Area in 2023, and Scatter Creek Wildlife Management Area and West Rocky Prairie in 2024. Playback stations were deployed in early April to coincide with arrival of territorial males and were visited weekly or biweekly throughout the duration of the breeding season and intensively searched for birds. This work is funded by the American Bird Conservancy and the Wildlife Forever Fund; this work will continue in 202 and 2025 with existing funds and secured funding from a Competitive State Wildlife Grant.

Discussion

- Kris: part of the evaluation is looking at distribution and creating a strategy to map habitat.
 - Looking for feedback/input for what best info can be fed into the habitat mapping program; important to incorporate locations of potential habitat, not just occupied habitat.
 - Not a formal habitat suitability model, more of an exploratory tool that can be tweaked in the future.
 - Bob: suggests using “potential” habitat rather than “suitable” habitat
 - Most interested in determining specific habitat requirements/characteristics for OVSP
 - In WA, do we have a good grasp of potential habitat throughout southwest WA? This would allow for broader types of potential habitat.
 - No other areas of WA are necessarily missing; might just be a couple pairs here and there.
 - It’s important not to overestimate the habitat either.
 - This could be a part of the OR connectivity and habitat assessment project; currently has no major OVSP info
 - Rachel Wheat, ODFW Wildlife Connectivity Coordinator, would be the POC for this
 - Kris: the evaluation will be available for review and critique soon

Review of the Working Group

- The consensus is that BLM and other CA folks should be present.
 - State-level BLM would be easier to engage; Jaime will reach out to Kelly
 - Would also be beneficial to invite Monument folks
- Kris will look into the USFWS private lands contact in the Umpqua; USFWS and NRCS are key entities there.
- Could consider having a larger-scale online meeting in the spring every year and an in-person central OR meeting in the fall
 - Could also model this WG after plover meetings, where each region has its own working group
- Expand inclusion with USFWS staff
- Point Blue is another organization that could and should be represented
 - Others include: CA DFW, Sierra Foothills Conservancy, other places where people own property where birds are being detected, etc.
- There was a recent paper that came out about [OVSP winter abundance trends in CA](#); met with some skepticism because it’s a large assumption to claim that these individuals are in fact OVSP as opposed to another vesper sparrow species.
- Would be good to send working group invites out to listservs like various joint ventures; Jaime had suggestions
- Awareness that some component of the meetings has to be remote
- Overall, need to catalyze nonbreeding habitat and conservation

ACTION PLAN REVIEW & DISCUSSION

Recovery Action 1. Determine Population Status, Trend, and Current Distribution

1.1 Monitor the rangewide population, tracking trends and distribution

- Not much is known about the Umpqua, so there needs to be additional focus on the region.
- Getting access to surveyable habitat is the first step, followed by the development of some sort of protocol.
 - The need for a standardized protocol was discussed at the spring meeting earlier this year; not so much a question of creating a protocol so much as formalizing one
- Transects are generally more appropriate than point counts.
- To get started, info about where birds occupy sites is needed before monitoring begins anywhere.
 - In terms of access, existing properties should be the starting point; Umpqua Oak Partnership is an entity that should be contacted.
- Ideally, it would be great to have a better abundance estimate before creating an OVSP recovery plan, but this info won't be available in time before the species' listing decision.
- There are no current efforts to band in nonbreeding areas in the SPS due to how sensitive the species is; MOTUS towers could potentially fill this niche.
 - Suggested task: Engage MOTUS partners/folks in CA for higher priority OVSP areas to get MOTUS towers installed.
 - Otherwise, GPS tags are still the best and quickest way to obtain info.
 - Higher returns rates to SPS would make it feel safer to start trapping and tagging individuals there.

Discussion

- The goal of this session was to conduct a high-level review of formatting and top actions; other sections will be finetuned and followed up on.
- Suggestions:
 - Place more emphasis on the climate angle (e.g., impacts from storms, whether climate impacts return rates, etc.); could add an action to the list about assessing annual weather conditions relative to return rates (fits with 3.1.3 – tracking current climate change).
 - Genetic bottleneck could also influence hatch rates.
- Tasks:
 - Add line numbers
 - Add columns for status and entity
 - Add short-term/long-term progress
 - ALL: go through the action plan line-by-line

OVSP Ecoregional Research Summary

Parameter	Method	Region	Years	Sample Size
Productivity, Fecundity, Nest Success	Nest Monitoring	Puget	2017-2024	114
		Willamette		
		Klamath	2018-2019, 2021, 2023	142 nests
Survival, Dispersal, Recruitment	Color-Banding	Puget	2017-2024	248 banded birds; adult (n=68), HY (n=14), nestling (n=166)
		Willamette		
		Klamath	2018-2024 (very limited new banding in 2024, but resighting occurred)	460 banded birds; adult (n=193), nestling (n=267)
Habitat Assessment, Nest Site Selection	Nest Vegetation Monitoring	Puget	2017-2024 (10m point-intercept transects)	100 (with paired random)
		Willamette		
		Klamath	2018, 2019, 2021, 2023 (10 m point-intercept transects and 1 m nest plots)	142 nests (116 with paired random)
Migration Routes, Wintering Sites	GPS-Tagging Adults	Willamette		
		Klamath	2020-2023, 2024-2025 (including return years)	Data retrieved from 6 males (2 pending return in 2025)
Population Establishment	Conspecific Attraction	Puget	2022-2024	5 sites
		Willamette		
Fledgling Habitat Use, Survival, Natal Dispersal	Motus-Tagging Fledglings	Klamath	2021-2023	36 late-stage nestlings or fledglings tagged

Vital Rates	Nest Success	Predation Rate	Egg Hatch Rate	Fledgling per Nest	Adult Return Rate	First-Year Return Rate	Site Fidelity
Puget	Apparent = 54.4% (n=114)	91.5% (n=47)	77% (43 nests)	3.1/success (n=62); 1.7/active (n=114)	63.9% (n=72)	18.9% (n=158)	NA
Willamette							
Klamath	Please contact Sarah Rockwell at KBO (smr@klamathbirds.org) for Klamath Mountains site data.						