Logan Valley Wildlife Mitigation Site

(BPA Project# 2000-009-00, Contract #81048)

2019 Annual Report

Covering Activities from 1/1/2019 – 2/28/2020

Created for:

Bonneville Power Administration

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Introduction

In 1998, the Burns Paiute Tribe submitted a land acquisition proposal to Bonneville Power Administration (BPA) to acquire the Logan Valley Wildlife Mitigation Site (LVWMS) or Project. In February 2000, the Tribe and BPA entered into a Memorandum of Agreement (MOA) to fund the acquisition and management of LVWMS. The MOA requires the Tribe to dedicate the Project to wildlife habitat protection.

The Logan Valley Wildlife Mitigation Site is located south of the Strawberry Wilderness in Grant County, Oregon. The LVWMS consists of 1,760 deeded acres in which Lake Creek, Big Creek and McCoy Creek combine to form the Malheur River (Figure 1.0.1). Elevation on LVWMS ranges from approximately 4,937–5,111 ft (Google Earth, Google, Inc.).

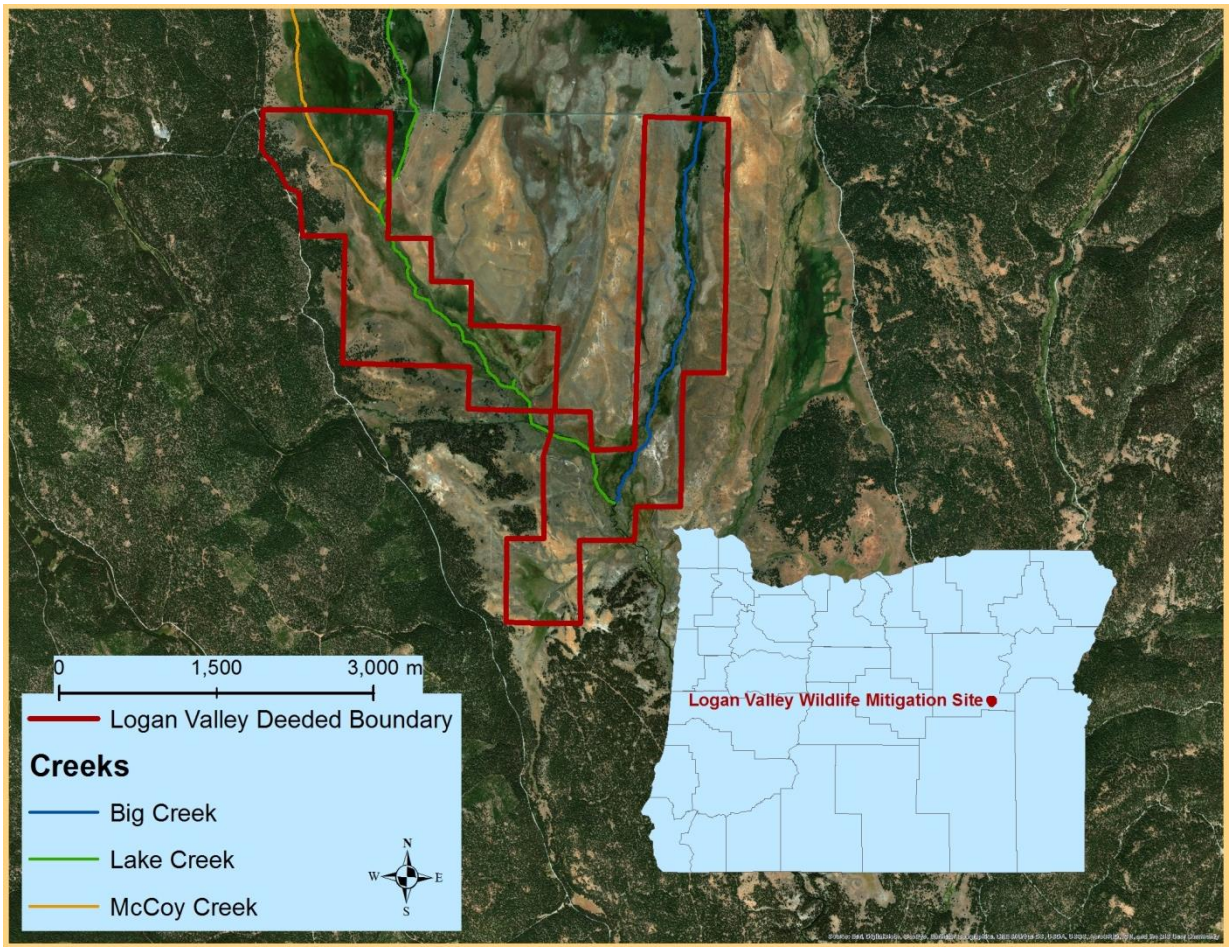

Figure 1.0.1. The location of the Logan Valley Wildlife Mitigation Site.

Wildlife Value

The 1986 Oregon Natural Heritage Program assessed Logan Valley as one of the best examples of mountain meadows in the Blue Mountain Ecoregion. LVWMS's unique assemblage of habitat types includes upland forest, wet meadow, aspen stands, bottomland forest, wetlands and sagebrush steppe. Table 1.1.1 outlines species in the ecoregion designated as sensitive, threatened, endangered, or of special concern by state and federal listings. A number of the species listed are known to occur on Project lands.

Table 1.1.1. Oregon Department of Fish and Wildlife Sensitive Species List for the Blue Mountains ecoregion.

Common Name	**Scientific Name**	**Oregon Department of Fish and Wildlife: Sensitive Species List**
Amphibians and Reptiles		
Columbia Spotted Frog	*Rana luteiventris*	Sensitive-Critical
Rocky Mountain Tailed Frog	*Ascaphus montanus*	Sensitive
Western toad	*Anaxyrus boreas*	Senstive
Reptiles		
Western Painted Turtle	*Chrysemys picta bellii*	Sensitive-Critical
Birds		
American Three-Toed Woodpecker	*Picoides dorsalis*	Sensitive
Black-Backed Woodpecker	*Picoides arcticus*	Sensitive
Bobolink	*Dolichonyx oryzivorus*	Sensitive
Burrowing Owl (Western)	*Athene cunicularia hypugaea*	Sensitive-Critical
Columbian Sharp-tailed Grouse	*Tympanuchus phasianellus columbianus*	Sensitive-Critical
Ferruginous Hawk	*Buteo regalis*	Sensitive
Flammulated Owl	*Psiloscops flammeolus*	Sensitive
Great Gray Owl	*Strix nebulosa*	Sensitive
Greater Sage-Grouse	*Centrocercus urophasianus*	Sensitive-Critical
Lewis's Woodpecker	*Melanerpes lewis*	Sensitive-Critical
Loggerhead Shrike	*Lanius ludovicianus*	Sensitive
Long-Billed Curlew	*Numenius americanus*	Sensitive
Olive-sided Flycatcher	*Contopus cooperi*	Sensitive
Pileated Woodpecker	*Dryocopus pileatus*	Sensitive
Swainson's Hawk	*Buteo swainsoni*	Sensitive
Trumpeter Swan	*Cygnus buccinator*	Sensitive
Upland Sandpiper	*Bartramia longicauda*	Sensitive-Critical
White-headed Woodpecker	*Picoides albolarvatus*	Sensitive-Critical

*Sensitive or Sensitive-Critical depending on Species Management Unit within the Blue Mountains ecoregion

Table. 1.1.1 continued.

Fish		
Bull Trout	*Siphateles alvordensis*	Sensitive, Sensitive-Critical*
Chinook Salmon - Fall	*Oncorhynchus tshawytscha*	Sensitive
Steelhead-Summer/Columbia Basin Rainbow Trout	*Oncorhynchus mykiss / gairdneri*	Sensitive, Sensitive-Critical*
Western Brook Lamprey	*Lampetra richardsoni*	Sensitive
Westslope Cutthroat Trout	*Oncorhynchus clarki lewisi*	Sensitive-Critical
Mammals		
American Pika	*Ochotona princeps*	Sensitive
California Myotis	*Myotis californicus*	Sensitive
Fringed Myotis	*Myotis thysanodes*	Sensitive
Hoary Bat	*Lasiurus cinereus*	Sensitive
Long-legged Myotis	*Myotis volans*	Sensitive
Pacific Marten	*Martes caurina*	Sensitive
Pallid Bat	*Antrozous pallidus*	Sensitive
Rocky Mountain Bighorn Sheep	*Ovis canadensis canadensis*	Sensitive
Silver-haired Bat	*Lasionycteris noctivagans*	Sensitive
Spotted Bat	*Euderma maculatum*	Sensitive
Townsend's Big-eared Bat	*Corynorhinus townsendii*	Sensitive-Critical

Bird surveys have detected the state and federally listed Lewis' Woodpecker (*Melanerpes lewis*). Two species, state listed as sensitive in other ecoregions, the greater Sandhill Crane (*Antigone Canadensis tabida*) and the Willow Flycatcher (*Empidonax traillii*), have likewise been documented since 2006. Upland Sandpipers (*Bartramia longicauda*) have historically bred on the property; one of only four known areas in Oregon, however, research conducted by the U.S. Forest Service confirmed many reports that there are no longer Upland Sandpiper breeding or using this area. The Bobolink (*Dolichonyx oryzivorus)* was documented on the Project in 2012, and the Black-backed Woodpecker (*Picoides arcticus*) in 2012, 2014, and 2015. The Project also serves as a waterfowl nesting area.

The threatened bull trout (*Salvelinus confluentus*) resides on the Project and spawns a short distance upstream (Schwabe et al. 2008). The redband trout (*Oncorhynchus mykiss*), designated as sensitive and as a species of concern, inhabits streams on LVWMS (Schwabe et al. 2008). The Columbia spotted frog (*Rana luteiventis*) is common throughout much of the property.

The Project is a known birthing area for pronghorn (*Antilocapra americana*), Rocky Mountain elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus*). Invasive White-tailed deer (*Odocoileus virginianus*) also frequent the property.

Literature Cited

Schwabe, L., D. Brown, R. Perkins, B. Bangs, S. Gunkel, S. Jacobs, and D. Hawkins. 2008. Evaluate the Life History of Native Salmonids in the Malheur Subbasin. FY 2007 Annual Report. Burns Paiute Tribe. Burns, OR. 167p.

Cultural Relationship

The Burns Paiute Tribe (BPT) has significant cultural ties to Logan Valley and the surrounding area. Prior to contact by non-tribal explorers in the mid-nineteenth century, the Northern Paiute people occupied a vast area as far west as the Cascades and as far east as Montana. The tribe ventured as far south as inter-mountain Nevada and as far north as the areas surrounding the Strawberry Mountains. The Wadatika people, the ancestors of the Burns Paiute, utilized this extended area, but maintained a primary traditional use area around the Strawberry Mountains, main stem and tributaries of the Malheur River, Malheur and Harney Lakes, Steens Mountain, and areas in-between. Within this traditional aboriginal area of primary and extended use, numerous areas were of great importance to the tribe. Logan Valley was one such area of importance.

Post-settlement contact, a "Snake Indian" or Paiute tribal reservation was created by Presidential Executive Order. The President signed the Executive Order on September 12, 1872 for the 1.8-million-acre reservation. Central within this described reservation area was Logan Valley, a key area of traditional use.

The Logan Valley area is known through oral histories and traditions as a seasonally utilized area for such activities as hunting of terrestrial and avian species, fishing primarily for salmon, gathering of food, medicinal, and daily use/craft fiber, and other secular and sacred activities (Peck 2008, pers. comm.). Some histories describe pre-settlement contact Logan Valley as a common meeting place between the Paiutes and non-Paiute Indians for trade, gaming, and other activities (Peck 2008, pers. comm.).

The loss of the Logan Valley area at the time the Reservation was removed from Paiute control and use has precluded much of the traditional activities within the valley for decades, although numerous Paiute descendants continued to return to the Logan Valley area (Peck 2008, pers. comm.). The purchase and continued operation of the Project offers the Tribal members a unique opportunity to resume traditional practices and to utilize the unique resources found within the area.

Literature Cited

Peck, Theresa. 2008. Burns Paiute Tribe Cultural Specialist. Communicated from tribal records.

Habitat Management and Monitoring

Vegetation Management

The Burns Paiute Tribe's Logan Valley Wildlife Mitigation Site (LVWMS) is in a fairly resilient ecological condition, therefore introduced weed species have difficulty becoming established. BPT staff performed a visual survey, similar to years past, of the property and surrounding Forest Service lands for noxious weeds in 2019.

Chemical: Herbicide

In 2018, we identified patches of African wire grass (*Ventenata dubia*, VEDU). This incursion is of particular concern. African wire grass can outcompete perennial bunchgrasses and is high in silica content (2.7%), making it poorly palatable to grazing animals. Litter can build up on the soil surface and plants dry early in the season and pose risks with respect to fire (DiTomaso et al. In August 2017, the Forest Service entered into an agreement with the Burns Paiute Tribe (BPT) to fund, in part, control of invasive plants both on Tribal land acquisitions as well as surrounding Malheur National Forest Lands. We also identified patches on adjacent Forest Service Land. The areas we treated in 2018 had much less VEDU, however, we found new locations in 2019. On June 28th of 2019, *Ventanata dubia* (VEDU) was treated with 1 oz of Roundup Max using a pump sprayer (Fig 2.1.1). In October and November of 2019, we spot sprayed all known *Ventenata dubia* locations on both tribal and Forest Service land with Plateau (imazapic) herbicide (Figure 2.1.2). We also used Esplanade 200 SC (indaziflam) on tribal land. We used a total of 60.75 oz of Plateau and 24.45 oz of Esplanade 200 SC.

Monitoring for noxious weeds will continue, with emphasis on previously identified weed incursion areas, roads and property boundaries of LVWMS. The property boundary along Forest Service road 16 and areas previously treated for VEDU will be areas of emphasis.

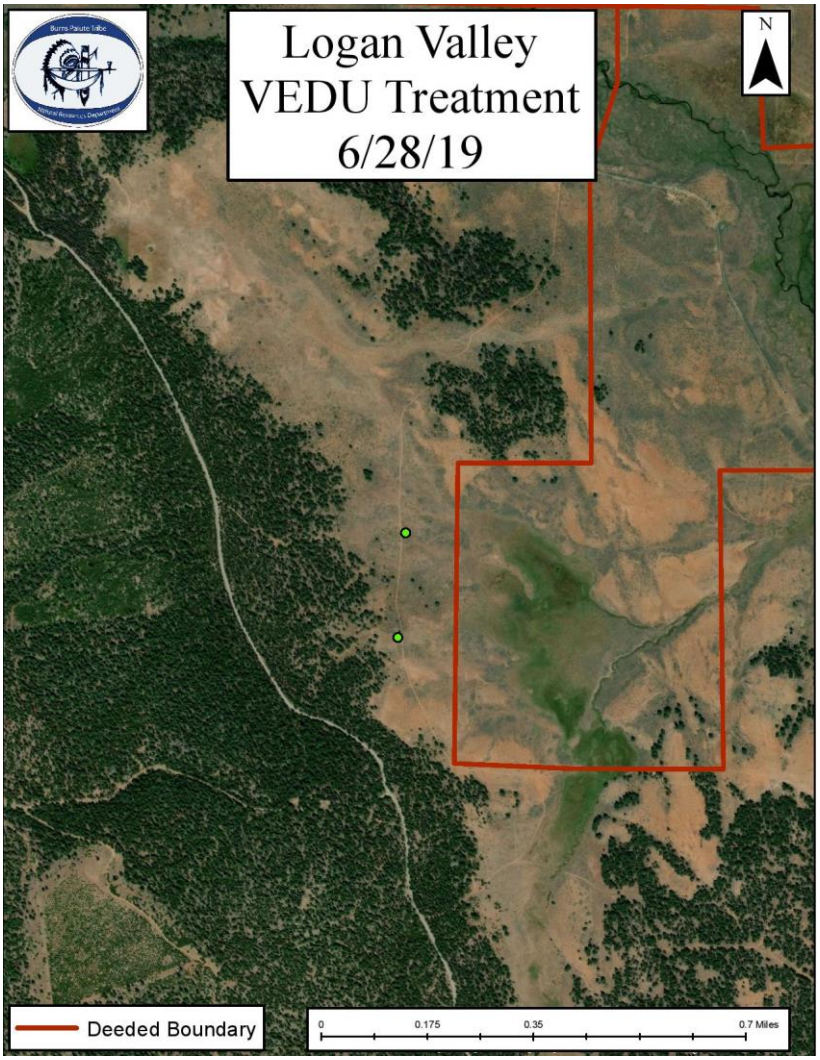

Figure 2.1.1. Areas treated for *Ventenata dubia* in the summer of 2019.

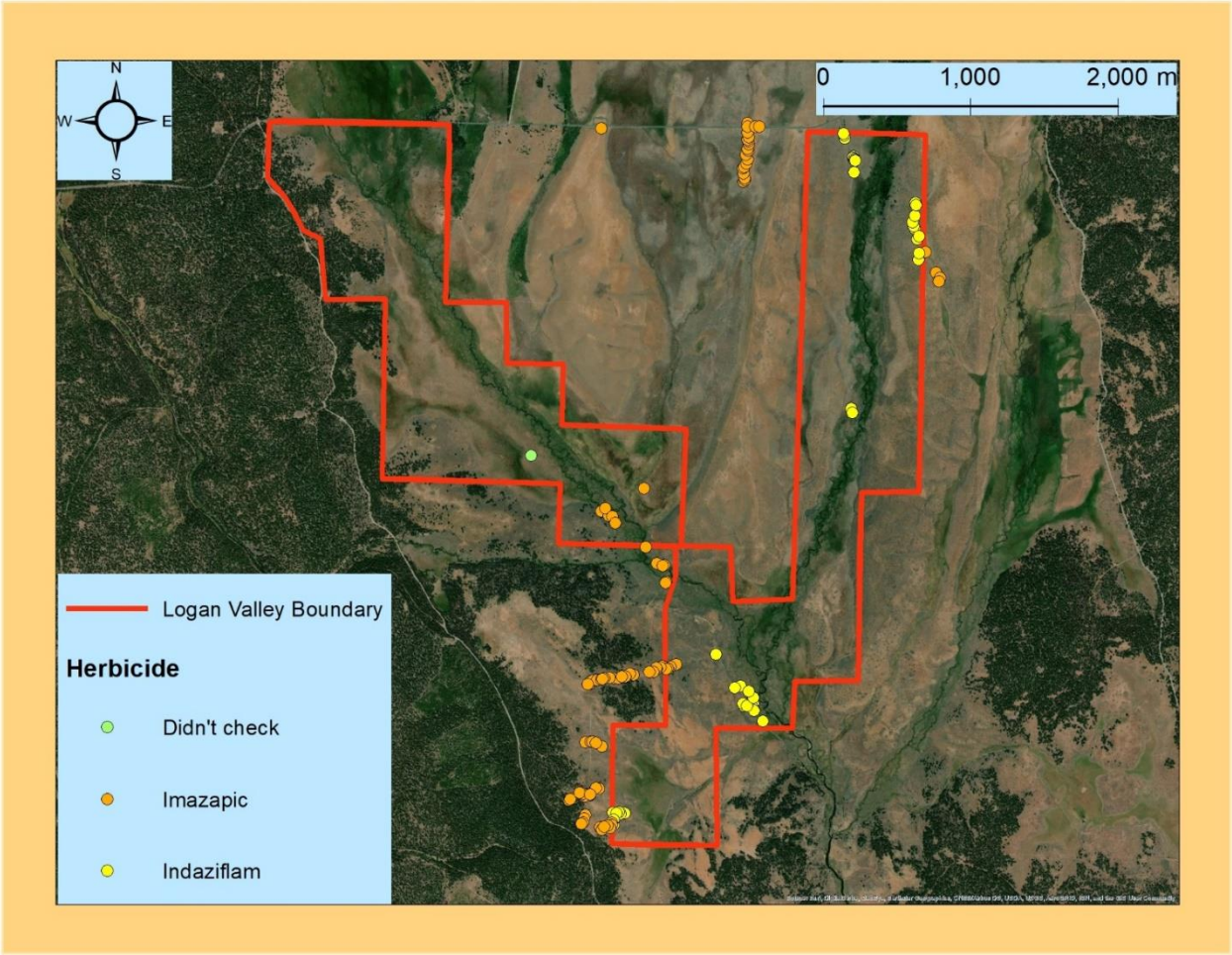

Figure 2.1.2. Areas treated for *Ventenata dubia* in the fall of 2019.

Grazing

In 2019 BPT staff worked with a local cattle owner to graze portions of the meadow in order to remove decadent plant material and stimulate new growth of meadow grass. The wet meadow in Logan Valley is extremely productive and the accumulation of decadent plant material constrains new growth.

The cattle owner was required to set up and maintain an electric fence throughout the grazing season preventing cattle from grazing inside of a 180-foot buffer from any riparian area. Four separate pastures were set up with electric fence allowing for shorter duration, higher intensity grazing inside each pasture (Table 2.1.1, Figure 2.1.3). In 2019, 72, 72, 67, and 62 cow/calf pairs grazed pastures 1, 2, 3, and 4 respectively (Table 2.1.1).

This method of rest-rotation grazing has appeared to work well, resulting in uniform use of the available forage without detriment to available wildlife forage and cover. In 2019, BPT staff continued monitoring rangeland and pasture areas at LVWMS for grazing and habitat management (Table 2.1.2 & 2.1.3, Figure 2.1.5). Photos from fix locations (Appendix A.) and written documentation of monitoring data was collected from two rangeland and two pasture points. This documentation included percent species utilization from rangeland points and stubble height estimates from pasture points using the Key Forage Plant Method (NRCS 1996). Only one of the three points (PT 1) was utilized for grazing in 2019. Post-grazing data for 2018 was collected on 10-17-2018 and on 9-24-2019 for 2019 (Table 2.1.2).

Table 2.1.1. Pasture and grazing/supplement rotation schedule in four pastures at LVWMS in 2019.

Start Date	# Cow/calf pairs	Pasture	End Date	Supplement/Water Rotation Date	AUMS
6/1/2019	37	1	7/19/2019	6/1-7/19	59
6/15/2019	2	1	7/9/2019		2
7/7/2019	33	1	7/9/2019		2
7/10/2019	72	2	8/17/2019	7/10-8/17	91
8/18/2019	67	3	9/16/2019	8/18-9/16	65
9/17/2019	62	4	10/30/2019	9/17-10/30	89

Table 2.1.2 Rangeland and pasture monitoring post-grazing results in 2018 and 2019.

Transect Name	Key Spp.	% Spp. Utilization	Avg. Stubble Height	Date Collected
RT1	Sandberg's Bluegrass	8%	NA	10-17-2018 9-24-2019
RT2	Meadow Foxtail	8% 8%	NA	10-17-2018 9-24-2019
PT1	Meadow Foxtail	NA	9.5" 9.27"	10-17-2018 9-24-2019
PT2	Meadow Foxtail	NA	10" 10"	10-17-2018 9-24-2019

Table 2.1.3. Rangeland and pasture monitoring land use type and location points.

Transect Name	Land Use Type	UTM X	UTM Y
RT1	Rangeland	369605	4889227
RT2	Rangeland	370615	4892745
PT1	Pasture	369083	4890542
PT2	Pasture	367704	4892167

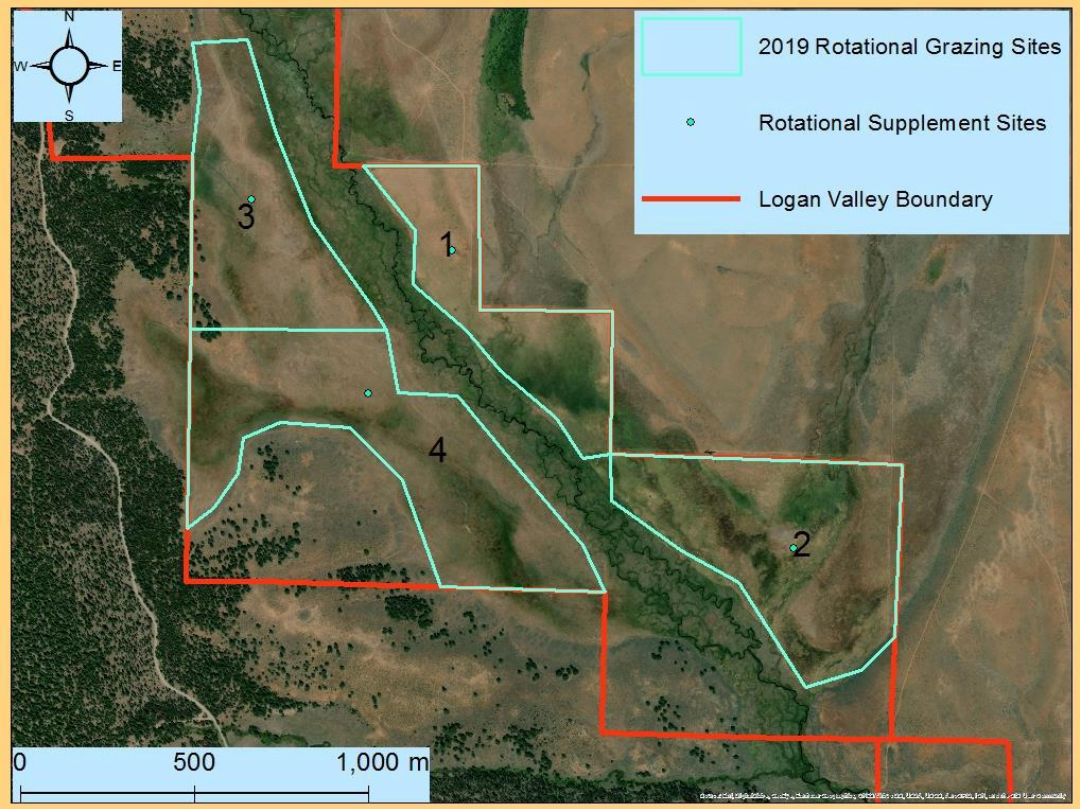

Figure 2.1.3. Grazing pasture and supplement locations at LVWMS.

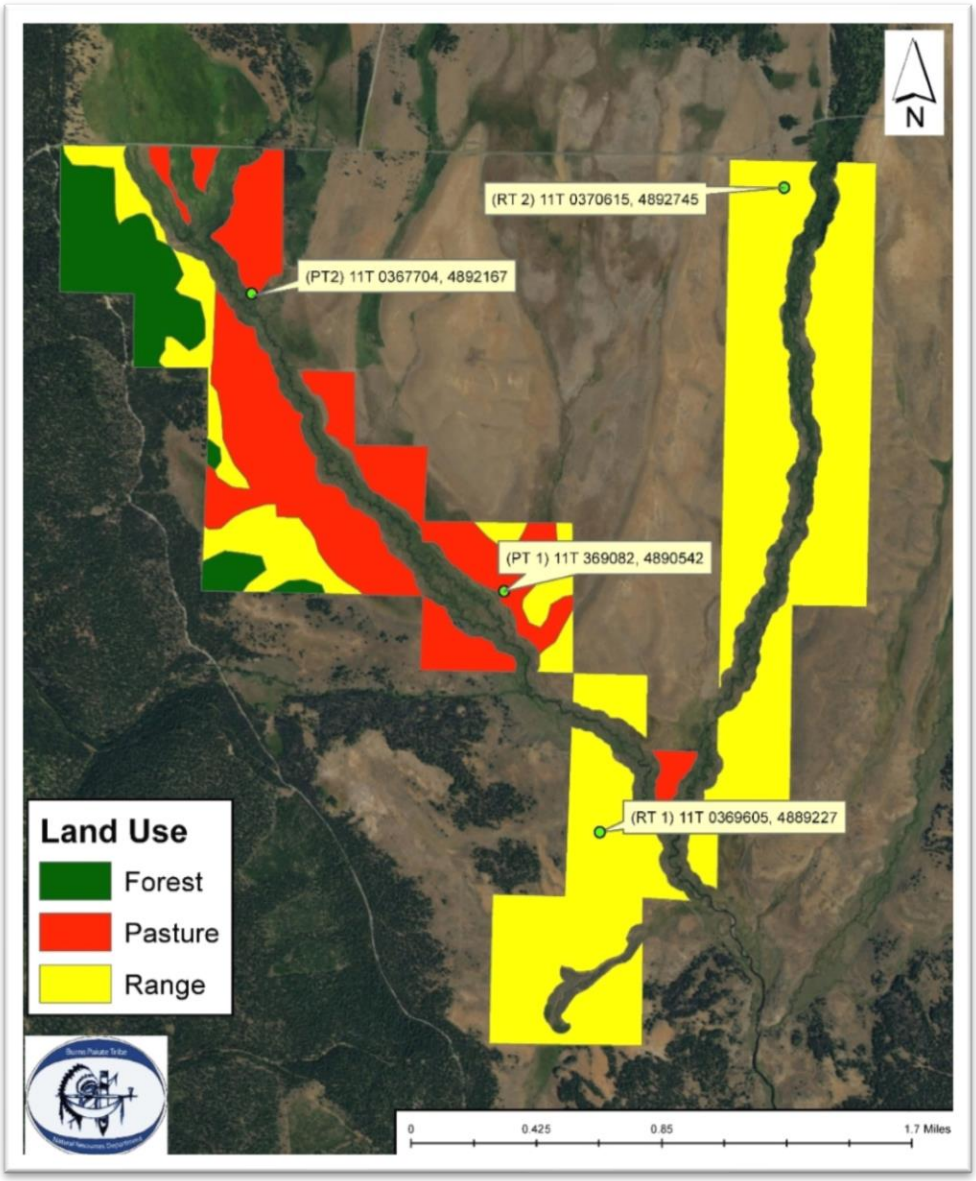

Figure 2.1.4. Vegetation monitoring points at LVWMS.

Literature Cited

DiTomaso, J.M., G.B. Kyser et al. 2013. Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California. 544 pp.

NRCS. 1996. Sampling Vegetation Attributes: Interagency Technical Reference. U.S. Department of Agriculture Technical Reference 1734-4. 171 pp.

Irrigation

Irrigation ditches were manually maintained in June of 2019 (Figure 2.2.1). The Big creek ditch located north of Forest Service Road 16 was cleared of all downed and impeding material before irrigation commenced. Lake creek irrigation started in June and was turned off in the Fall. Big creek irrigation started in June and was continued until Fall to allow for cattle to water in the neighboring Forest Service grazing allotment.

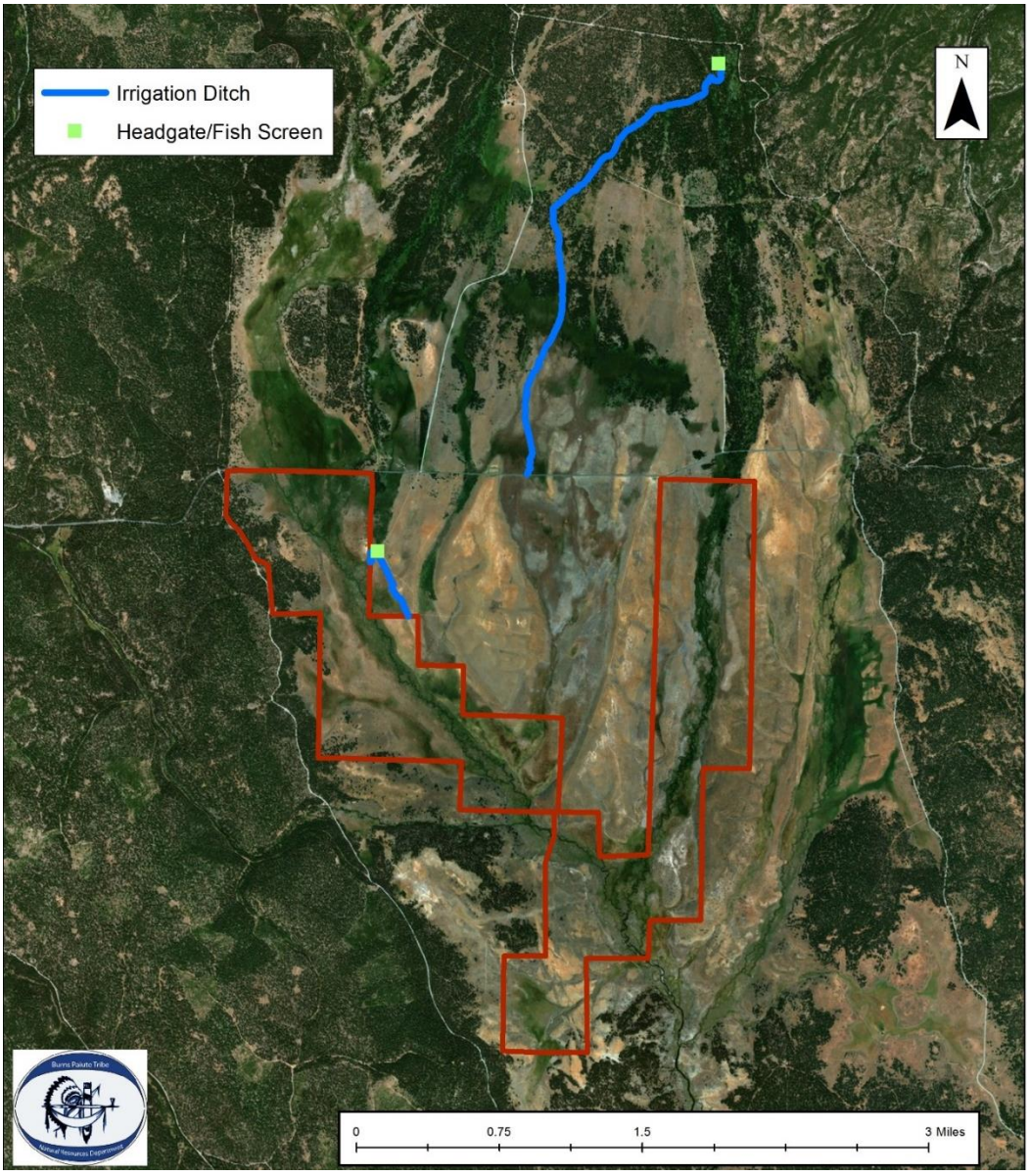

Figure 2.2.1. Location of irrigation ditches maintained at LVWMS in 2019.

Native Species Plantings

Willows

We did monitor willows in 2019. In 2021, we will monitor willows using the methodology used in 2018, allowing us to collect data while taking streamside photos and adding to the 2018 data (Table 2.3.1). We count every willow 5 m from the water 25 m upstream and 25 m downstream. We count willow bunches as one willow and split the willows into live and dead and into 3 height classes for living willows (0–3 ft, 3–6 ft, and 6+ ft). This methodology likely undercounts dead willows from willow plantings as they are less visible than successful plantings, and we also count live willows whether they were planted by us or already there before plantings (all of the willows >3ft were likely there prior to plantings. While this methodology is not perfect it is a good starting point for monitoring willows in the coming years. In 2018, we counted 191 living willows in the 0–3 ft range, 14 in the 3–6 ft range, 0 over 6+ ft range. We also counted 63 dead willows.

Table 2.3.1. Willow monitoring data from the north population at LVWMS in 2018.

		Live						Dead		
		0–3 ft			3–6 ft					
Date	Point	Up	Down	**TOTAL**	Up	Down	**TOTAL**	Up	Down	**TOTAL**
8/7/2018	LC2	11	16	27	0	0	0	14	11	25
8/8/2018	LC6	20	3	23	0	0	0	1	11	12
8/8/2018	LC4	0	0	0	0	0	0	0	0	0
8/8/2018	LC5	1	2	3	0	0	0	2	0	2
8/8/2018	LC3	5	5	10	1	0	1	3	5	8
8/8/2018	McC1	3	5	8	2	10	12	2	0	2
8/8/2018	McC2	42	36	78	0	0	0	5	6	11
8/8/2018	MR1	11	31	42	0	1	1	2	1	3
TOTAL				191			14			63
Percent Alive		76.5%								

Oregon Semaphore Grass

Monitoring

In 2019, Oregon Department of Agriculture (ODA) staff were not available to visit previously established plots. While we did not count the number of reproductive culms and vegetative culms as in past years, BPT staff did visit many of these plots to inspect which areas did well, so we could locate similar locations for planting.

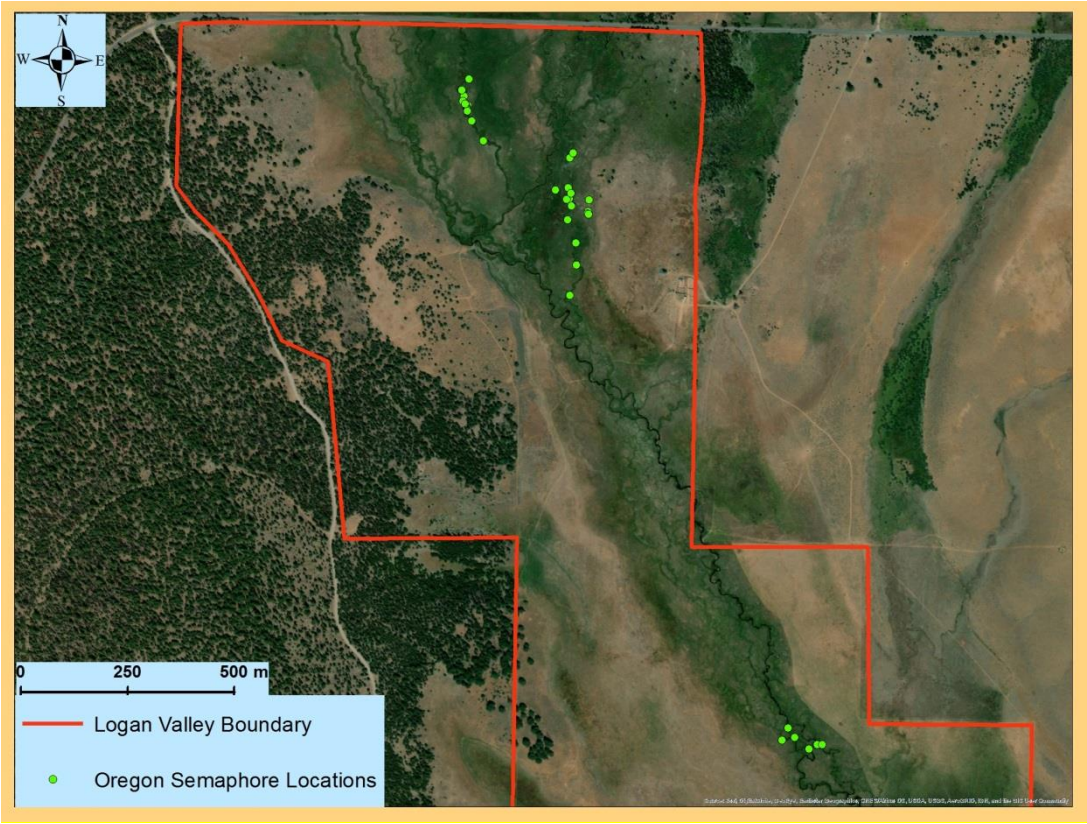

Figure 2.3.1. Oregon semaphore locations established by ODA

Propagation and planting

In 2018, BPT staff obtained an Oregon Department of Agriculture (ODA) permit to collect Oregon semaphore vegetative culms and seed for propagation and re-planting on the LVWMS property (OAR 603-073-0100). This will give us the ability to transplant Oregon semaphore to new areas on LVWMS, and if transplants are successful expand the population.

Permit stipulation

- Collect approximately 250 tillers (with roots) and 2,500 seeds, from the naturalized *P. oregonus* population on BPT land in the Logan Valley, not exceeding 10% of the population's output in a given year
- *P. oregonus* plants will be cultivated from collected seeds and tillers (with roots) by the BPT Natural Resources Department
- A portion of the collected *P. oregonus* tillers and roots may be translocated to suitable habitat on BPT land in the Logan Valley immediately following collection

- Plant material collections and cultivation will begin in 2018 and continue until cultivated stock is sufficiently developed for transplanting into suitable habitat on BPT land in the Logan Valley in the autumn of 2019 and/or 2020
- Conduct transplant monitoring to quantify transplant survival and flowering during the first growing season after transplanting
- Cultivated *P. oregonus* plants will not be sold to other clients, or planted at other sites of other ownership, without ODA consultation
- The final number of *P. oregonus* plants collected and grown by BPT, and the number that survive cultivation to be ultimately be transplanted, will be communicated to ODA in a brief report (e-mail is fine), *within 60 days after the 2019 and/or 2020 transplanting work is completed.*
- A brief follow-up report will be sent to ODA *within 90 days after the first post-transplant flowering season ends*, detailing the number of *P. oregonus* tillers (both flowering and non-flowering stems) that emerged from surviving transplants (as an example, if cultivated plants are transplanted in the autumn of 2019, or early spring of 2020, they will emerged and flower the summer of 2020, and we would expect the brief report sometime that fall).
- No further monitoring of transplant mortality is required. However, if transplant monitoring continues beyond the first growing season, ODA would appreciate being kept informed of the long-term results.
- Any planned or unplanned deviation from the above project specs and the project description/summary submitted by BPT should be discussed with ODA, as appropriate.

Collection and Propagation

We collected 331 vegetative tillers and 25.5 reproductive tillers (233 caryopses) in September-October 2018 (Figure 2.3.2). We propagated throughout 2019 in both the greenhouse and outside near our office in Burns, OR (Figure 2.3.3). We kept detailed notes and photos of the propagation process. We had success with propagating from both vegetative stock and from seed. We propagated a total of 5,019 tillers from the 331 vegetative tillers collected in 2018, and we planted 765 tillers from the 233 caryopses collected in 2018 (Table 2.3.2).

Table 2.3.2. Oregon semaphore stock (vegetative and seed) collected for propagation.

Collection Date	Patch Plant Type	# of Plants Collected	Patch Plant Number	% of Plants Collected From in Patch	ODA_Patch#	# of Caryopses	Size
9/10/2018	Reproductive	12	125	9.6%	48	122	15 ft x 4 ft
9/10/2018	Reproductive	3	25	12%	18	12	
9/10/2018	Reproductive	2.5	19	13.2%	16	24	
9/10/2018	Reproductive	4	40	10%	44	61	
10/10/2018	Vegetative	331	*	< 10%	48	NA	20 ft x 6 ft
10/18/2018	Reproductive	4	40	10%	44	14	
6/2019-7/2019	Reproductive	81	N/A	N/A	48**	N/A	
10/28/2019	Vegetative	291	***	> 10%	18	N/A	

*collected 3 shovel fulls (<2 sq feet). If the patch is approximately 20*6 feet (120 sq feet) we collected <2% of the patch

**Collected reproductive tillers from greenhouse and outside trough plants

***hard to get accurate count due to grazing, escape cows

Planting

On October 28, 2019, we took a group of 9 Portland Audubon volunteers and 2 BPT staff to plant tillers. It was a cool and breezy day with some ice on the water at the start of the day. We planted 19 new plots north and south of the primary plots already established by ODA on the property in previous years (Table 2.3.2, Figure 2.3.4).

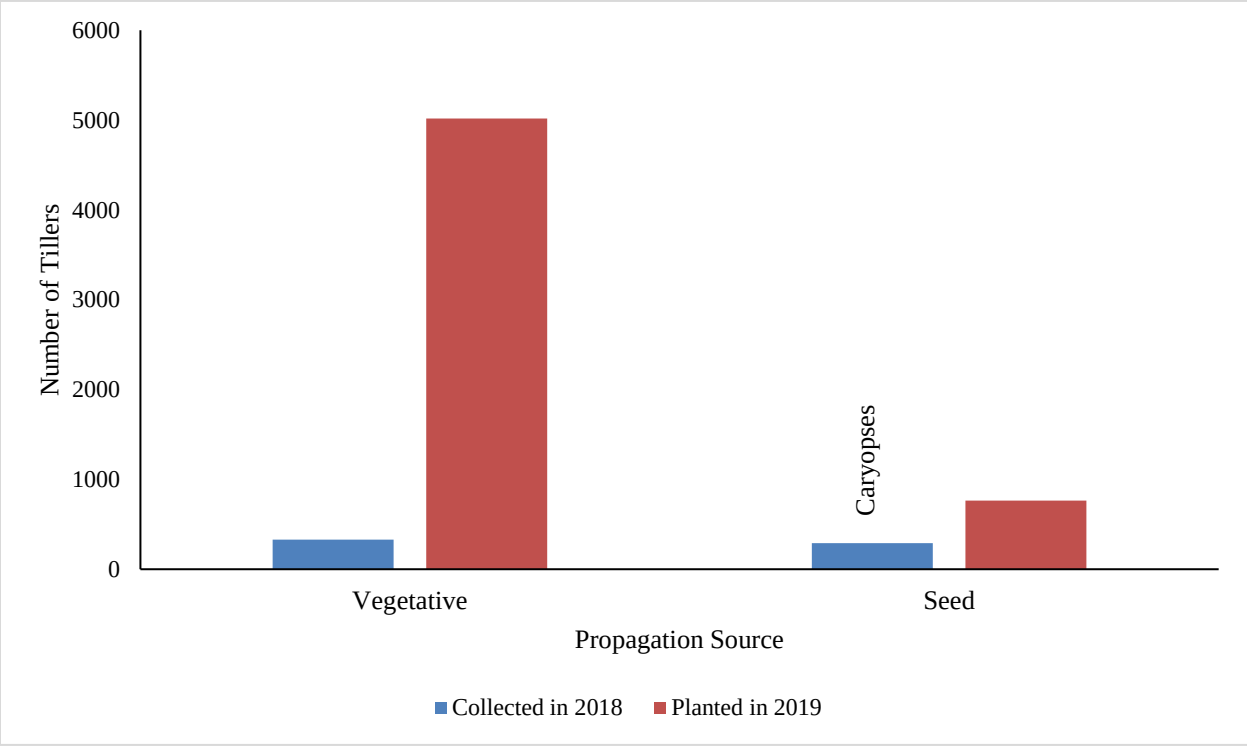

Figure 2.3.2. Comparison of the number of tillers/caryopses by plant propagation source (vegetative and seed). We will monitor tillers planted in 2019 during the summer of 2020.

Figure 2.3.3. Oregon semaphore grass vegetative tillers collected and replanted in the greenhouse in October 2018 and October 2019 (right before replanting).

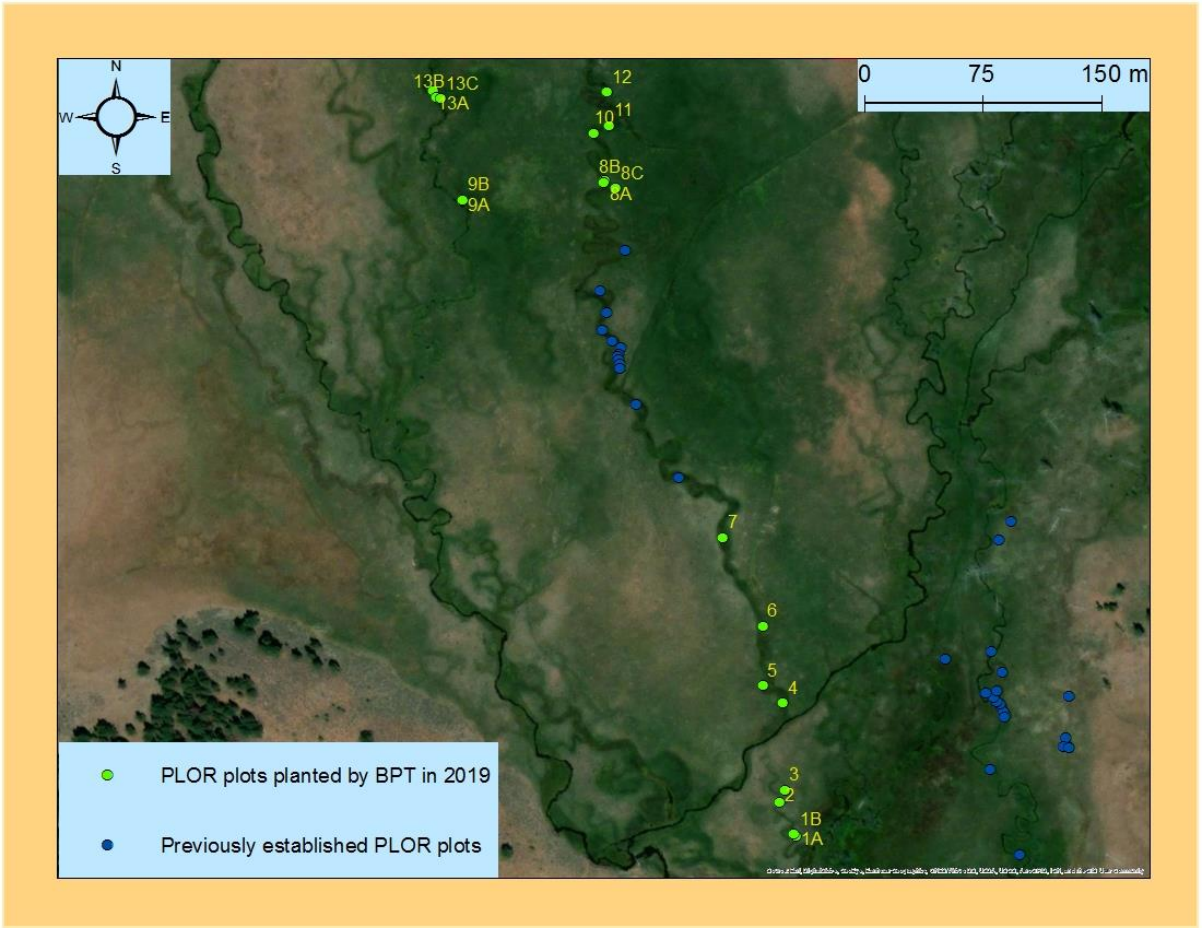

Figure 2.3.4. Oregon semaphore locations at LVWMS, including previously established plots and new plots planted by BPT and Portland Audubon on October 28, 2019.

Table 2.3.3. Data on Oregon semaphore plots planted by BPT and Portland Audubon on October 28, 2019.

BPT Patch #	Patch Size	# of Tillers	X	Y	ODA Patch Plant Number Source	Grown from seed or veg?
1A	2x2 ft	333	367444	4892469	48	Veg
1B	2x2 ft	354	367443	4892470	48	Veg
2	2x2 ft	152	367434	4892490	48	Veg
3	2x2 ft	456	367437	4892498	48	Veg
4	2x2 ft	264	367436	4892553	48	Veg
5	2x2 ft	220	367423	4892564	48	Veg
6	2x4 ft	239	367423	4892602	48	Veg
7	2x2 ft	375	367398	4892658	48	Veg
8A	2x2 ft	249	367323	4892884	48	Veg
8B	2x2 ft	278	367322	4892883	48	Veg
8C	2x2 ft	215	367330	4892879	48	Veg
9A	2x2 ft	243	367233	4892871	48	Veg
9B	2x2 ft	282	367233	4892872	48	Veg
10	2x4 ft	432	367316	4892914	48	Veg
11	2x2 ft	281	367326	4892919	48	Veg
12	2x3 ft	296	367324	4892940	48	Veg
13A	2x4 ft	350	367214	4892941	48	Veg
13B	2x4 ft	272	367216	4892937	44	Seed
13C	2x4 ft	424, 11, 58	367219	4892936	48, 18, 16	Seed

Infrastructure Management

Fencing

Annual fence maintenance activities occurring at the Logan Valley Wildlife Mitigation Site in 2019 consisted of maintaining perimeter fence, especially those that are located on the west and south west sides of the property. This area is a main crossing point for deer, elk, and pronghorn, which occasionally damage sections of fence. Trees and snags that fall across the perimeter fence are another common cause of damage. BPT staff mitigates this issue by fixing breaks and checking this fence line throughout the season.

Other annual fence maintenance included placing and removing cattle panels at stream crossings. Cattle panels at all stream crossings were installed in the spring to prevent cattle trespass and removed in the fall to prevent ice flow damage.

Let-down fence was put up in the spring prior to cattle grazing on neighboring properties to prevent cattle trespass and let down in the late fall prior to minimize snow damage and maintenance in the spring.

The Wildlife Department also maintained a riparian exclusion fence bordering the U.S. Forest Service allotments. BPT staff will continue to monitor and maintain this fence for 10 years following its installation in 2012, per an agreement with the U.S. Forest Service and OWEB.

Cattle trespass is a continual problem on the Logan Valley property and frequent monitoring is necessary to prevent trespass cattle from having a negative impact on recovering riparian areas. Trespass was documented on the property in 2019 from neighboring cattle and from cattle escaping the electric fences on our property. In 2020, we will be ordering additional electric fencing wire, and the cattle producer will be helping work on the perimeter fence. Therefore, maintenance will continue to be a priority before ranchers have turned-out cattle for the grazing season.

Wildlife Monitoring

Fisheries Research

For fisheries work performed in the Malheur Subbasin including work performed on the Logan Valley Wildlife Mitigation Site, please reference BPT's FY2019 Annual Report for BPA Project# 1997-019-00 – Evaluate the Life History of Native Salmonids in the Malheur Subbasin.

Migratory Bird Surveys

Migratory bird surveys were performed to estimate population change, i.e. whether a population is increasing, decreasing or stable at LVWMS. We will use these data to detect possible benefits or consequences of land use and climate changes on bird populations. Additionally, by collecting information on bird populations in relation to their associated vegetation communities, we may use certain "community indicator species" to assess the health of the surveyed vegetation communities. This data may be used to set priorities, allowing conservation effort to focus on the vegetation communities most in need of attention.

Sampling design

Tribal staff utilized protocols developed by Huff et al. (2000). The Interactive Habitat and Biodiversity Information System for the Columbia Basin (IBIS) is no longer accepting data for inclusion in their database, so all 2019 data was submitted to eBird under the username "BurnsPaiuteTribe". We will continue to submit annual data to eBird in the coming years.

BPT staff monitored four transects based on the four different community types identified (meadow, riparian, upland, and forest). Within each transect, BPT staff established five locations as points (stations) to conduct the counts (Table 4.2.1, Figure 4.2.1). In 2019, each transect was surveyed three times (Table 4.2.2). In 2019, we conducted our surveys on May 23rd and 24th and June 4th, 5th, 12th, and 28th.

Table 4.2.1. Spatial locations in UTMs and decimal degrees for migratory bird survey points by community type at LVWMS.

Point Identity	X	Y	Latitude	Longitude
MEADOW 1	367666	4891454	44.164	-118.655
MEADOW 2	367733	4891301	44.163	-118.654
MEADOW 3	367773	4891158	44.162	-118.654
MEADOW 4	368120	4890930	44.160	-118.649
MEADOW 5	368175	4890689	44.158	-118.649
RIPARIAN 1	370909	4892635	44.176	-118.615
RIPARIAN 2	370861	4892421	44.174	-118.615
RIPARIAN 3	370780	4892285	44.172	-118.616
RIPARIAN 4	370794	4892135	44.171	-118.616
RIPARIAN 5	370764	4891843	44.168	-118.617
FOREST 1	366736	4892756	44.176	-118.667
FOREST 2	366779	4892591	44.174	-118.667
FOREST 3	366924	4892424	44.173	-118.665
FOREST 4	367001	4892292	44.172	-118.664
FOREST 5	367144	4892096	44.170	-118.662
UPLAND 1	369525	4889533	44.147	-118.631
UPLAND 2	369530	4889390	44.146	-118.631
UPLAND 3	369602	4889227	44.145	-118.630
UPLAND 4	369709	4889079	44.143	-118.629
UPLAND 5	369714	4888901	44.142	-118.629

UTM points in NAD_1983_UTM_Zone_11N. Note a slight shift (< 2 m) in points due to data shift when projecting data into a different coordinate system. Note that these coordinates don't match coordinates used in previous reports. We are unsure of the cause of this difference.

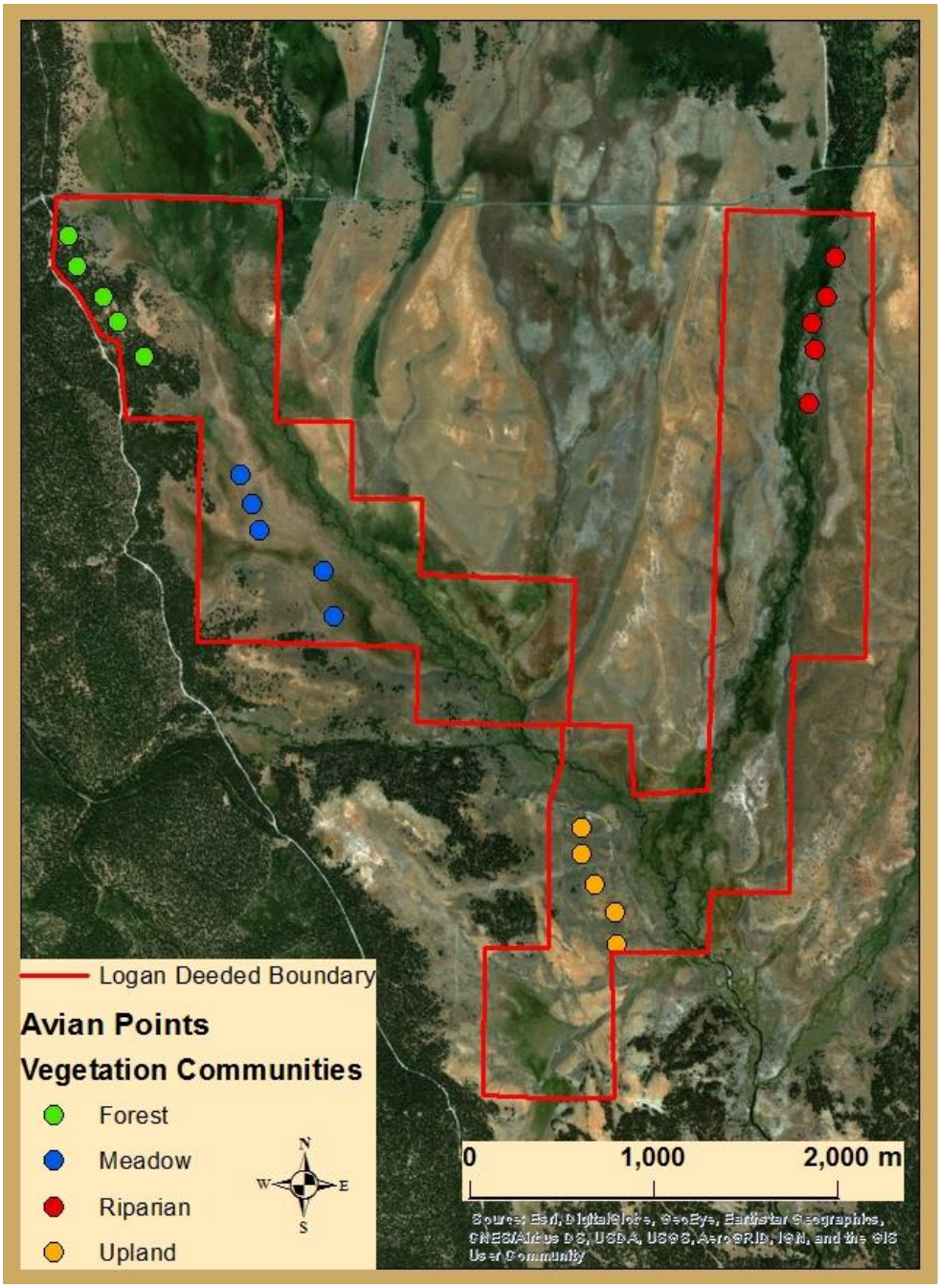

Figure 4.2.1. Location of each migratory bird survey station separated by community type at LVWMS.

Table 4.2.2. Number of times avian transects were surveyed by year, separated by community type at LVWMS.

Year	MEADOW	RIPARIAN	FOREST	UPLAND
2006	1	1	1	1
2007	3	3	3	3
2008	3	3	3	3
2009	3	3	3	3
2010	2	2	3	2
2011	3	3	3	3
2012	3	3	3	3
2013	3	3	3	3
2014	3	3	3	3
2015	3	3	3	3
2016	2	2	2	2
2017	1	1	1	1
2018	3	3	3	3
2019	3	3	3	3

Individual birds detected by sight or sound during the five minutes at each survey point were counted only once. Detections were classified as a “Typical Detection” or as a “Flyover Detection”. “Typical Detections” were further classified by distance from the survey point (0–50m or >50m) and by the timeframe the detection was recorded (during minutes 0–3 at the survey point or during minutes 3–5). Flyover Detections were further classified by the timeframe the detection was recorded (similar to a “Typical Detection”) and then as an “Associated Flyover” or “Independent Flyover”. By definition, an “Associated Flyover” occurred when a bird was detected in flight that could be found utilizing the community the survey was taking place in. Conversely, “Independent Flyover” was a bird detected in flight that was likely just passing through, i.e. the species had no known affinity to the community type being surveyed. “Independent Flyovers” could also be a bird seen far in the distance, like a soaring raptor, that were not currently using the community but potentially could. Flush detections are explained as, “Birds encountered for this detection usually are disturbed, or flushed, by the observer as that person enters or leaves a point-count station and are not detected again during any of the station point counts. Flush detections are limited to birds detected only within the 0- to 50-m band from the center of the point-count station. The flush detection provides additional information on bird occurrence at the site that is not obtained from point counts (Huff et al. 2000).” Birds heard that were suspected of being within earshot only from an adjacent community were not counted in the survey. For instance, the calls of a Sandhill Crane from a riparian area that could be heard while surveying in the forest community were not counted as a detection. For all analyses, we included all data regardless of detection type.

As this is a habitat (community) based point count, the past two years we have made a concerted effort to only include birds using the community type we were surveying. This appears to have been done inconsistently in previous sampling years, contradicting the methodology in Huff et al. 2000. For example, while surveying the meadow we excluded birds we could hear from the forest. We have tried to be as consistent as possible in this data collection, but unfortunately it is still subjective at times. A problematic area is the band of upland vegetation that falls between the meadow and the forest. We excluded Vesper Sparrows that were calling in the sagebrush, however we counted Western Meadowlarks that were in the sagebrush, also in the meadow, and sometimes flying back and forth between the two. This involves some in-the-field judgment, but we feel the data will be more representative of the birds using particular vegetative communities.

Data limitations and recommendations

It has come to BPT staff's attention that two points are located less than the 150 m minimum distance (>250 is ideal) between point count stations given by Huff et al. (2000). The minimum distance between points is 153.6 m in the forest community, 148.5 m in the meadow community, 151.0 m in the riparian community, and 143.1 m in the upland community. This may limit the independence between points and increases the likelihood of counting an individual on multiple points. However, BPT staff has decided to continue monitoring the current sites without any alterations. These sites should still provide metrics of relative abundance and species richness that BPT can monitor in the coming years.

It has also come to our attention that many of the tally types were entered incorrectly (i.e. >50 m detections, reported as <50 m detections and vice versa in many years). Since this mistake doesn't affect how we are analyzing and reporting the data, we have not corrected this mistake yet, but wanted to make a note of it in case other analyses take the tally type into consideration.

Analysis

Species richness and species accumulation curves

Species richness is the number of species observed in a site and species accumulation curves represent an accumulation of species throughout the sampling years. To analyze species richness and species accumulation curves in each community type, we analyzed and graphed these data in Excel. Although some years were sampled more often than others, for visual simplicity we treated years equally in the species accumulation graph. BPT staff will continue to monitor avian species richness and species accumulation curves in 2020.

Community indicator species

Indicator species were chosen for each of the communities surveyed. These species were chosen as they represent the sensitive species with regards to their specific habitat preferences. In turn, these species will help to act as barometer of change in the abiotic and biotic conditions of that community over time. The indicator species that were selected in 2015 were used in this analysis, and we added Wilson's Snipe and Savannah Sparrows (*Passerculus sandwichensis*) additional meadow community species. We also added Mountain Chickadee (*Poecile gambeli*) to the forest community. In past analyses, species that were not as ecologically dependent on representative community types were chosen; this was rectified in 2015 by choosing species that may act as better indicators of community health.

To analyze changes in abundance of indicator species from 2006–2019, we analyzed and graphed the average abundance observed/transect annually in Excel. We only included the detections of indicator species that were in their respective community type for this analysis. Due to a low sample size of many indicator species we pooled abundance on each transect instead of graphing average abundance/point annually.

Results

Species richness and species accumulation curves

Since monitoring began in 2006, a total of 96 bird species have been detected on LVWMS. Over the 13 years of surveys, 40 species have been observed in the meadow community, 72 in the riparian community, 32 in the upland community, and 59 in the forest community (Figure 4.2.2). BPT staff had 439 detections of 638 individuals, representing 39 different species at LVWMS in 2018. In 2019, BPT staff had 485 total detections of 726 individuals, representing 51 different species.

In 2019, 1 species was added to the species accumulation curve in the meadow community, flyover Red Crossbills (*Loxia curvirostra*). Four new species were found in the riparian community, including American Crow (*Corvus brachyrhynchos*), Cassin's Finch (*Carpodacus cassinii*), House Wren (*Troglodytes aedon*), and Wilson's Snipe (*Gallinago delicata*). In the forest community, 6 new species were added. These include the American Kestrel (*Falco sparverius*), Brown-headed Cowbird (*Molothrus ater*), Green-tailed Towhee (*Pipilo chlorurus*), Lincoln's Sparrow (*Melospiza lincolnii*), Red Crossbill, and Violet-green Swallow (*Tachycineta thalassina*). Finally, in the upland community, there were 4 new species documented. These included Red Crossbill, Sage Thrasher (*Oreoscoptes montanus*), Spotted Sandpiper (*Actits macularius*), and Yellow-rumped Warbler (*Dendroica coronata*). The Red Crossbill, House Wren, and Sage Thrasher were newly discovered species on LVWMS in 2019. The Sage Thrasher was singing, apparently on a territory. It is likely that Red Crossbills have

gone undetected in the past due to their high flights over longer distances (Benkman and Young 2019). Familiarity with the call is important, as all the detections in 2019 were flyover birds. In 2019, we had 9 detections of Lincoln's Sparrows (*Melospiza lincolnii*) in the riparian community. This species was first detected in 2018 but appears to be common in the riparian areas. Due to similarities in appearance and song to the Song Sparrow (*Melospiza melodia*), all future data collectors should be able to distinguish the two for accurate data collection.

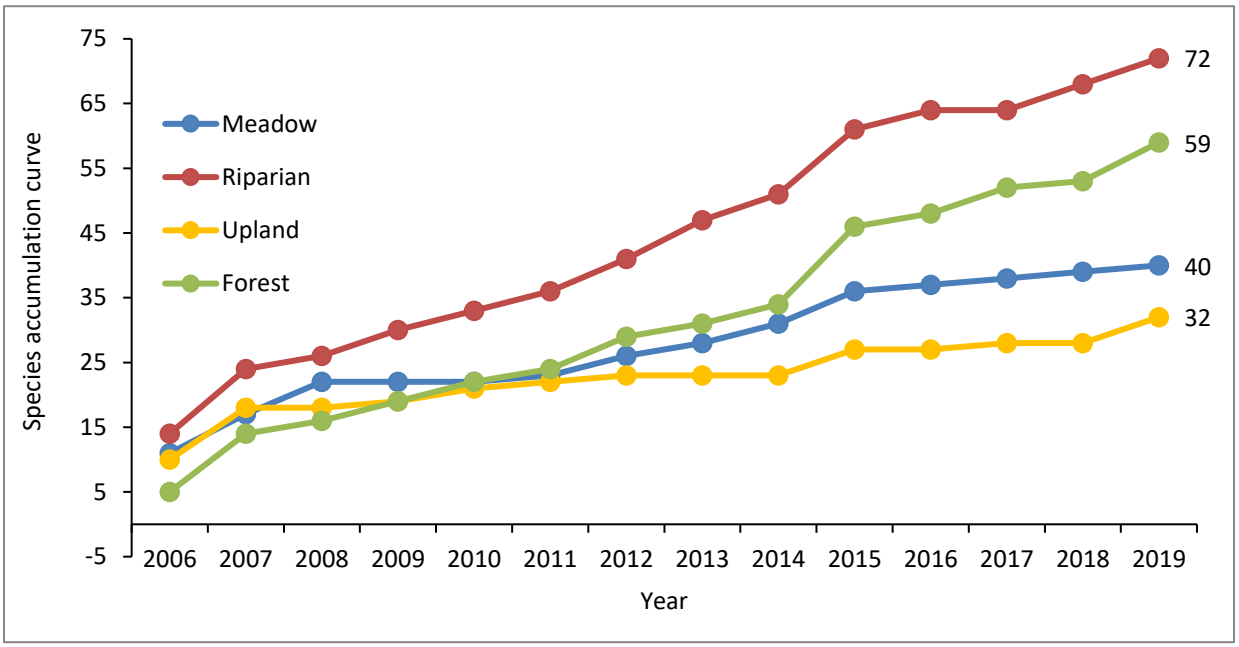

Figure 4.2.2. Avian species accumulation curves on the four vegetation communities at LVWMS from 2006–2019.

Community indicator species

Meadow community

In the meadow community, the Wilson's Snipe (*Gallinago delicata*), Long-billed Curlew (*Numenius americanus*), and the Sandhill Crane (*Antigone canadensis*) were selected as indicators of meadow community health, as these species often associate with wetlands and grasslands. Long-billed Curlews typically utilize short or mixed-grass prairie during the breeding season but moves to taller and denser grass during brood rearing (Dugger and Dugger 2002). Surveys conducted from 2006–2019 show a stable abundance of Wilson's Snipes using the meadow community with a noticeable drop in 2017. Numbers rebounded in 2018 and remained the same in 2019. However, numbers of Wilson's Snipe remain well below the 13-year average

(Figure 4.2.3). Abundance of Sandhill Crane and Long-billed Curlews in the meadow sharply increased in 2019, with numbers above the long-term average (Figs. 4.2.4 and 4.2.5). However, due to their large size, mobility, and inherent lower density, Long-billed Curlews and Sandhill Cranes may not make the best indicators of community health. Given these shortcomings we added Savannah Sparrow as another indicator species to the meadow community in 2018. Savannah Sparrows typically utilize agriculture fields, meadows, marshes, coastal grasslands, and tundra during the breeding season (Wheelwright and Rising 2008) so should make a good indicator for this community. As reported in past reports, it seems highly probable that Savannah Sparrows were misidentified prior to 2015 as Song Sparrows (*Melospiza melodia*). While this limits the usefulness of the data, we will continue to monitor this species in future years. The average abundance of Savannah Sparrows in 2019 was slightly lower than in 2018 when peak numbers were observed (Figure 4.2.6).

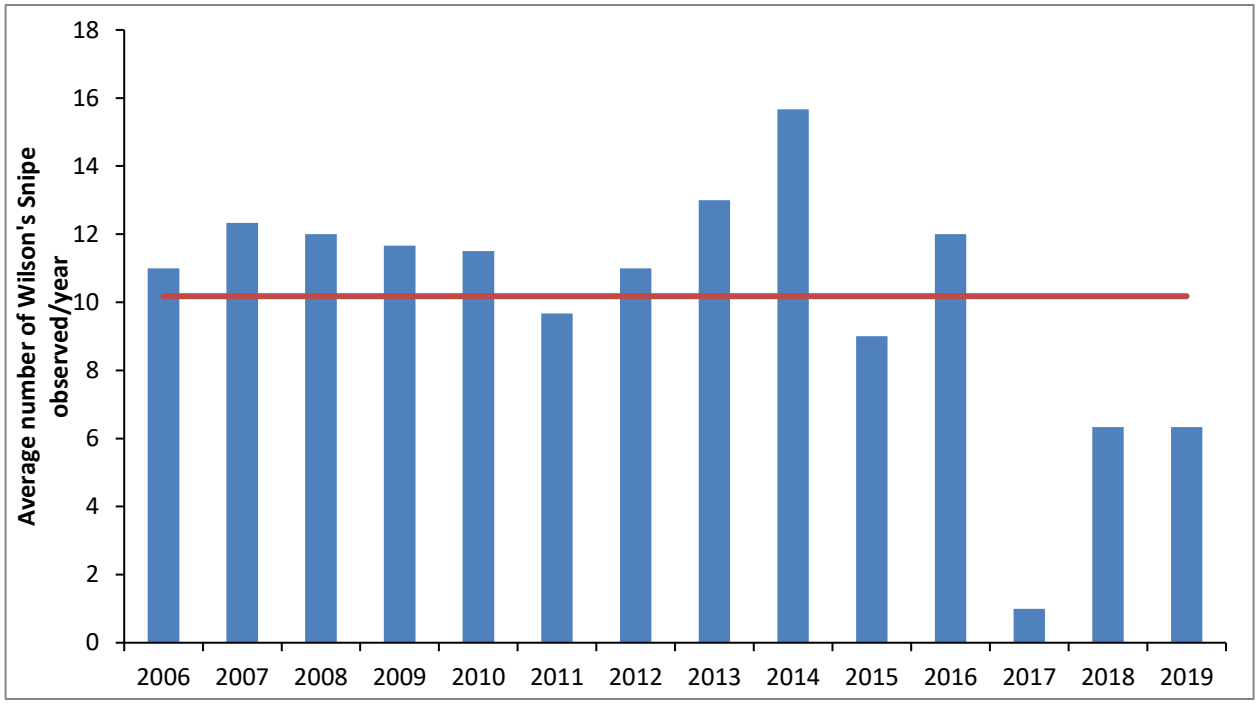

Figure 4.2.3. Average number of Wilson's Snipes observed in the meadow community at LVWMS from 2006–2019. The orange line represents the 13-year average abundance. SEs available, but not included.

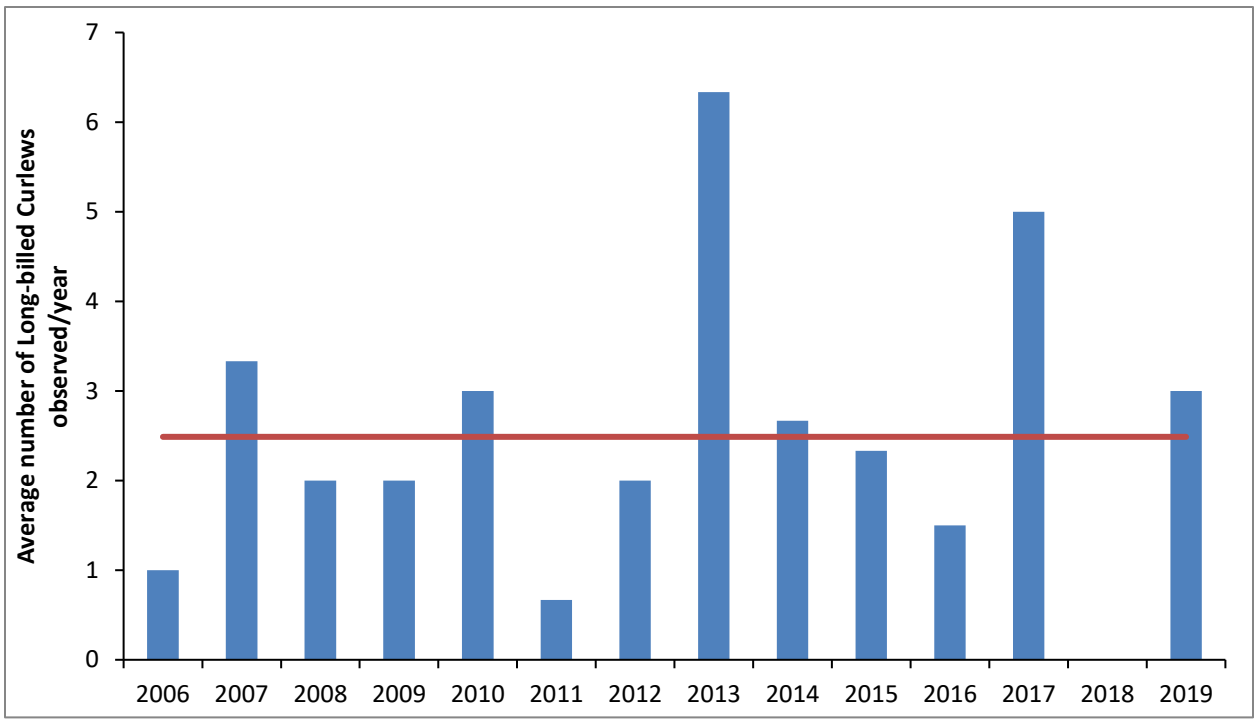

Figure 4.2.4. Average number of Long-billed Curlews observed in the meadow community at LVWMS from 2006–2019. SEs available, but not included.

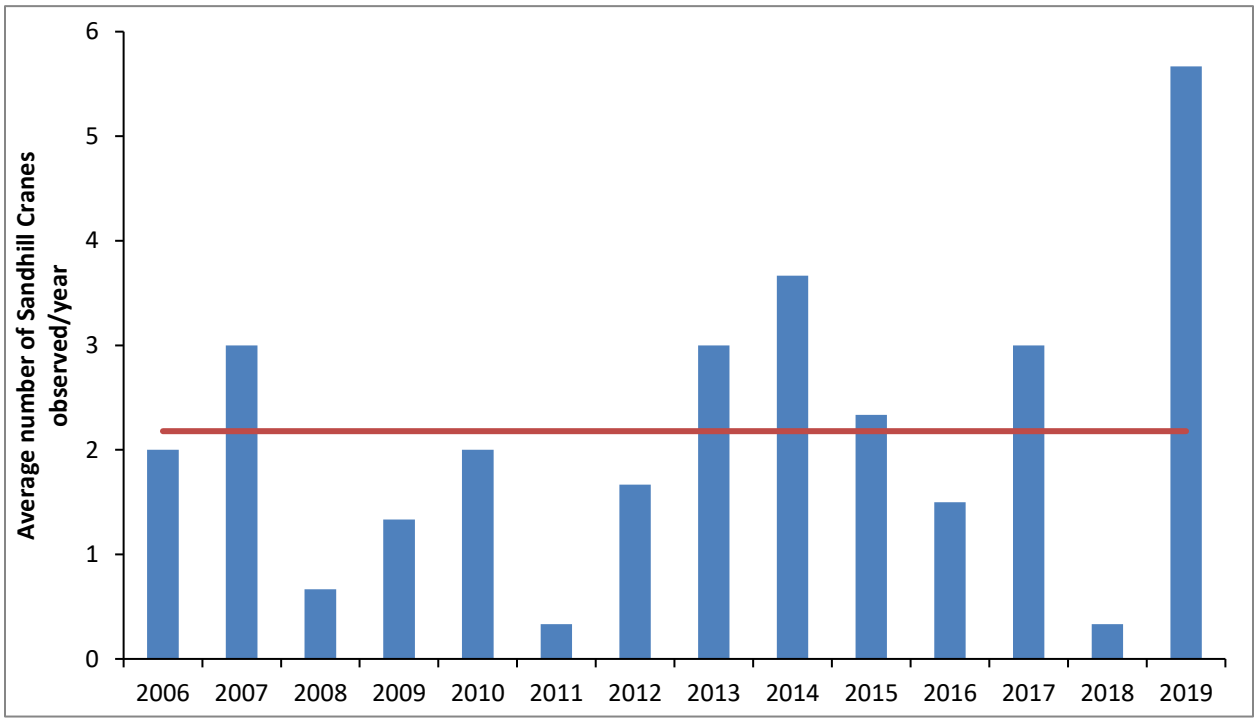

Figure 4.2.5. Average number of Sandhill Cranes observed in the meadow community at LVWMS from 2006–2019. SEs available, but not included.

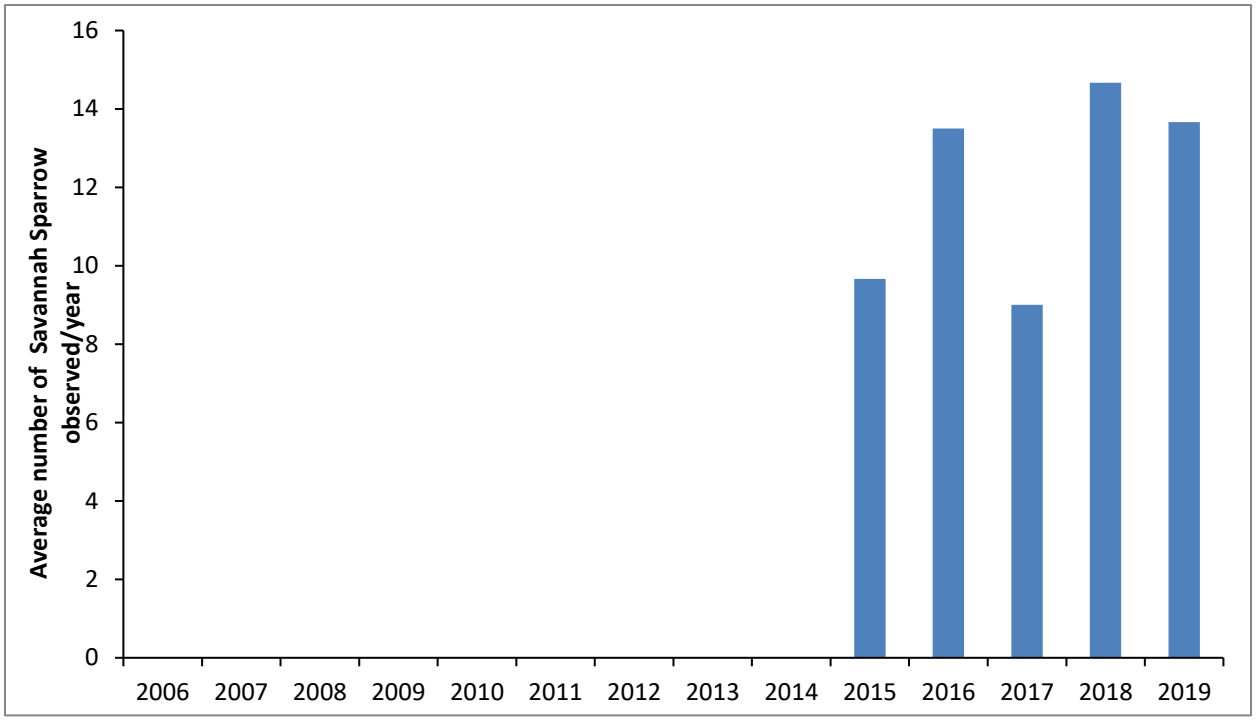

Figure 4.2.6. Average number of Savannah Sparrows observed in the meadow community at LVWMS from 2006–2019. We think it is highly likely that Savannah Sparrows were misidentified, prior to 2015, probably as Song Sparrows. SEs available, but not included.

Riparian community

The Yellow Warbler (*Setophaga petechia*) and Willow Flycatcher (*Empidonax traillii*) were selected as indicators of riparian community health. These two species are often found in riparian communities, including streams lined with willows. Abundance of Yellow Warblers rebounded in 2019 and was above the 13-year average abundance (Figure 4.2.7), while abundance of Willow Flycatchers remained above the long-term average (Figure 4.2.8). We counted 0 Willow Flycatchers on the first count day, possibly due to a cold spring and delayed migration. This likely skewed our abundance results. The management efforts to create a healthy willow gallery such as supplemental willow plantings and prevention of cattle browse appears to be an effective tool in maintaining habitat for these birds.

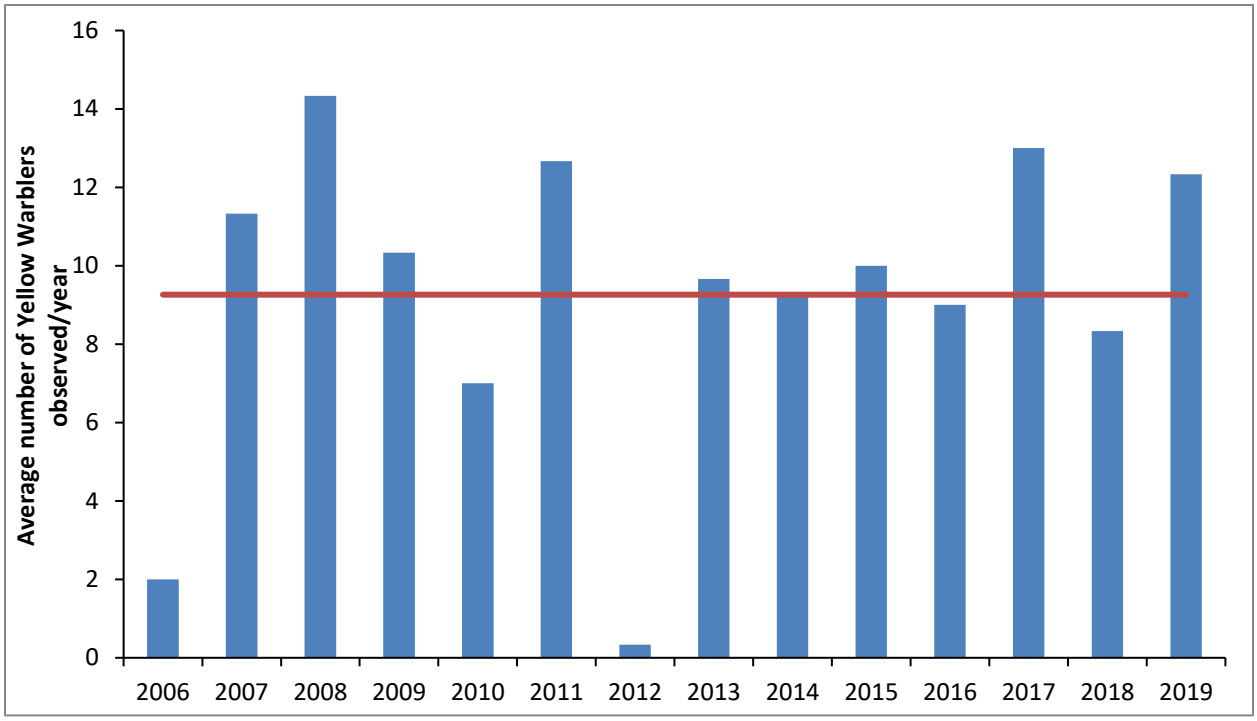

Figure 4.2.7. Average number of Yellow Warblers observed in the riparian community at LVWMS from 2006–2019. The orange line represents the 13-year average abundance. SEs available, but not included.

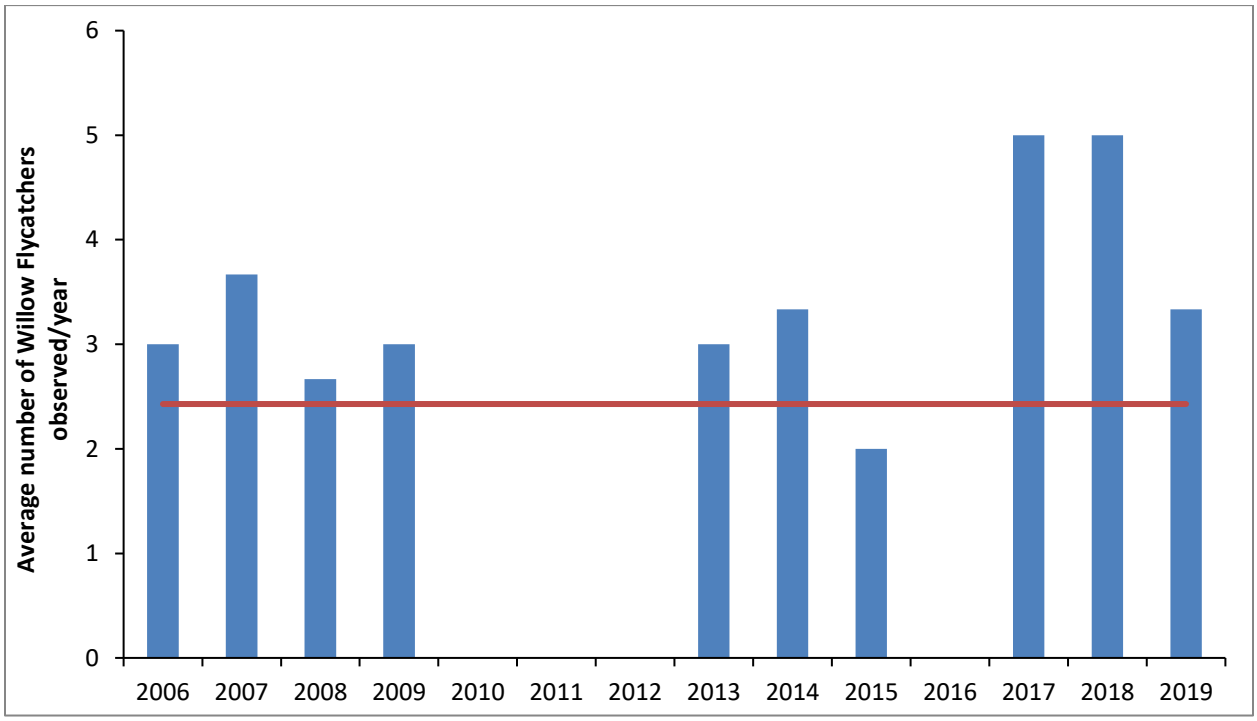

Figure 4.2.8. Average number of Willow Flycatchers observed in the riparian community at LVWMS from 2006–2019. The red line represents the 13-year average abundance. SEs available, but not included.

Upland community

The Brewer's Sparrow (*Spizella breweri*) was selected as an indicator of upland community health. This bird is a sagebrush obligate species and depends, almost exclusively, on the upland sagebrush community for breeding and nesting. Breeding Bird Surveys have documented a significant decline in breeding numbers of Brewer's Sparrows both survey-wide and in the state of Oregon from 1966–2015 (Sauer et al. 2017). Abundance of Brewer's Sparrows on LVWMS in 2019 was above the 13-year average abundance (Figure 4.2.9). In the future, BPT staff will continue to limit cattle grazing in this area and may address the encroachment of conifers into this community type at some time.

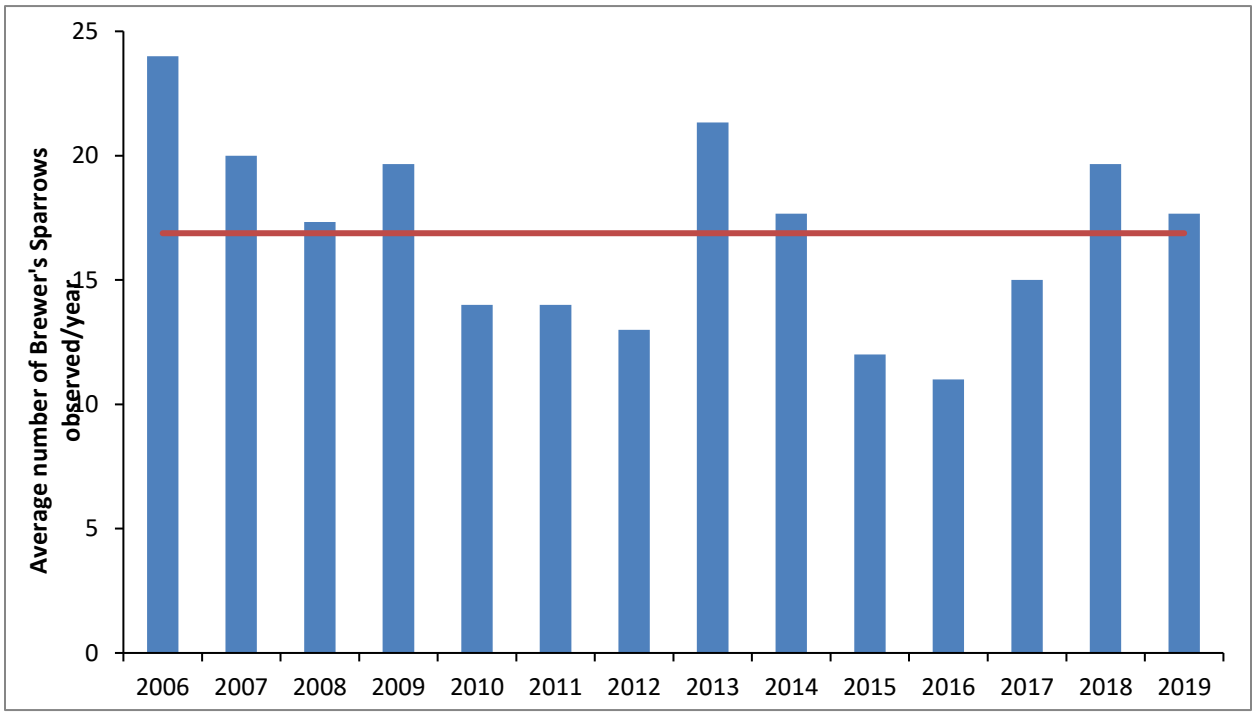

Figure 4.2.9. Average number of Brewer's Sparrows observed in upland community at LVWMS from 2006–2018. The red line represents the 13-year average abundance. SEs available, but not included.

Forest community

The Black-capped Chickadee (*Poecile atricapillus*) and Ruby-crowned Kinglet (*Regulus calendula*) have been used as indicators of forest community health. Black-capped Chickadees occupy deciduous and mixed-conifer forests, open woods and parks, willow thickets and cottonwood groves during the breeding season (Foote et al 2010). Mountain Chickadees inhabit montane coniferous forests (McCallum et al. 1999) and would make a better indicator species for the forest community at LVWMS. Given this habitat difference and the familiarity with the

property, it seems likely that many of the detections of Black-Capped Chickadees in previous years were, in fact, Mountain Chickadees. So, starting in 2018 and into the future, we will graph both species and make a concerted effort to identify all chickadees to species in future years. All chickadees detected during 2018 and 2019 were Mountain Chickadees. Chickadee numbers appeared to have rebounded a bit in 2019 compared to 2018 (Figure 4.2.10). Breeding Ruby-crowned Kinglets tend to occupy a variety of forests (Swanson et al. 2008). Ruby-crowned Kinglet abundance appears to have shown a steady decline throughout the survey years on LVWMS. However, in 2019, abundance of Ruby-crowned Kinglet exhibited an increase to above the long-term average (Figure 4.2.11). Although a common and widespread species across North America this species has also shown a significant decline in Breeding Bird Surveys across the state of Oregon from 1966–2015 (Sauer et al. 2017). BPT staff will continue to monitor Ruby-crowned Kinglet abundance in the coming years.

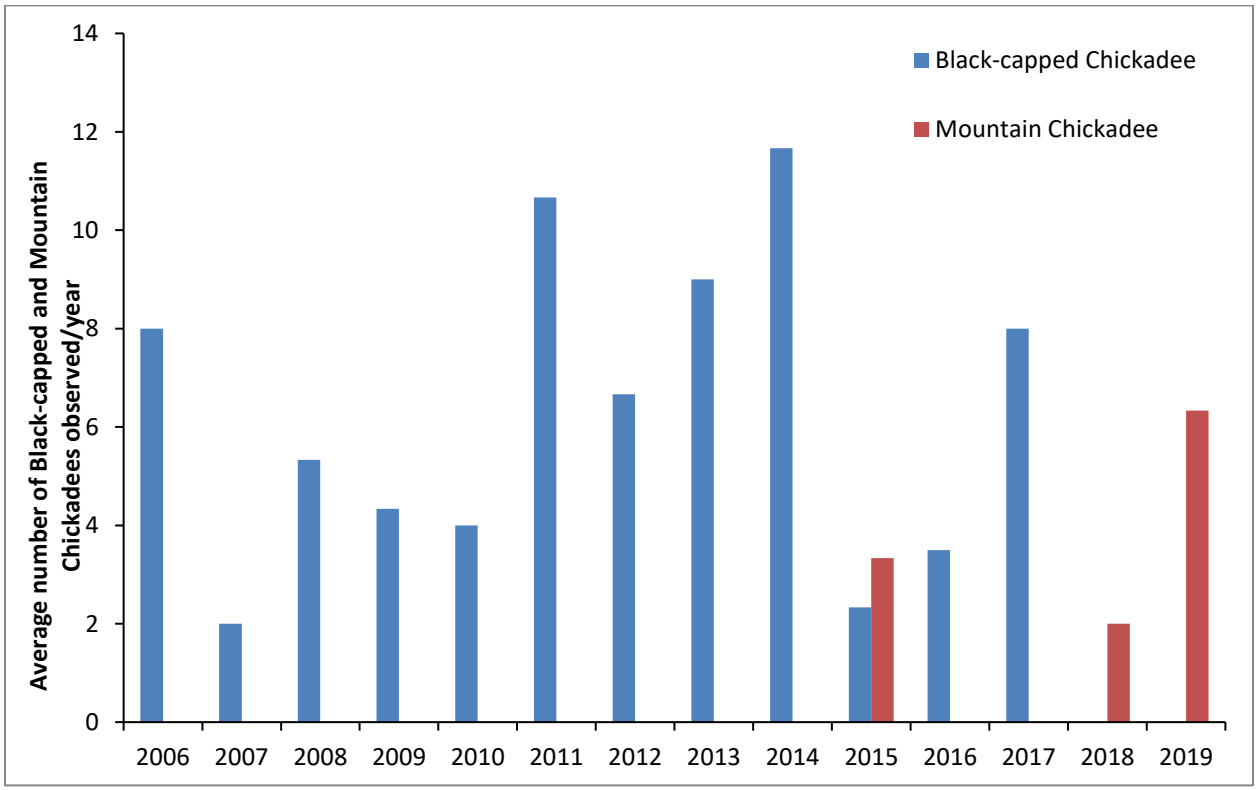

Figure 4.2.10. Average number of Black-capped Chickadees and Mountain Chickadees observed in the forest community at LVWMS from 2006–2019. Note that it is likely many of the past detections of Black-capped Chickadees were Mountain Chickadees. SEs available, but not included.

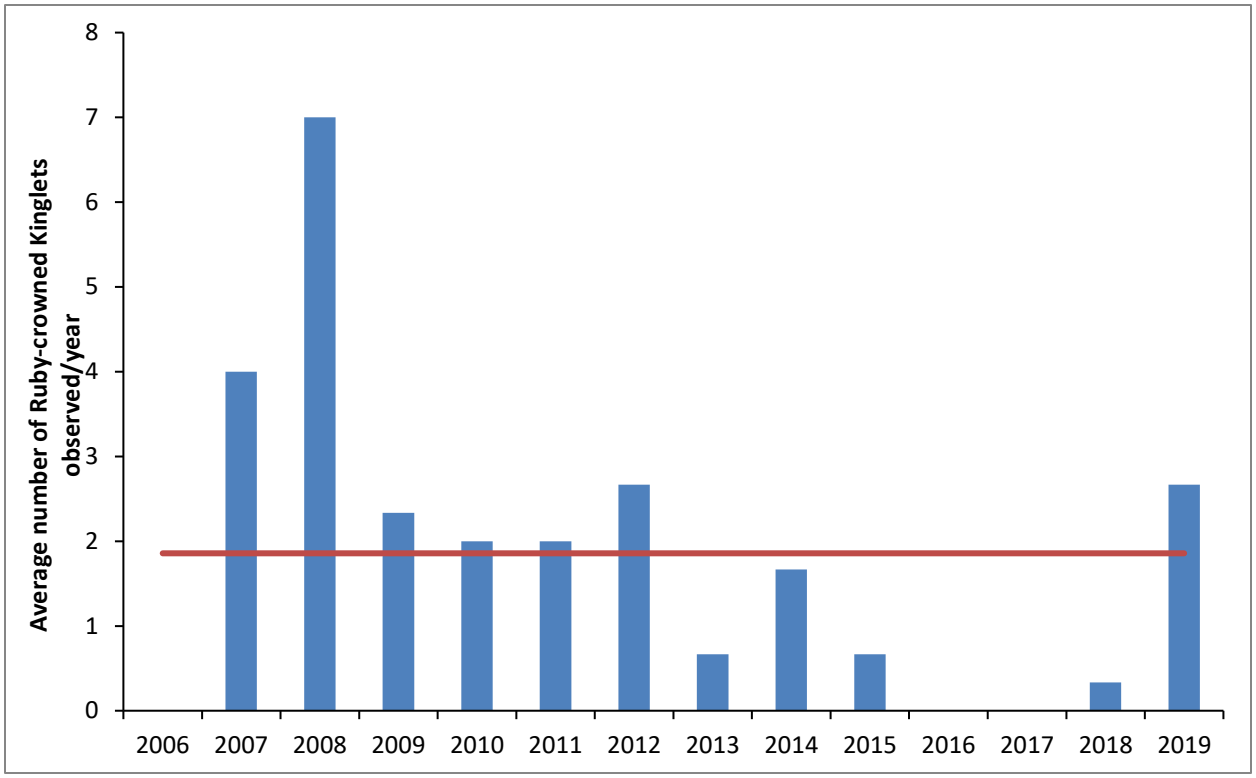

Figure 4.2.11. Average number of Ruby-crowned Kinglets observed in the forest community at LVWMS from 2006–2019. SEs available, but not included.

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Wheelwright, N. T. and J. D. Rising. 2008. Savannah Sparrow (*Passerculus sandwichensis*), version 2.0. In The Birds of North America (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.45.

Amphibian Surveys

The goal for amphibian monitoring at the LVWMS is to document presence and breeding of amphibians present, with particular emphasis on Columbia spotted frog (*Rana luteiventris*). Columbia spotted frogs are considered a sensitive species in the state of Oregon (Oregon Conservation Strategy 2016). In October 2015, the Great Basin Distinct Population Segment (DPS) of Columbia spotted frogs was removed from the list of Endangered Species Act candidate species by the U.S. Fish and Wildlife Service (USFWS 2015a). This decision was based on the discovery of additional populations, fairly stable populations and distribution, as well as the conservation practices occurring throughout the range of the DPS (USFWS 2015a, 2015b).

Methods

Habitat in Logan Valley consists primarily of wetland meadow bisected by several small stream courses. Each year we survey McCoy, Lake, and Big creeks on or nearby tribal property. The primary channels of these three creeks are shown in Figure 4.3.1. Since McCoy Creek confluences with Lake Creek shortly after intersecting FS-16 (which borders the BPT's northern property line), the McCoy/Lake Creek surveys included both streams from FS-16 to just below the confluence with Crooked Creek (which is near one of the BPT's southern property lines). Big Creek was surveyed from the FS-16 Road to its confluence with Lake Creek. We survey along the principle channel, side channels, wetlands, and prime habitat of minor tributaries observed. Time constraints limited complete coverage of all marshy areas and split channels. However, we attempt to survey the majority of amphibian habitat.

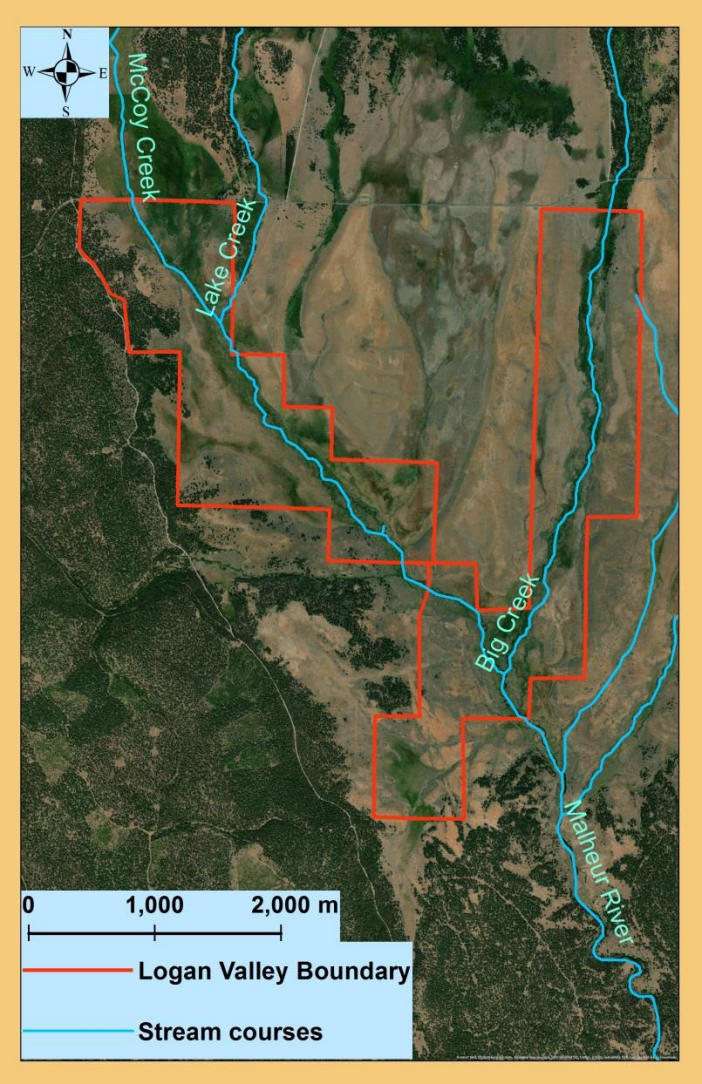

Figure 4.3.1. Map displaying the primary stream courses on LVWMS.

Visual encounter amphibian surveys conducted on the LVWMS were adapted from methods used by Pearl at al. (2010) to survey for Oregon spotted frogs (*Rana pretiosa*). Surveys are conducted in early summer (after snow melt allows access) to coincide with high amphibian activity. Two surveyors, typically one on each side of the principle channel of the selected stream course (habitat can dictate otherwise), search for isolated pools, slow moving channels, marshy habitat, backwater areas, and any other type of habitat with high potential for amphibian presence. If more than two surveyors are used, we make a note and add the time up for all surveyors. Surveyors weave back and forth along the floodplain, keeping within proximity of the bank to assure amphibian habitat is not missed. When a split channel is encountered, the fork with the perceived best amphibian habitat was followed if time constraints limited surveying both forks. Overall effort is quantified by timing searches in amphibian habitat for each observer. Starting in 2018, we began tracking each surveyor's route on GPS units. After surveying, we deleted the parts of the track where we weren't surveying (i.e. walking back to the vehicle away

from the stream courses). This allows us to map the route, and have a total distance surveyed in addition to the total time.

All amphibians and egg masses located were keyed (if possible) and tallied. When we find egg masses, we also take down some descriptive habitat data (depth, vegetation cover, flow) and a GPS point, so egg masses can be mapped and year to year locations compared in the future. Dip nets were used to capture adult and larval amphibians when necessary for identification purposes. In order to obtain a temporal estimate of breeding occurrence in Logan Valley, egg masses were classified as early, middle, or late stage if this could be reliably determined. Larval amphibian numbers were simply estimated. Based on species range records and habitat requirements, Logan Valley has the potential for the following amphibian species: long-toed salamander (*Ambystoma macrodactylum*), tiger salamander (*Ambystoma tigrinum*), non-native American bullfrog (*Lithobates catesbeiana*), Columbia spotted frog, Pacific tree frog (*Pseudacris regilla*), Great Basin spadefoot toad (*Spea intermontana*), and western toad (*Anaxyrus boreas*) (Stebbins 2003). Surveyors had resources available to them to assist with species identification.

In 2019, two egg mass surveys were conducted, one on Lake/McCoy Creek and one on Big Creek. Two surveyors conducted the survey of Lake/McCoy Creek on May 9th. Conditions were clear and sunny with winds at 5-15 mph and highs in the 60's. Two surveyors conducted the survey of Big Creek on May 10th. Conditions were sunny with winds at 0-5 mph and high temperatures in the 70's.

Results

On May 9th, 2019 we surveyed McCoy and Lake Creek with two surveyors for a combined 516 survey minutes (Table 4.3.1). One surveyor covered 9,741 m while the other covered 7,625 m (Figure 4.3.2 A). On May 10th, we surveyed Big Creek with one surveyor covering 8,427 m, and the other covered 6,625 m (Figure 4.3.2 B).

All reproductive stages of Columbia spotted frog egg masses were detected in 2019 surveys, however since all the tadpoles detected were still surrounding the egg masses, we treated them as egg masses as opposed to estimating their numbers (Table 4.3.1). Like in 2018, we detected egg masses on Big Creek (Table 4.3.1, Figure 4.3.2). All egg masses found on LVWMs in 2019 were found in slow-moving to stagnant back channels containing less than 1-2 ft of water. Tallies and numbers per minute of egg masses were higher in 2019 than previous years on both Big Creek and Lake Creek (Table 4.3.1). Juveniles and adults (tallies and numbers/minute) were down (Table 4.3.1), but we documented multiple breeding Columbia spotted frogs in 2019.

Table 4.3.1. Columbia spotted frog numbers from LVWMS in 2017–2019. McCoy/Lake Creek was surveyed twice in 2017, inflating the survey minutes. * For some clusters it was difficult to reliably count egg masses, so a range was used, we then took the mid-point of this range for this table.

	McCoy/Lake Creek					Big Creek				
	Survey Minutes	Egg mass tally		Juveniles and adults		Survey Minutes	Egg mass tally		Juveniles and adults	
		Tally	per minute	Tally	per minute		Tally	per minute	Tally	per minute
2017	1579	5	0.003	126	0.08	470	0	0	13	0.028
2018	835	48*	0.057	30	0.036	705	13*	0.01844	28	0.04
2019	516	110	0.213	8	0.016	576	78	0.13542	17	0.03

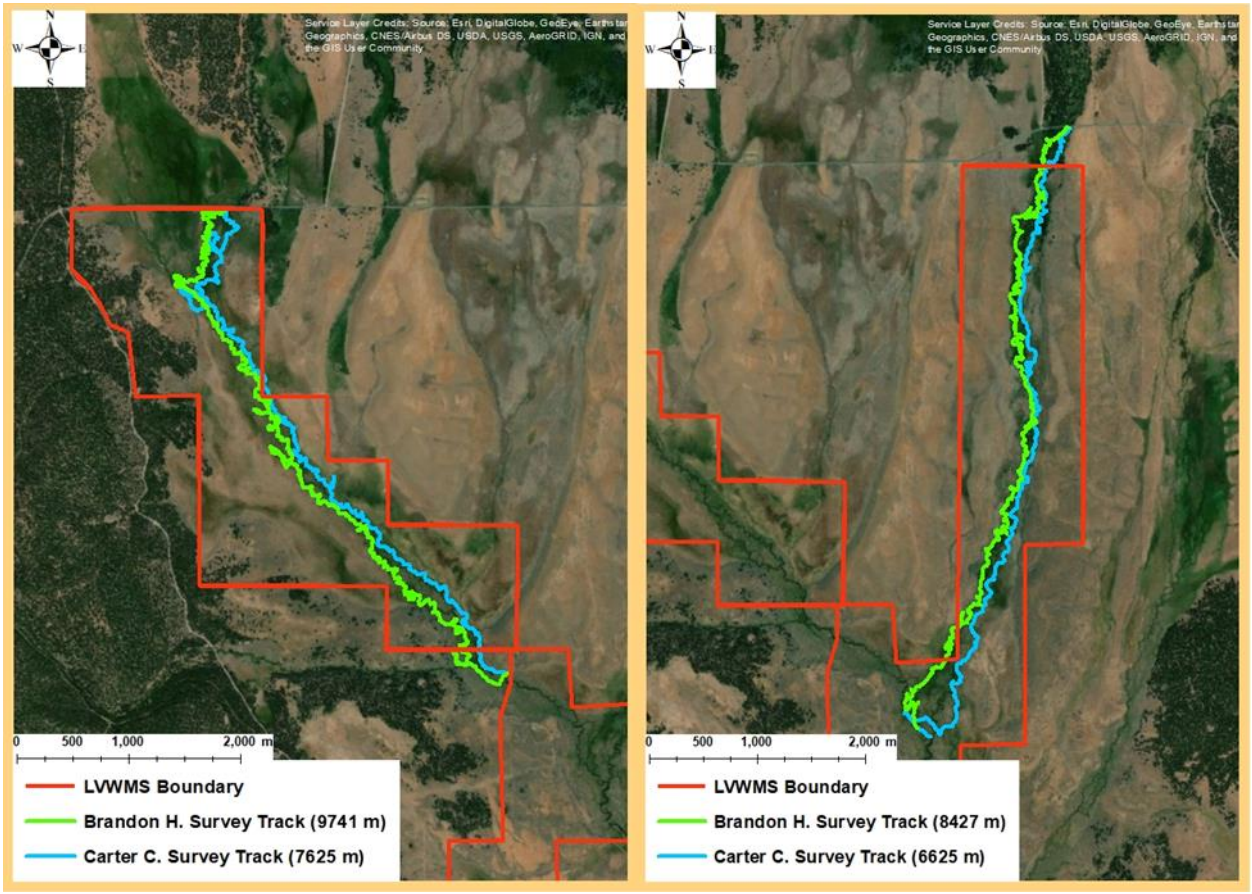

Figure 4.3.2. Survey tracks and distances from LVWMS in 2019.

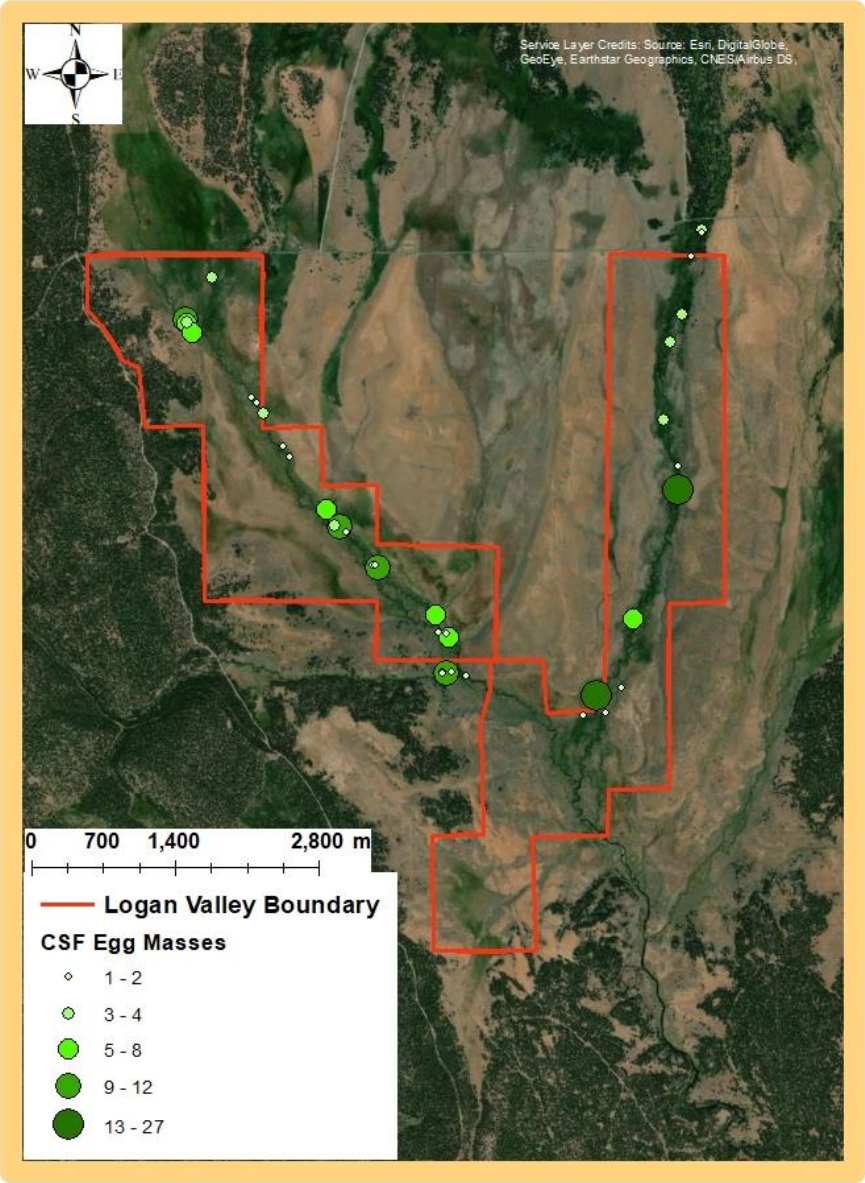

Figure 4.3.3. Columbia Spotted Frog egg mass locations and numbers on LVWMS in 2019.

Discussion

LVWMS appears to provide ample useable space for Columbia spotted frogs, a species of conservation concern in Oregon. Egg mass tallies were very high in 2019 compared to previous years, and for the past two years egg masses were found on Big Creek, with two very large clusters in 2019. Of note, there were two clusters along Big Creek containing 25 and 27 eggs. It is unclear if this high reproductive output represents a great breeding year or well-timed surveys, but the results from the previous two years are promising.

Management actions to increase habitat for Columbia spotted frogs include creating shallow pools with submerged and emergent vegetation as this would make excellent reproductive habitat for the species (Davis and Verell 2005). Manually creating pools and ponds or encouraging beaver activity and placing woody debris to increase channel complexity has the potential to create beneficial habitat for reproduction, sunning, foraging, overwintering, and refugia (Dodd 2013).

Future Columbia spotted frog monitoring may include surveys completed back to back to allow for better comparisons between drainages. Because it is difficult to predict the timing of breeding, multiple survey rounds are one option to decrease the chances of missing egg masses. Year over year trends in observation location could also be investigated to obtain insight into population dynamics and habitat preference. Recording more specific habitat where each sighting occurs could prove valuable if the BPT decides to modify habitat to the benefit of the Columbia spotted frog in the future.

We recommend continuing to track and map survey routes in future years as it provides useful data on survey effort and will allow for better year to year comparisons.

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Small Mammal Surveys

An assessment of small mammal population trends continued in 2019 on the Logan Valley Wildlife Mitigation Site. Trapping has been completed from 2007–2012 and 2014–2019. The trapping protocol followed the Monitoring and Evaluation Plan for the Albeni Falls Wildlife Mitigation Project (2002) with some modifications. Two different vegetation communities were surveyed for small mammals; forest and meadow. This year we utilized extra help in the form of ONDA's Tribal Stewards Program for small mammal trapping. College age tribal members from various Tribes helped us set the trap grids and check them.

Sampling design

Capture was accomplished using Sherman live traps and a rolled oat and peanut butter bait. For each habitat type, 100 Sherman live traps were spaced 10m apart in a 100m x 100m area. The first trap was set at the origin. From the origin, traps were set every 10 m along two perpendicular lines running along an established azimuth 100 m in each direction. We continued with the azimuths used since at least 2017, but these may not have always been the azimuths used (Table 4.4.1)

Table 4.4.1. Spatial locations in UTMs and decimal degrees for the origin of the small mammal surveys LVWMS.

GPS_ident	Vegetation community	X	Y	Latitude	Longitude	Azimuth
RIPMAMMALS	Meadow/riparian	367379	4892565	44.174	-118.659	N & E
TREEMAMMAL	Forest	366767	4892542	44.174	-118.667	S & E

UTM points in NAD_1983_UTM_Zone_11N. Note a slight shift (< 2 m) in points due to projecting data in a different coordinate system.

In 2019, BPT staff sampled small mammals on July 24th and 25th. Upon capture of each small mammal, we weighed, sexed, and aged all individuals. We also marked individuals caught on the first night for potential recapture by marking them with a non-toxic fabric marker. By marking mammals captured on the first capture event BPT can accumulate recapture data for use in a mark/recapture population analysis.

Analysis

Species richness and species accumulation curves

In past reports, we have relied on the Simpsons Diversity Index to calculate diversity and evenness. However, due to the low number of individuals caught each year, we have decided to

report only the annual species richness and species accumulation curves to illustrate how many small mammal species we document using the forest and meadow/riparian vegetation communities. Species richness is the number of species trapped in a site and species accumulation curves represent an accumulation of species throughout the sampling years. For example, in the forest community in 2012 BPT staff caught a golden-mantled ground squirrel (*Callospermophilus lateralis*) and four Douglas squirrels (*Tamiasciurus douglasii*). Since neither of these species had been caught in the forest community in previous years, the curve raises by two species in 2012.

Abundance

In the past, BPT staff have used the small mammal data to report the estimated number of a species that would be caught in 1000 traps. In 2017, we decided that this extrapolation of the data is unnecessary, and the only benefit appears to be the ability to report whole numbers. For reporting abundance in this report, we used the abundance/trap nights as a metric for relative abundance. Trap nights are equal to the number of traps set * the number of nights that these traps were set. We summarized trap effort from 2007–2019 in Table 4.4.2. After looking at the number of recaptures in the data set, we have concluded that use of the Lincoln- Petersen mark-recapture method would not be biologically meaningful. For this report we treat individuals the same regardless of if they were a new capture or a recapture. However, we will continue to mark individuals and obtain mark-recapture data in the coming years.

Table 4.4.2. Small mammal trapping effort at LVWMS in the forest and meadow/riparian vegetation communities from 2007–2019 (note that no traps were set in 2013).

Site		Traps	Nights	Trap Nights
Forest	2007	100	2	200
	2008	100	3	300
	2009	100	2	200
	2010	100	2	200
	2011	100	2	200
	2012	100	1	100
	2014	100	2	200
	2015*	100	2	200
	2016	100	2	200
	2017	100	2	200
	2018	100	2	200
	2019	100	2	200
Meadow	2007	100	2	200
	2008	100	3	300
	2009	100	2	200
	2010	100	2	200
	2011	100	2	200
	2012**	100	2	200
	2014	100	2	200
	2015	100	2	200
	2016	100	2	200
	2017	100	2	200
	2018	100	2	200
	2019	100	2	200

*sampled once during the day also, but the second sampling period was excluded to keep consistency between years.
**2012 report said this site was sampled twice with no small mammals caught, but we cannot locate the raw data for either day.

Results

Species richness and species accumulation curves

Throughout the 12 years of sampling, BPT staff has documented eight species in both the forest and the meadow/riparian communities, and 14 species at LVWMS (Fig 4.4.1 and Figure 4.4.2). These species represent six small mammal families: Cricetidae, Dipodidae, Heteromyidae, Mustelidae, Sciuridae, and Soricidae.

In 2019, BPT staff caught 3 species of small mammals in the forest community, the deer mouse (*Tamias minimus*), yellow-pine chipmunk (*Tamias amoenus*), and the western red-backed vole (*Myodes californicus*). Three species is above the long-term average of 2.17 species/year in the forest community. BPT staff captured only 1 species in the meadow/riparian community, the yellow-pine chipmunk (*Tamias amoenus*). The long-term average is 1.25 species/year in the meadow/riparian community (Figure 4.4.1).

Abundance

Numbers/trap night for least chipmunks and all small mammals were below the long-term average abundance/trap night in the meadow community but small mammals were well above the long-term average for the forest community. Of note, we captured a total of 12 Yellow-pine Chipmunks (*Tamius amoenus)* on LVWMS. Prior to 2019, we had only captured one of Yellow-pine Chipmunk in 2018. These two chipmunk species are similar in appearance and staff should be careful to identify them to species. Additionally, we only captured 1 species of vole in 2019, the Western Red-backed vole (*Myodes californicus*). Three deer mice were captured in the forest community. Only 1 individual was trapped in the meadow/riparian site in 2019 compared to the long-term average of 3.17 small mammals/year.

Figure 4.4.1. Annual species richness in the forest and meadow/riparian communities on the LVWMS from 2007-2019 (note differences in trapping effort between years and sites, see Table 4.4.2).

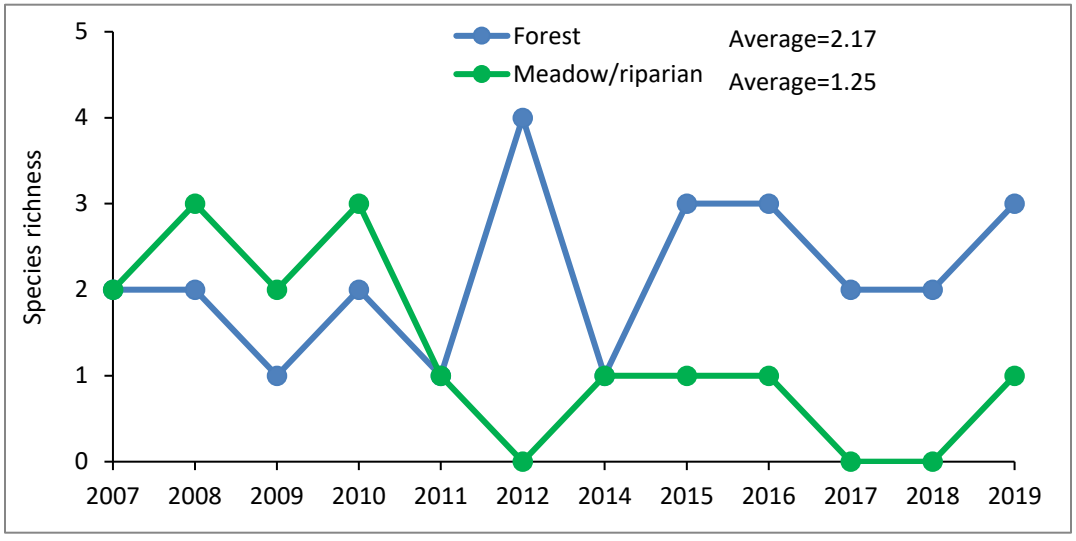

Figure 4.4.2. Species accumulation curves in the forest and meadow/riparian communities on the LVWMS from 2007-2019 (note differences in trapping effort between years and sites, see Table 4.4.2).

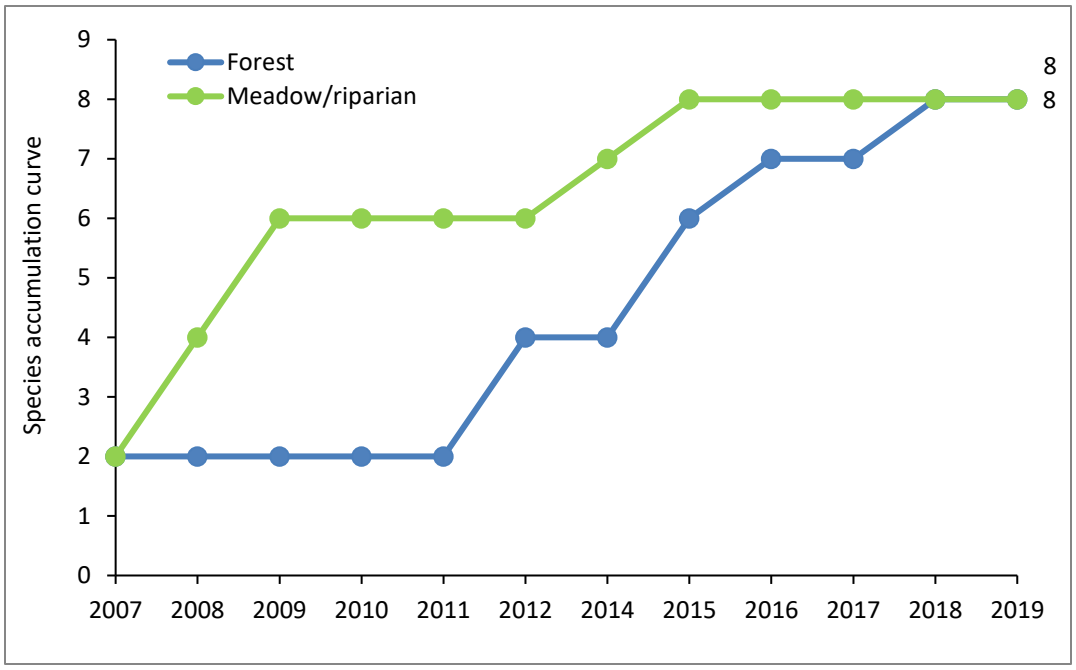

Table 4.4.3. Abundance and abundance/trap night of all small mammals, deer mice, and least chipmunks trapped on LVWMS from 2006-2019 (note that no traps were set in 2013).

						Small mammals		Deer Mouse		Least chipmunk	
Site	Year	Traps	Nights	Trap nights	#	#/trap night	#	#/trap night	#	#/trap night
Forest	2007	100	2	200	4	0.020	1	0.005	3	0.015
	2008	100	3	300	3	0.010	1	0.003	2	0.007
	2009	100	2	200	6	0.030	6	0.030	3	0.015
	2010	100	2	200	6	0.030	2	0.010	1	0.005
	2011	100	2	200	2	0.010	2	0.010	0	0.000
	2012	100	1	100	19	0.190	5	0.050	9	0.090
	2014	100	2	200	2	0.010	2	0.010	0	0.000
	2015	100	2 *	200	9	0.045	2	0.010	2	0.010
	2016	100	2	200	16	0.080	13	0.065	1	0.005
	2017	100	2	200	10	0.050	6	0.030	4	0.020
	2018	100	2	200	4	0.020	0	0.000	3	0.015
	2019	100	2	200	15	0.075	3	0.015	0	0.000
	Average				**8.000**	**0.048**	**3.583**	**0.022**	**2.333**	**0.017**
Meadow	2007	100	2	200	2	0.010	1	0.005	0	0.000
	2008	100	3	300	4	0.013	0	0.000	0	0.000
	2009	100	2	200	2	0.010	0	0.000	0	0.000
	2010	100	2	200	7	0.035	2	0.010	0	0.000
	2011	100	2	200	4	0.020	0	0.000	0	0.000
	2012	100	2 **	200	0	0.000	0	0.000	0	0.000
	2014	100	2	200	7	0.035	0	0.000	0	0.000
	2015	100	2	200	10	0.050	0	0.000	0	0.000
	2016	100	2	200	1	0.005	0	0.000	0	0.000
	2017	100	2	200	0	0.000	0	0.000	0	0.000
	2018	100	2	200	0	0.000	0	0.000	0	0.000
	2019	100	2	200	1	0.005	0	0.000	0	0.000
	Average				**3.167**	**0.018**	**0.250**	**0.002**	**0**	**0.000**

*sampled once during the day also, but the second sampling period was excluded to keep consistency between years.
**2012 report said this site was sampled twice with no small mammals caught, but we cannot locate the raw data for either day.

Discussion

The high number of Yellow-pine Chipmunks we captured on LVWMS in 2019 is of particular interest as this species has not been captured in previous years with the exception of 2018. However, Yellow-pine Chipmunks have a similar appearance to Least Chipmunks, which is a species of interest on LVWMS. As a result, care must be taken in order to ensure correct identification of species.

The partnership with the Tribal Stewards Program was immensely helpful. It provided the Tribal participants with experience with small mammal trapping, and it provided BPT staff with much needed help in setting trap grids. It was far more efficient than doing it with 1 to 2 staff only. We plan to continue this partnership in future years, and schedule trips around our small mammal trapping.

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Stream Photos

There are 14 stream photo points on the Project to monitor vegetative components and changes in stream structure. An upstream and downstream azimuth is used to make the photograph repeatable. The purpose of the stream photos is for qualitative analysis for visual historic reference, see Appendix B.

Nest Box Program

Densities of cavity nesting birds can be limited by the number of cavities available, with densities in areas correlated to the number of nest sites, and populations changing with experimental manipulations of nest site density (Newton 1994). Supplemented nest sites can be a valuable conservation tool. Nest box programs have demonstrated the ability to increase population numbers for American Kestrels (*Falco sparverius*) (Hamerstrom et al. 1973, Shave and Lindell 2017), and the recovery of the Eastern Bluebird (*Sialia sialis*) has been attributed in part to the promotion of nest boxes (American Bird Conservancy 2018).

In 2018, we initiated a nest box program on MRWMS, LVWMS, other tribal properties, and private property in southeastern Oregon. We have continued to expand this program. We monitor these nest boxes and collect the data requested by the American Kestrel Partnership (AKP) on all boxes (regardless of which species the boxes were intended).

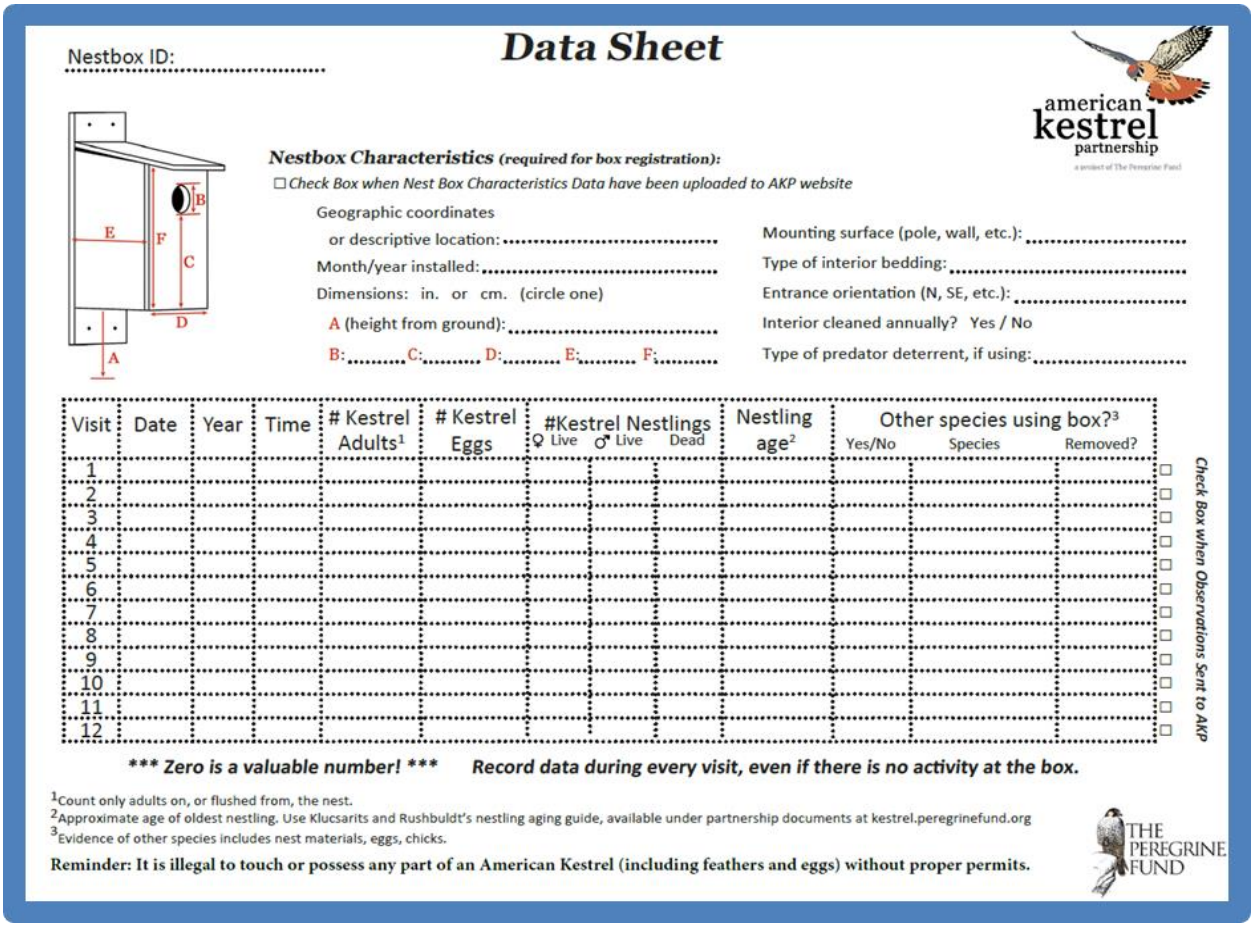
In 2018, Carter obtained a Bird Banding Lab subpermit and a state permit to band American Kestrels, Mountain Bluebirds (*Sialia currucoides*), Western Bluebirds (*Sialia mexicana*), Northern Saw-whet Owls (*Aegolius acadicus*), Flammulated Owls (*Psiloscops flammeolus*), Northern Pygmy Owls, and Violet-green Swallows (*Tachycineta thalassina*). With these permits he will band nestlings from the nest box program and incorporate bird banding field days with Tu Wa-kii Nobi for education and outreach. In 2020, Carter received his Master Bander permit and will continue banding under this permit.

Due to his research background with American Kestrels (*Falco Sparverius*), Carter was asked to take on the role of state coordinator for the American Kestrel Partnership (AKP) in Oregon. "Launched 2012 in response to long-term population declines of kestrels in North America, The Peregrine Fund's American Kestrel Partnership is a network of citizen and professional scientists working to collaboratively understand kestrel demographics and advance kestrel conservation (https://kestrel.peregrinefund.org/)." With this role, Carter oversees field questions, and encourage folks to collect data according to protocol and submit soon after the breeding season, as well as recruiting new Partners for the AKP. Most of the recruiting will take place in southeastern Oregon. Carter will manage the nest box program for the Burns Paiute Tribe, as well as collaborate with other partners and help them run their own programs. With his banding permit he will also help them band nestlings from other partner's nest boxes. The experience with the BPT nest boxes will help him guide others.

Methods

For installation and monitoring, we collect the data requested by the AKP on all boxes, regardless of it was for kestrels (Figure 4.6.1). These data include measurements and other data on the box, as well as what occupies it through the breeding season. The AKP recommends checking the box every two weeks during the breeding season but leaves the decisions up to the party managing the box. It is unlikely we will be able to check every two weeks, but we will check as frequently as our schedule allows. We will submit data from the kestrel boxes to the AKP each year. If nests contain European Starlings (*Sturnus vulgaris*) or House Sparrows (*Passer domesticus*) nests, we will remove them and try to trap the adults, as these non-native species can negatively affect native birds.

Before fledging, we will band all kestrel nestlings. Bluebirds and swallows have short banding windows so we will band them opportunistically. Banding will take place near the end of the nestling stage but early enough to avoid force fledging any nestlings. For kestrels this will take place when nestlings are 17–26 days old.



Nestbox ID: .....

Data Sheet

american kestrel partnership

Nestbox Characteristics *(required for box registration):*

☐ *Check Box when Nest Box Characteristics Data have been uploaded to AKP website*

Geographic coordinates
or descriptive location: .....
Month/year installed: .....
Dimensions: in. or cm. (circle one)
A (height from ground): .....
B: ..... C: ..... D: ..... E: ..... F: .....

Mounting surface (pole, wall, etc.): .....
Type of interior bedding: .....
Entrance orientation (N, SE, etc.): .....
Interior cleaned annually? Yes / No
Type of predator deterrent, if using: .....

Visit	Date	Year	Time	# Kestrel Adults[1]	# Kestrel Eggs	#Kestrel Nestlings ♀ Live	#Kestrel Nestlings ♂ Live	#Kestrel Nestlings Dead	Nestling age[2]	Other species using box?[3] Yes/No	Other species using box?[3] Species	Other species using box?[3] Removed?	
1													☐
2													☐
3													☐
4													☐
5													☐
6													☐
7													☐
8													☐
9													☐
10													☐
11													☐
12													☐

Check Box when Observations Sent to AKP

*** Zero is a valuable number! *** **Record data during every visit, even if there is no activity at the box.**

[1]Count only adults on, or flushed from, the nest.
[2]Approximate age of oldest nestling. Use Klucsarits and Rushbuldt's nestling aging guide, available under partnership documents at kestrel.peregrinefund.org
[3]Evidence of other species includes nest materials, eggs, chicks.

Reminder: It is illegal to touch or possess any part of an American Kestrel (including feathers and eggs) without proper permits.

THE PEREGRINE FUND

Figure 4.6.1. Example data sheet used for box deployment and monitoring.

Results

Box deployment

Prior to the 2019 breeding season we have deployed 7 kestrel boxes and 10 bluebird boxes on or near the MRWMS (Figure 4.6.2). We have deployed 11 kestrel boxes, 1 Northern-Pygmy Owl box, and 15 bluebird boxes on or near the LVWMS (Figure 4.6.3). We deployed 2 kestrel boxes at tribal employees' houses in Harney County, and 5 kestrel boxes on Beech Creek, tribal property in Grant County. We have also monitored 4 kestrel boxes that had already been deployed on private properties in Burns, OR, and we have also assisted Crane Middle/High School, Portland Audubon, and the U.S. Forest Service Prairie City Ranger District Office in deploying their own boxes to manage.

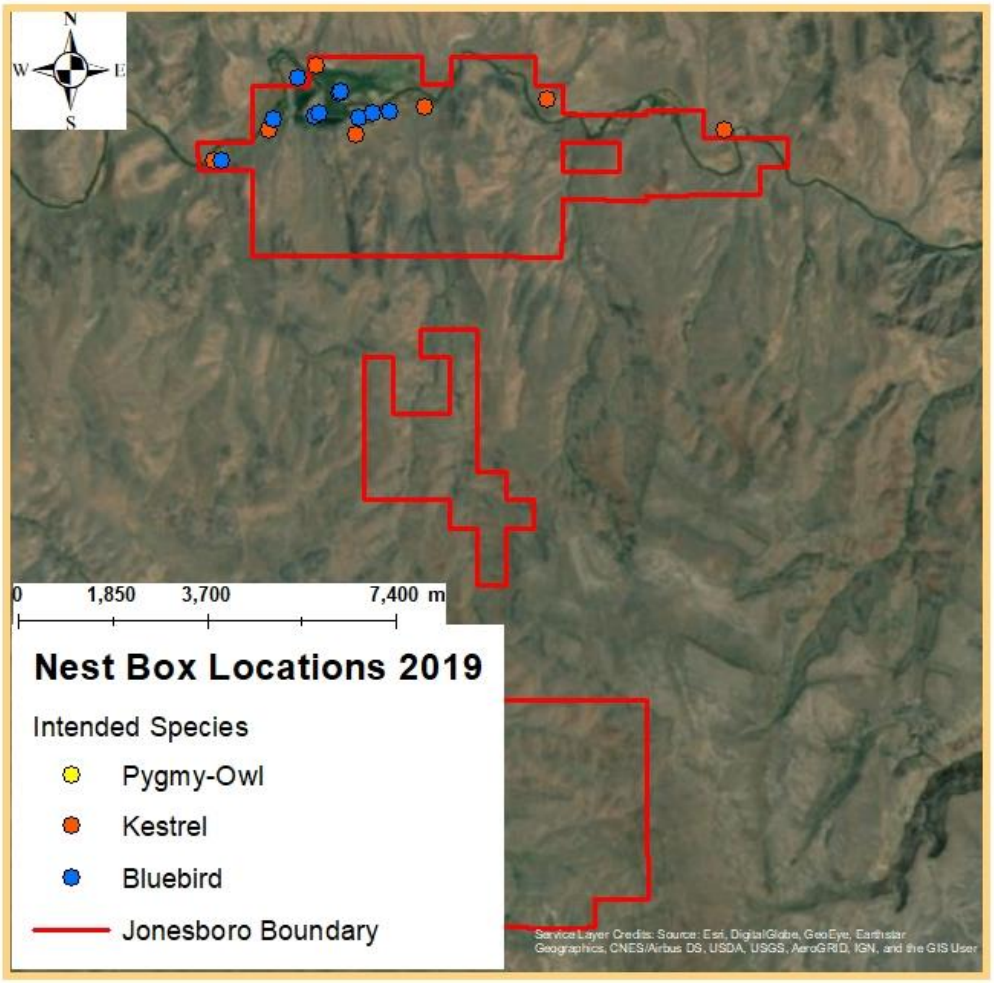


Figure 4.6.2. Nest box locations on the MRWMS.

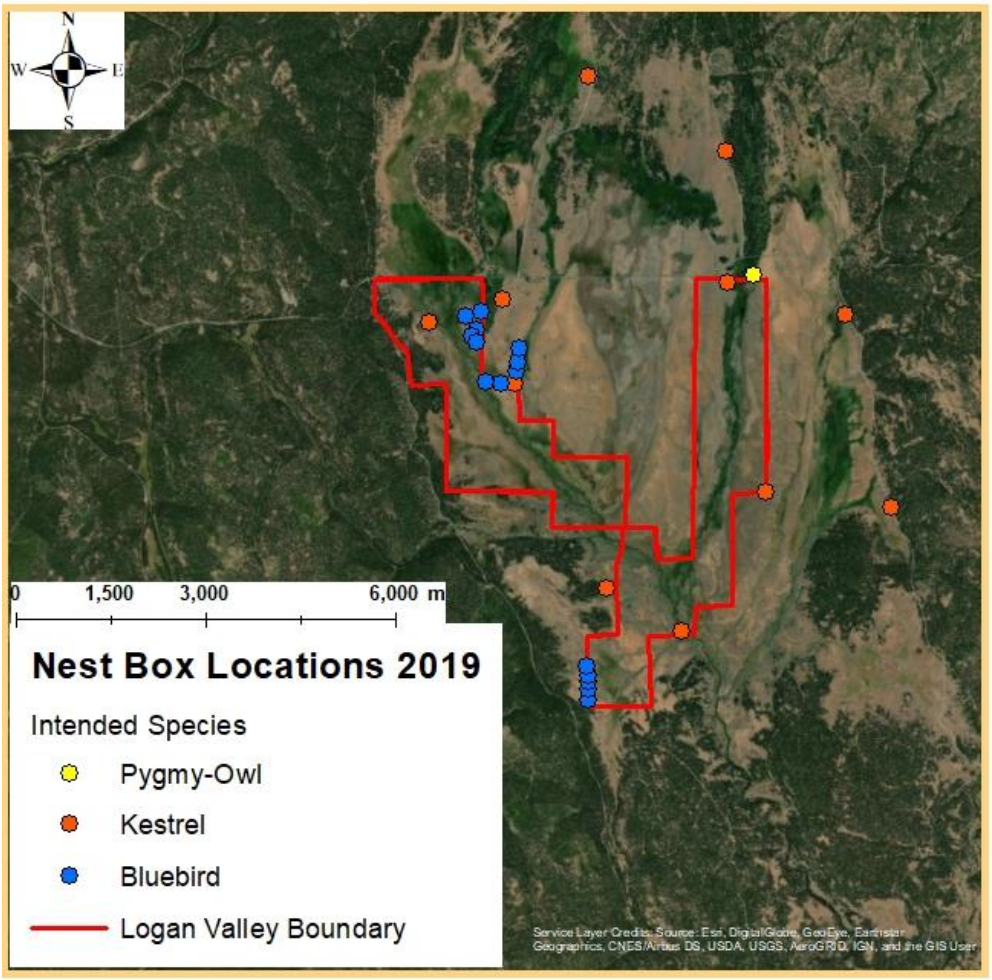


Figure 4.6.3. Nest box locations on the LVWMS.

Box occupancy and success

All data from the kestrel boxes, even unoccupied boxes, were submitted to the AKP database for inclusion in their large-scale nest box monitoring program.

On the MRWMS, all 7 kestrel boxes deployed were occupied by kestrels. These 7 nests successfully fledged 23 young. We also monitored a nest found in a hole in a barn at headquarters, that appeared to fledge 2-3 young. On the LVWMS, 9 of 11 kestrel boxes deployed were occupied by kestrels which initiated nests. Five of these boxes successfully hatched and fledged young. One of the kestrel boxes deployed was occupied by a Mountain Bluebird which laid 5 eggs, and likely fledged 4 young. One of 5 boxes at Beech Creek, was occupied by kestrels and only fledged 1 young. Three of 6 boxes monitored at private residences around Burns, were occupied by kestrels and 2 of 6 boxes fledged a total of 8 nestlings. Occupancy, nesting activity, and fledging success are all displayed in Table 4.6.1.

Table 4.6.1. Occupancy and nesting and fledging success at kestrel nest boxes deployed at each site.

Property	% & # of boxes occupied 2019	Total number of eggs 2019	% hatched 2019	Number of nestlings 2019	% of boxes that fledged ≥1 nestling 2019	Number of nestlings fledged in 2019	TOTAL number of nestlings fledged since 2018
MRWMS	7/7 = 100%	30	7/7	24	7/7	23	29
LVWMS	9/11 = 82%	34	5/11	10	4/11	12	16*
Beech Creek	1/5 = 20%	4	1/5	1	1/5	1	1**
Other	3/6 = 50%	8	2/6	8	2/6	8	13***

*Only 2 kestrel boxes were deployed in 2018
**No kestrel boxes were deployed in 2018
***Nestlings found at 1 of 3 nest boxes deployed in Burns before other sites deployed nest boxes

None of the 10 bluebird boxes deployed at MRWMS were occupied by bluebirds. However, 9 of these boxes were occupied by native species including Ash-throated Flycatchers and Tree Swallows (*Tachycineta bicolor*). Tree Swallows occupied 7 of these boxes while Ash-throated Flycathcers occupied 3 of these boxes. Of these boxes, only 2 successfully fledged young with 3 failing and the rest unknown. The unknown status of nesting at boxes is due to gaps in monitoring and a short window between hatching and fledging. At LVWMS, Mountain Bluebirds were found at 9 out of 15 boxes deployed. Other native species found using these nest boxes included House Wren and Tree Swallow. Again, the high number of unknown outcomes at these boxes is likely due to gaps in monitoring and short window to monitor between hatching and fledging. Occupancy and success are shown in Table 4.6.2 below.

Table 4.6.2. Occupancy and success at bluebird boxes deployed at each site. Some boxes are occupied more than once in a year.

Property	% Occupied 2019	Species (# of boxes) *	# Success	# Fail	# Unk.
MRWMS**	9/10 = 90%	TRES (7), ATFL (3)	2	3	6
LVWMS***	11/15 = 73%	MOBL (9), HOWR (1), TRES (6)	4	3	11

*Each species labeled by its 4 letter Alpha code
**Jones BB4 – ATFL and TRES both occupied box on 6/10/2019
***Logan BB1 – HOWR occupied box after MOBL successfully fledged young

One of the bluebird boxes deployed was occupied by a House Wren which had 2 nestlings. Tree Swallows (*Tachycineta bicolor*) occupied 5 bluebird boxes containing nestlings about to fledge.

Figure 4.6.4 Tree swallow nestlings in a box.

Figure 4.6.5. Kestrel adult and eggs in one box and nestlings in another box.

Bird Banding

On 9 days during the summer of 2019, we hand-captured and banded kestrel and Mountain Bluebird nestlings at MRWMS and LVWMS (Table 4.6.3). At MRWMS, we banded a total of 23 kestrel nestlings across 7 nest boxes. We banded 12 kestrel nestlings at 4 nest boxes and banded 3 nestling Mountain Bluebirds at 1 nest box at LVWMS. At Beech Creek we banded 1 kestrel nestling, and we banded 12 other kestrels at other locations.

Table 4.6.3. Total number of each species captured and banded at MRWMS, LVWMS, and other locations.

Species	MRWMS	LVWMS	Beech Creek	Other
American Kestrel	23	12	1	12
Mountain Bluebird	0	3	0	0

Outreach

On February 12th Carter gave a presentation on kestrel biology and nest boxes to Crane Middle/High School and then helped them deploy their own box to manage (Figure 4.6.6). On July 1st, 2019 we banded nestlings with 2 Tu-Wa-kii Nobi (Kid's House) youth, BPT staff, and Burn's resident. On July 9th, we banded 4 nestlings with a few Crane Middle and High School Students at a box they've monitored this year. On July 20th, the wildlife program banded 3 nestlings with Tribal youth at Culture Camp. On July 17th and 25th, we banded nestlings with ONDA and their Tribal Stewards Program. On August 1st, we banded 3 kestrel nestlings and 3 Mountain Bluebirds with Forest Service Staff. At each banding event, we teach kids and adults present about kestrel biology and how to tell the difference between male and female kestrels. We explain why we band birds, what can be gained from banding, and what data we collect (Figure 4.6.7). When appropriate, we allow participants to help us collect some of the data.

Figure 4.6.6. Successful deployment of a kestrel nest box with Crane High School.

Figure 4.6.7. Kestrel and Bluebird banding days.

Discussion

Our nest box program has shown great promise with kestrel, Tree Swallow, and Ash-throated Flycatcher, and House Wren nests shortly after deployment. This speedy occupancy by kestrels is especially promising as occupancy rates can take a few years to build up after installing boxes (according to the AKP director). The high depredation rate of kestrel nests at LVWMS is of concern. We will keep an eye on this in 2020 and will consider using a smaller entrance hole to deter predators. We will continue to monitor these nest boxes into 2020 to determine occupancy 2 years post-deployment.

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Shave, M. E., and C. A. Lindell. 2017. Occupancy modeling reveals territory-level effects of nest boxes on the presence, colonization, and persistence of a declining raptor in a fruit-growing region. PLoS ONE 12(10): e0185701.

Golden Eagle Nest Monitoring

The Oregon Eagle Foundation, Inc. initiated a statewide nest monitoring program for Golden Eagles in 2011, this project has continued and is planned to continue for a total of 10 years. To accomplish such a large-scale project many volunteers have been recruited to help collect data, in 2017, 658 people contributed to the project, including 337 volunteers and 321 people representing 54 different organizations. In 2019, BPT staff was asked to monitor 4 Golden Eagle (*Aquila chrysaetos*) breeding territories on or near tribal properties.

1. Logan Valley is a historical tree nest south of the LVWMS, and it has been visited since 2010 with no eagles or nests observed. The coordinate precision is unclear.

2. Jonesboro is a cliff nest that has been active between 2011–2017. It is located on the MRWMS.

3. Pole Creek is a historical cliff nest that has not been visited between 2011–2017, it has not been visited between 2011–2017 and the precision is unclear. It is located northwest of the MRWMS.

4. Fenwick Canyon is a historical cliff nest, north of Burns. It has been visited since 2010 with no eagles or nests observed. The coordinate precision is unclear.

Methods and reminders

1. DO NOT DISTURB EAGLES or LANDOWNERS. If you disturb eagles leave the area promptly. Try to stay 1/2 mile from nests. Do not go onto private property without owner permission.

2. Nest SEARCHING can be done any time of year. MONITORING is done during the breeding season (mid-February–July). A BREEDING AREA includes one or more nests used by one breeding pair. NESTS are large and can be on cliffs, in trees, or on manmade structures.

3. The SURVEY GOAL is to locate and monitor golden eagle nests. The MONITORING GOAL is to determine nesting status and outcome at breeding areas.

4. Report nest observation on a REPORT FORM (e-mail, standard, your own format) or in field notes. If you don't like filling out forms, at least report DATE, NEST LOCATION and EAGLE ACTIVITY by whatever means suits you.

5. Be properly equipped for observing and recording your observations (BINOCULARS, SPOTTING SCOPE, FIELD NOTEBOOK, FORMS, MAPS, GPS RECEIVER, COMPASS, CAMERA). Remember... "Even the worst field notes are better than the best memory." – S. Postupalsky

6. Be prepared to SURVIVE harsh weather in a remote location in case you become stranded. Carry plenty of water, food, warm clothing, and EMERGENCY SURVIVAL GEAR.

7. Nests can be observed anytime during the breeding season; however, TIMING IS IMPORTANT and MORE THAN TWO VISITS MAY BE REQUIRED to determine nesting outcome. (See: Nesting Phenology Chart).

8. TIMING of first annual nest observations should coincide with early nesting behavior, including courtship, incubation, and downy young (mid-February–April). TIMING of subsequent observations (generally late May–July) at occupied breeding areas should be based on nesting status determined during previous observations, with the goal of determining nesting outcome (failure or number of eaglets at least 51 days old).

9. AGE EAGLETS by comparing them to pictures found in Hoechlin, D.R. 1976. Development of golden eaglet nestlings in southern California. Western Birds 7:137–152, which can be found at: http://elibrary.unm.edu/sora/wb/v07n04/p0137-p0152.pdf

10. Eaglets must be at least 51 DAYS OLD to be counted as SUCCESSFULLY FLEDGED; however, it is still important to DETERMINE AND REPORT NUMBER AND AGE OF ALL EAGLETS observed.

11. CLASSIFYING A BREEDING AREA AS UNOCCUPIED is valuable. Doing so requires two properly-executed, four-hour observation periods at least 30 days apart conducted between mid-February and early May that includes all known nests within the breeding area. (The head of this project gave us flexibility on this and said the 4 hour time frame was not practical for volunteers, so we searched but did not follow the 4 hour search period).

The monitoring form includes the following data that should be collected:

1. OBSERVER(S) NAME(S) and AFFILIATION(S) include contact information if not already submitted:

2. BREEDING AREA NAME and/or NUMBER if known:

3. DATE(S) of the observation(s):

4. METHOD(S) of observing:

5. DURATION of the observation(s):

6. OBSERVATION POINT LOCATION(S) (GPS coordinates or map; include x and y coordinates, datum, and UTM Zone if applicable):

7. NEST LOCATION(S) (GPS coordinates or map; include x and y coordinates, datum, and UTM Zone if applicable):

8. NEST LOCATION ACCURACY (actual coordinates at the nest, or estimated from the air or an observation point?):

9. NUMBER OF NESTS at each location (usually 1 unless 2 or more nests are tightly clumped and represented by one location):

10. NEST SUBSTRATE(S) (cliff, tree, manmade structure, ground, etc.):

11. NUMBER & BEHAVIOR OF ADULT and SUBADULT GOLDEN EAGLES by date:

12. NUMBER, AGE* & BEHAVIOR OF NESTLING GOLDEN EAGLES by date:

    *Simple guide to AGE OF NESTLING(S):
    0-7 days (0-1 week) Short grayish-white down.
    8-14 d (1-2 w) Long, wooly, white down developing.
    15-21 d (2-3 w) Long, wooly, white down nearly complete.

22-28 d (3-4 w) Pin feathers begin to show as dark spots on edges of wings and tail.
29-35 d (4-5 w) Body evenly mottled dark and white; head and neck white.
36-42 d (5-6 w) Body nearly feathered (dark) except for head and legs.
43-49 d (6-7 w) Body nearly feathered and head partly feathered.
50-56 d (7-8 w) Feathers nearly complete; tufts of down on head.
57-63 d (8-9 w) Feathers complete; "golden" hackles and white at base of tail.
64+ d (9+ w) Feathered and ready to fledge or fledged.

13. OTHER RELEVANT NOTES (For example: access information, human activity, other eagles (bald or golden), other species interacting with golden eagles, weather or lighting affecting the observation, etc.):

14. VOLUNTEER HOURS & MILES (for each observer and each observation):

15. OTHER OBSERVATIONS OR COMMENTS:

Results

In 2019, we searched/monitored the Logan Valley breeding territory only once (5-23-19) for a total of 7 minutes. We did not see any evidence that Golden Eagles were breeding in the area. We searched/monitored the Jonesboro breeding territory 1 time on 4-11-18 with no evidence of eagles. We did notice a pair of Golden eagles soaring over the Jonesboro cliff on the 1-24-19 and we saw 1 flying a few miles to the north on 6-10-19. We did not see any evidence that Golden Eagles were breeding in the area this year. We searched/monitored the Pole Creek breeding territory 3 times (4-11-19, 6-11-19, and 6-27-19). On the second visit, we noticed two adults with one carrying a snake. However, based on time constraints, we could not determine whether eagles were nesting at this location. We searched/monitored the Fenwick Canyon breeding territory only once (5-8-19). We did not see any evidence that Golden Eagles were breeding in the area. We visited Big Swamp Creek after BPT staff noticed a possible nest in the fall of 2018. We searched the area on 4-23-19, and we confirmed the presence of an apparent nest (Figure 4.7.1). On the way down from a lek survey, BPT staff saw a Golden Eagle on Shumway road on 4-11-19. We were unable to locate a nest. Finally, Tim's Peak was monitored twice in 2019 (4-23-19 and 6-10-19). At Tim's Peak, it was uncertain whether there was an eagle nest present without additional signs. However, whitewash was noticed on large rock face west of Tim's Peak but it is uncertain whether it was an old eagle nest or possibly an old Common Raven nest (Figure 4.7.2). While we did not see an eagle in the immediate vicinity, we did see an adult Golden Eagle approximately 1.4 miles from Tim's Peak, while visiting Hunter's Creek. We will continue to monitor these territories in 2020.

Figure 4.7.1. Possible nest was found at Big Swamp Creek.

Figure 4.7.2. Photo of a possible nesting location on a ridge west of Tim's Peak.

Discussion

All the data collected will be helpful for the Golden Eagle nest monitoring project in the coming years. The finding of a Golden Eagle nest at Big Swamp Creek is useful in documenting nesting activity in these territories. The documentation of adult eagles at the Pole Creek territory is helpful, but they did not appear to be using the same nest as 2018. It is possible they nested within the territory at a different nest site, and we will put in more of an effort to locate the nest in this breeding territory in 2020. Despite not finding any concrete evidence of nesting at Shumway and Tim's Peak, we will continue to monitor these breeding territories in 2020.

Winter Raptor Surveys

In 2019, staff was asked to take on a route for the winter raptor survey by the project coordinator.

The following provides a brief introduction, of the winter raptor survey:

"In an effort to get a better understanding of the biology of wintering birds of prey in Oregon, the southern portions of Washington, the California portion of the Klamath Basin, and in Idaho, the East Cascades Audubon Society located in Bend, OR sponsors an extensive survey project designed to reveal population levels and densities for the species that choose to winter in the project area. Volunteers in this citizen science project conduct surveys during November through March on established route transects under the guidance of a Project Coordinator who assists with volunteers needs as well as receives all data collected on the surveys which is then displayed in various project charts and graphs."

Methods

Staff agreed to survey the Double OO route that runs south and west of Burns; it is approximately 102 miles long (Fig 4.8.1).

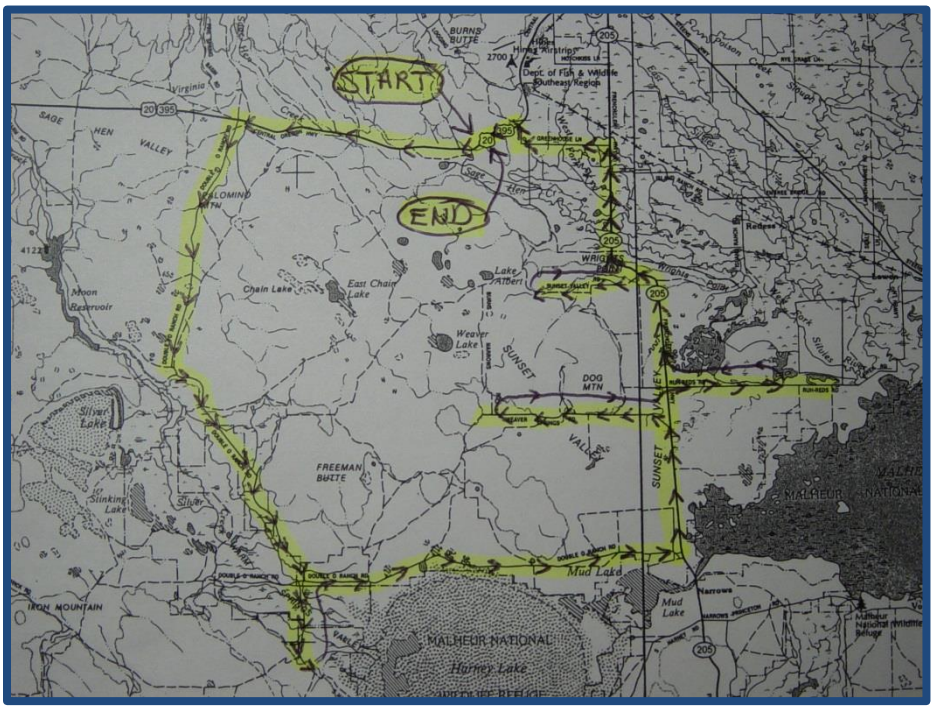

Figure 4.8.1. Double OO winter raptor survey route located south and west of Burns, OR.

Survey methods

1. Routes will be surveyed once a month during the months of December, January, and February. Additional survey options decided on by each volunteer include surveys conducted during November and March and doing more than one survey in a given month. All survey dates will be determined by each volunteer based on their own life schedules.

2. Surveys should be conducted during favorable weather conditions to get the most return for the effort expended. Excessive wind, fog, and precipitation will force birds to shelter and thus make them less visible to see. If a volunteer's life schedule dictates conducting a survey during inclement weather, it will be better to have the survey completed versus having no data for that given month.

3. Volunteers are encouraged to make stops along the route path in order to scan favorable habitat for birds. These stops will be at the discretion of the volunteer, most routes do not have planned stopping points built into the route path.

4. Volunteers should drive slow enough to be able to properly scan all available habitat that they can see that might hold birds. This includes viewing power poles, fence posts, trees, water wheel lines, trees, and any other structure that a bird can perch on. In addition, the skies should be scanned for soaring birds and the ground should be scanned for perching/feeding birds.

5. Suggested driving speeds range up to 30-35 mph to insure viewing coverage. Driving SAFETY will dictate if these slower speeds are safe to do. Volunteers should not compromise their or anyone else's safety on the roads. ECAS will not be held responsible for any accidents resulting from unsafe driving by volunteers. When in doubt, do not drive in an unsafe manner. Volunteers should also make sure that when stopped to view birds, they are parked in a safe and legal manner so as not to disrupt traffic flow around them and compromise their individual safety.

6. All birds observed along the route path should be counted. Every attempt should be made to determine species of the bird viewed. If that is not possible, an attempt should be made to determine the type of bird it is, i.e., falcon, eagle, buteo, owl, accipiter, etc. and reported as UNID falcon, etc. If that is not possible, birds can then be classified as unidentified raptors.

7. Birds viewed at some distance may have the possibility of being counted from another part of the survey route depending on the design of the route path. Volunteers should be aware of possible double counting in these circumstances. If there is concern about the possibility of double counting a bird, it will be best to be conservative and not count the bird.

8. Some routes will have circumstances where it will be necessary to back track over previously surveyed roads. In these instances, any NEW birds viewed on the second pass can be added to the survey.

9. Age and sex information of birds counted is not necessary with the exception of aging Bald Eagles. For them, the only age differentiation that we would like to have would be if the bird is a white headed/tailed adult bird (A) or a dark subadult bird (S). Age differentiation for the first four years of a Bald Eagles life, when they do NOT have a white head or tail, is not necessary.

Each route will have their own specific data collection form to be used during surveys. These forms display a sequential list of roads that are driven for each route as well as a suggested list of the more common species that will be seen in the area. Four letter codes are used to denote different species that have been found in this project. Following are codes to be used on the data forms:

The data collection forms are to be completed as follows:

1. Each time a bird is located, it should be entered on the appropriate road line and in the appropriate species column on the form.

2. Each form will have a few columns designated for family groupings of birds, ie, falcons, accipiters, owls. To keep the data form to a manageable size in the field, these family grouping columns are included for the less apt to be seen species. When one of these species is encountered, the bird should be entered into the appropriate family column on the appropriate road line using one of the above listed codes to indicate what species was seen.

3. Because owls are the least likely birds to be seen on any given survey, the owl column can be used to record other species found.

4. In addition to bird data, the top of the form displays other data that must be entered as well. These include the DATE that the survey was completed, the amount of TIME that the survey took to complete (minutes recorded in 5 minute increments), and the MILES that were driven to conduct the survey (recorded down to tenths of a mile). Miles driven to get to the start of the route from home and to get from the end of the route back to home should NOT be included.

5. Additional voluntary information that could be included on the form would be weather conditions, other species of interest seen on the survey, non-route miles, or anything of note that you thought would be of interest to record. All of this information can be added to the bottom of the form below the TOTALS line.

6. When the survey is completed, the TOTALS line needs to be filled out accurately.

7. Completed forms need to be submitted to the Project Coordinator as soon after each survey as possible. The reason for timely submission is because at the end of each month a summary chart is prepared that will include all the data collected for all of the routes surveyed. This summary chart is then sent to all of the project volunteers as soon as possible to keep everyone informed as to what is being seen and where in as close to real time as possible. Preparation of this summary chart is much quicker if the data is submitted throughout the month rather than waiting until the end when I would have to deal with data from close to 200 routes.

Although we are not required to count corvids, we made the decision to count Common Ravens (*Corvus corax*) due to their importance to sage-grouse and potential population management in the future.

Results

Three days of survey routes were run in the winter of 2019–2020. The December survey was conducted on the 26th with temperatures in the upper 20's, light wind and cloud cover starting at approximately 95% but switching to 45% as the day progressed. A Short-eared Owl (*Asio flammeus*) was the highlight of the day. The January survey was conducted on the 10th with temperatures at approximately 21º F, little to no wind, and cloud cover about 95%. We tallied a total of 23 Rough-legged Hawks (*Buteo lagopus*). The February survey was conducted on the 21st with temperatures ranging from approximately 20–43º F, 1–6 mph wind, and cloud cover around 95%. Four Ferruginous Hawks (*Buteo regalis*) and 25 eagles were the highlights (Table 4.8.1, Figure 4.8.2)

Table 4.8.1. Winter raptor road survey results for the Double OO route in the winter of 2019–2020. Un-identified (UNID) birds were not seen well enough to accurately identify the species but were put in the most precise grouping.

Group	Buteos				Falcons		Eagles					
Species	Red-tailed Hawk	Rough-legged Hawk	Ferruginous Hawk	UNID Buteo	American Kestrel	Prairie Falcon	Bald Eagle	Golden Eagle	Northern Harrier	Short-eared Owl	UNID Raptor	Common Raven
12-26-19	24	16	0	3	1	2	13	7	0	1	1	56
1-10-20	23	23	0	1	2	0	4	9	0	0	1	77
2-21-20	20	11	4	2	1	2	15	10	3	0	1	157

Figure 4.8.2. Golden Eagle, Bald Eagle, Rough-legged Hawk and Short-Eared Owl observed during winter raptor surveys.

Discussion

Data collected during these surveys will provide data from an area with an abundance of wintering raptors and will be included in a large-scale data set. The high numbers of Common Ravens in each count is of interest, as ODFW is currently discussing the possibility of lethal and non-lethal raven control.

Administration

Cultural Resources

Federally funded projects require an environmental review of all ground disturbing activities before project implementation can begin. This often entails a cultural resources survey

with Tribal and State Historic Preservation Office (SHPO) consultation. Parts of the Logan Valley Wildlife Mitigation Site has been surveyed for significant cultural resources since its acquisition, however, each year there are new projects that require additional surveys or have never been surveyed before.

Outreach and Education

In 2019, the BPT Natural Resources Department participated in several outreach and education activities (Figure 5.3.1.). In January, Wildlife staff helped Tu-Wa-kii Nobi make their own snowshoes and hosted a snowshoe relay race. In April, we partnered with Portland Audubon staff, and took tribal youth to the Malheur Wildlife Refuge to view owls, a Bald Eagle (*Hailaeetus luecocephalus*) nest, and a Golden Eagle nest. We got excellent looks at nestling Golden Eagles and watched a Prairie Falcon (*Falco mexicanus*) dive bomb the parent. Other activities and field trips with Tu-Wa-Kii Nobi youth included: visiting Malheur cave in March, banding kestrels in June & July, fishing at Fish Lake in August and the Trout Farm in September, and Creatures of the Night II in October. Creatures of the Night II celebrated our nocturnal friends and included dissecting owl pellets, making bat rockets, and playing Bats vs. Moths (a game that highlights bat's use of echolocation). We ended 2019 with a short practice of bird identification with our own BPT CBC 4 Kids (Christmas Bird Count). We highlight many of these activities in Figure 5.3.1.

Figure 5.2.1. Highlights from 2019 with Tu-Wa-Kii Nobi. Snow-shoe relay, bat rockets, visit to Malheur Cave, and Christmas Bird Count for Kids.

Using an Oregon Chapter of the Wildlife Society Grant, we took 8 tribal youth, 3 grandparents, and 1 parent to the High Desert Museum and the Pine Mountain Observatory in June. We explored the Museum for about an hour, before sitting down to watch the Desert Dwellers show. During the show we got up close and personal with 3 of the High Desert's native mammals, the striped skunk (*Mephitis mephitis*), badger (*Taxidea taxus*), and porcupine (*Erethizon dorsatum*). We got to learn about the biology of these three species, and we also got to see them show off some of their skills, such as the digging prowess of the badger and the tree

climbing ability of the porcupine. After the Desert Dwellers show we took an hour-long private tour with High Desert Museum Staff, Erica and Kelsey. During the Private Tour we focused on the Natural History exhibits of the Museum. We got to see and learn about birds of prey, reptiles, amphibians, and river otters. The Museum Staff even brought along educational materials that weren't part of the exhibit. We got to hold porcupine quills, snake skins, and a model eyeball to show how big our eyes would be if we had Great-horned Owl eyes. We also got eye to eye with a Western rattlesnake, an activity I don't recommend outside of the museum. We saw Gila monsters, turtles, Desert tortoises, kingsnakes, leopard frogs, Bald Eagles, Golden Eagles, and a feeding Burrowing Owl (Figure 5.2.2).

Around sundown we headed up to meet Alton, the Operations Manager at the Pine Mountain Observatory. Alton told us the history of both the Observatory and some of the telescopes on site. As the night sky darkened, we got our first looks through the telescopes. The first stop was Jupiter and we could see 4 of Jupiter's moons as well as the equatorial belts. Next stop was Saturn, and it was incredible! Saturn was the highlight for most of the group, and it certainly was for me. I still cannot believe how visible Saturn's rings were, they did not look real. We checked out the Wild Duck Cluster, a constellation that supposedly resembles a flock of flying ducks. While I'm skeptical of this resemblance, it was an impressive constellation, nonetheless. We also viewed a globular cluster, which was 200,000 stars all in a tight cluster. The next stop was the moon. While an almost full moon, hindered our views of other things throughout the night it may have been worth it for the views it provided. We viewed some of the "seas" on the moon including the Sea of Tranquility (Figure 5.2.3).

Figure 5.2.2. Highlights from the High Desert Museum. Photos by Teresa Wicks.

Figure 5.2.3. Some highlights from the Pine Mountain Observatory. Photos by Teresa Wicks.

BPT wildlife staff also took part and in other tribal events such as the annual carnival, Trunk or Treat, and Culture Camp, as well as the release of salmon into the Malheur River by the Fisheries Department. At Culture Camp the Fisheries Program showed the kids how to sample invertebrates and the Wildlife Program banded kestrels with youth.

In addition to working with Tu-Wa-Kii Nobi, staff worked with other youth. In January, Carter gave a presentation on American Kestrels to Crane Middle and High School and then helped them set up two nest boxes for them to monitor. He returned in June to band nestlings with a few students. Carter also banded nestlings with young adults working through ONDA's Tribal Stewards Project. Calla assisted the Agricultural Research Station with the Fair in the Field Event and Range Camp.

The Wildlife Staff also hosted a non-lead hunting demonstration with the Oregon Zoo's Non-Lead Hunting Education coordinator. The demonstration was held at the local gun range. Staff also attended and represented the tribe at local collaboratives and meetings such as the Harney County Restoration Collaborative, Harney Basin Wetlands Initiative, Harney County Wildland Fire Collaborative, Vale Local Implementation Team meetings (sage-grouse), Tribal Council and all staff meetings. Tribal staff also attended a field-based science workshop hosted by Greater Oregon STEM. At this workshop, we learned methods to more efficiently work with youth on educational activities. Wildlife staff also attended the Oregon Wildlife Society Conference and the SageCon Summit.

In 2019, BPT staff partnered with multiple agencies and entities in their work at LVWMS and eastern Oregon. We collected kestrel nest box data for inclusion in the American Kestrel Partnership's monitoring program, Golden eagle nest monitoring data for inclusion in the Oregon Eagle Foundation, Inc. statewide monitoring effort, and winter raptor survey data for inclusion in the East Cascades Audubon Society winter raptor monitoring efforts. The Wildlife Program Manager also continued the role as Oregon State Coordinator for The American Kestrel Partnership, to help streamline nest box data collection in the state and recruit interested partners. We hosted the Tribal Stewards for a week at LVWMS, where they helped with small mammal trapping, picking up vexar from old plantings, and surveying with the Fisheries crew. Wildlife staff also assisted the Crane Middle and High School and Portland Audubon/Malheur National Wildlife Refuge in deploying kestrel nest boxes.

BPT Wildlife Program continued their data sharing agreement with Oregon State University in order to receive assistance with sage grouse trapping, data collection, and analysis. This agreement will benefit both parties with a larger and more comprehensive dataset on sage-grouse movement and habitat use.

Access

No access permits were requested or issued in 2019 for the Logan Valley Wildlife Mitigation Site.

Project Income

The Project's MOA requires the reporting of all project generated income and the expenditures covered by the income. A summary of all activities is included (Table 5.4.1).

Table 5.4.1. Accounting of project generate income for LVMWS in 2019.

2019 Beginning Balance		**$136,422.69**
Lake Creek CREP Payment	$25,592.00	$162,014.69
NRCS CSP Payment	$14,965.00	$176,979.69
NRCS Forest Practice Payment	$1,500.00	$178,479.69
Hay Payments	$100.00	$178,579.69
ORTWS Grant	$850.00	$179,429.69
ODFW payment	$1,114.96	$180,544.65
Grazing	$6,035.00	$186,579.65
Equipment Disposal	$1,629.70	$188,209.35
F&W Supplies	($70.13)	$188,139.22
Property Insurance	($929.63)	$187,209.59
Miscellaneous Expenses	($162.79)	$187,046.80
Vehicle Operating Expense	($68.40)	$186,978.40
Property Taxes	($3,065.40)	$183,913.00
Subcontracts	($3,100.69)	$180,812.31
Indirect Expenses	($245.24)	$180,567.07
2019 Ending Balance		**$180,567.07**

Staff

The Projects success can be attributed to the following staff members:

Calla Hagle – Natural Resource Director
Carter Crouch – Wildlife Program Manager
Brandon Palmer – Wildlife Biologist
Lucas Samor – MRWMS Site Manager
Eric Hawley – LVWMS Lead Technician
Gabe First-Raised – Fish and Wildlife Technician
Brandon Haslick – Fisheries Program Manager
Rebecca Fritz – Fisheries Biologist

Appendix A. Photos from grazing points on LVWMS in 2019.

Burns Paiute Tribe
PLT02—Monitor Grazing
Logan Valley
Pre-grazing photos (10-17-18)
Post (9-24-19)
Date Cattle IN: 6-1-19
Date Cattle OUT: 10-30-19*

Pre-grazing **Post-grazing**
Photo Point: PT1 (Pasture) (North-facing)
UTM: 11T 0369083 4890542
Key Species: Meadow foxtail

Photo Point: PT1 (Pasture) Ground Photo

Appendix A. Photos from grazing points on LVWMS in 2019.

Photo Point: PT1 (Pasture) West Photo

Photo Point: PT1 (Pasture) South Photo

Photo Point: PT1 (Pasture) East Photo

Appendix A. Photos from grazing points on LVWMS in 2019.

Pre-grazing **Post-grazing**

Photo Point: PT2 (Pasture) (North-facing)
UTM: 11T 0367704 4892167
Key Species: Meadow foxtail


Photo Point: PT2 (Pasture) Ground Photo

Photo Point: PT2 (Pasture) West Photo


Appendix A. Photos from grazing points on LVWMS in 2019.

Photo Point: PT2 (Pasture) South Photo

Photo Point: PT2 (Pasture) East Photo

Appendix A. Photos from grazing points on LVWMS in 2019.

Pre-grazing **Post-grazing**

Photo Point: RT1 (Rangeland) (North-facing)
UTM: 11T 0369605 4889227
Key Species: Sandberg bluegrass

Photo Point: RT1 (Rangeland) Ground Photo

Photo Point: RT1 (Rangeland) West Photo

Appendix A. Photos from grazing points on LVWMS in 2019.

Photo Point: RT1 (Rangeland) South Photo

Photo Point: RT1 (Rangeland) East Photo

Appendix A. Photos from grazing points on LVWMS in 2019.

Pre-grazing **Post-grazing**

Photo Point: RT2 (Rangeland) (North-facing)
UTM: 11T 0370615 4892745
Key Species: Meadow foxtail
Photo Point: RT2 (Rangeland)


Photo Point: RT2 (Rangeland) Ground Photo


Photo Point: RT2 (Rangeland) West Photo


Appendix A. Photos from grazing points on LVWMS in 2019.

Photo Point: RT2 (Rangeland) South Photo

Photo Point: RT2 (Rangeland) East Photo

Appendix B. Photo points at LVWMS comparing 2007 to 2019 riparian vegetation and stream bank condition.

BC1: Upstream 2007

BC1: Upstream 2019

BC1: Downstream 2007

BC1: Downstream 2019

BC2: Upstream 2007

BC2: Upstream 2019

Appendix B. Photo points at LVWMS comparing 2007 to 2019 riparian vegetation and stream bank condition.

BC2: Downstream 2007

BC2: Downstream 2019

BC3: Upstream 2007

BC3: Upstream 2019

BC3: Downstream 2007

BC3: Downstream 2019

Appendix B. Photo points at LVWMS comparing 2007 to 2019 riparian vegetation and stream bank condition.

BC4: Upstream 2007

BC4: Upstream 2019

BC4: Downstream 2007

BC4: Downstream 2019

BC5: Upstream 2007

BC5: Upstream 2019

Appendix B. Photo points at LVWMS comparing 2007 to 2019 riparian vegetation and stream bank condition.

BC5: Downstream 2007

BC5: Downstream 2019

LC1: Upstream 2007

LC1: Upstream 2019

LC1: Downstream 2007

LC1: Downstream 2019

Appendix B. Photo points at LVWMS comparing 2007 to 2019 riparian vegetation and stream bank condition.

LC2: Upstream 2007

LC2: Upstream 2019

LC2: Downstream 2007

LC2: Downstream 2019

LC3: Upstream 2007

LC3: Upstream 2019

Appendix B. Photo points at LVWMS comparing 2007 to 2019 riparian vegetation and stream bank condition.

LC3: Downstream 2007

LC3: Downstream 2019

LC4: Upstream 2007

LC4: Upstream 2019

LC4: Downstream 2007

LC4: Downstream 2019

Appendix B. Photo points at LVWMS comparing 2007 to 2019 riparian vegetation and stream bank condition.

LC5: Upstream 2007

LC5: Upstream 2019

LC5: Downstream 2007

LC5: Downstream 2019

LC6: Upstream 2007

LC6: Upstream 2019

Appendix B. Photo points at LVWMS comparing 2007 to 2019 riparian vegetation and stream bank condition.

LC6: Downstream 2007

LC6: Downstream 2019

MR1: Upstream 2007

MR1: Upstream 2019

MR1: Downstream 2007

MR1: Downstream 2019

Appendix B. Photo points at LVWMS comparing 2007 to 2019 riparian vegetation and stream bank condition.

McC1: Upstream 2007

McC1: Upstream 2019

McC1: Downstream 2007

McC1: Downstream 2019

McC2: Upstream 2007

McC2: Upstream 2019

Appendix B. Photo points at LVWMS comparing 2007 to 2019 riparian vegetation and stream bank condition.

McC2: Downstream 2007

McC2: Downstream 2019