Environment and Climate Change Canada
Canada Nature Fund: Community-Nominated Priority Places for Species at Risk

Kootenay Connect: Columbia Wetlands

Restoration of Habitats and Species at Risk in the Columbia Valley

Year 5 (2023-2024)

Environment and Climate Change Canada
Environnement et Changement climatique Canada

KCP
Kootenay Conservation Program

KOOTENAY CONNECT

The Columbia Wetlands
Stewardship Partners

Executive Summary

In the fifth year (2023-24) of working on the Kootenay Connect initiative, the Columbia Wetlands Stewardship Partners (CWSP) was contracted to operate the continuation of Years 1-4 (2020-23) of species at risk conservation and inventory work in the Columbia Wetlands. This project was comprised of three main components designed by Goldeneye Ecological Services to: 1) improve Western Painted Turtle (WPT) habitat based on Years 2 and 3 inventories and Year 4 enhancements; 2) continue Years 2-4 monitoring effort for Osprey; and 3) expand Year 4's inventory of American Badger burrows and habitat to inform applications for Badger Wildlife Habitat Features (WHFs) and Wildlife Habitat Areas (WHAs) in regions identified as federally designated critical habitat. Wildlife Habitat Feature and/or WHA submissions were made for American Badger, Mountain Goat mineral licks, and follow-up was done for alkali-saltgrass ecological community WHAs made previously.

Volunteers were coordinated to assist with WPT nesting bed enhancements. Landowners monitored WPT enhancements on two parcels of private land where CWSP enhancements were made. To help prevent road and predation mortality in Spillimacheen, several modifications were made to improve a WPT nesting bed and fence enclosure that was created in 2022 and monitored for its effectiveness. Five wildlife monitoring cameras were installed at various enhancement features. Observations included 11 turtles prospecting on the larger nesting bed, and one nest predation at the smaller roadside nesting bed (indicating that bed has been used for nesting). A total of 88 (+1 possible) turtle observations were made from a camera at a traditional and natural nesting area, including 32 turtle road crossings to reach the area. Both nesting beds created to reduce road crossings were used or prospected, but high nest site fidelity by WPT was driving the majority of turtles to continue to cross the road to nest and many nests were predated. To prevent future road and predation mortality, it is recommended that a larger fenced WPT nesting bed be created ahead of where turtles are crossing the road to the traditionally used nesting area. Vegetation management should continue, as well as effectiveness monitoring using wildlife cameras.

The Osprey project collected baseline data on a bioindicator species of ecosystem health. Seventy-six Osprey nests were identified in 2023, eight of those were tree nests and the remaining 68 were on nest platforms affixed to the top of large wooden poles (often BC Hydro poles), but sometimes poles are installed by private landowners. Forty-six of 76 nests were occupied with incubating adult Osprey during the first round of nest checks. Thirty nests had chicks present during the final visit in August and were deemed successful. A five-year baseline dataset is now available for Osprey in the Columbia Valley, providing reliable numbers for breeding Osprey in the study area. Breeding population numbers were not available for Osprey in the Columbia Valley prior to this work, nor was any information on the success of their nests. The continuation of annual monitoring is recommended since they are an indicator species; they respond quickly to negative environmental change.

Inventories for American Badger burrows continued to establish new badger WHFs and WHAs in areas identified as critical badger habitat. There were 614 central burrow point locations (representing 2,164 individual burrows) submitted for WHFs in the Columbia Valley from 2022 and 2023 inventory work. 510 of those 614 locations submitted were uploaded by the government to the provincial WSI Survey Observations layer in March 2024. Those 510 WHF locations represent the central points within clusters of burrows (up to 45 burrows per point). Boundaries for WHAs designated for American Badgers were

based upon burrow locations, buffers around those points and soil classification polygons. Eight badger WHAs with a combined size of 164.1 hectares have been submitted to the provincial government.

Additional work was done regarding WHAs and WHFs, including pursuing the three WHAs submitted in 2021 for at-risk alkali-saltgrass ecological communities. The boundaries for those three WHAs are now officially recognized in the provincial database as 'proposed WHAs', at 233.7 hectares combined. Two Mountain Goat mineral lick WHF submissions made in 2020 are designated as WHFs at 736 hectares. A third goat mineral lick was surveyed in 2023 with subsequent WHF application made in 2024 at 246.6 hectares. In total, 1279.5 hectares of land within the study area has been approved or in progress for WHA or WHF status, due to this ongoing project.

Suggested Citation:

Darvill, R. 2024. Kootenay Connect. Columbia Wetlands: Restoration of habitats and species at risk in the Columbia Valley. March 31, 2024 - Year 5. Final Report - Species at Risk. Report for the Columbia Wetlands Stewardship Partners and Kootenay Connect.

Prepared by:

Rachel Darvill, BSc., MSc., RPBio
Goldeneye Ecological Services
racheldarvill@gmail.com

Cover photo: Western Painted Turtle hatchlings in a pond near Invermere; credit John Zehnder.

Table of Contents

Table of Figures

List of Tables

1.0 Introduction

Since 2019, the Kootenay Conservation Program has been coordinating Kootenay Connect, a multi-year initiative that focuses on conservation actions benefiting species at risk in priority locations (Proctor & Mahr, 2019). The Columbia Wetlands is a priority region for Kootenay Connect, and the Columbia Wetlands Stewardship Partners (CWSP) is a key partner group working in this area. The CWSP was formed in 2006 and is active with conservation and stewardship activities in the Columbia Valley. Composed of more than 30 diverse groups of community interests, Indigenous groups and government agencies, the CWSP develops and implements effective stewardship practices for the Columbia Wetlands and the Upper Columbia River. The CWSP works to engage the general public and works with all levels of governments to implement a shared stewardship model for the management of the Columbia river and wetlands.

Four years of previous CWSP work on species-at-risk for Kootenay Connect is presented in annual reports from the preceding four years (Darvill, 2020a; Darvill, 2021; Darvill, 2022; Darvill, 2023), with accompanying videos available on the KC website. Additional work has also been completed in the Columbia Wetlands for Kootenay Connect including: Durand, 2020; Gustafson & Higgins, 2023; Lausen, Gates, Low & Rae, 2023. This report describes conservation actions accomplished in Year 5 (2023-2024) of the species-at-risk component of the CWSP Kootenay Connect project, which included species inventorying, installation of enhancement structures, Wildlife Habitat Area (WHA) and Wildlife Habitat Feature (WHF) applications and progress made towards applications submitted in previous years (Darvill, 2021; Darvill, 2022, Darvill, 2023).

2.0 Study Area

The Columbia Valley (UTM: 535767; 5649168) is situated in the Rocky Mountain Trench in southeastern British Columbia, Canada (Figure 1). It comprises a vast mosaic of habitat types including riparian areas and wetlands, grasslands, montane, subalpine, and freshwater rivers and lakes. At nearly 55,000 hectares it provides habitat for a vast number of species including at least 65 species at risk (SAR) and 21 ecological communities at risk as documented in a 2020 literature review (Darvill, 2020a). After an application made by Wildsight in 2004, the Columbia Wetlands (large contiguous wetland ecosystem in the valley bottom) were identified as a Ramsar site under the Ramsar Convention in 2005. Ramsar status recognizes this ecosystem as a wetland of international significance.

Approximately two-thirds of the study area is within the Regional District of East Kootenay (RDEK) Areas F and G, the other one-third is located within the Columbia Shuswap Regional District (CSRD) Area A. A number of communities are located in the study area including Fairmont, Invermere, Radium, Edgewater, Brisco, Spillimacheen, Parson, Nicholson and Golden. The author acknowledges that our work in Columbia Valley is within the unceded traditional territory of the Ktunaxa Nation (including ?Aqam and Akisqnuk bands), Secwépemc Nation (including the Shuswap Band), and is the current home of the Metis Nation Columbia River.

Figure 1. The study area depicted in the Columbia Valley within British Columbia, Canada.

3.0 Western Painted Turtle

3.1 Introduction

The Western Painted Turtle – Intermountain – Rocky Mountain population (*Chrysemys picta* pop. 2) (hereafter referred to as WPT) is blue-listed in the province of British Columbia (B.C.). It is listed as a 'species of special concern' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and under the federal Species at Risk Act (SARA). It is the only native freshwater turtle found in B.C. Reasons for the WPT population decline are attributed to the "continuing loss of habitat, fragmentation of habitats and road mortality" (B.C. Ministry of Environment, 2017).

The Intermountain – Rocky Mountain population is estimated to have somewhere between 5,000 to 10,000 adults, but no accurate population estimate exists (COSEWIC, 2016). The WPT population in the Columbia Valley is peripheral, or on the edge of its habitat range; it may contain unique genetic material that could be important for the long-term survival and evolution of the species (Fraser, 1999). Species at the edge of their habitat range are particularly susceptible to disturbances that may cause mortality. To assist with recovery efforts, CWSP has been working to identify important nesting and basking sites for WPT in the Columbia Valley, as well as any threats to those sites. WPT conservation initiatives have taken place in the Columbia valley annually since 2020 (Darvill, 2020a; Darvill, 2021; Darvill, 2022; Darvill, 2023). This report will detail conservation actions that took place for WPT in the Columbia Valley in 2023.

3.2 Nesting Bed Enhancement

3.2.1 Volunteer coordination

Nest cages can be used to cover and protect a turtle nest from predation (Figure 2). One-way escape doors are an innovative idea to try and resolve the problem of turtles getting stuck on the wrong side of fences installed around nesting beds to keep predators out (Figure 3). In order to attract volunteers to assist with building nest cages and one-way escape doors, a poster was created and distributed through social media (Appendix 1). One volunteer built eight one-way escape doors and another volunteer built ten nest cages. Designs and dimensions were modified off what other projects had done; dimensions used for our WPT project can be found in Figures 2 and 3. Nest cages were provided to landowners and three one-way gates were installed in Spillimacheen (see Sections 3.2.3 and 3.2.4.4). We also coordinated three community volunteers, three CWSP contractors, and four members from the Lake Windermere District Rod and Gun Club to help with turtle nesting bed enhancement activities in Spillimacheen (Figure 7).

3.2.2 Zehnder Farm (Invermere)

The WPT project at Zehnder Farm began in 2021 (Darvill, 2022). A fence was erected around the main WPT nesting area with the goal of keeping predators from digging up nests, something that had been occurring for many years. The landowner made regular observations at this site during the 2022 field season, including nest laying inside the enclosure and the first recorded small turtles were seen in many years, indicating successful hatchlings from inside the enclosure from the 2021 breeding season (Darvill, 2023).

In 2023, additional substrate was brought to the nesting bed, but it was unable to be spread due to a lack of time capacity by the landowner and logistical constraints. That substrate will be spread late May 2024 by CWSP contractors and landowners. In June 2023, the landowner observed six WPT hatchlings in a small

pond near the enhanced nesting feature (Figure 5). This was the second year in a row where small turtles had been observed by the landowner (they had not been seen in about a decade). This indicates that nests had hatched within the enclosure. Additional landowner observations include: On June 2, 2023 a nest outside of the fenced-in nesting area was quickly predated after being laid. Successful nest emergence hole was observed at two nests inside the enclosure on May 8, 2023 and May 23, 2023 (Figure 6). There was also vegetation removal at the nesting area, which should continue ahead of each nesting season since roots can grow through turtle eggs, killing hatchlings or preventing their emergence.

Figure 2. Dimensions and design used for WPT nest covers.

Figure 3. Dimensions and design for one-way escape doors.

Figure 4. Viable turtle hatchlings from the Zehnder Farm nest bed enhancements.

Figure 5. Evidence of successful hatchling emergence from a WPT nest inside the fenced-in nesting area.

Figure 6. The field crew that worked on the Western Painted Turtle enhancement project in Spillimacheen in 2023.

3.2.3 Stewart's Farm (Spillimacheen) - Actions and Results

In 2020, CWSP solicited and collected volunteer observations of where people saw turtles in the Columbia Valley, many of those sightings were field verified to determine important nesting locations for WPT (Darvill, 2021). One of the identified nesting hotspot locations was Westside Road, the portion that bisects the Columbia Wetlands in Spillimacheen. In 2022 and 2023, a number of habitat enhancements were made in Spillimacheen for turtles (Darvill, 2022; Darvill, 2023). Most of those occurred on private land at Stewart's Farm and included actions such as nesting bed creation, installed fencing around nesting bed to dissuade predators, installing one-way escape doors to help prevent turtles from getting stuck on the wrong side of the fence when trying to get back to water, and effectiveness monitoring at the site (Darvill, 2023).

In 2023, we built upon work done in the preceding years. Through effectiveness monitoring we learned of modifications needed to improve habitat enhancements. The following was completed at the Stewart Farm site in 2023:

a. Realigned a portion of the fencing installed in 2022 so that both ends go towards the water; this helps prevent predation by skunks since they have an aversion to water (Greg Ross, personal communication, 2022). This method has been successful at the Elizabeth Lake WPT project in Cranbrook. The water levels were low in the Columbia Valley in 2023 and the north end of the fence was often not submerged in water.

b. To prevent road mortality 'Slow Down Turtle Crossing' signs were created, printed on sandwich boards, and placed at both ends of the nesting area, as well as on two other roads (Brisco Crossing, Forester's Landing Road) that bisect the Columbia Wetlands and where nesting turtles have been observed crossing the road (Figure 3a). To avoid sign fatigue, signs were put out seasonally; only during the breeding season when turtles are actively crossing the road (mid-May to mid-July). One sign in Spillimacheen went missing and the signs at Brisco and Radium were retrieved after the breeding season.

c. Turtle nesting mound in field - Substrate installed in 2022 created a solid base and elevated the nesting bed above the high-water mark, but it was not ideal substrate for nesting turtles and needed improvement (Darvill, 2023). The Windermere District Rod and Gun Club trucked/trailered turtle nesting substrate from Invermere and with the help of volunteers, we spread this on top of the WPT nesting site in Spillimacheen on May 2, 2023 (Figure 3b). The bed is 5m x 7m in size, with approximately 30cm of nesting substrate. Camera observations from a portion of this nesting bed are reported on in Section 3.2.4.2.

d. An additional nesting bed was created on May 2, 2023 by adding substrate (3.8m x 3m, 30cm deep) along the south side of the roadside located adjacent to the traditional nesting bed which is on the north side of the road [Ministry of Transportation and Infrastructure (MoTI) provided permission] (Figure 3c). In Spillimacheen, adult females cross the road to reach their traditional nesting area, and they will likely continue to make these risky movements each year unless they select alternate nesting sites. Information learned from wildlife camera observations at this nesting area are found in Section 3.2.4.3.

e. Installed Animex wildlife fencing (black, thick plastic) alongside the metal mesh fence that was put up in 2022. This was in response to observing turtles getting stuck on the wrong side of the fence in 2022 when they were trying to get back to the water. The Animex fence was intended to remove turtles'

sightline of the water (which can make them stall at the fence) and provide turtles with a smooth surface (rather than mesh) to slide along to get back to the water beyond the fence (Figure 3d).

f. Retrofitted two one-way escape doors into the fence in an attempt to prevent turtles from getting stuck on the wrong side of the fence when trying to get back to water after nesting. The doors were open from May-July for WPT movement, then closed to prevent predators from getting into the nesting area.

g. Five wildlife cameras were installed for effectiveness monitoring to determine: 1) whether one-way escape doors get used by turtles and/or predators; 2) WPT use of natural nesting site to help CWSP learn about population numbers using that nesting bed and level of skunk predation: 3) WPT use of the new nesting bed along MOTI Right-of-Way; and 4) WPT use of nesting bed created in 2022.

3a. 

3b. 

3c. 

3d. 

Figure 7. Various enhancement features in Spillimacheen: a) temporary and permanent signage, b) volunteers spreading nesting substrate on created nesting bed in field, c) small nesting bed created at roadside, d) plastic fencing installed alongside mesh fence.

3.2.4 Results and discussion– wildlife cameras

Five wildlife cameras were installed at various enhancement features that were used to help determine the effectiveness of each monitored feature. Two 'Reconyx HyperFire 2' cameras were deployed on May 4, 2023 and photos were taken every minute for 24 hours. They were set up on the traditional nesting bed and the one-way gate/black fencing. Three PlotWatcher Pro cameras were also deployed on May 4, 2023. The Plotwatchers were set up to take photos between the hours of 0530-2330 with 20 second intervals set on one, and 5 second intervals set on the other two. Plotwatchers were placed on the roadside nesting bed, and both the north and south sides of the nesting mound in the field (Figure 9). Cameras were set to go off in intervals rather than motion detection because turtles can be too slow to be detected through motion.

There were some technical issues with cameras and SD cards; there is not a complete dataset for all the cameras for the entire summer. Also, some cameras were not able to cover the entirety of each feature (e.g., historic nesting hotspot) and the 'nesting mound in field' needed two cameras yet the entire nesting area was still not covered with a camera. Despite these issues some insight was provided for the effectiveness of enhancement features, including the number of turtles using each feature, and how many species of various types were observed at each feature (Table 1).

For all camera observations, there may be some overlap counting. For example: (1) if one turtle was present alone in the frame/image, and then a second turtle entered the frame (then labeled turtle x2) - technically one of those turtles may have been counted twice. (2) Or, if a turtle crossed the road from wetland to nesting bank, this would count as one observation. This same turtle could have gone out of view then crossed from the nesting bank back to the wetland, and this would also count as one observation. There is no way to decipher individual turtles from the cameras. (3) A turtle may have come and gone from the water/wetland area more than once if the first nesting attempt was not successful.

3.2.4.1 Traditional Nesting Bed

A camera was situated to be well hidden from public view (to avoid theft) and to monitor much of the roadside bed in front of the traditional nesting area (Figure 9). This camera was functioning from May 24-June 9, August 21-29. Camera images captured only a small portion of the traditional nesting bed. 184 observations were recorded for 24 categories of species; it had the highest amount of wildlife activity compared to other four cameras. There were a total of 88 (+1 possible) observed turtles (Tables 1 and 2). Thirty-two road crossings were caught on camera (Figures 10 and 11), as well as several other behaviours such as nesting, prospecting, and humans present with turtles (Table 2). No predation events were observed by the camera; however, a private landowner made an observation on September 28th that 24 of the turtle nests were either dug up by skunks or had hatchlings emerge (Figure 10). He was unable to differentiate between a predated and hatched nest. The high number of turtles observed shows that this area is a hotspot for turtle nesting and road crossing.

Figure 8. Photos of the WPT enhancement area in Spillimacheen taken in May 2023 during high water.

Figure 9. Hole in the traditional or 'historic nesting bed' indicating nest predation observed September 28, 2023.

Table 1. Number and species type recorded on wildlife cameras at the various enhancement features.

Species	Traditional Nesting Bed	Roadside Nesting Bed	North Field Nesting Bed	South Field Nesting Bed	One-way Escape Door/plastic fence
Coyote	7	1			2
Crow	17				
Deer	3	1			
Dog	11	1			1
Dog and Human	2				
Dogs	12				
Domestic Sheep	1				
Domestic Sheep (Herd)	9				
Ground Squirrel	6				
Ground Squirrels	3				
Human	12	8	2	1	1
Human/Dog	2				
Humans	15	4			
Mallard	1				
Rodent		25	8		47
Small Mammal					1
Snake	1		21		3
Snakes			1		
Squirrel	1				
Turtle	71	5	7	6	10
Turtle (x2)	7				
Turtle?	1				
Turtle/Humans	2				
Unknown		8	15		25
Total	**184**	**53**	**54**	**7**	**90**

Table 2. Camera observations of turtles and their behaviours at the Traditional Nesting Bed and road crossing.

Species	Interaction	Laid Nest, Road Crossing	Nesting	Nesting/Interaction	Nesting/Road Crossing	Prospecting	Prospecting/Nesting	Prospecting/Possible Nesting	Prospecting/Road Crossing	Road Crossing	Road Crossing (Attempt)	Road Crossing and Prospecting	Road Crossing/Nesting	Road Crossing/Prospecting	Transiting	Transiting/Prospecting	Total
Turtle			2		3	17	2	1	1	28	2		5	3	6	1	71
Turtle (x2)		1			1	1			1	2		1					7
Turtle?										1							1
Turtle/ Humans	1			1													2
Totals	**1**	**1**	**2**	**1**	**4**	**18**	**2**	**1**	**2**	**31**	**2**	**1**	**5**	**3**	**6**	**1**	81

*Note – When including the Turtle (x2) category, meaning two turtles were in view in the same frame, there was a total of 88 (+1 possible) observed turtles. Possible rationale for some unavoidable double counting of turtles is discussed in Section 3.2.5.

Figure 10. Two turtles crossing the road located between the wetlands and their 'traditional nesting area'.

Figure 11. Vehicle on road, passing close to turtle on edge of road (turtle circled in red).

3.2.4.2 Turtle nesting mound in field

Results from two cameras that were monitoring a portion of the nesting bed created in 2022 (and further enhanced in 2023) are shown in Tables 3 and 4. Much of the feature (nesting mound) was not in the camera's frame/fields of view; additional activities occurring on portions of the nesting mound that were not covered by the camera or outside of the camera's operating time were not captured. Tables 3 and 4 show that there were 13 turtles observed; that is 13 different times a turtle appeared in a camera frame that wasn't there in the previous frame (Figure 12). Upon further grouping of the observations given the closeness of time between observations, it is estimated that these 13 observations are 8 different turtles. Some turtles probably left the field of view, and then went back into it. While prospecting was the only confirmed behaviour at the nesting mound, this nesting area was of interest to the turtles. Nesting was not confirmed, but could have occurred on positions of the mound not covered by the camera's field of view.

Figure 12. Turtle observation on nesting mound in field.

Table 3. Species type and observed behaviour data from camera placed on the north side of the artificial nesting mound created in 2022/23.

Species	Basking/Transiting	Investigating	Loitering	Loitering/Basking	Possible Predation	Possible Predation - Loitering	Possible Predation/Transiting	Prospecting	Transiting	Transiting/Basking	Total
Human		2									**2**
Rodent			1		4	2	1				**8**
Snake	4								14	3	**21**
Snakes				1							**1**
Turtle								7			**7**
Unknown			12						3		**15**
Total	**4**	**2**	**13**	**1**	**4**	**2**	**1**	**7**	**17**	**3**	**54**

*Note – Camera was operational between May 24-June 20 and July 16-Augsut 21st.

Table 4. Species type and observed behaviour data from camera located at south side of artificial nesting mound created in 2022/23.

Species	Inspecting	Prospecting	Prospecting/Nesting?	Grand Total
Human	1			1
Turtle		5	1	6
Grand Total	**1**	**5**	**1**	**7**

*Note – Camera was operational between May 24-June 20.

3.2.4.3 Turtle nesting bed created on roadside

To minimize turtle road crossings and thus the potential for road mortality, nesting substrate was added to the south edge of the road that must be traversed by a turtle to access its traditional or historic nesting grounds on the north side of the road (Figure 8). We wanted to see if the nesting substrate (without a fence) was enough to encourage turtles to nest, or if nesting site fidelity was high and road crossings would continue.

Using a wildlife camera on the new roadside nesting area, no observations indicated a turtle stopped to nest at the newly created alternate nest site. However, the wildlife camera was operational from June 20-July 16, missing three weeks of the peak nesting period. The camera did capture observations of five turtles transiting from the wetlands across this bed, then across the road to the traditional nesting area on the north edge of the road. This suggests high site fidelity to their historic nesting area, but on September 28, 2023 a landowner observed that 24 turtle nests were dug up by a predator (likely skunk) on the 'traditional nesting bed' and one was predated on the newly created roadside bed on the same day. The author also saw the same predation hole in the roadside nesting bed, indicating that at least one nest had been laid.

3.2.4.4 One-way escape doors and Animex fencing

In 2022, horizontal wire mesh fencing had been installed along the ground of the vertical fence and those two fences (vertical and horizontal) were threaded together with wire to keep potential predators from digging underneath (Darvill, 2023). A live turtle was found underneath a horizontal fence in 2022 and was subsequently released. There was also a possibility that small mammals and amphibians could get trapped. Additionally, a few turtles got stuck on the wrong side of the fence when trying to get back to the water after being on land.

To remove these threats, the horizontal fence was removed in 2023, and in an experiment, replaced with wildlife crossing specific fencing (Animex fencing). It was installed alongside the vertical mesh fence and dug/fitted into the ground six inches. The Animex fence is black, which reduces the sightlines of turtles (they can't see where the habitat they want to get to is, and do not stop), and it's plastic, which creates a smooth surface for turtles to move along towards the marsh/water.

Three one-way escape doors were also retrofitted into the fencing in 2023. The doors were installed May 28, 2023 and closed after the nesting season to prevent predators from accessing the nesting mound. This was an experiment to see if this black plastic fencing would reduce turtles getting stuck on the wrong side of the fence, and help guide the turtles stuck on the wrong side of the fence towards one-way escape doors, and/or along the smooth fence into the water.

One camera was mounted on a post to monitor one of the three one-way escape doors as well as a portion of the black plastic fencing. This camera was operational from May 24 – July 5 and July 16 – August 22. The results of the camera data are presented in Table 5. The transiting category in Table 5 indicates species that were either traveling along the black plastic fence, or going though the one-way door. No predators (e.g., skunks, coyotes) used the one-way door. One turtle did use the one-way door (Figure 13), as did one snake (Figure 14), and multiple rodents. The Animex plastic black fencing was effective for keeping turtles moving along and around the fence towards the water in a short amount of time (2-3 minutes) and the one-way doors helped maintain habitat connectivity for at least one turtle, small mammals and snakes.

Table 5. Species and the observed behaviours detected by camera in around the one-way door and portion of black plastic Animex fencing.

Species	**Interacting with camera**	**Loitering**	**Transiting**	**Total**
Coyote		1		**1**
Deer			1	**1**
Dog		1		**1**
Human	1		7	**8**
Humans			4	**4**
Rodent		14	11	**25**
Turtle			5	**5**
Unknown		6	2	**8**
Total	**1**	**22**	**30**	**53**

Figure 13. Turtle using one-way exit access water/marsh.

Figure 14. Snake approaching one-way exit.

Figure 15. Turtle using black fencing as a smooth guide to move along towards water.

3.3 Recommendations for 2024

Effectiveness monitoring of the various turtle nesting enhancement features using wildlife cameras was very useful. It is recommended that cameras be used to monitor the effectiveness of additional enhancements made in 2024. The project would benefit from deploying cameras earlier in the season to better assess if created nesting beds are being used, to provide dates of hatchling emergence, and the start of the WPT nesting window. Cameras should be removed later in the season than in 2023, to collect possible information on early emergence or predation events, i.e., 25 turtle nests were observed by a landowner in September 2023 (after the cameras were taken down (described in Sections 3.2.4.1 and 3.2.4.3).

Additional recommendations to build upon lessons learned in previous years and to improve the turtle habitat at the Stewart's Farm include:

1. By August 2023, an abundance of weeds was growing in the two turtle beds created in Spillimacheen. In 2024, remove all weeds ahead of nesting season since roots can grow through turtle eggs, killing hatchlings or preventing their emergence.
2. To prevent more weeds, acquire and use seed free substrate as much as possible in future projects. Source 'washed' substrate.
3. Expand the linear road-side bed in front of the traditional nesting area. Create a 15m x 4m nesting bed and work with the Ministry of Transportation and Infrastructure to obtain the required permit. Work within BC Hydro's requirements (i.e., must be 10m away from a pole).
4. Around the new linear nesting bed, install 20m of 3ft mesh fencing with t-posts pounded into the roadside. By not fencing off the entire roadside, this allows some turtles to nest in their traditional nesting area and we accept some unknown amount of mortality from road crossings and predators. Continue to monitor with cameras.
5. The Animex plastic black fencing was effective for keeping turtles moving along the fence towards the marsh/water and not getting stuck on the wrong side of the fence (increases predation threat). The plastic fence only needs to be tall enough for turtles to use and not see through. Therefore, cut the black plastic fencing in half (currently around the nesting mound in the field) and attach half to the new portion of mesh fence that will enclose the linear roadside bed.
6. Reinforce all plastic fencing to mesh fence with Animex washers and UV resistant zip-ties.
7. One-way escape doors were effective for maintaining connectivity for turtles, small mammals and snakes. However, they need to be closed off after the nesting season to avoid predators (especially skunks) accessing the nesting beds. Since the main purpose of the one-way doors is to create passageways for turtles, doors should be made smaller so that they can stay open year-round providing connectivity for small mammals, amphibians and reptiles.
8. One-way escape doors – improve ramps leading to the doors by adding more gravel in front of them with landscape fabric under the gravel to reduce growth of vegetation around the doors.
9. Add some nesting substrate along the south facing bottom edge of the nesting mound in the field. Turtles were prospecting here, but the substrate could be improved along the margins.

4.0 American Badger

4.1 Introduction

The American Badger (*Taxidea taxus jeffersonii*, eastern population) is red-listed in the province of B.C. and listed as an Endangered species by COSEWIC (2012) under the Species at Risk Act (SARA) (2018). Major threats include the loss of open areas (forest succession, urban development) resulting in ongoing habitat decline; trapping, persecution, urban development, highway mortality, forest in-growth, reservoir flooding, gravel and sand pits, cultivation agriculture, extermination of prey (Adams & Kinley, 2004). It has been estimated that "as few as 100 mature badgers live in the East Kootenay region where they are vulnerable to increasing threats from roadkill" (COSEWIC, 2012).

Badger densities are low where they are found. They have large home ranges with hundreds of different burrows within their home range (Newhouse, 2001). They often change locations daily and they reuse burrows from year to year making it important to ensure that unoccupied burrows are not destroyed (Newhouse, 2001). It has been shown that soil and prey availability are the key defining features or requirements for Badger habitat (COSEWIC, 2012). Their primary food source in the study area is the Columbian ground squirrel (*Urocitellus columbianus*) (Kinley & Newhouse, 2008). Badgers prefer coherent soils that do not collapse when tunneled (COSEWIC, 2012). "Connectivity habitat in [the] Upper Columbia is primarily a north-south concern as badgers are mostly limited to lower elevations in the Trench" (Adams, 2011).

The American Badger is recognized as a species at risk under the Forests and Range Practices Act (FRPA). Special provisions under FRPA can be used to manage badgers, e.g., Wildlife Habitat Areas (WHAs) and Wildlife Habitat Features (WHFs). These designations protect important habitats where they are known to exist on provincial Crown land. Once badger burrow points are submitted into the provincial Wildlife Species Inventory (WSI) database, they:

…technically become WHFs as soon as they are identified. If there is a Range Act tenure on the Crown land where these burrows exist, the tenure holder is required to "not damage or render ineffective" the features. Measures a Range Act tenure holder may take to protect the burrows could include establishing fencing to exclude cattle from the area, or moving livestock attractants such as mineral/water away from the area. (K. Stark, personal communication, March 2023).

Establishment of a WHA can help by protecting a larger area of contiguous habitat. Badger WHAs protect concentrations of burrows, abundant prey sources, maternal denning areas, preferred friable soil (Adams & Kinley, 2004). Once a WHA is established there are legal 'general wildlife measures' (GWMs) to protect or conserve the species at risk associated with a WHA. GWMs are species dependent and provide specific direction related to the local situation (Kinley, 2009). GWMs can include specific direction on access (e.g., no road building), harvesting and silviculture, pesticides, range, and recreation. When proposing a WHA for badgers, there are no firm requirements regarding the amount of badger activity, WHA size, vegetation type or density of burrows (Kinley, 2009).

At the start of CWSP's work with Kootenay Connect in 2020 there was only one American Badger WHA in the study area, near Canal Flats. The main objective for the badger portion of the CWSP/KC species at risk projects was to identify where potential important habitats are located for badgers, collect the requisite data at these locations, and submit applications for WHF/WHA proposals.

4.2 Methods

In 2023, the CWSP built upon badger conservation work from 2022 (Darvill, 2023). Two surveyors (biologist Rachel Darvill, assistant Verena Shaw) did extensive searching for burrows in three areas of badger habitat areas on crown land in American Badger critical habitat. Since WHA and WHF designations only apply to provincial Crown land; only Crown land was inventoried. Once at a burrow, a variety of parameters were recorded including UTMs, whether the burrow was old or new, in functioning condition, visible evidence of use, threats to habitat area, and additional comments when warranted. For areas with multiple burrows relatively close together a UTM was provided for the center of the burrow cluster, as well as the number of burrows present around that central UTM. Only those burrows found to be in 'functioning condition' were recorded. A burrow is considered to be in 'functioning condition' when it is still capable of providing habitat and ecological functions to badgers. If there is vegetation or some soil sloughing around the burrow entrance, the feature is considered to be in 'functioning condition' because a badger could easily reoccupy it; if the burrow had collapsed, it would not be considered to be in 'functioning condition' (K. Stark, personal communication, September 2022). If a burrow is still in 'functioning condition', regardless of whether it is currently active or inactive, it can be documented as a feature and thus become a WHF.

Subsequent Wildlife Habitat Area WHF and WHA applications were made after inventory work. WHAs provide more protection than WHFs through land management practices at a broader scale. The two designations are not mutually exclusive – features can be listed as WHFs as an initial step in the process, then designated as WHAs where warranted (e.g., on parcels of Crown land where badger activity is concentrated) (K. Stark, personal communication, September 2022). The WHA designation process is more time consuming so it can be useful to have features first designated as WHFs. Badger WHAs protect concentrations of burrows, abundant prey sources, maternal denning areas, preferred friable soil (Adams & Kinley, 2004).

To select the boundaries for Badger WHAs, burrows with multiple counts were broken up into even groups to 45 to determine the following buffer sizes: 1 = 20, 2-9 = 45m, 10-18 = 70m, 19-27 = 90m, 28-36 = 100m, 37-45 = 120m. Then all the buffers were dissolved into a single buffer for delineation of the WHA. For proposed WHA areas in 2024, we used soil classification polygons and buffers to create the boundary. When a single count WHF was outside the buffer area, the WHA polygon was brought to the outer edge of the 20m buffer to include it in the WHA boundary if within close proximity to the existing buffers/points.

4.3 Results and Outcomes

Inventory for badger burrows was completed at a newly discovered badger habitat area (Kloosifier) and at two additional areas where surveys were initiated in 2022, but not completed (Dry Gulch and Steamboat). At Kloosifier there were 144 burrows in functioning condition identified at 25 sites (centers of burrow clusters). At the Dry Gulch/Old Coach Trail area, 696 burrows in functioning condition were identified at 152 sites (centers of burrow clusters); this was in addition to the data collected at Dry Gulch in 2022 with 368 burrows identified at 25 sites (cluster points) (Figure 16). At the Steamboat area, 415 burrows in functioning condition were located at 113 central locations in 2023 (Figure 17). This was in addition to the 322 burrows that were identified here in 2022 at 126 points (Figure 17).

In late March 2024, Ministry of Water, Land and Resource Stewardship (MWLRS) Land Use Policy, Planning and Ecosystems Division advised that many of the badger WHFs has been formally approved: 510 of the 614 burrow locations (central areas in the middle of clusters of burrows) submitted for 2022 and 2023 were uploaded by the provincial government to the WSI Survey Observations layer (WSI – SO – Mammals), but were not available to use for mapping at the time of this report. The omitted 114 records were either merged with adjacent points, were duplicates (in both 2022 and 2023), or the burrows were labeled "UN" in the "Feature is in functioning condition" column. The WHA applications for both Dry Gulch and the Steamboat areas will be made by late March 2024, boundaries for which can be seen in Figures 16 and 17.

4.4 Discussion and Recommendations

Measurable outcomes for the 2024 badger project included geo-referenced locations and maps of all identified badger burrow sites, with all approved and pending WHAs or WHFs delineated (Figures 16, 17 and 18). These applications cumulatively represent 164.1 hectares of important badger habitat identified from this work. There is potential for WHAs to be considered as part of the 30% protected by 2030 (30 by 30) federal government initiative (Ball & Nixon, 2022).

It is recommended that the following occur to further advance badger conservation in the Columbia Valley:

-Continued follow-up with the provincial government staff to ensure that approved WHFs are managed according to regulations under the Forest and Range Practices Act (FRPA).

-Continue to pursue the WHA designations with the government, as well as suggest that General Wildlife Measures be improved to further protect badger habitat. Current GWMs for American Badger are from 2004 (Adams and Kinley, 2004) and should be revisited.

-Continue conversations with the government to ensure that buffer distances around WHF points representing large clusters of burrows (up to 45) have a buffer greater than 20m; the 20m buffer is meant to be for a single burrow point. This may require updates to the 2004 guidelines as well. However, once WHAs are established that will negate the rationale for any buffer on individual WHF points.

-Continue to provide information to the Ministry of Water, Land & Resource Stewardship (MWLRS) on Rushmere about the badger habitat value there and how recreational impacts may be affecting badgers.

-Continue conversations with the provincial government to determine what additional tool(s) may be useful to overlay onto a badger WHA for potential protection from recreational impacts.

-Collaborate with the Shuswap Band to expand badger conservation work in the Columbia Valley, involving the collection up-to-date data to help inform a baseline population estimate of both badgers and their prey, Columbian Ground Squirrels. This will also lead to on-the-ground action. CSWP has agreed to support this project in 2024-25, dependent on Shuswap funding.

-Continue to provide badger burrow location information and recommendations to the MWLRS who is working on developing a recreation plan for the Columbia Wetlands Wildlife Management Area of Dry Gulch. Share the Dry Gulch WHA application boundaries with them.

- Develop educational materials including social media posts that highlight the endangered status of badgers in the Columbia Valley, designated critical habitat area, reasons for their decline and ways to help badgers including keeping to trails and keeping dogs on leash in badger habitat areas.

-Determine areas of private land that are most active with badgers and aim to conduct outreach with private landowners that are in hotspot corridor areas for badgers.

- Explore potential to work on badger conservation or enhancement on private land to enhance Biodiversity Opportunity Areas.

-Additional badger burrow inventories should take place at areas of Crown land where badgers are thought to occur, with subsequent WHF and WHA applications where appropriate.

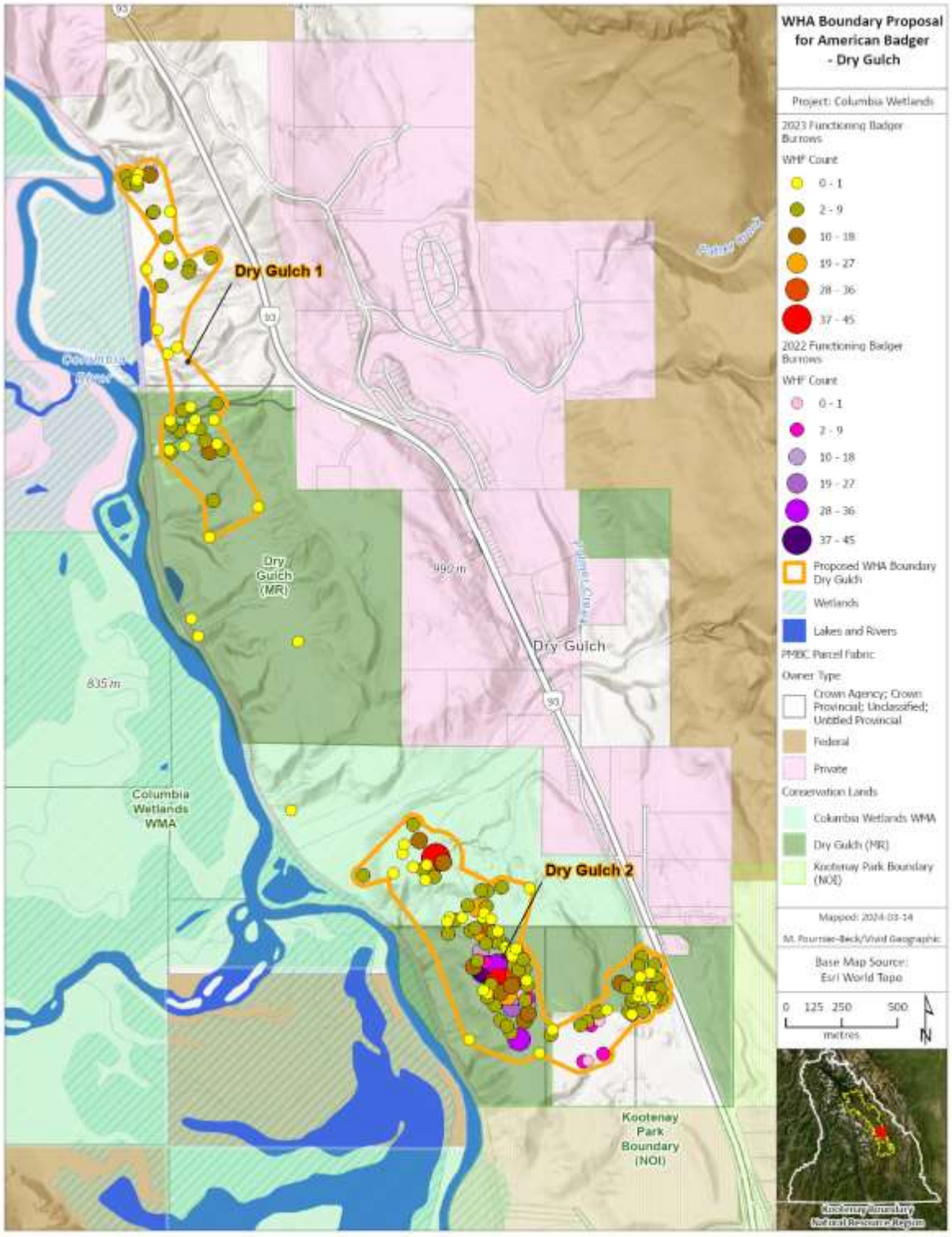

Figure 16. Proposed WHF locations and proposed WHA boundary lines for American Badger at Dry Gulch; based on 2022 and 2023 inventory data.

**Note* – WHF counts are represented with graduated points, i.e., a point with 45 burrows is larger than one with 2 burrows.

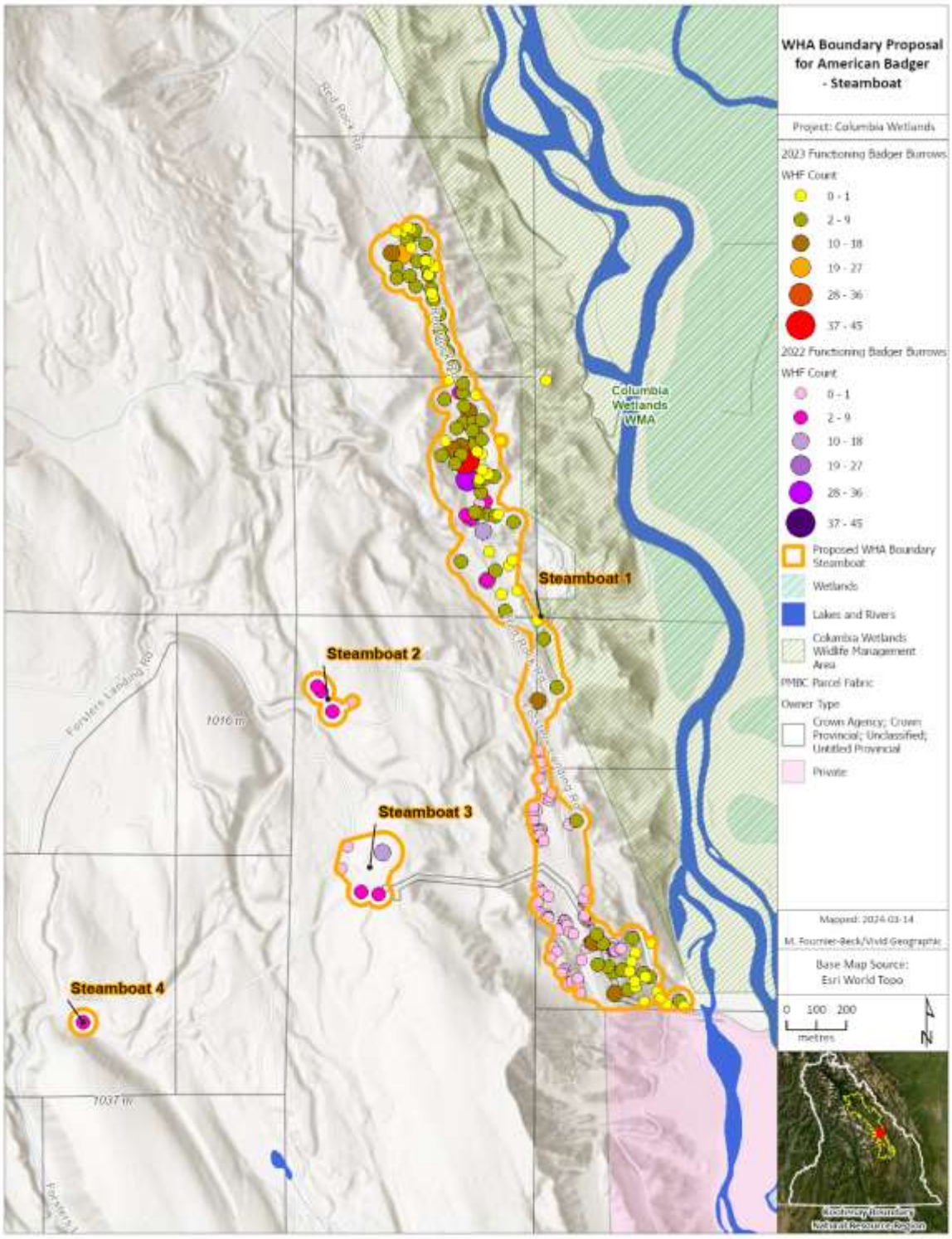

Figure 17. Proposed WHF locations and proposed WHA boundary lines for American Badger at Steamboat (Red Rock); based on 2022 and 2023 inventory data.

**Note* – WHF counts are represented with graduated points, i.e., a point with 45 burrows is larger than one with 2 burrows.

5.0 Osprey

5.1 Introduction

Osprey (*Pandion haliaetus*) are culturally valued and a bioindicator species of ecosystem health due to their proven sensitivity towards pollutants. They have been used as an indicator species of environmental change (Henny et al., 2004). They are sensitive to anthropogenic and climatic influences and can be affected by land and water management practices. Threats to osprey include human disturbance, predation and displacement by other species. In 2023, osprey monitoring continued and five years of consecutive monitoring data is available for this species in the Columbia Valley. To the best of the author's knowledge, osprey nests in the Columbia Valley (Canal Flats to Donald) had not been monitored prior to this work (Darvill, 2021, Darvill, 2022, Darvill, 2023), which began with the Wildsight Golden administered Columbia Wetlands Waterbird Survey (Darvill, 2020b).

5.2 Methods

Unlike previous years of osprey monitoring, there were two rather than three periods of inventorying nests in 2023. Not all nests were visited twice during the breeding season due to logistical constraints and three nests were unable to be visited at all due to the inaccessibility of nest sites (Hydro line above east side of Columbia Lake requiring 4x4). Survey dates were variable to accommodate for a few volunteers that participated in monitoring, but the majority of first nest observations took place May 5, 2023. Most of the second nest observations took place on August 10, 2023. Five new nests were identified for the first time during various periods over the summer; field observations took place on the first day identified. During final nest checks, observations lasted at least five minutes at each nest. This is the amount of time between rest periods that chicks generally move in the nest, with detection of movement being the most useful parameter to determine nest occupancy (Moore & Arndt, 2016). At each site the following parameters were recorded: observation date, UTMs, time of arrival, number of chicks in the nest (if known), other general observations at the nest (e.g., one adult at nest, one adult calling nearby, two chicks seen in nest). The UTMs were not always taken from directly under the nest, but from the closest possible viewing location.

5.3 Results and Outcomes

There were 76 osprey nests identified in 2023. Only eight of those were tree nests and the remaining 68 were on nest platforms affixed to the top of large wooden poles that are usually hydro poles, but sometimes poles installed by private landowners. During the first round of nest checks, 46 nests were occupied with incubating adults.

Thirty nests still had chicks present during the final visit in August. Those 30 nests were deemed successful since chicks observed at that time were close to fledging, or in some cases had already taken flights from the nest, but were still seen returning to the nest. Thirteen nests had unknown success either because, 1) they were unable to be surveyed later in the season, or 2) they did not have any osprey present in the nest during the final monitoring period in August which could have been a result of early fledging or egg/chick death. There was only one nest where we were confident the nest had failed before chicks fledged. Detailed observation and monitoring data is found in Appendix 4.

A comparison of nest numbers and nest success over the five years of monitoring is shown in Table 6. More nests have been discovered during each subsequent year of our project. The number of osprey returning and producing chicks has stayed relatively consistent across the five-year period.

The durability of osprey nest platforms were accessed. Subsequently, the addition of one new nest pole in Spillimacheen was proposed to BC Hydro as well as the replacement of one platform at 'McMurdo Slough' (Figure 18). The request was made to BC Hydro staff because they install the osprey nest poles. Active nests on live transmission poles can cause power outages, fires, and/or injure or kill a bird. It is in BC Hydro's best interests to place nest poles adjacent to locations that have become a dangerous or inappropriate nesting site for osprey. In February 2024, BC Hydro staff reported that the older style platform in the photo (Figure 18) will be replaced with a new standard platform which includes some bracing, before the end of March 2024 (just prior to the Osprey returning to the area). In terms of the nest built on the transmission structure in Spillimacheen, BC Hydro assessed that nest and did not think that it posed a hazard. They would consider doing some maintenance on a nest on a transmission pole if the nest started to hang down closer to the conductors. In the case of that particular nest, they do not plan to remove or relocate this nest. It is anchored in the middle of the crossarm away from the infrastructure, and there is low risk to the bird and the structure.

5.4 Discussion and Recommendations

This project has been valuable for collecting baseline data on a bioindicator species of ecosystem health. A five-year baseline dataset is complete for ospreys in the Columbia Valley, which is available in the provincial WSI database. Breeding population numbers were not available for ospreys in the Columbia Valley prior to this work, nor was any information on the success of their nests. This data provides population numbers for breeding ospreys in the study area. For instance, 46 pairs were present at the beginning of the 2023 breeding season.

Thirty of 46 nests that were occupied in May 2024 were deemed successful in terms of producing at least one fledgling. The remaining 16 nests could have failed due to a number of reasons including ravens eating eggs, human disturbance, poor weather, unknown environmental causes. The limited amount of time that is provided to this subproject is not sufficient for further analysis regarding why some nests failed.

The continuation of annual monitoring is recommended since ospreys are an indicator species for wetlands health; they respond quickly to negative environmental change. Also, as seen during each year of CWSP/KC osprey monitoring, nest poles do require maintenance and ospreys also build nests in unsafe locations (Darvill, 2021, Darvill, 2022, Darvill, 2023). Observations followed by recommendations to BC Hydro are able to keep the number of nesting platforms maximized. Additional work on the osprey data collected to-date could be further analyzed, e.g., statistically analyzed population trends for the overall population and at each nest site. Some of the nest poles that have been erected by private landowners have never been occupied by osprey, potentially owing to improper placement of nest platforms (e.g., poles too low to the ground or reduced sightlines due to close proximity of trees). Those landowners could be contacted to see if the nest poles/platforms could be modified to provide suitable nesting habitat for osprey.

Table 6. Comparison of the number of osprey nests identified, active and successful (2019-2023).

Year	# of osprey nests recorded	# of nests active during beginning of season	# of nests either presumed or known to have produced fledglings
2019	59	43	27
2020	65	43	19
2021	72	39	27
2022	71	39	27
2023	76	46	30

Figure 18. Osprey nest platform needing repairs at 'McMurdo Slough'.

6.0 Mountain Goat Mineral Licks

The mountain goat (*Oreamnos americanus*) is blue-listed in the province of B.C, and does not have a ranking by COSEWIC or SARA. It is listed as a species of special concern on the IUCN's Red List. Mountain goat habitat is found within high elevations of the Columbia Valley study area. In some areas, mountain goats may migrate up and down mountains between summer and winter habitat ranges (B.C. CDC, 1994b; Rideout & Hoffman, 1975). A study in Montana showed that summer and winter habitat range were 2.2 kilometers apart (B.C. CDC, 1994b; Singer & Doherty, 1985).

Some mountain goats may also travel to salt licks during spring and summer (B.C. CDC, 1994b). Under the Wildlife Act, any significant mineral lick on crown land can be designated as a Wildlife Habitat Feature (WHF), as such the identification and documentation of three mineral licks have been completed by Rachel Darvill since 2021 (Darvill, 2021, Darvill, 2022). Two of those three licks are now designated as WHFs and the third site at Dutch Creek was inventoried in 2023 (Figure 19). Submission of the 2023 data occurred in March 2024. The Dutch Creek WHF listing should be forthcoming.

Figure 19. Dutch Creek mountain goat mineral lick.

7.0 Summary of WHA and WHF applications

Under the Forest and Range Practices Act, the Minister responsible for the Wildlife Act can establish two categories of wildlife that require special management, species at risk and regionally important wildlife. “Identified wildlife are managed through the establishment of Wildlife Habitat Areas (WHAs) and the implementation of general wildlife measures (GWMs) and wildlife habitat area objectives, or through other management practices specified in strategic or landscape level plans'' (Ministry of Environment, n.d.). Creating a WHA is a lengthy approval process, whereas WHF identification provides immediate habitat protection. The Minister responsible for the Wildlife Act may identify any or all of the following as a Wildlife Habitat Feature (WHF) in the Kootenay Boundary Region: the nest of a bald eagle, osprey, flammulated owl, great blue heron, Lewis’s woodpecker, an American Badger burrow, a grizzly bear den, a significant mineral lick, a bat hibernaculum, a significant wallow, a hot spring or thermal spring (Province of B.C., 2018). Since 2021, much of our work has centered around identifying and nominating WHAs and WHFs to the province.

This includes 510 of the 614 points submitted as WHFs for 2022 and 2023, and approved as WHFs in March 2024. Those point locations represent the central locations within clusters of burrows (up to 45 burrows per point). Boundaries for Wildlife Habitat Areas (WHAs) were designed for American badgers based upon burrow locations, buffers around those points, and soil classification polygons. Eight badger WHAs with a combined size of 164.1 hectares have been submitted to the provincial government for consideration and approval.

Additional work was done regarding WHAs and WHFs including pursuing the three WHAs submitted in 2021 for at-risk alkali-saltgrass ecological communities. The boundaries for those three WHAs are now recognized in the provincial database as ‘proposed WHAs’, at 233.7 hectares combined. Two Mountain Goat mineral lick WHF submissions made in 2020 are designated as WHFs at 736 hectares. A third goat mineral lick was surveyed in 2023 with subsequent WHF application made in 2024 at 246.6 hectares. In total, 1279.5 hectares of land within the study area has either been approved or is pending approval with WHA or WHF status. That number does not include all of the badger WHFs that are located within the larger WHA polygons. A summary of all WHA/WHF work between 2020-2024 is provided in Table 7 and with a map presented in Figure 20.

Table 7. WHA and WHF applications (pending and approved) for the Columbia Valley through the 2020-2024 SAR projects.

Species	General Location	Zone	Easting	Northing	Status	Observation Date (YYYY/MM/DD)	Date application submitted	Feature Area (ha)	Status	Comments
Alkali saltgrass EC	Findlay Creek FSR	11	570524	5553321	WHA	2020-08-06	2021-02-21	101.0	In gov't WHA proposal layer	Concern that livestock grazing and use by ATVS are causing damage the sites. This community is rapidly declining in BC and management actions (e.g., fencing, restoration, signage) should be put in place to halt the damage. There are <20 occurrences in BC.
Alkali saltgrass EC	Findlay Creek FSR	11	571605	5550362	WHA	2020-08-06	2021-02-21	120.0	In gov't WHA proposal layer	Concern that livestock grazing and use by ATVS are causing damage the sites. This community is rapidly declining in BC and management actions (e.g., fencing, restoration, signage) should be put in place to halt the damage. There are <20 occurrences in BC.
Alkali saltgrass EC	Findlay Creek FSR	11	581333	555140	WHA	2020-08-07	2022-01-07	12.7	In gov't WHA proposal layer	
Mountain Goat	Canyon Creek	11	sensitive	sensitive	WHF	2020	2020	242.8	approved	
Mountain Goat	Toby Creek	11	sensitive	sensitive	WHF	2020-10-19	2020	493.2	approved	
Mountain Goat	Dutch Creek	11	sensitive	sensitive	WHF	2023-08-11	2024-02-16	246.6	pending approval	
American Badger	Rushmere 1	11	574763	5584971	WHA	2022-09-01	2023-04-05	10.2	pending approval	
American Badger	Rushmere 2	11	576513	5583335	WHA	2022-09-01	2023-04-05	6.0	pending approval	
American Badger	**Steamboat 1*	*11*	*562179*	*5610101*	*WHA*	*2022-09-01*	*2023-04-05*	*18.1*	*Replaced with boundary expansion*	Steamboat WHAs boundaries submitted in Feb 2023 were expanded and resubmitted in 2024 due to many additional burrows discovered in 2023.
American Badger	**Steamboat 2*	*11*	*562418*	*5608854*	*WHA*	*2022-09-01*	*2023-04-05*	*14.2*		
American Badger	**Steamboat 3*	*11*	*561713*	*5609435*	*WHA*	*2022-09-01*	*2023-04-05*	*5.1*		
American Badger	**Steamboat 4*	*11*	*561813*	*5608861*	*WHA*	*2022-09-01*	*2023-04-05*	*7.3*		
American Badger	**Steamboat 5*	*11*	*560862*	*5608393*	*WHA*	*2022-09-01*	*2023-04-05*	*2.7*		
American Badger	Steamboat 1	11	562633.9764	5608561.248	WHA	2022 and 2023	2024-03-30	46.6	re-submitted March 2024	Steamboat WHAs boundaries submitted in Feb 2023 were expanded and resubmitted in 2024 due to many additional burrows discovered in 2023.
American Badger	Steamboat 2	11	561647.0148	5609510.683	WHA	2022 and 2023	2024-03-30	1.6	re-submitted March 2024	
American Badger	Steamboat 3	11	561821.9047	5608911.017	WHA	2022 and 2023	2024-03-30	4.1	re-submitted March 2024	
American Badger	Steamboat 4	11	560861.0019	5608392.001	WHA	2022 and 2023	2024-03-30	0.6	re-submitted March 2024	
American Badger	Dry Gulch 1	11	566319.973	5605327.601	WHA	August 2023	2024-03-30	34.7	submitted March 2024	
American Badger	Dry Gulch 2	11	567407.9984	5603224.406	WHA	August 2023	2024-03-30	60.3	submitted March 2024	
American Badger	Columbia Valley - Thunderhill, Rushmere, Dry Gulch, Steamboat	n/a	n/a	n/a	WHFs	September & October 2022	February 2023	n/a	approved	909 burrows submitted at 232 point locations (points are UTM centres of burrow clusters). 510 of the 614 burrow locations submitted for 2022 & 2023 were uploaded to the WSI Survey Observations layer (WSI – SO – Mammals). The omitted 114 records were either merged with adjacent points, were duplicates, or the burrows were labeled "N" or "UN" in the "Feature is in functioning condition" column.
American Badger	Columbia Valley - Dry Gulch, Steamboat, Kloosifier	n/a	n/a	n/a	WHFs	September & October 2023	February 2024	n/a	approved	1255 burrows submitted at 290 point locations (points are UTM centres of burrow clusters). 510 of the 614 burrow locations submitted for 2022 & 2023 were uploaded to the WSI Survey Observations layer (WSI – SO – Mammals). The omitted 114 records were either merged with adjacent points, were duplicates, or the burrows were labeled "N" or "UN" in the "Feature is in functioning condition" column.

*Note – Steamboat 1-5 WHA applications made in 2023 were revised and resubmitted in 2024 with boundary adjustments (high number of additional burrows located in 2024).

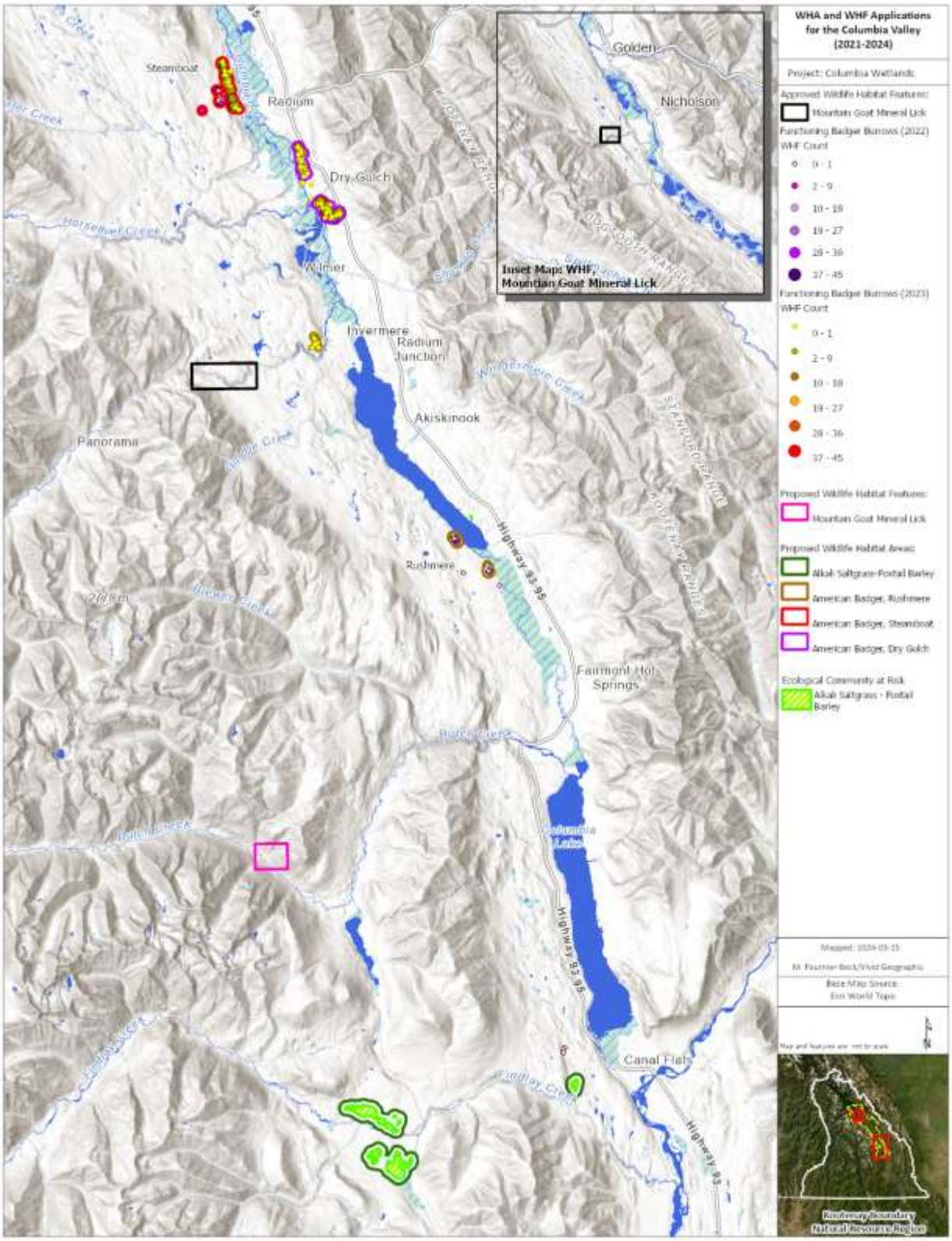

Figure 20. WHAs and WHFs approved or pending approval in the Columbia Valley. FRPA species at risk include American Badger, Mountain Goat and alkali-saltgrass ecological community.

8.0 Acknowledgements

I acknowledge that this work has occurred on the traditional and unceded territory of the Ktunaxa Nation, Secwepemc First Nation, and Metis Nation Columbia River. Thank you to Verena Shaw who was hired for her excellent naturalist skills, assisting with field work, and for doing much of the data entry work. Thank you to GIS analyst Marie-Ange Fournier-Beck for doing excellent mapping work for this project. Thanks to Jessica Holden and Catriona Leven for their work assisting with the WPT camera work. Special thanks to Jessica who sifted through and carefully organized all of the WPT camera data. Gratitude is extended to the vast number of individuals that contributed their time and submitted observations. Public sighting contributions have been of immense value to conservation actions for species at risk in the study area. Also thank you to Gerhardt Lepp, John Zehnder, John Jenkins and Elliot Darvill-Jenkins who helped with private land enhancement work to improve nesting habitat for Western Painted Turtles. Thanks to Rick Hoar and the Lake Windermere District Rod and Gun Club for helping with the creation of the Western Painted Turtle nesting area in Spillimacheen and the installation of turtle basking logs. Gratitude is also extended to Barb and Kevin Stromquist who volunteered to conduct Osprey observations in the Fairmont and Columbia Lake areas. Also, thanks to Hayley MacDonald with The Nature Conservancy of Canada for her assistance monitoring the Osprey nests at Lot 48. Special thank you to Suzanne Bayley who is always there to answer any of my questions, and for helping to facilitate my work. Thanks also to Marcy Mahr and Michael Proctor, the brains behind the overarching Kootenay Connect project.

Thank you to our main funding agency, without you this work would not be possible: Environment and Climate Change Canada, Canada Nature Fund: Community-Nominated Priority Places for Species at Risk. Thank you to the Columbia Wetlands Stewardship Partners and Kootenay Connect, a project facilitated by the Kootenay Conservation Program.

9.0 References

Adams, I. (2011). Connecting the Upper Columbia Valley III: habitat criteria and conditions. Prepared for Columbia Wetlands Stewardship Partners. Available: https://wetlandstewards.eco/wpcontent/uploads/2019/10/UCV-Corridors-III-Habitat-Criteria-and-Conditions.pdf (accessed Feb 18, 2020).

Adams, I., & T.A. Kinley. 2004. Badger. Accounts and Measures for Managing Identified Wildlife – Accounts V. 2004. Available: https://www.env.gov.bc.ca/wld/frpa/iwms/documents/Mammals/m_Badger.pdf (accessed March 20, 2022).

Ball, T., & S. Nixon. 2022. An honest accounting: Improving BC's approach to claiming other conserved areas. EcoJustice and CPAWS. Available here: https://kootenayconservation.ca/wp-content/uploads/2023/07/An-Honest-Accounting-2022-CPAWS.pdf

B.C. Conservation Data Centre. (1994b). Species Summary: *Oreamnos americanus*. B.C. Minist. of Environment. Available: http://a100.gov.bc.ca/pub/eswp/ (accessed Apr 10, 2020).

B.C. Ministry of Environment. 2017. Management plan for the Painted Turtle – Intermountain– Rocky Mountain Population (*Chrysemys picta* pop. 2) in British Columbia. B.C. Ministry of Environment, Victoria, BC. 31 pp.

COSEWIC. 2012. COSEWIC assessment and status report on the American Badger *Taxidea taxusin* Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. iv + 63 pp.

COSEWIC. 2016. COSEWIC assessment and status report on the Western Painted Turtle *Chrysemys picta bellii*, Pacific Coast population, Intermountain – Rocky Mountain population and Prairie/Western Boreal – Canadian Shield population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxi + 95 pp. (http://www.registrelep-sararegistry.gc.ca/default.asp?lang=en&n=24F7211B-1).

Darvill, R. 2020a. Kootenay Connect: Columbia Wetlands. Literature review of species at risk in the Columbia Valley- Final report. Prepared for the Columbia Wetlands Stewardship Partners and Kootenay Connect, a project facilitated by the Kootenay Conservation Program.

Darvill, R. 2020b. 2015-2019 Columbia wetlands waterbird survey. Prepared for Wildsight Golden. Available: https://wildsight.ca/wp-content/uploads/2016/01/CWWS-2015_2019-Final-Report_Jan-2-2020.pdf

Darvill, R. 2021. Kootenay Connect: Columbia Wetlands, Year 2 (2020-2021). Conservation Planning for Species at Risk in the Columbia Wetlands – Final report. Prepared for the Columbia Wetlands Stewardship Partners and Kootenay Connect, a project facilitated by the Kootenay Conservation Program.

Darvill, R. 2022. Kootenay Connect: Columbia Wetlands, Year 3 (2021-2022). Conservation Action for Species at Risk in the Columbia Wetlands – Final report. Prepared for the Columbia Wetlands

Stewardship Partners and Kootenay Connect, a project facilitated by the Kootenay Conservation Program.

Darvill, R. 2023. Kootenay Connect: Columbia Wetlands. Restoration of habitats and species at risk in the Columbia Valley. Year 4. Final Report – Species at Risk. Prepared for the Columbia Wetlands Stewardship Partners and Kootenay Connect, a project facilitated by the Kootenay Conservation Program.

Durand, R. 2020. Kootenay Connect: Columbia Wetlands Summary Report – Mapping the vegetative communities in Columbia Wetlands. Prepared for the Columbia Wetlands Stewardship Partners and Kootenay Connect, a project facilitated by the Kootenay Conservation Program.

Environment and Climate Change Canada. 2021. Recovery Strategy for the American Badger *jeffersonii* subspecies (*Taxidea taxus jeffersonii*) Western population and Eastern population in Canada [Proposed]. Species at Risk Act Recovery Strategy 6 Series. Environment and Climate Change Canada, Ottawa. 2 parts, 20 pp. + 36 pp.

Fraser, D. F. 1999. Species at the edge: the case for listing of "peripheral" species. In At Risk. Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk (Vol. 1, pp. 15-19).

Gustafson, B. & S. Higgins. 2023. 4CW Project Report for CWSP and Kootenay Connect 2022-2023 Conservation of Cottonwood Trees in Columbia Wetlands: saving important wildlife trees. Prepared for the Columbia Wetlands Stewardship Partners and Kootenay Connect, a project facilitated by the Kootenay Conservation Program.

Kinley, T. A. 2009. Effectiveness monitoring of Badger wildlife habitat area: Summary of current areas and recommendations for developing and applying protocols. Prepared for Forest and Range Evaluation Program –Wildlife Resource Value Ministry of Environment (Ecosystems Branch) and Ministry of Forests and Range (Forest Practices Branch), Victoria, BC.

Kinley, T.A. & N. J. Newhouse. 2008. Ecology and translocation-aided recovery of an endangered Badger population. Journal of Wildlife Management. 72(1):113-122. DOI: 10.2193/2006-406. Available: https://s3-us-west-2.amazonaws.com/epscwsp/Kinley%202006.pdf

Lausen, C., Gates, H., Low, E., & J. Rae. 2023. Kootenay Connect: Bat Conservation in Kootenay Connect Focal Areas Year 4. Prepared for Kootenay Connect.

Ministry of Environment. n.d. Identified wildlife management strategy. Available: http://www.env.gov.bc.ca/wld/frpa/iwms/index.html

Moore, E., & J. Arndt. 2016. Monitoring *Pandion haliaetus* aka osprey. Prepared for Friends of Kootenay Lake Stewardship Society. Retrieved from: https://www.friendsofkootenaylake.ca/news/osprey-nest-monitoring/

Newhouse, N. 2001. Management and protection of Badgers in the East Kootenay of British Columbia. Prepared for Columbia Basin Fish & Wildlife Compensation Program. http://trench---er.com/public/library/files/Badger---management---protection---2001.pdf

Proctor, M. & M. Mahr. 2019. Kootenay connect: Riparian wildlife corridors for climate change. A preliminary report. Prepared for Kootenay Conservation Program. Available: http://transbordergrizzlybearproject.ca/pdf/Proctor_and_Mahr_2019.pdf

Province of B.C. 2018. Order of the Ministry of Environment and Climate Change strategy: Wildlife habitat features in the Kootenay Boundary region. Forest and Range Practices Act. Ministerial Order No. M213. Available: https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/legislation-regulation/frpa-pac/wildlife-habitat-features/wildlife_habitat_features_order_kootenay_boundary.pdf

Rideout, C.B. & R.S. Hoffmann. 1975. *Oreamnos americanus.* Mammalian Species 63:1-6.

Singer, F. J., & J. L. Doherty. 1985. Movements and habitat use in an unhunted population of mountain goats, *Oreamnos americanus*. Can. Field-Nat. 99:205-217.

10.0 Appendices

Appendix 1. Social media and poster requesting volunteers to create nest cages, one-way escape doors and to help with on-the-ground enhancement efforts.

Appendix 2. Social media and poster for the American Badger public sightings request.

Appendix 3. Newspaper article requesting American Badger sightings in the Columbia Valley.

American badger sightings wanted for the Columbia Valley

Submitted by Rachel Darvill

Did you know that there are American badgers living in the Columbia Valley? Southeastern British Columbia is the northern extent of where American badgers live. Unfortunately, the American badger is an endangered species and needs our help!

Badgers have stocky and flattened bodies with short, powerful legs. As few as one hundred mature badgers live in the East Kootenay region. Here they are vulnerable to being wiped out from increasing threats like roadkill, the loss of open habitat needed, and urban development. But, together we can work to keep them living here for generations to come. There is a new project supported by the Columbia Wetlands Stewardship Partners (CWSP) that is currently taking observational reports from the public - recording all badger roadkill sites, dens, burrows, and dead or alive sightings.

Leading project biologist Rachel Darvill states, "We are interested in knowing where American badgers are using dens in the Columbia Valley, especially where areas of high suitable badger habitat overlap with public crown land. These areas can be conserved through various regulations, but first we need to identify where those important areas are."

Badgers have large home ranges with hundreds of different burrows per individual. The burrows have an entrance that resembles a large elliptical hole, often with a mound of dirt at the entrance. Badgers often change locations daily and reuse burrows from year to year, making it important to ensure that unoccupied burrows are not destroyed. Badgers use dens for denning, foraging, resting and as a source of shelter.

American badger wanders alongside riverbank.
Submitted photo

"We are also interested if any badger denning and burrow sites are found in areas that we have already designated as wildlife corridors (through Kootenay Connect) that are important to other large ranging species like grizzly bear and elk," says Darvill.

"It has been shown that soil and prey availability are the key defining features or requirements for badger habitat," says Darvill. Their primary food source in our region are Columbian ground squirrels (which are often locally referred to as gophers). "Like badgers, Columbian ground squirrels also live in burrows, and at first glance it can be confusing to distinguish these holes from the ones badgers make," says Darvill.

Do you know where a badger lives, where a badger hole exists, or have you seen a badger in the Columbia Valley before? If so, please let us know by contacting the CWSP with your observations at badgersightings@gmail.com. This project is a partnership with Kootenay Connect and is financially supported by Environment and Climate Change Canada (ECCC) through the Canada Nature Fund with equal matching funding from local partners.

Appendix 4. Osprey data from 2024 inventories.

Nest No.	Location	Easting	Northing	Observation Date (DD-MM-YY)	Time	Nest occupancy	Nest successful	Nest type	Observer	Notes/Comments
1	Old Mill in Donald	487568	5704145	06-08-23	1520	1 chick	Yes	pole	RD	
2	Golden CVSE Inspection Station	489583	5703175	06-08-23	1545	1 chick	Yes	pole	RD	
3	Golden - LP Mill north end	501285	5684941	n/a	n/a	n/a	No	pole	RD	Local worker reported no Osprey this year.
3	Golden - LP Mill south end	501264	5684484	n/a	n/a	n/a	No	n/a	n/a	Local worker reported no Osprey this year.
4	13th Street S and 7th Ave in Town of Golden	502028	5682396	05-08-23	1818	no OSPR	no	pole	RD	No sticks on platform.
5	13th Street S and 7th Ave in Town of Golden	502028	5682396	06-08-23	1610	no OSPR		pole	RD	No sticks on platform.
6	Hwy 95 S, at CP Railway Pond across from Day Road	504896	5679931	05-05-23	925	1 OSPR	Yes	pole	RD	
6	Hwy 95 S, at CP Railway Pond across from Day Road	504896	5679931	08-09-23	1315	2 OSPR		pole	RD	
7	Hwy 95 S, Champagne Road off Hwy 95S	505039	5679727	05-05-23	924	no OSPR	No	pole	RD	Never seen nest in use
7	Hwy 95 S, Champagne Road off Hwy 95S	505039	5679727	08-08-23	1320	no OSPR		pole	RD	

8	Hwy 95 S, near Lou's Feed Store	506900	5676032	05-05-23	921	1 OSPR		pole	RD	
8	Hwy 95 S, near Lou's Feed Store	506900	5676032	08-05-23	1325	1 chick	Yes	pole	RD	Volunteer saw 3 chicks early in season, something happened to two of them but not sure what. As for the lone remaining chick, as of Saturday Aug 5, volunteer saw chick try to take flight and ended up on the driveway and spent time under the nest. Uncertain what happened to it, but suspect it fledged.
9	Hwy 95 S at Horse Creek North end, Austin Rd	507395	5673513	05-05-23	915	no OSPR		pole	RD	Never seen nest in use, pole too low and surrounded by trees
9	Hwy 95 S at Horse Creek North end, Austin Rd	507395	5673513	08-08-23	1330	no OSPR	No	pole	RD	
10	Horse Creek rock quarry site	507213	5673280	05-05-23	915	no OSPR		pole	RD	
10	Horse Creek rock quarry site	507213	5673280	08-08-23	1340	no OSPR	No	pole	RD	
11	Hwy 95 S at Horse Creek South end	508317	5672306	05-05-23	914	1 OSPR		pole	RD	
11	Hwy 95 S at Horse Creek South end	508317	5672306	08-08-23	1342	1 chick	Yes	pole	RD	1 chick in nest
12	Hwy 95 S, South of Nine Mile Slough	509511	5671022	05-05-23	910	1 OSPR	No	pole	RD	

12	Hwy 95 S, South of Nine Mile Slough	509511	5671022	08-08-23	1350	no OSPR		pole	RD	
13	Hwy 95 S North of Judy's house; Hydro pole near VGSW colony at about 16kms	510210	5670318	05-05-23	905	1 OSPR	Yes	pole	RD	
13	Hwy 95 S North of Judy's house; Hydro pole near VGSW colony at about 16kms	510210	5670318	08-08-23	1356	3 chicks, 1adult		pole	RD	
14	Dickson Downs Rd at Judy Malones home	510846	5669517	05-07-23	1303	no OSPR	No	pole	RD	
14	Dickson Downs Rd at Judy Malones home	510846	5669517	08-08-23	1405	no OSPR		pole	RD	
15	Canadian Timberframes	513969	5667201	05-05-23	900	no OSPR	No	pole	RD	Never seen nest in use, no sticks on platform
15	Canadian Timberframes	513969	5667201	08-08-23	1407	no OSPR		pole	RD	
16	Hwy 95 S at McMurdo Slough	515333	5666384	05-05-23	855	1 OSPR	Yes	pole	RD	
16	Hwy 95 S at McMurdo Slough	515333	5666384	08-08-23	1415	1 chick, 1 adult		pole	RD	
17	Hwy 95 S, on east side of McMurdo Slough	515360	5666382	05-05-23	855	no OSPR	No	pole	RD	

17	Hwy 95 S, on east side of McMurdo Slough	515360	5666382	08-08-23	1415	no OSPR		pole	RD	
18	Columbia Valley B&B	515760	5665939	05-05-23	855	no OSPR	No	pole	RD	Never seen nest in use
18	Columbia Valley B&B	515760	5665939	08-08-23	1421	No OSPR		pole	RD	
19	Hwy 95 S, 1km south of Mons Road (25kms south of Golden)	517394	5664998	05-05-23	850	no OSPR	No	pole	RD	
19	Hwy 95 S, 1km south of Mons Road (25kms south of Golden)	517394	5664998	10-08-23	1423	no OSPR		pole	RD	
20	Hwy 95S, ~26kms south of Golden (2677 Hwy95)	518702	5663866	05-05-23	921	no OSPR	No	pole	RD	No sticks on platform
20	Hwy 95S, ~26kms south of Golden (2677 Hwy95)	518702	5663866	10-08-23	908	no OSPR		pole	RD	
21	Hwy 95 S, ~28kms south of Golden	520568	5661842	05-05-23	923	2 OSPR	Yes	pole	RD	1 in nest on eggs, 1 perched in tree nearby
21	Hwy 95 S, ~28kms south of Golden	520568	5661842	10-08-23	915	2 chicks		pole	RD	
22	Hwy 95 S, just north of Parson Store	522450	5659924	05-05-23	926	2 OSPR	Yes	pole	RD	1 in nest on eggs, 1 perched on pole nearby

22	Hwy 95 S, just north of Parson Store	522450	5659924	10-08-23	921	2 chicks, 1 adult		pole	RD	
23	Hwy 95 S, Timber Inn, Parson (MRC Lodge)	524531	5658477	05-05-23	929	no OSPR	No	pole	RD	Had seen Osprey here earlier this season.
23	Hwy 95 S, Timber Inn, Parson (MRC Lodge)	524531	5658477	10-08-23	923	No OSPR		pole	RD	
24	Hwy 95 S, south of Timber Inn, beside Wilfred's place	524988	5658171	05-05-23	933	2 OSPR	Yes	pole	RD	Two osprey in nest. One flew to bring food to the other laying on eggs in nest.
24	Hwy 95 S, south of Timber Inn, beside Wilfred's place	524988	5658171	10-08-23	924	1 chick		pole	RD	
25	Hwy 95 S, South of Parson School	526207	5657242	05-05-23	936	2 OSPR	Yes	pole	RD	Two osprey in nest. One incubating.
25	Hwy 95 S, South of Parson School	526207	5657242	10-08-23	1518	1 chick, 1 adult		pole	RD	
26	Hwy 95 S near Hildeguards house, about 250m above Hwy in field.	527816	5655758	05-05-23	939	1 OSPR	Yes	pole	RD	One Osprey incubating in nest.
26	Hwy 95 S near Hildeguards house, about 250m above Hwy in field.	527816	5655758	10-08-23	929	1 chick		pole	RD	

27	Hwy 95 S - 1	530941	5653663	05-05-23	942	No OSPR	No	pole	RD	platform has never been used. no sticks.
27	Hwy 95 S - 1	530941	5653663	10-08-23	931	No OSPR		pole	RD	
28	Hwy 95 S, Quinn Creek Campground	531948	5653113	05-05-23	943	1 OSPR	Yes	pole	RD	One Osprey incubating in nest.
28	Hwy 95 S, Quinn Creek Campground	531948	5653113	10-08-23	933	1 chick		pole	RD	
29	Hwy 95 S, McKeeman's	534149	5651579	05-05-23	947	2 OSPR	Yes	pole	RD	1 OSPR nearby chasing raven away. 1 OSPR incubating.
29	Hwy 95 S, McKeeman's	534149	5651579	10-08-23	936	1 chick, 1 adult		pole	RD	2 OPSR seen flying nearby, but unsure if they were fledglings. Probably one was. Monsanto crop just west of pole on other side of Hwy
30	Hwy 95 S - 2	536073	5650604	05-05-23	954	2 OSPR	Unknown	pole	RD	1 in nest on eggs, 1 perched on pole nearby
30	Hwy 95 S - 2	536073	5650604	10-08-23	1500	1 adult		pole	RD	1 adult calling in nest
31	Hwy 95 S, Ben Hynes Loop Rd	537904	5648337	05-05-23	958	1 OSPR	Yes	pole	RD	One Osprey incubating in nest.
31	Hwy 95 S, Ben Hynes Loop Rd	537904	5648337	10-08-23	944	2 chicks		pole	RD	
32	Near Westside Rd xing in Spilli - up hill off Hwy 95 S ~400m	544800	5639788	05-05-23	1011	1 OSPR	No	active hydro pole	RD	One Osprey incubating in nest. active hydro pole
32	Near Westside Rd xing in Spilli - up hill off Hwy 95 S ~400m	544800	5639788	10-08-23	945	no OSPR		active hydro pole	RD	
33	Spill xing east end	544566	5639534	05-05-23	1016	no OSPR	No	pole	RD	No sticks on platform

33	Spill xing east end	544566	5639534	10-08-23	945	no OSPR		pole	RD	Never seen occupied with OSPR, only CAGO
34	Brisco Pole Treatment Facility	550969	5630693	05-05-23	1030	2 OSPR	yes	pole	RD	One Osprey incubating in nest. one perched in nest.
34	Brisco Pole Treatment Facility	550969	5630693	10-08-23	1004	3 chicks		pole	RD	
35	Trescher's field near barn	549912	5630945	05-05-23	1040	2 OSPR	Yes	pole	RD	1 in nest on eggs, 1 perched on fence post nearby
35	Trescher's field near barn	549912	5630945	10-08-23	1012	1 chick, 1 adult		pole	RD	
36	Trescher's field west, on hydro line	549749	5630689	05-05-23	1042	2 OSPR	No	pole	RD	Both on nest.
36	Trescher's field west, on hydro line	549749	5630689	10-08-23	1012	no OSPR		pole	RD	
37	Edgewater	561204	5615921	05-05-23	1106	no OSPR	no	pole	RD	No sticks on platform.
38	Edgewater - across Sewage Treatment Plant	50.696011	116.157335	10-08-23	1404)	no OSPR	Unknown	Pole		Pole found this year, new to survey. Unsure if it was active. Many sticks on nest.
39	Radium xing	563761	5608098	05-05-23	1126	no OSPR	no	pole	RD	No sticks on platform.
40	Shuswap Band - Eagle Ridge (new nest)	50.533594	116.023092	21-06-23	1310	1 OSPR	Yes	pole	RD	Pole found this year, new to survey
40	Shuswap Band - Eagle Ridge (new nest)	50.533594	116.023092	10-08-23	1300	1 chick, 1 adult		Pole	RD	Pole found this year, new to survey
41	Athalmer - Pete's marina	569469	5596354	05-05-23	1311	no OSPR	no	pole	RD	
41	Athalmer - Pete's marina	569469	5596354	10-08-23	1146	no OSPR		pole	RD	

42	James Chabot Provincial Park	569268	5596096	05-05-23	1312	1 OSPR	Unknown	pole	RD	
42	James Chabot Provincial Park	569268	5596096	21-06-23	1148	1 OSPR		pole	RD	
42	James Chabot Provincial Park	569268	5596096	10-08-23	1145	no OSPR		pole	RD	Nest was active earlier in season; chicks could have fledged ahead of last survey date.
43	Between Rona and wetlands	569192	5596455	05-05-23	1318	2 OSPR	Yes	pole	RD	Both in nest, 1 incubating.
43	Between Rona and wetlands	569192	5596455	10-08-23	1150	1 OSPR		pole	RD	
44	Panorama Drive (new nest)	568306	5596632	05-05-23	1320	2 OSPR	Unknown	Pole	RD	Both in nest, 1 incubating.
44	Panorama Drive (new nest)	568306	5596632	10-08-23	1152	No OSPR		Pole	RD	Nest was active earlier in season; chicks could have fledged ahead of last survey date.
45	Near Rona in Invermere - off 7th Ave	568847	5596040	05-05-23	1320	2 OSPR	Unknown	pole	RD	Both in nest, 1 incubating.
45	Near Rona in Invermere - off 7th Ave	568847	5596040	10-08-23	1201	1 adult		pole	RD	only 1 adult seen, chicks could have fledged.
46	Nest pole near LWA office/prov gov't offices	568907	5595772	05-05-23	1331	1 OSPR	Unknown	pole	RD	Both in nest, 1 incubating.
46	Nest pole near LWA office/prov gov't offices	568907	5595772	10-08-23	1203	no OSPR		pole	RD	Could have fledged
47	Nest pole south of LWA office/prov gov't offices	569014	5595633	05-05-23	1332	No OSPR	No	pole	RD	

47	Nest pole south of LWA office/prov gov't offices	569014	5595633	10-08-23	1203	no OSPR		pole	RD	
48	Downtown Invermere, behind arena	569141	5595225	05-05-23	1423	2 OSPR	Unknown	pole	RD	Large nest.
48	Downtown Invermere, behind arena	569141	5595225	10-08-23	1212	no OSPR		pole	RD	Nest was active earlier in season; chicks could have fledged ahead of last survey date.
49	Dorothy Lake	569084	5594499	05-05-23	1338	No OSPR	yes	pole	RD	
49	Dorothy Lake	569084	5594499	10-08-23	1209	2 chicks, 1 adult		pole	RD	
50	Dorothy Lake - NE end	569135	5594673	05-05-23	1338	1 OSPR	No	pole	RD	First time seeing this nest in use.
50	Dorothy Lake - NE end	569135	5594673	10-08-23	1209	no OSPR		pole	RD	
51	Invermere Community Gardens (new nest)	567859	5595055	01-09-23	n/a	2 OSPR	yes	pole	JJ, ED	1 adult carrying fish to nest
52	RDEK offices - Windermere Loop Rd	572650	5593879	05-05-23	1146	No OSPR	No	pole	RD	CAGO nesting in nest.
52	RDEK offices - Windermere Loop Rd	572650	5593879	10-08-23	1053	No OSPR		pole	RD	
53	North of Winderberry Nursery	572182	5591459	05-05-23	1153	1 OSPR	Yes	pole	RD	in nest, likely on eggs.
53	North of Winderberry Nursery	572182	5591459	10-08-23	1058	1 chick, 1 adult		pole	RD	

54	Behind Winderberry Nursery	572223	5590766	05-05-23	1305	2 OSPR		pole	RD	One on nest, one nearby flying.
54	Behind Winderberry Nursery	572223	5590766	10-08-23	1120	no OSPR	No	pole	RD	Report from nearby landowner that this nest was not successful; in 2022 geese took over the nest and the osprey went elsewhere. In 2021 and 2023 they were harassed by crows and did not produce offspring. Prior to that they were very successful, sometimes raising 3 chicks.
55	Akisqnuk Offices - across the street	573056	5590459	05-05-23	1247	2 OSPR	yes	pole	RD	both in nest
55	Akisqnuk Offices - across the street	573056	5590459	10-08-23	1101	1 chick, 1 adult		pole	RD	
56	1858 Victoria Avenue	572131	5589834	05-05-23	1257	No OSPR	No	pole	RD	Few sticks on platform
56	1858 Victoria Avenue	572131	5589834	05-05-23	1102	No OSPR		pole	RD	Never been occupied. Pole is too low and surrounded by taller trees.
57	Wilmai Place	572387	5589995	05-05-23	1258	No OSPR	No	pole	RD	No sticks on platform. Never been in use. Too low to the ground
57	Wilmai Place	572387	5589995	10-08-23	1111	No OSPR		pole	RD	
58	Windermere Creek mouth	571559	5589936	05-05-23	1300	2 OSPR	Yes	pole	RD	One incubating.
58	Windermere Creek mouth	571559	5589936	10-08-23	1115	1 chick, 1 adult		pole	RD	

59	Akisqnuk Lakeshore Resort	575280	5587220	05-05-23	1253	2 OSPR	Yes	tree	RD	1 in nest, 1 flying near nest
59	Akisqnuk Lakeshore Resort	575280	5587220	10-08-23	1105	2 chicks		tree	RD	
60	Old tree nest, west side of Hwy	576455	5586835	05-11-23	1350-1400	2 adults	Yes	tree	BS, KS	One adult in nest one adult perched in tree
60	Old tree nest, west side of Hwy	576455	5586835	07-17-23	1400-1410	3 adults 2 juv		tree	BS, KS	2 adults flying , 2 juveniles feeding, 1 adult standing on nest
60	Old tree nest, west side of Hwy	576455	5586835	08-26-23	1300-1310	No OSPR		tree	BS, KS	empty nest (listened for osprey calls: nothing)
61	~400m N of #3 Rd, on Hwy 95	576820	5586340	05-11-23	1120	No OSPR	No	tree	BS, KS	Nest was gone.
61	~400m N of #3 Rd, on Hwy 95	576820	5586340	07-17-23	1315	No OSPR		tree	BS, KS	
61	~400m N of #3 Rd, on Hwy 95	576820	5586340	08-26-23	1250	No OSPR		tree	BS, KS	
62	#3 Rd on east side of Hwy 95 - Akisqnuk lands	577147	5585838	05-11-23	1110-1120	1 adult	Unknown	tree	BS, KS	One adult bird brooding
62	#3 Rd on east side of Hwy 95 - Akisqnuk lands	577147	5585838	07-17-23	1412 - 1417	1 adult		tree	BS, KS	Osprey was calling , standing on nest
62	#3 Rd on east side of Hwy 95 - Akisqnuk lands	577147	5585838	08-26-23	1315 -1325	1 adult		tree	BS, KS	I adult sitting on nest

63	North of Funtasia, west side of Hwy 95	578167	5583967	05-11-23	1400-1410	1 adult	Yes	tree	BS, KS	1 adult perching
63	North of Funtasia, west side of Hwy 95	578167	5583967	07-17-23	1305-1315	2 adults, 2 juveniles		tree	BS, KS	1 adult flying , 2 juveniles feeding, 1 adult standing on nest
63	North of Funtasia, west side of Hwy 95	578167	5583967	08-26-23	1235-1250	2 adults, 2 juveniles		tree	n/a	2 juveniles: 1 on nest, other in a tree about 30 m away, 2 adults soaring
64	Funtasia mini golf course	581331	5577284	05-11-23	1050-1105	1 adult	Yes	pole	BS, KS	1 adult brooding
64	Funtasia mini golf course	581331	5577284	07-17-23	1245-1300	2 adult , 1 Juveniles		pole	BS, KS	1 adult on nest, heard the other adult, 1 juvenile
64	Funtasia mini golf course	581331	5577284	08-26-23	1220-1230	2 adults		pole	BS, KS	2 adults flying, nest empty
65	Fairmont Airport 1	580121	5574869	05-11-23	1015-1020	No OSPR	No	pole	BS, KS	empty nest
65	Fairmont Airport 1	580121	5574869	07-17-23	1220-1235	No OSPR		pole	BS, KS	empty nest (can observe both platforms from one spot)
65	Fairmont Airport 1	580121	5574869	08-26-23	1153-1212	No OSPR		pole	BS, KS	empty nest
66	Fairmont Airport 2	580100	5575164	05-11-23	1020-1030	1 adult	Yes	pole	BS, KS	1 adult perched on side of nest
66	Fairmont Airport 2	580100	5575164	07-17-23	1220-1235	1 adult, 2 Juveniles		pole	BS, KS	1 adult standing, 2 juveniles in nest
66	Fairmont Airport 2	580100	5575164	08-26-23	1153-1212	2 adults		pole	BS, KS	2 adults perched on top of telephone poles (with scope saw yellow eyes)
67	Downey Farm (new nest)	580126	5574294	07-20-23	1745-1800	2 adults, 1 juvenile	Yes	pole	BS, KS	2 adults sitting on nest , 1 very small juvenile. Newly discovered nest in 2023.
68	Columere marina - Columbia Lake	580325	5571480	05-11-23	950-1010	1 adult		pole	BS, KS	1 adult sitting on nest

68	Columere marina - Columbia Lake	580325	5571480	07-03-23	1000	1 adult	No	pole	BS, KS	
68	Columere marina - Columbia Lake	580325	5571480	07-17-23	1205-1210	No OSPR		pole	BS, KS	empty nest
68	Columere marina - Columbia Lake	580325	5571480	08-26-23	1140	No OSPR		pole	BS, KS	empty nest
69	Lot 48 Nest 2	581933	5570426	05-05-23	1523	No OSPR		tree	Hayley MacDonald	Nest remains unfinished/damaged. However, one adult osprey was perched on the nest. Definitely not in any shape to hold eggs, and is in relatively close proximity to the active nest. Wondered if this osprey was “thinking about” rebuilding this nest.
69	Lot 48 Nest 2	581933	5570426	06-19-23	1301	No OSPR	No	tree	Hayley MacDonald	Drive by visit. Approached nest slowly and observed for 3 mins. No osprey present at nest.
70	Lot 48 Nest 1	582034	5570095	05-05-23	1430	1 OSPR		tree	Hayley MacDonald	1 adult at nest. Appeared to have been sitting low initially, although it flew off when we slowly approached.
70	Lot 48 Nest 1	582034	5570095	06-19-23	1328	No OSPR	Unknown	tree	Hayley MacDonald	Drive by visit. Approached nest slowly and observed for 5 mins. No adult osprey present during this timeframe, and no movement noted in nest.
71	Private property - SW end Columbia Lk -	581153	5563175	07-03-23	1000	1 adult	Unknown	pole	RD	Unable to survey a second time due to access constraints.

	boat access only for viewing									
72	Pole 53-02 Hydro Line above west side of Columbia Lk	580828	5565189	n/a	n/a	n/a	n/a	pole	n/a	Could not access, need 4X4
73	Pole 54-04 Hydro Line above west side of Columbia Lk	580912	5559630	n/a	n/a	n/a	n/a	pole	n/a	Occupied according to BC Hydro via Hayley MacDonald, but unsure of nest success.
74	Pole 53-04 Hydro Line above west side of Columbia Lk	580941	5557777	n/a	n/a	n/a	n/a	pole	n/a	Could not access, need 4X4
75	Canal Flats	585723	5555701	05-11-23	925-935	1 adult	Yes	pole	BS, KS	1 adult brooding , 1 adult flying close by
75	Canal Flats	585723	5555701	07-03-23	1130-1145	2 adult, 1 juvenile		pole	BS, KS	1 adult standing on nest, 1 adult flying near by, 1 Juvenile in nest
75	Canal Flats	585723	5555701	07-17-23	1110-1120	1 juvenile		pole	BS, KS	I juvenile (orange eyes) on nest. Note many construction trucks parked below.
76	Fairmont Sign	581343	5576494	05-11-23	1040-1050	1 adult	No	tree	BS, KS	1 adult perching
76	Fairmont Sign	581343	5576494	07-03-23	1237-1245	No OSPR		tree	BS, KS	empty, nest in disarray
76	Fairmont Sign	581343	5576494	07-17-23	1212-1220	No OSPR		tree	BS, KS	empty, nest on dead tree looks like it has cavity nesting birds in it.