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

Kootenay Connect: Columbia Wetlands, Year 2 (2020-2021)
Conservation Planning for Species at Risk in the Columbia Wetlands

Final Report

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Prepared for the Columbia Wetlands Stewardship Partners and Kootenay Connect, a project facilitated by the Kootenay Conservation Program

The Columbia Wetlands Stewardship Partners
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KCP Kootenay Conservation Program

Executive Summary

In the first year of Kootenay Connect (2019-2020) the Columbia Wetlands Stewardship Partners (CWSP) completed the first literature review of species at risk produced for the Columbia Valley. Following up in Year 2 (2020-2021), the CWSP narrowed its scope focusing on four at-risk species : western painted turtle, Lewis's woodpecker, osprey, and mountain goat; and one at-risk ecological community: alkali saltgrass-foxtail barley. These five components comprise CWSP's Year 2 project and results and recommendations for each sub-project are provided in this report. Overall, through the Kootenay Connect project the CWSP aims to raise awareness around species at risk and to identify biodiversity conservation opportunities in the Columbia Valley.

For the western painted turtle portion of the project, outreach materials were distributed requesting information from the public regarding their turtle observations in the Columbia Valley. In response, numerous people contacted the author to report western painted turtle sightings and location information for where they saw them. Most locations were visited by a field technician to determine if any turtles were present and to see if nesting sites and basking logs could be identified. Turtle observations were made and confirmed at 14 general locations and habitat surveys including a threat analysis were also completed at these sites. In total, we observed 123 western painted turtles and discovered 18 nest sites in the Columbia Valley. Our preliminary results show that the Columbia Valley has many more western painted turtles than had been previously reported. In terms of direct threats, nest predation was noted at several of the nest sites (thought to be mainly from skunks), road mortality was reported at two locations, recreational impacts were observed at two nest sites, and the details on specific sites lacking basking features was also recorded. Recommendations for conservation of turtles include the installation of basking logs and nesting site enhancement.

For Lewis's woodpecker, another at risk species, we completed point counts at 76 locations, including at all 57 Lewis's woodpecker nest boxes that were put up between 2014-2016. We observed that no nest boxes were occupied, 13 Lewis's woodpecker nests were located in 11 tree cavities and two hydro poles. We also completed primary habitat assessments to look for potential restoration opportunities. None of the locations can be submitted as Wildlife Habitat Features since no nests are on crown land, however BC Hydro has been made aware of the two hydro poles with active nest cavities within their right-of-way.

For osprey, a culturally valued species, three nest inventories were completed in the Columbia Valley. Sixty-five osprey nests were monitored and 19 of those produced fledglings, indicating that only 29% of nests were productive in 2020. In comparison, 27 nests produced fledglings (or 45% of nests) during surveys of 60 nests conducted in 2019 by the Columbia Wetlands Waterbird Survey, indicating a 16% reduction in nest successes from the previous year. We determined that only eight of the 65 osprey nests were tree nests. Pole nests can't be classified as Wildlife Habitat Features because those features aren't naturally occurring (i.e., poles are man-made features). In addition, the eight tree nests found (i.e., five on Indigenous lands and two on the Nature Conservancy of Canada's land) do not meet the requirement of Wildlife Habitat Features under the Forest and Range Practices Act (FRPA) because they do not occur on crown land.

For mountain goat mineral licks, a site visit to the Toby Creek goat lick was conducted to collect the requisite data to submit the lick as a Wildlife Habitat Feature. Additionally, information on another mineral lick in Canyon Creek near Nicholson was received from a local biologist. Data on both mineral licks were submitted to the province and these mineral licks are now listed as Wildlife Habitat Features under FRPA.

For the alkali saltgrass - foxtail barley ecological community, two days of inventory work were conducted to assess current distribution of this at-risk ecological community at three previously known occurrences near Canal Flats. We determined that these at-risk ecological communities are still present at all three sites. We assessed the different threats to each area and associated levels of disturbance, such as observed motorized use and cattle trampling. This data has been submitted to the province, as well as a proposal to designate two of these site occurrences which occur on crown land as Wildlife Habitat Areas.

The results of this Kootenay Connect Year 2 species and ecological communities at risk project has been combined with spatial occurrence data collected during the species at risk work for Kootenay Connect Year 1, as well as with new predicted upland-valley bottom wildlife corridors to inform conservation opportunities on private land adjoining the Columbia Wetlands. This exercise will allow Kootenay Connect and CWSP to identify key land parcels in the Columbia Valley that should be targeted by land trust organizations or receive increased landowner stewardship due to their habitat value for species-at-risk.

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1.0. Introduction

Kootenay Connect is a four-year project funded by Environment and Climate Change Canada in which over 25 Kootenay Conservation Program (KCP) partners are working together to enhance and restore habitat for species at risk in four locations situated within the Kootenay region. Kootenay Connect aims to enhance, restore, and manage large riparian and wetland complexes to support the recovery of numerous species at risk (SAR) and of conservation concern (Proctor & Mahr, 2019). The overarching goal is to maintain and enhance biological hotspots by focusing on habitat connectivity within and between valley bottoms and mountain ranges, where the main focus is the valley bottom riparian wetland.

Kootenay Connect is currently focusing on four key areas identified where KCP's partners have been active in conservation and stewardship. The Columbia Wetlands have been identified as one of the four key areas, and the Columbia Wetlands Stewardship Partners (CWSP) are one of the key partner groups that have been working in that area. The CWSP group was formed in 2006 and has been active on conservation and stewardship activities in the Columbia Valley. This group is made up of more than 30 diverse groups of community interests, Indigenous groups and government agencies, created to develop effective stewardship and management practices for the Columbia Wetlands and the Upper Columbia River. The partnership 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.

In year one (2019-2020) of Kootenay Connect, the CWSP completed a literature review of species at risk (SAR) in the Columbia Valley (Darvill, 2020a) that identified which SAR are found in the Columbia Valley in addition to what is currently known about SAR (including spatial information).This information was used to help identify biodiversity hotspots, linkage areas, and data gaps in our knowledge that would be necessary to fill to satisfy the overarching goal of the four-year Kootenay Connect project.

Year two of the CWSP's Kootenay Connect project focusing on SAR had six sub-components or sub-projects, that will be described in this report, whereas some aspects were completed by other contractors and will be described elsewhere. This report focusing on SAR is organized by sub-projects in order to describe research and analysis, and discuss recommendations for future conservation and stewardship actions in the Columbia Valley.

1.1. Lewis's woodpecker

The Lewis's woodpecker (LEWO) (*Melanerpes lewis*) is blue-listed in British Columbia, it was listed as Threatened by COSEWIC in 2010 and was listed as Threatened on Schedule 1 of the Species at Risk Act (SARA) in 2012. The LEWO is also listed as a species at risk under the B.C. Forest and Range Practices Act Identified Wildlife Management Strategy, which means that it requires special management attention by protecting Critical Habitat with special management guidelines such as Wildlife Habitat Areas (WHA), General Wildlife Measures (GWM) and Higher-Level Plans.

In Canada, breeding range for LEWO is only found within six geographic regions of southern British Columbia, the most northerly breeding location is within the East Kootenay Trench (B.C. CDC, 2015). In 2010, under the Forest and Range Practices Act the B.C. Ministry of Environment established three WHAs for LEWO in the southern end of the study area near Canal Flats (Environment Canada, 2014) (appendix 1). In 2017, under the federal 'Recovery Strategy for the Lewis's woodpecker,' three Critical Habitat areas were designated for LEWO within the Columbia Valley study area are not on federal lands

Dutch Creek burn, Findlay Creek burn, and Wilmer area (appendix 1) (Environment and Climate Change Canada, 2017). These were selected based on habitat suitability models and nesting occurrence data (Environment and Climate Change Canada, 2017).

Available occurrence data from Year 1 showed that there were additional LEWO observation sites outside of designated Critical Habitat or WHAs (Darvill, 2020a) (appendix 1). Based on recommendations that were made in Year 1 of Kootenay Connect (Darvill, 2020a), a LEWO inventory was completed at suspected or known nesting sites on private and crown land. The goal was to identify additional areas on crown land that could be designated as WHAs and to designate any nest trees on crown land as Wildlife Habitat Features (WHFs), as well as identify potential Critical Habitat expansion areas [required for SAR recovery actions under the Species at Risk Act (SARA)].

1.2. Alkali saltgrass – foxtail barley

The alkali saltgrass - foxtail barley (*Distichlis spicata - Hordeum jubatum*) is a blue-listed ecological community. There are less than 20 known occurrences of this at-risk ecological community in B.C. (Lea, 2004). It is also an ecological community at risk under the provincial Forests and Range Practices Act (FRPA), as such the WHA designation could apply to areas where it is found on crown land. There are four known locations in the Columbia Valley, one is on the Akisqnuk Indigenous Lands near Windermere, one is situated on private land near Canal Flats and two of the occurrences are on crown land (1.5 kilometers southwest of Doctor Creek/Lavington Creek confluence, and 1.1 kilometers west of Doctor Creek/Lavington Creek confluence) (B.C. CDC, 2012).

In 2020, three known locations were visited in to investigate whether this rare ecological community still existed at these locations, and what (if any) threats or disturbances exist. If the ecological community was still present at a site on crown land, CWSP planned to develop a WHA proposal to be submitted to the provincial government's Ministry of Forest, Lands, Natural Resource Operations and Rural Development (MFLNRORD)to protect this rare ecological community.

1.3. Mountain goat mineral licks

Mountain goat (*Oreamnos americanus*) are blue-listed in the province of B.C. Mountain goats are known to travel to salt licks during spring and summer (B.C. CDC, 1994). Under the Wildlife Act, any significant mineral lick can be designated as a Wildlife Habitat Feature (WHF) under FRPA. There are at least two known mountain goat mineral licks within the Columbia Valley, one in Canyon Creek and the other at Toby Creek. The CWSP project aimed to locate these two significant mineral links for mountain goats with field surveys and prepare the necessary documentation to apply for WHF designation of the licks by FLNRORD.

1.4. Osprey nest sites

Osprey (*Pandion haliaetus*) are not an at-risk species; they are a yellow-listed in the province of BC and are not listed federally under the Species at Risk Act. They are a culturally valued species and due to their proven sensitivity towards pollutants, they can be used as an indictor species of a changing environment. Three osprey nest surveys of the Columbia Valley were completed in 2020 at 65 nest sites, most of which were located and inventoried in 2019 (Darvill, 2020b). This inventory was done to determine if any nests met with WHF criteria (i.e., on crown land and natural nest feature; not on pole).

1.5. Western painted turtle

The western painted turtle - intermountain - Rocky Mountain population (*Chrysemys picta* pop. 2) is blue-listed in the province of B.C. It was listed as Special Concern by COSEWIC in 2006, then re-examined and confirmed in 2016 as Special Concern. It was listed as Special Concern on Schedule 1 of SARA in 2016. Habitat protection and road morality mitigation have been identified as priorities to conserve this species in B.C. (B.C. Ministry of Environment, 2017), but working toward those objectives requires additional knowledge of western painted turtles (WPT) and where important habitat areas such as basking and breeding sites are located.

Prior to 2020, monitoring or inventory work had not been completed for western painted turtle in the Columbia Wetlands. In 2020, CWSP aimed to determined where WPTs were nesting by soliciting sighting information from the public and following up with field investigations at the reported sites and at previously recorded locations (Darvill, 2020a). The objectives of the WPT sub-project were:

a. Determine if there are any current road mortality hotspots for WPT in the Columbia Valley.
b. Identify current nesting and basking habitat locations for WPT in the Columbia Wetlands.
c. Report on all potential threats at all locations where turtles were observed (and reported on) by the public.
d. Suggest potential habitat enhancement, restoration, or creation options that could be implemented in 2021-2022 to help maintain or increase the WPT population in the Columbia Valley.
e. Provide specific mortality mitigation and habitat creation/enhancement options to occur at specific locations.
f. Submit the data to the province in Species Inventory (SPI) format so that it can be incorporated into the CDC database and future development plans (e.g., RDEK Official Community Plans, Columbia Wetlands Wildlife Management Area Management Plan) to help guide future decisions regarding development in the valley.

1.6. Priority of lands for conservation

Year 1 of the Kootenay Connect project provided the first comprehensive list of species at risk in the approximately 180-kilometer-long Columbia Valley (from Canal Flats to Donald). The corresponding report summarized research conducted to date for bird, plant, mammal, reptile and amphibian SAR (Darvill, 2020a). The report summarized data for: 35 bird species, 2 amphibian species, 2 reptile species, 9 mammal species, 7 vascular plant species, 2 fish species, 6 invertebrate species, 1 fungus species, 1 lichen species (Darvill, 2020a). There are also at least at 26 at-risk ecological communities present in the Columbia Valley (Darvill, 2020a; Durand, 2021). This CWSP sub-project aimed to identify priority lands for conservation by combining all of the spatial data gathered in Year 1 and Year 2 (i.e., LEWO, at-risk ecological communities, mineral licks, western painted turtle, osprey), along with the new spatial information completed for wildlife corridors in the Columbia Valley (Proctor, 2021).

Wetlands are well known to provide a number of ecosystem values, services and functions (e.g., flood management, water purification) and anthropogenic values (e.g., timber collection, fisheries, tourism). Wetlands support areas of intense biodiversity and genetic resources (Denny, 1994) and “freshwater ecosystems are the ultimate biodiversity hotspot” (Mittermeirer & Mittermeier, 2010). They contain a greater concentration of life than anywhere else. Additionally, spatial data indicates that the valley bottom (Columbia Wetlands) provides habitat for dozens of species at risk and at-risk ecological

communities, including western painted turtle, horned grebe (*Podiceps auratus*), bank swallow (*Riparia riparia*), northern leopard frog (*Lithobates pipiens*), and narrow-leaf willow Shrubland (*Salix exigua* Shrubland). As such, the Columbia Wetlands as a whole was assessed a biodiversity hotspot in the Columbia Valley, but CWSP identified specific priority lands for biodiversity conservation opportunities (BCOs) within this valley bottom biological hotspot. These should become priorities for the CWSP/KC in terms of further conservation action in future years.

2.0. Study Area

The Columbia Valley (UTM: 535767; 5649168) is 54,9058 hectares in size and situated in the Rocky Mountain Trench in southeastern British Columbia, Canada (figure 1). The study area is a diverse ecosystem comprised of a wide variety of habitat types including montane, subalpine, grasslands, riparian areas and wetlands, and freshwater rivers and lakes. The Biogeoclimatic zones within the Columbia Valley study area are Engelmann spruce-subalpine fir, interior cedar-hemlock, interior Douglas-fir, montane spruce and interior mountain-heather alpine. The Columbia Valley is the unceded traditional territory of the Ktunaxa Nation (including ?Aqam and Akisqnuk bands), Secwepemc Nation(including the Shuswap Indian Band) and Metis Nation Columbia River.

Situated in the valley bottom, the Columbia Wetlands are considered one the largest contiguous wetlands complex in western North America and the largest within the southern interior of BC (Hammond, 2007). The wetlands are an important refuge for species which rely on wetlands for important stages of their life history. They have been identified as an essential habitat component of the Pacific Flyway, which in North America is the westernmost primary migratory bird corridor (Wilson, 2010). This ecosystem plays an important role as migration stopover habitat for birds (Kaiser, McKelvey & Smith, 1977), providing a refuge where birds can fuel up and rest during the necessary long migratory flights requiring substantial amounts of energy. The Columbia Wetlands and valley bottom also provides vital habitat for breeding birds and for a number of ungulate, mammal, amphibian, reptile, invertebrate, fish and plant species – a number of which are imperilled.

Figure 1. The study area as depicted within British Columbia.

3.0. Methods

3.1. Lewis's woodpecker

Point counts were conducted at three LEWO nest site occurrences reported through the B.C. Conservation Data Centre (CDC) and identified through eBird (appendix 1), as well as at 57 LEWO nest box sites that had been erected by the Windermere Rod and Gun Club between 2014-2016. In total, we conducted 76-point counts at all suspected and previously known nesting sites. Point counts were conducted on June 23 and 29, and July 3, 7 and 9, 2020. Maps and UTM coordinates were used to navigate to the pre-defined survey points. The weather conditions were recorded and the nest box/cavity content (if known), as well as the general habitat type (ponderosa pine, burn, riparian cottonwood, or other, % shrub cover, % grass cover). LEWO were looked for in the area at each point count location for a set time of 15 minutes.

3.2. Alkali saltgrass – foxtail barley

One field visit to each of the three known occurrence sites happened on August 5 and 6, 2020. The sites were walked and assessed for current plant association distribution, potential impacts and threats, and to ensure the at-risk ecological communities still existed at these locations. Previous inventory at these sites took place in 2014 by Iverson, K. and A. Haney and the resulting data is available on the CDC website.

3.3. Mountain goat mineral licks

A site visit was made to the Toby Creek goat lick with a nearby landowner on November 4, 2020. During the site visit UTMs of the salt lick were collected, photographs and notes were taken. The Canyon Creek goat lick was not visited in 2020, but a habitat biologist that had previously collected data on this goat lick was used for the WHF submission process. In December 2020, application for both mineral licks were submitted into the provincial governments online 'Wildlife Habitat Future Reporting' system.

3.4. Osprey

The first of three rounds of nest observations were undertaken on May 6 and 7, 2020. The second group of nest observations were undertaken between July 25 and 17. This second round of observations was determined to be the best windows to count early-hatched young preparing to fledge (leave the nest). Observations continued for a time frame of at least five minutes at each nest, as this is the amount of time between rest periods that chicks are thought to move about with detection of movement being the most useful parameter to determine nest occupancy (Moore & Arndt, 2016). The final visit took place on August 24 and 25. The first round of surveys were completed by volunteers and the second two round of surveys were completed by a registered professional biologist (R. Darvill) and volunteers who completed surveys at some specific nesting locations (e.g., Lot 48).

3.5. Western painted turtle

3.5.1. Soliciting sighting information from the public

A poster was developed to solicit the public for reporting information on sighting locations of the western painted turtle (WPT) in the Columbia Valley (Appendix 11). Additionally, in order to solicit a response from the public, a press release was drafted and sent to The Golden Star and Columbia Valley Pioneer newspapers, and to conservation organizations such as the Kootenay Conservation Program, Columbia Mountain Institute, Wildsight Golden and Columbia Wetlands Stewardship Partners for

inclusion into their respective newsletters and eblasts. Volunteer networking was also used in addition to social media (Facebook) posts. All of the people that contacted CWSP with WPT sighting information were asked a series of questions over the phone or social media, or were emailed to collect additional information on their sightings in a standardized fashion. We asked the following questions about the WPT sighting(s) with all responses recorded in an excel format:

When you see turtles on land:

a. What are the turtles doing when you observe them (travelling, nesting, etc.)?
b. What was the date of the sighting?
c. What was the time of day?
d. Where were the turtles located? (UTMs if possible)
e. What direction were the turtles generally moving (cardinal directions)?
f. How often do you observe turtles? (very frequent, occasional, rare, never)
g. Where do you live?
h. Where were you observing the turtles from? (from your property, out for walk, paddling, etc.)

3.5.2. Conducting western painted turtle inventories

Western painted turtle (WPT) monitoring followed the Resources Information Standards Committee (RISC) 'Inventory Methods for Pond-breeding Amphibian and Painted Turtle' (Province of BC, 1998). 'Time-constrained searches' were conducted, they can be useful when a lot of study area must be covered (Province of BC, 1998). Surveys conducted were opportunistic and the level of intensity was relatively simple (WPT presence/not detected), which was useful as a preliminary approach. This approach was taken during the breeding and basking season because animals are easier to detect due to increased activity.

Field inventories were conducted between mid-May and late-August/early September 2020 to coincide with the active period for WPT. Searches took place on sunny days when turtles are likely to be basking. Heavy rains, high winds, or very dark overcast conditions that reduce visibility were avoided. The focus for the field surveys was on breeding ponds and riparian habitats where the target species were likely to be found (i.e., reported locations and easily accessible areas). Using binoculars, ponds were inventoried thoroughly for basking turtles. Appropriate environmental conditions and habitat information was recorded. Field data that was collected included:

- coordinates (UTM and dec degrees) at each location of a sighted turtle
- total survey time at each site
- habitat information at most locations where WPT were observed and/or reported by volunteers
- potential threats at all locations where turtles were located, or had been reported from the public
- each threat at each site was assessed with special attention given to how any potential habitat changes or threats may influence basking, breeding and foraging habitat

3.6. Priority of lands for conservation

Using QGIS (Version 3.10.1 A Coruña) CWSP spatially combined all results from the SAR occurrence work done in Year 1 (Darvill, 2020a) with spatial occurrences from the 2020 field work done in the Columbia Valley [i.e., barn swallow and bank swallow nest sites (Darvill, 2021), western painted turtle, Lewis's woodpecker, osprey nests), as well as Old Growth Management Areas (legal and non-legal polygons). Additionally, a spatial layer with the results used to identify east-west connectivity (Proctor, 2021) was added along with a recently completed Columbia Wetlands mapping project that shows the specific locations for five at-risk ecological communities in the valley bottom (figures 2, appendices 2-10) (Durand, 2021). This combined spatial knowledge along with layers used to identify land jurisdictions and professional knowledge to identify potential threats and concerns, enabled for appropriate private land parcels to be identified for future conservation actions or 'biodiversity conservation opportunities' (BCO). The BCO layer spatially and qualitatively defines (and gives priority too) conservation action(s), i.e., acquisition, restoration, stewardship, zoning, etc.

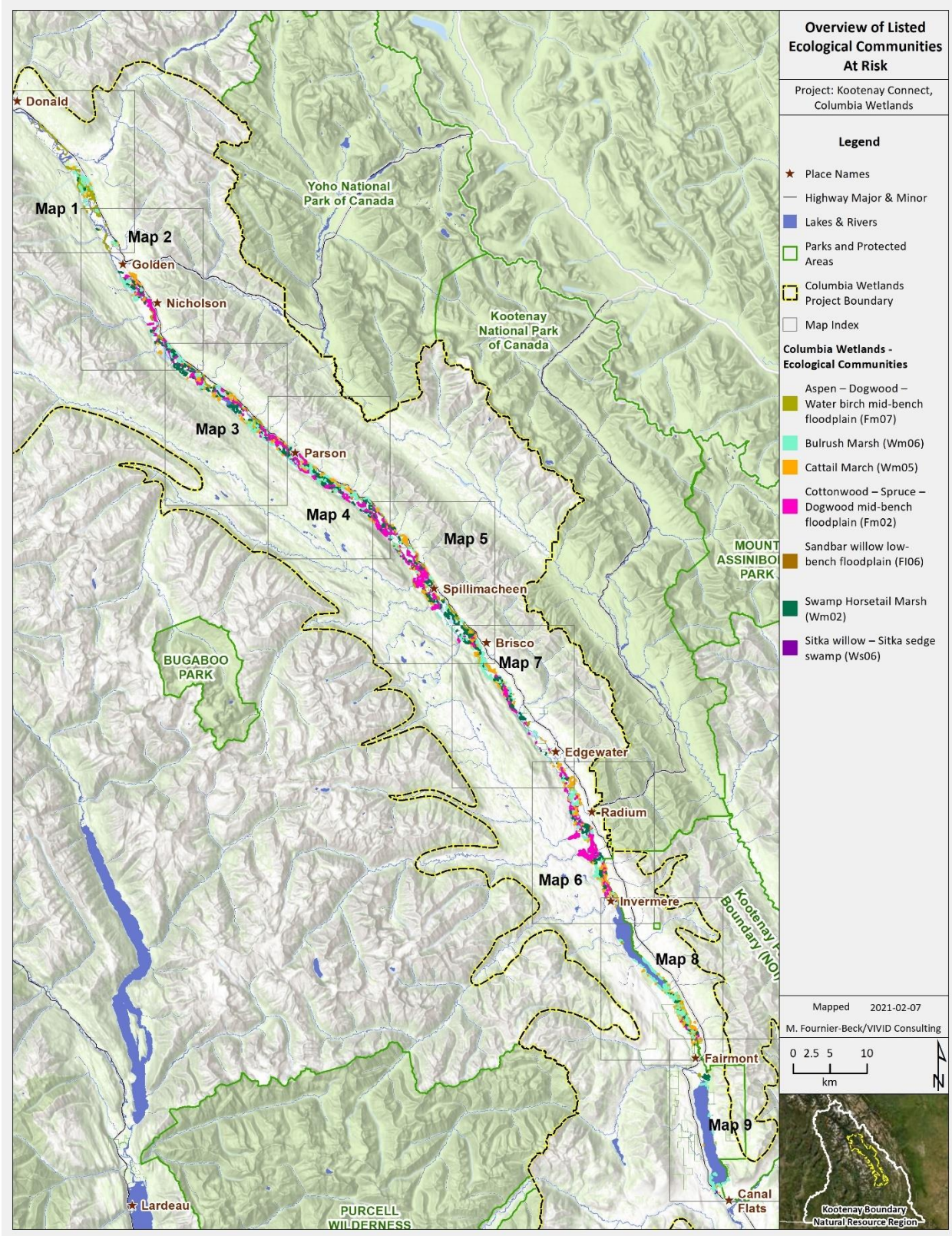

Figure 2. At-risk ecological communities in the Columbia Wetlands.
Note: A breakdown of at-risk ecological communities (Maps 1-9), is shown in Appendices 2-10.

4.0. Results and outcomes

4.1. Lewis's woodpecker

We completed point counts at 76 locations in the Columbia Valley, including at all 57 Lewis's woodpecker nest boxes that were put up between 2014-2016. Data can be found in appendix 12. No nest boxes were occupied with LEWO, but 13 active LEWO nests were located in 10 tree cavities, 1 LEWO condo (figures 4 and 5) and 2 hydro poles. Five of the 11 nest boxes installed for LEWO on the Zehnder Farm (in Invermere) were occupied, but four had European Starlings in them and one had a Mountain Bluebird. Excluder devices were put up on some of the nest boxes on the Zehnder Farm, but they were not adequately maintained (i.e., correct timing window for putting them out and taking them down were not followed due to lack of capacity). We informed BC Hydro of the two hydro poles where nests were located in 2020 and also provided BC Hydro representatives with a link to the Wildlife Habitat Features Field Guide (Kootenay Boundary Region) information so that best practices could be applied and followed at those nests' sites.

There are a number of nests (and suitable nest trees) located in a gated community in Fairmont, where some trees were cut down on private land (in LEWO Critical Habitat) during the fall of 2020 without a Development Permit (DP). This private land is within an Environmentally Sensitive Area (ESA) in the Regional District of East Kootenay's (RDEK) Fairmont Officially Community Plan (OCP). The area is designated as an ESA because it of its importance to LEWO (within federally defined Critical Habitat). A CWSP contract biologist was asked by the RDEK if it were possible to have the landowners undergo some LEWO compensation work (e.g., erecting nest boxes) for cutting suitable nesting trees down an ESA without a DP. Since there is no evidence to show the LEWO nest boxes have been effective, the possibility of erecting LEWO condo's (figure 4 and 5) in the Fairmont gated community was suggested as a potential compensatory action. Nearby private landowners in this same Fairmont gated community constructed and erected a human-made 'LEWO condo' in 2020. A cottonwood tree that came down in a wind storm was cut up the pieces were secured together using wire, which was then rigged up using a pulley system to get the logs up (figure 5). It was found that it the 'condo' was occupied by LEWO shortly after it was put up. There were three cavities in the 'condo' when erected, but the LEWO preferred making their own cavity in this erected tree.

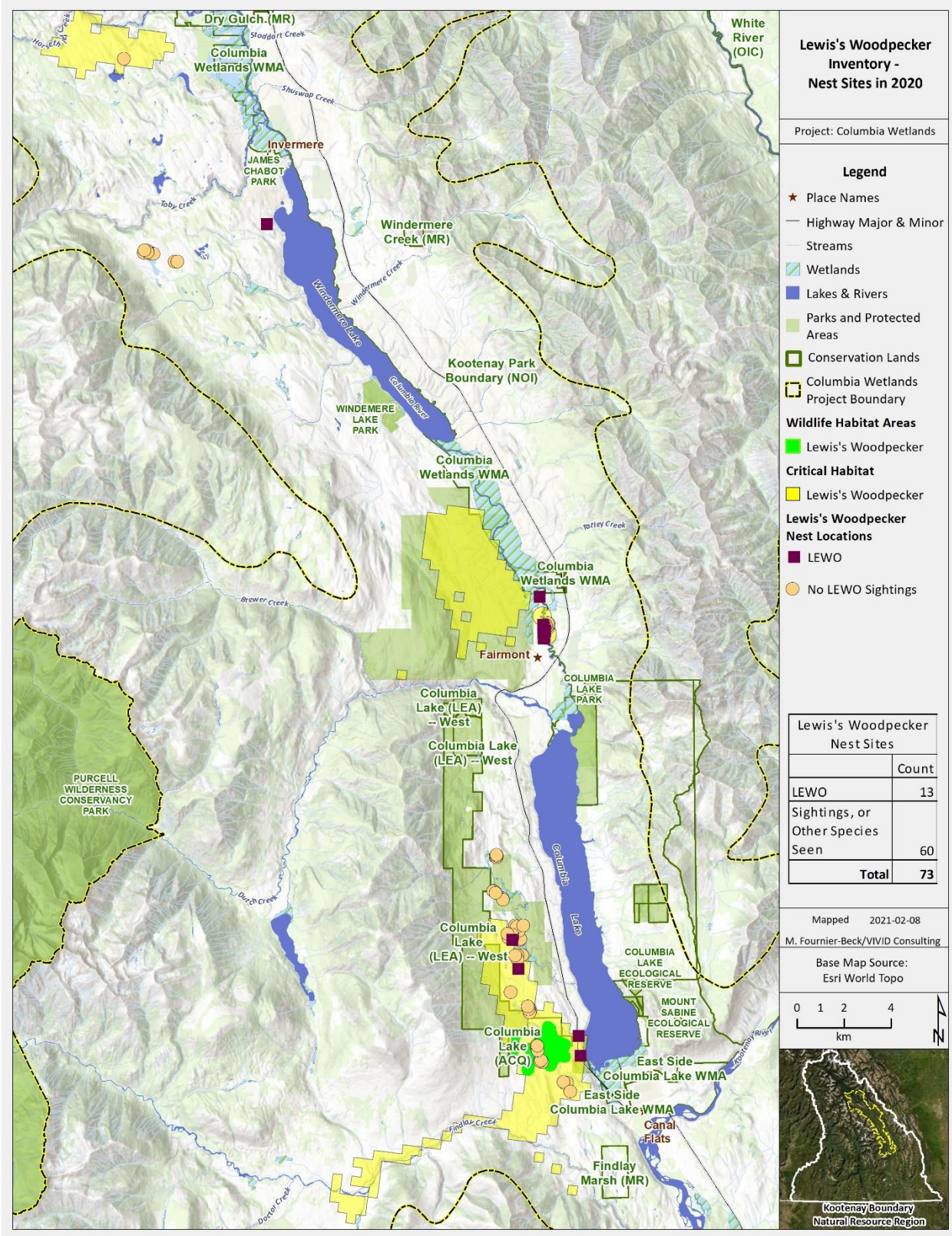

Figure 3. Point count locations for Lewis's Woodpecker in 2020, including identified nest sites.

Figure 4. Lewis's Woodpecker at entrance of active nest cavity at re-rested LEWO condo.

Figure 5. Re-erected Lewis's Woodpecker nest cavity that was activity used once erected.

4.2. Alkali-saltgrass – foxtail barley

Two of the four occurrences of alkali-saltgrass-foxtail barley situated in the Columbia Valley occur on crown land. A 'Wildlife Habitat Area Form for Multiple Proposals' was completed for these two occurrences and sent to Ministry Staff on February 9, 2021 including the map in figure 6. Additionally, an accompanying document was created providing more detail on each site, including photographs of cattle trampling and motorized impacts that were recorded at each sites with the at-risk ecological community. Examples of the types of disturbance recorded are seen in figures 7-10.

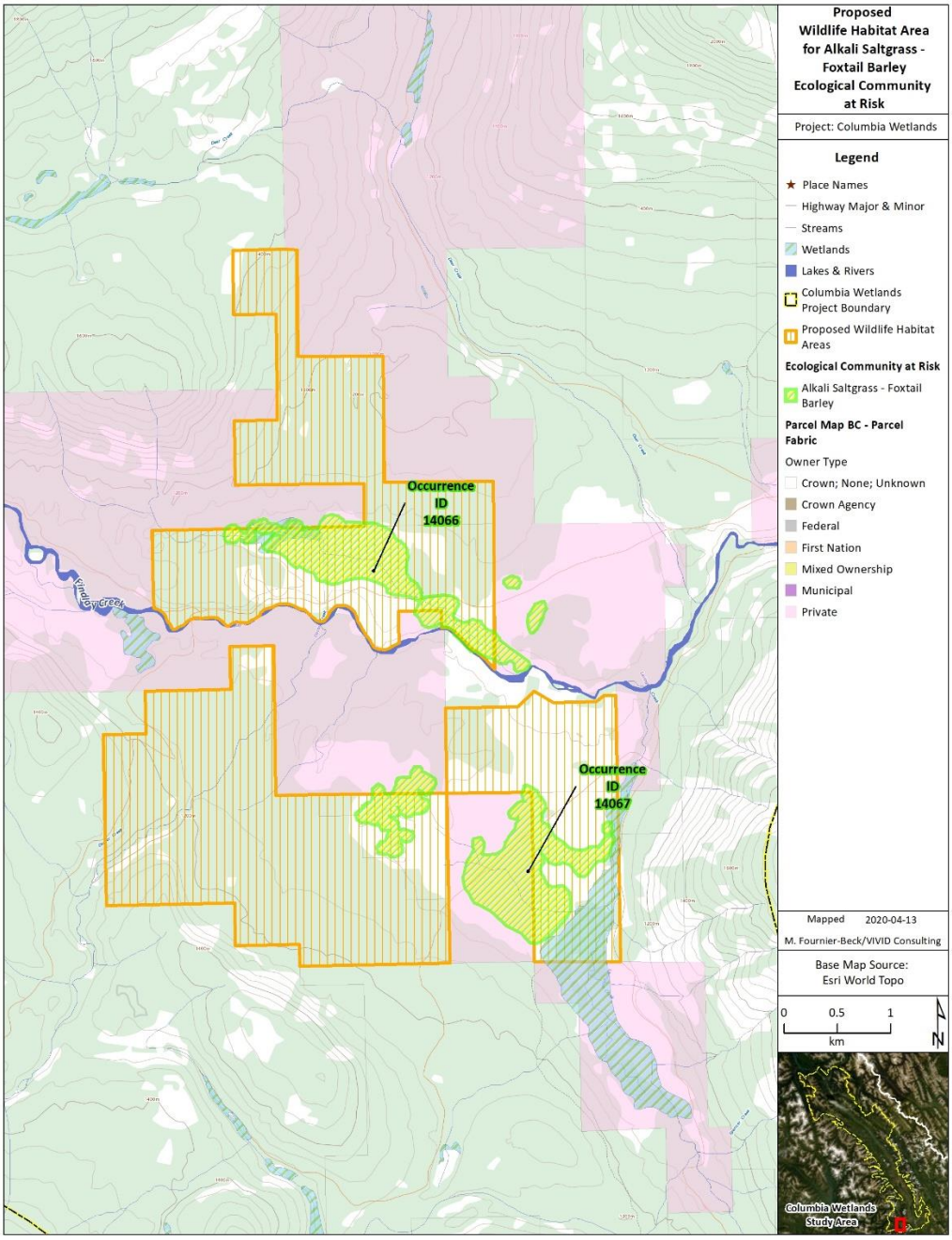

Figure 6. Map of the alkali-saltgrass-foxtail barley at-risk ecological community occurrences that are being proposed as Wildlife Habitat Areas.

Figure 7. Cattle tramping at an alkali-saltgrass foxtail barley ecological community.

Figure 8. Dirt road leading and going through the north end of occurrence ID # 14067.

Figure 9. Extensive alkali saltgrass present at the site, occurrence ID #14067.

Figure 10. Some alkali-saltgrass still persists despite extensive cattle trampling at the site off Findlay Creek FSR.

4.3. Mountain goat mineral licks

For mountain goats, a site visit was made to the Toby Creek goat lick on November 4, 2020 (figure 11). The early snowfall in 2020 prevented a field visit to the mineral lick at Canyon Creek in 2020. Data on a mineral lick at Cedar Creek was previously collected by a local biologist. Data on both mineral licks were submitted to the province though the online wildlife habitat feature process.

Figure 11. Mountain goat mineral lick at Toby Creek.

4.4. Osprey

We monitored 65 nests in 2020 and 19 of those produced fledglings (figure 12). The data from 2020 monitoring activities can be found in appendix 13. In comparison with data collected during surveys conducted in 2019 by the Columbia Wetlands Waterbird Survey (Darvill, 2020b) a 16% reduction in nest successes was found in 2020 when compared to data from the previous year (figure 12). It was beyond the scope of this project to determine why nest success was lower in 2020. We also determined that only 8 of the 65 nests were tree nests, most of those remaining nests were on hydro poles erected by BC Hydro.

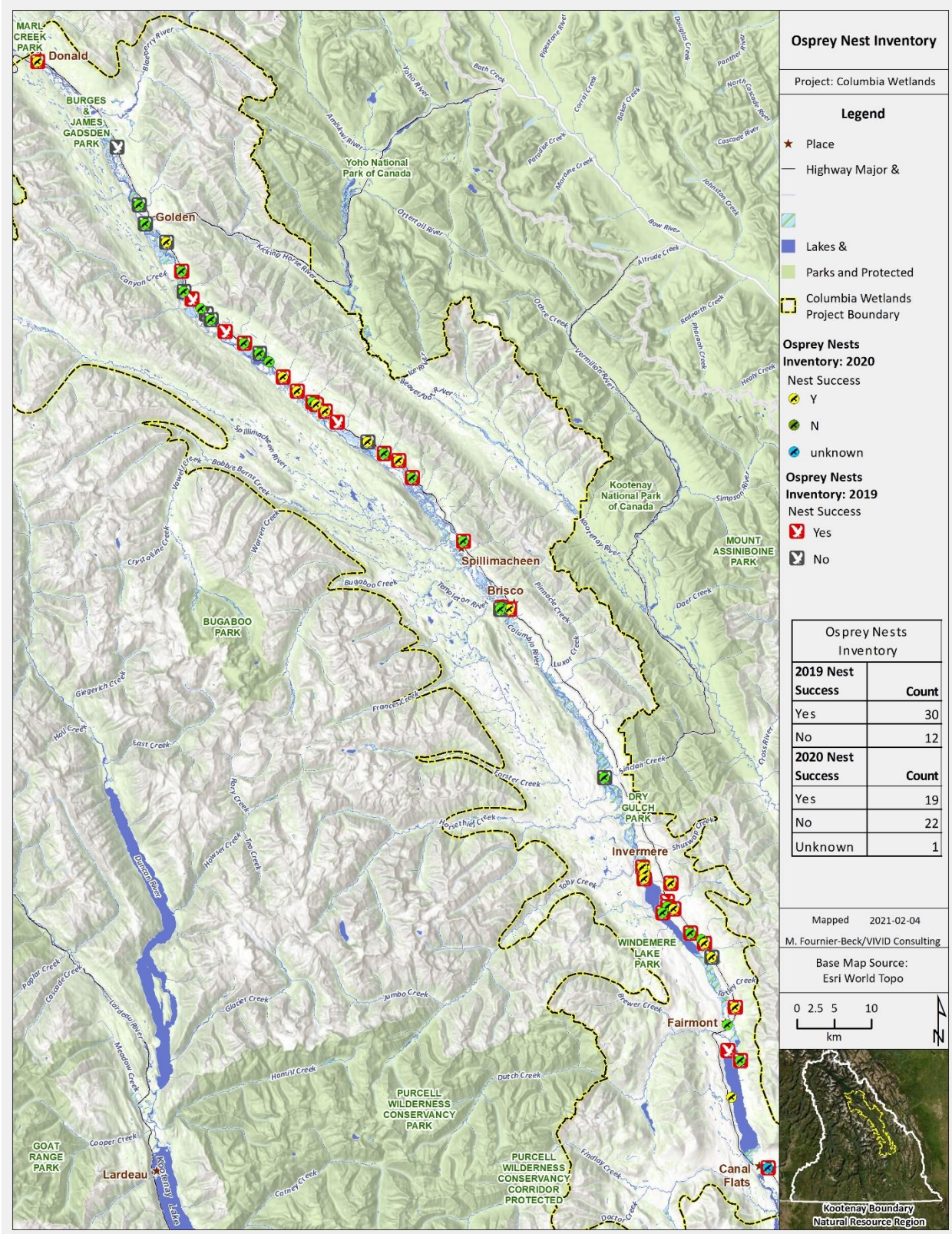

Figure 12. Osprey nest locations indicating the nest success for 2019 and 2020.

4.5. Western painted turtle

The outreach materials distributed that requested information from the public regarding their turtle observations in the Columbia Valley resulted in 51 people contacting the CWSP in response, with western painted turtle (WPT) sightings and location information for 88 locations. Some of these locations (e.g., Westside Road in Spillimacheen, Parson River Crossing, Athalmer Slough, etc.) had multiple reported sites within each general location (figure 13).

In total, 123 WPT observations were made in the field by CWSP in the year 2020. At least 12 important locations for turtles were identified (table 1) and 18 WPT nest sites were discovered. Habitat surveys (including a threat analysis) were completed at each of the main (general) locations. Nest predation was noted at several of the nest sites (e.g., Columbia National Wildlife Area – Wilmer Unit, Westside Road in Spillimacheen, Zehnder Farm, Greywolf Pond), road mortality was reported at two locations (Lake Enid, Westside Road in Spillimacheen), recreational impacts were observed at two nest sites (Columbia National Wildlife Area – Wilmer Unit, Armstrong Bay – Columbia Lake) (table 1). Comments on specific sites that were observed to lack basking features was also recorded. Detailed information on each of the 2020 field observations(including the habitat surveys) can be found online in the provincial data warehouse for wildlife species inventories (SPI).

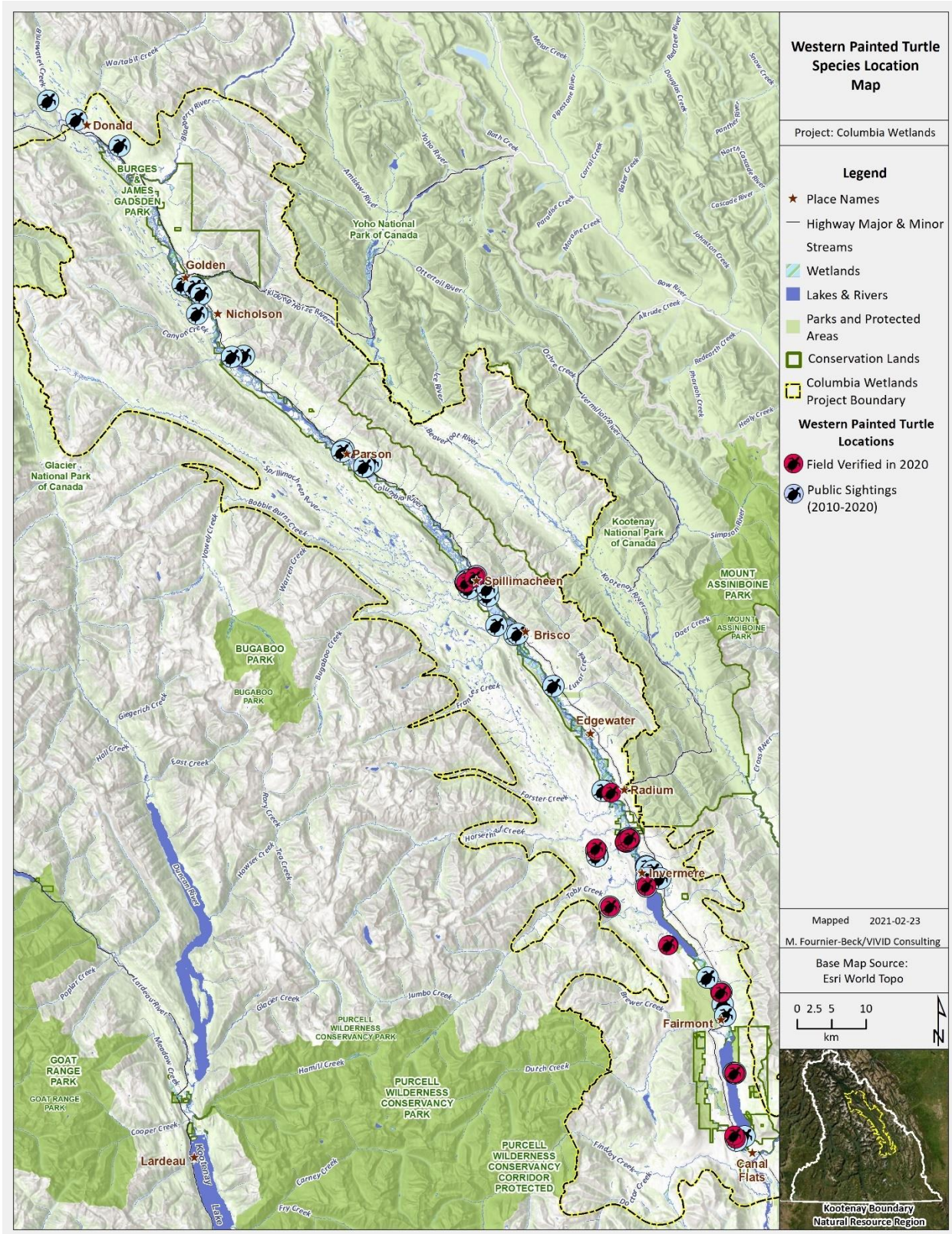

Figure 13. Map showing the locations of western painted turtle in the Columbia Valley.

Table 1. List of important western painted turtle locations in the Columbia Valley.

General locations for WPTs	Nest predation observed	Sufficient basking habitat	WPT observed in 2020	Road mortality reported	Additional concerns or threats	Land Jurisdiction	Conservation Opportunties
Columbia NWA (Wilmer Unit)	yes	yes	yes	no	dogs off leash	NWA- Federal gov't	1) Regulation in plave with enforement and signage in NWA; must have dogs on leash in NWA. 2) Re-route walking trail so that it doesn't go through known nest beds.
Lake Enid	no	yes	yes	yes	Increasing levels of recreation use. Signs of motorized activity and illegal camping on north side of lake. Baking logs being removed from the lake for firewood.	Provncial crown land; Provincial Recreation Site	Work with BC Trails and Recreation and Wildsight Invermere (they have an interpritive trail and signage at lake Lake Enid to help with camper education, stewardship and mortality reduction.
Raven's Nest Campground	no	unknown	yes	no	New campground. Opened summer 2019. WPT seen in 2 campsites in 2020 with fresh soil, as if baby turtles had emerged, in addition to possible fresh nest.	Aquisqnik Indiginous Band	Stewardship and education at new campground. Brochure and sigage could be developed for campground owners to put up.
Greywolf Pond	no	yes	yes	no	Neareby gravel parking area and paved road may pose mortality concerns.	Private land	Work with private landowner and Greenways - the organization who created the Westside Legacy Trail. They are interested in adding turtle information to their website.
Radium Mill Pond	no	no	yes	no	Nesting beach likely destroyed (in 2019) with creation of Radum Boat Launch. Doesn't appear to be adequate nesting habitat, unless turtles try nesting on side of gravel road directly by pond. Also, plenty of tall grass and shrubs to be in but no leaf litter (required).	WMA - provincial	Install basking logs. Nest habitat creation, to comptensate for nesting area lost when creating the Radium Boat Launch.
Westside Road - Spillimacheen	yes	yes	yes	yes	Skunk predation seen, mortility on road, steep gravel slope probably gets reshaped by machinery. Well used floating dock lies in the water just beyond a gravel nesting area with people walking directly through the nesting area.	Mixed (private, MoT, WMA)	1) Create nesting area(s) with fencing into water at each fence end to detour predators and WPT road crossings neseccary to get to one of the current nesting areas. 2) Learn the MoT the maintemce schedule for road reshaping, work with them to have most appropriate timing window to do this work. 3) Develop plan to better accomodate both WPT nest area and floating dock for humans at east end of Westside Road.
SW Columbia Lk	no	no	yes	yes	Potential subdivision development	Private land	Purchase land for conservation. Also Lewis's woodpercker nest trees present on this land.
Zehnder Ranch	yes	yes	yes	no	Limited nesting habitat. Skunk and ground squirrel predation evident.	Private land	Enhance nesting area with gravel and erect fencing around nesting site to help keep out predators.
Armstrong Bay	yes	no	yes	no	Hiking/biking trail in area is heavily used; trail is unauthotrized. Motorboats on other side of bullrush where turtles bask (180 m away) and basking area is very close to a trail (50 m). Non-motorized users go into bay and easily spook WPT.	WMA - provincial	1) Re-route trail away from nesting area. 2) Install basknig logs. 3) Get regulatulation for no human use inside the bay (also need sigange).
Dorothy Lake	no	no	yes	no	Busy trail around lake with a fountain in centre. Wildsafe BC person saw people feeding and touching turtles; they put sign up saying no feeding.	RDEK	Installing basking logs as current logs are very crowed with WPT.
Parson River Crossing	unknown	unknown	no	WPT moved off road	unknown	Mixed (WMA, Canfor, private	Site needs further investigation.
Reflection Lake	unknown	unknwn	no	WPT moved off road	unknown	Mixed	Site needs further investigation.

4.6. Priority of lands for conservation

A shapefile, list, and associated justifications for high priority candidate biodiversity conservation opportunities (BCOs) for the valley bottom of the Columbia Valley has been created. The CWSP identified lands within the valley bottom (biodiversity hotspot) that should become priorities for the CWSP/KC in terms of further conservation action in future years. For instance, private land acquisition for conservation, addition of lands to the Columbia Wetlands Wildlife Management Area, private parcels provide habitat for at risk species - stewardship and education should occur. This data is sensitive and will not be shared publicly in this report.

5.0. Discussion and Recommendations

5.1. Lewis's woodpecker

A goal of CWSP's project was to identify additional areas that could be designated as WHAs and to designate LEWO nest trees on crown land as WHFs by making submission to the province (appendix 14). However, no WHAs or WHFs can be designated as a result of 2020 inventories because none of the nest sites occurred on crown land (as stated above, WHAs and WHFs only apply on crown land). We also worked to identify potential Critical Habitat expansion areas required for SAR recovery actions under the Species at Risk Act. A summary table in appendix 14 show the various types of protections sought, and their status.

There are two nest sites from 2020 that fall outside of the previously known area of LEWO occupancy and thus are outside of currently identified Critical Habitat (figure 3); one was at a nest located in Invermere, the other was found north of the current Critical Habitat area in Fairmont. Representatives at Environment and Climate Change Canada's Canadian Wildlife service were recently contacted to see if it is possible to expand the LEWO Critical Habitat boundaries into these two areas. "Critical Habitat expansion would occur in either amendment to the recovery strategy or when an action plan is written. Neither is likely to happen in the short-term unfortunately as documents are prioritized, cycles are lengthy, and review/posting process can be slow" (Eric Gross, personal communication, March 3rd, 2021).

Fungal inoculation treatment methods have been used to create wildlife tree habitat (Manley & Manning, 2017; Manning, 2008; Manning, 2010), with the intent to restore and maintain habitat for LEWO and other wildlife tree dependent species, such as flammulated owl and other woodpecker species. Wildlife tree creation can benefit and provide habitat for over 70 species of wildlife in B.C. (Fenger et al., 2006; Manning, 2017). Effectiveness monitoring of the fungal inoculation has shown that treatments are useful as a wildlife habitat enhancement tool (Manning & Manley, 2014). We conducted primary habitat assessments to look for potential restoration opportunities such as fungal inoculation or burning opportunities. Given that there has been a documented habitat decline for LEWO in the study area, and that fungal inoculation can take several years before a tree will become suitable for cavity excavation, it is recommended that wildlife tree creation using this methodology could continue on the Thunderhill Ranch property owned by the Nature Conservancy of Canada. It is advised to speak with contractors whom have expertise in the area of wildlife tree creation for their opinion on best options for treatment areas; conservation lands should be prioritized for fungal inoculation treatment since investment of creating trees on undesignated crown land is risky (treated trees could be logged or taken for firewood).

Some of the LEWO next boxes were facing trees or bushes and could be reoriented to face more open (little vegetation) areas. However, since none of the LEWO boxes were shown to be occupied by LEWO in 2020, and they are placed high up on trees (making access challenging), this should not be considered a priority. It was suggested that CWSP have some of the LEWO nest boxes closed off with excluder devices from August until May to decrease other species using them (Irene Manley, personal communication, January 19, 2021); this idea could be explored further.

In 2021 we will continue to work with private landowners in Fairmont in regards to concerns over continued destruction of breeding habitat of gated community. Neighborhood residents have requested a brochure and poster be developed for them to distribute in their neighborhood in regards to LEWO. For Critical Habitat located on non-federal lands (as is the case for the Fairmont gated community), "if the Minister of the Environment forms the opinion that any portion of Critical Habitat is not protected by provisions in or measures under SARA or other Acts of Parliament, and not effectively protected by the laws of the province or territory, SARA requires that the Minister recommend that the Governor in Council make an order to extend the prohibition against destruction of Critical Habitat to that portion. The discretion to protect Critical Habitat on non-federal lands that is not otherwise protected rests with the Governor in Council" (Environment Canada, 2017). Protecting the non-federal land (designated as LEWO Critical Habitat) in this way should be considered. It is also recommended that future point counts for LEWO be conducting up the Findlay Creek Forest Road in order to locate potential nesting trees on crown land that could be designated as WHFs, or where WHAs or Critical Habitat areas could be expanded. There is excellent LEWO habitat in that area.

5.2. Alkali-saltgrass – foxtail barley

The Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD) is working on regulations that would protect alkali saltgrass - foxtail barley plant associations, in addition to 13 additional ecological communities that are slated for protections under the Forest and Range Practices Act (FRPA). Confirmation of the establishment of WHA's for this at-risk ecological community near Canal Flats is being awaited (appendix 14). Once WHAs are established for these occurrences, the current threats facing these sites (cattle tramping, motorized use), needs to be addressed with measures in place that are outlined in the Lea (2004) document, such as: do not develop trails and roads, rehabilitate current roads, plan livestock grazing. The alkali-saltgrass should also be fenced off to prevent cattle trampling and the further degradation and destruction of these rare plants. CWSP should continue to pursue this with the province to ensure that cattle fencing occurs.

5.3. Mountain goat mineral licks

Both the Toby Creek and Canyon Creek mineral licks are listed as Wildlife Habitat Features as the applications submitted were successful (appendix 14). Now special management tools under the Forest and Range Practices Act may provide some protection for these important features.

5.4. Osprey

The osprey nests built on hydro poles cannot be classified as Wildlife Habitat Features because they are not naturally occurring features. Of the eight tree nests, five are on Indigenous lands, and two are on The Nature Conservancy of Canada's Land. Only one nest is on crown land, but that nest is found within the Columbia Wetlands National Wildlife Area and therefore is already afforded protection under that status. Thus, WHF status cannot be applied to any osprey nests in the Columbia Valley since they are not natural features on crown land.

Ospreys are sensitive to chemical pollutants and because of this they make excellent indicator species for the surrounding ecology (Henny, 1983). Since a significant reduction in nest success was noted over two years of observation (2019, 2020), it is recommended that osprey surveys continue in 2021 including special consideration given to the possible reasons for this noted population decline.

5.5. Western painted turtle

For the western painted turtle (WPT) portion of the larger CWSP/KC project, much was learned about turtles in the Columbia Valley in 2020, especially knowledge about some specific locations in the Columbia Valley that provide important basking and/or nesting habit. It as also determined that far more WPT reside is the Columbia Wetlands than was previously known or documented. As of 2015, there were only three known locations of WPT in the Columbia valley according to the B.C. Conservation Data Centre (Darvill, 2020a). Now with at least 12 locations of important habitat identified, there are a number of priority actions that can be taken to ensure that the Columbia Wetlands continues to function as important habitat for at-risk WPT. For instance, the availability of suitable nesting habitat was identified as a limiting factor for turtle populations in the Spillimacheen area (along Westside Road where it bisects the wetlands), and road mortality is also a concern there. At Zehnder Farms, there is little habitat available with suitable nesting substrates and road mortality is a concern as road exposure exists close to water bodies occupied by WPT.

We had planned to scout potential nesting locations according to suitable habitat estimation in the Columbia Valley, but given the limited resources, high number of locations that were provided by the public, and the vast spatial scale of the Columbia Wetlands, we did not complete WPT inventories at all areas of suitable habitat. The areas that were more accessible and potentially impacted were prioritised since the goal of the years 3 and 4 of this CWSP/KC project is to implement on the ground conservation activities.

5.5.1. Nesting habitat

Without suitable nesting sites to lay eggs, WPT are unable to produce viable offspring to regenerate and strengthen their existing population (Beckmann et al., 2015). Turtles have made extensive use of the Westside Road in Spillimacheen for nesting: they nest on a private residences' driveway and their lawn, along the edges of Westside Road, in gravel piles around the main bridge that goes over the Colombia River, and in a sandy area of the Columbia that has a floating dock and is popular for swimming. In order to reach the nesting sites, they travel to and across the landscape making WPT at risk from roadkill, predation, and other sources of mortality on Westside Road. Turtles are most vulnerable while nesting or traveling to and from these nesting sites (COSEWIC, 2006) and WPT tend to respond well to nest sites placed in safer locations, i.e., away from a road (Dulisse, 2017).

To mitigate threats at Westside Road in Spillimacheen, nest habitat enhancement (bringing in suitable nest substates) will occur at a safer location in 2021. To reduce road mortality and decrease nest predation, exclusion fencing will be installed around the enhanced nest bed by CWSP (working with private landowners) to keep the WPT from crossing the road and to help keep out predators. It is important to monitor the use of the enhanced habitats by turtles and apply adaptive management as needed, therefore effectiveness monitoring will occur.

During the 2020 WPT inventory work it was noted that there is limited nesting habitat present at the Zehnder Farm, and skunk and ground squirrel predation is evident at the current WPT nest site. In 2021, we will enhance the nesting area with suitable substrates and we will erect fencing around the nest site to help keep out predators.

5.5.2. Basking habitat

Turtles need to obtain heat from their environment to thermoregulate. They need to actively seek out warm microhabitats and bask in the sun to elevate their body temperature, which is particularly important in spring and fall when ambient temperatures are low (COSEWIC, 2006). Basking can occur several times a day, usually for several hours at sunrise (before feeding occurs) and sometimes again in the afternoon and evening (Beckmann et al., 2015). Basking is a required part of a turtle's life history, it raises a turtle's body temperature to a suitable level, which is required for foraging and mating (Beckmann et al., 2015). Raising body temperature also helps turtles digest their food, provides an essential source of Vitamin D, and it helps reduce ectoparasites on the turtles' body (Engelstoft & Ovaska, 2011). The amount of basking required by a turtle varies with temperature (i.e., less basking with warmer ambient temperature), age (juveniles appear to need to bask less), and activity (females appear to bask longer prior to the nesting season) (COSEWIC, 2006). CWSP looked for suitable basking habitat during all WPT surveys in 2020. A deficiency of basking sites in certain areas could force turtles to compete with predators or other larger animals that are also more aggressive than the WPT, for basking sites (Umphrey et al., 2012).

The deficiency of basking sites was noted at particular locations in the Columbia Valley in 2020 (Table 1). Given the crucial requirement of basking habitat, this indicates that deploying basking structures at select sites would be of use to WPTs in the Columbia Valley. It is recommended that basking sites be added to areas where these features have been shown to be lacking through inventory work (i.e., Armstrong Bay, Dorothy Lake, Radium Mill Pond).

It will be important to ensure that placement of basking logs will be in areas where they will not receive disturbance and predation threats from the shoreline. Previous projects have had challenges associated with basking substrate anchoring (e.g., anchor not heavy enough and substrate gets born to shoreline) vegetation in growth, and water-logging of the boards (e.g., Umprey et al., 2012). Therefore, the specific locations at select sites, the anchoring strategy and durability of basking logs will be strongly considered before deployment in 2021. The installation of basking structures will encourage the health and reproductive success of WPTs in the Columbia Valley.

5.6. Priority of lands for conservation

Wetlands with their associated high levels of biodiversity face disproportionately high levels of threat around the world. As a result, the worlds largest wetlands have now become some of the largest conservation priorities in the world (Keddy et al., 2009). Maps and lists of biodiversity conservation opportunity (BCO) areas in the valley bottom have been shared with the Kootenay Connect. This information will be shared with Kootenay Conservation Program's (KCP's) securement committee, local land trusts, regional district planners, and provincial government. It is recommended to provide information to partners in 2021 with a verbal explanation of the BCO spatial and qualitative information,

i.e., with a workshop to interest groups that highlights selected BCOs. A number of groups should be involved with this initiative moving forward (e.g., Farmland Advantage, Wildsight, KCP, Windermere Rod and Gun Club, The Nature Trust of BC, The Nature Conservation of Canada, etc.). Delegating conservation priorities and opportunities to a number of different groups will help ensure that conservation of this biodiversity hotspot (Columbia Wetlands) continues and persists for species at risk and for future human generations. A key recommendation is to collaborate with Indigenous groups in the area so that Indigenous traditional knowledge (cultural and ecological) can be used to help prioritize (and identify additional) priority lands within the Columbia Valley.

6.0. Acknowledgements

I would like to acknowledge that this work has occurred on the traditional and unceded territory of the Ktunaxa Nation, Secwepemc First Nation, and Metis Nation Columbia River. Gratitude is extended to the vast number of individuals that contributed their time and submitted observations, especially on the western painted turtle. The public sighting contributions have been of immense value to learning more about locations important to western painted turtle and to other species at risk in the Columbia Valley. Thank you to Verena Shaw who was hired for her naturalist skills and for doing much of the data entry work. Thank you to Nicole Trigg whom helped me develop the video that accompanies this report and to Marcy Mahr for coordinating Kootenay Connect efforts and for editing this document. Thank you to Marie-Ange Fournier-Beck of Vivid Consulting whom turned the data into maps. Thank you to Ryan Durand who did all the mapping work in the Columbia Wetlands. Also, my gratitude goes out Dr. Suzanne Bayley and Dr. Michael Proctor whom helped guide me along through this research process.

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The cover photos for this report feature western painted turtle, ospreys at a nest, Lewis's woodpecker and a mountain goat mineral lick. All photos taken by Rachel Darvill in the Columbia Valley in 2020.

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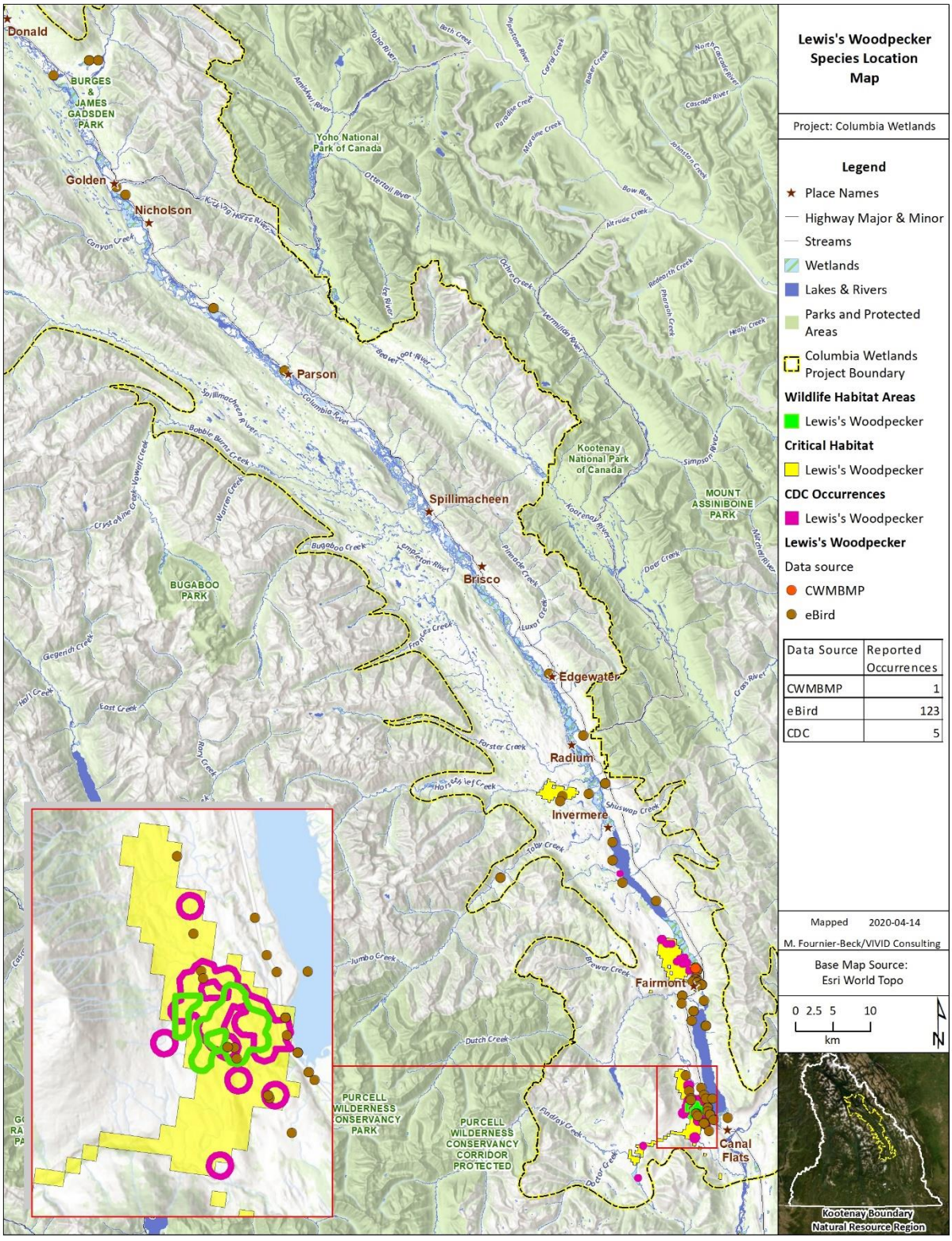
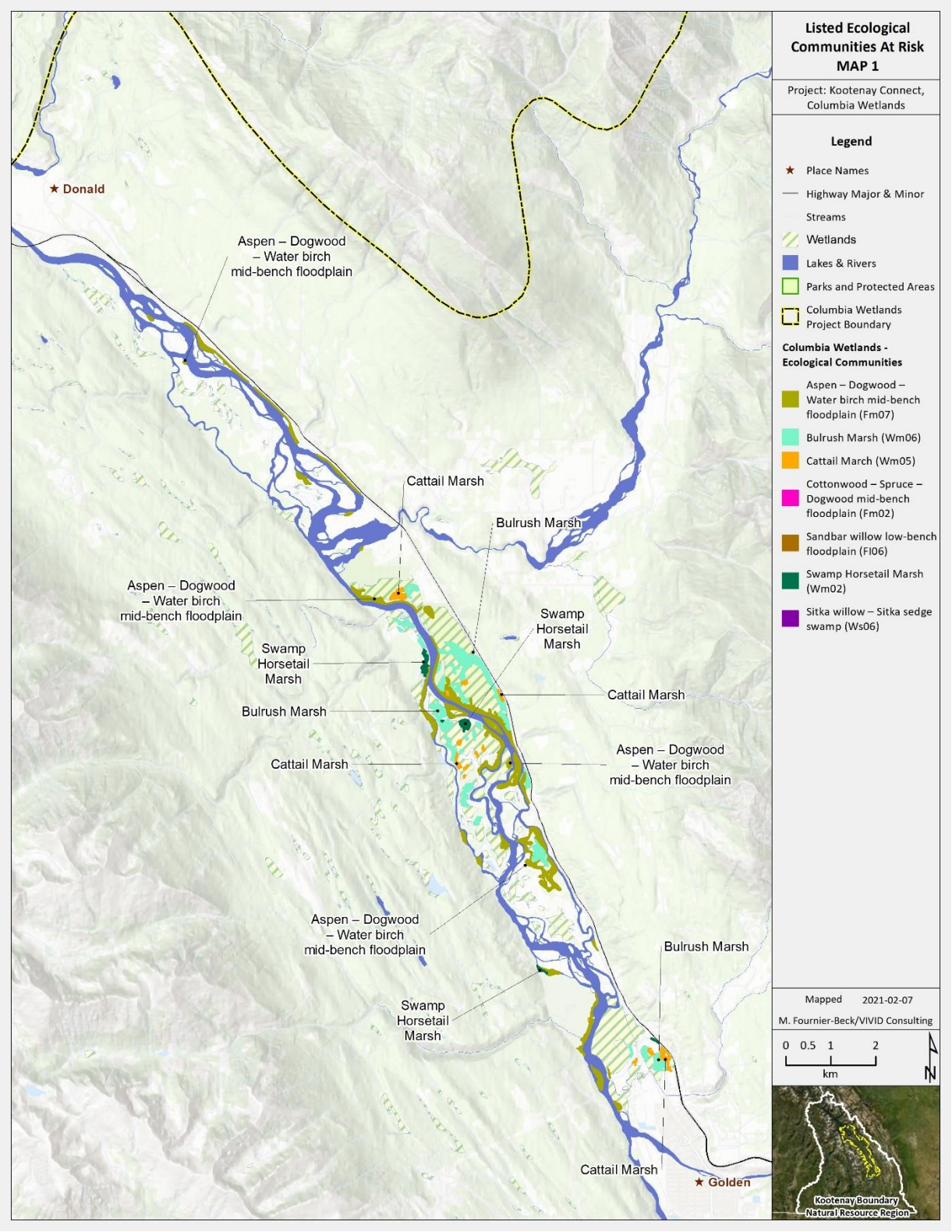
8.0. Appendices

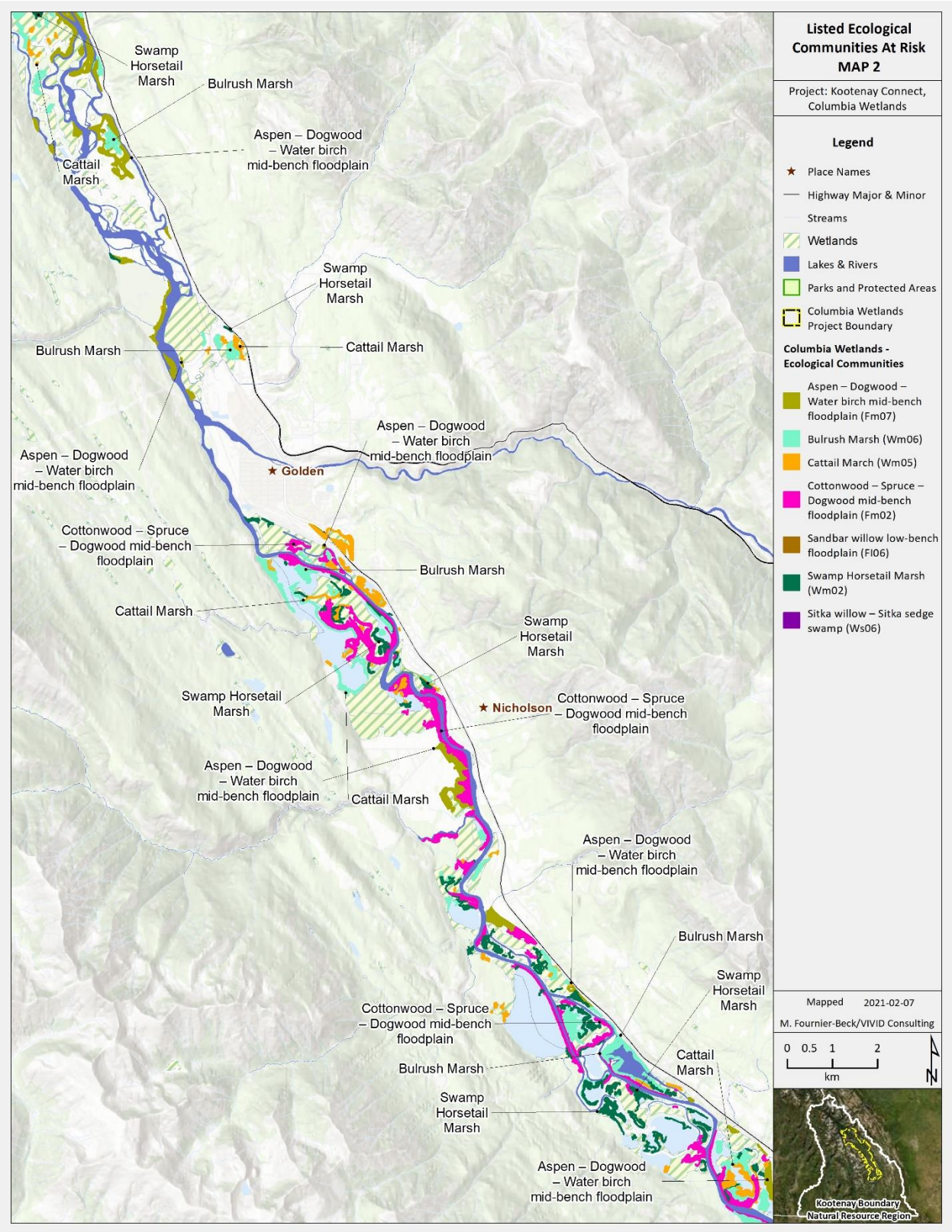
Appendix 1. Map indicating Lewis's Woodpecker Wildlife Habitat Areas 2019-2020.



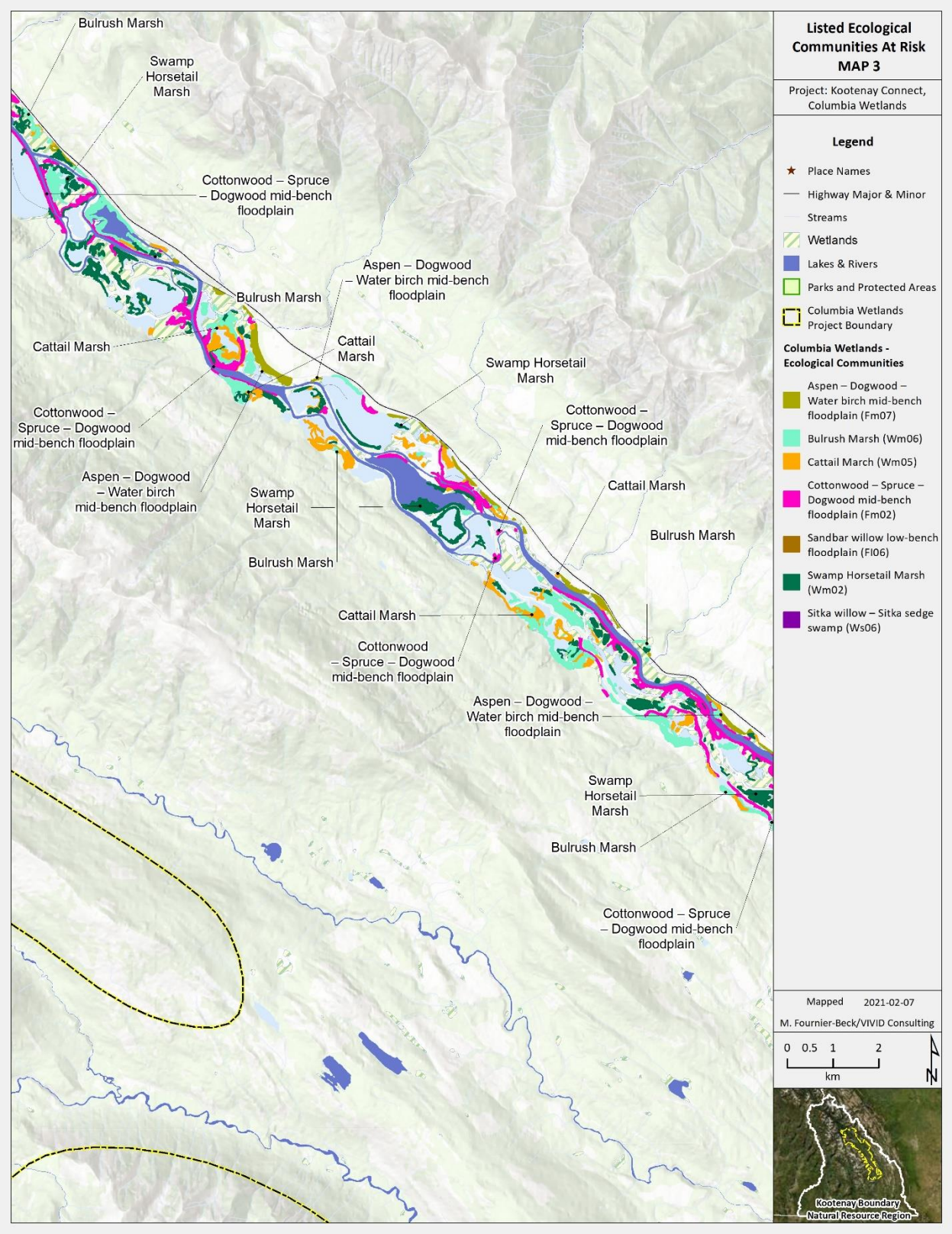
Appendix 2. At-risk ecological communities in the areas of the Columbia Wetlands between Donald and Golden.



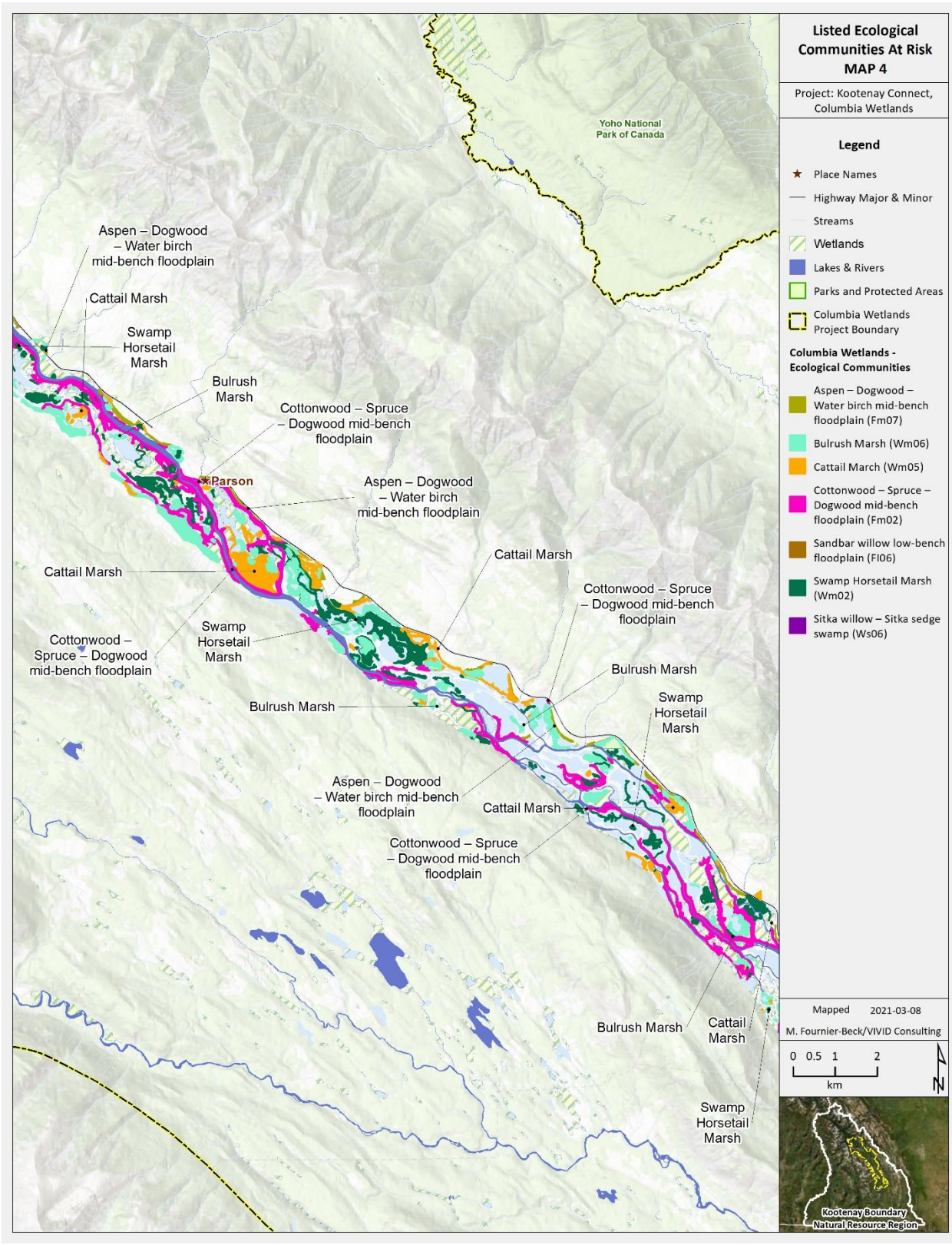
Appendix 3. At-risk ecological communities in the areas of the Columbia Wetlands near Golden and Nicolson.



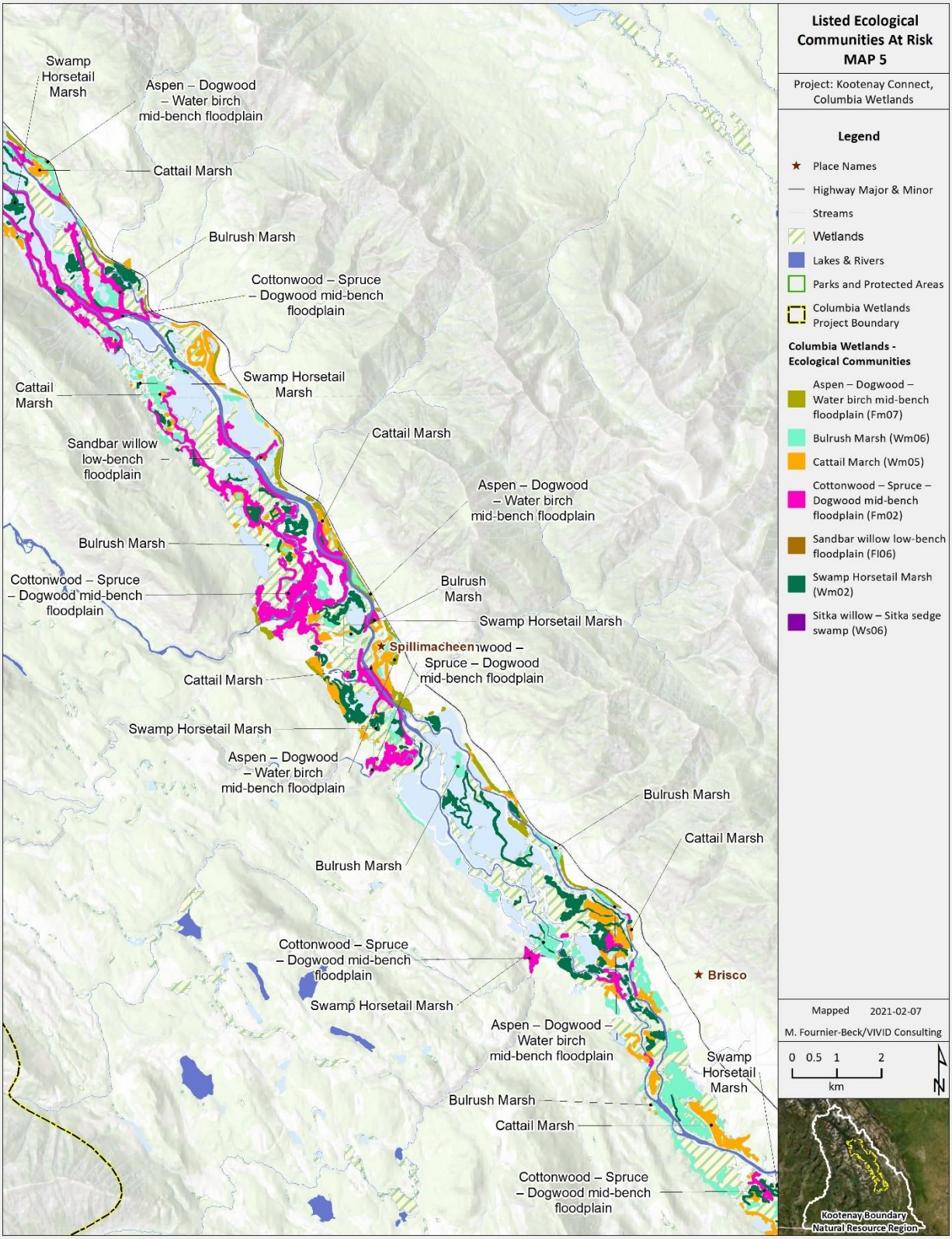
Appendix 4. At-risk ecological communities in the areas of the Columbia Wetlands south of Horse Creek to north of Parson.



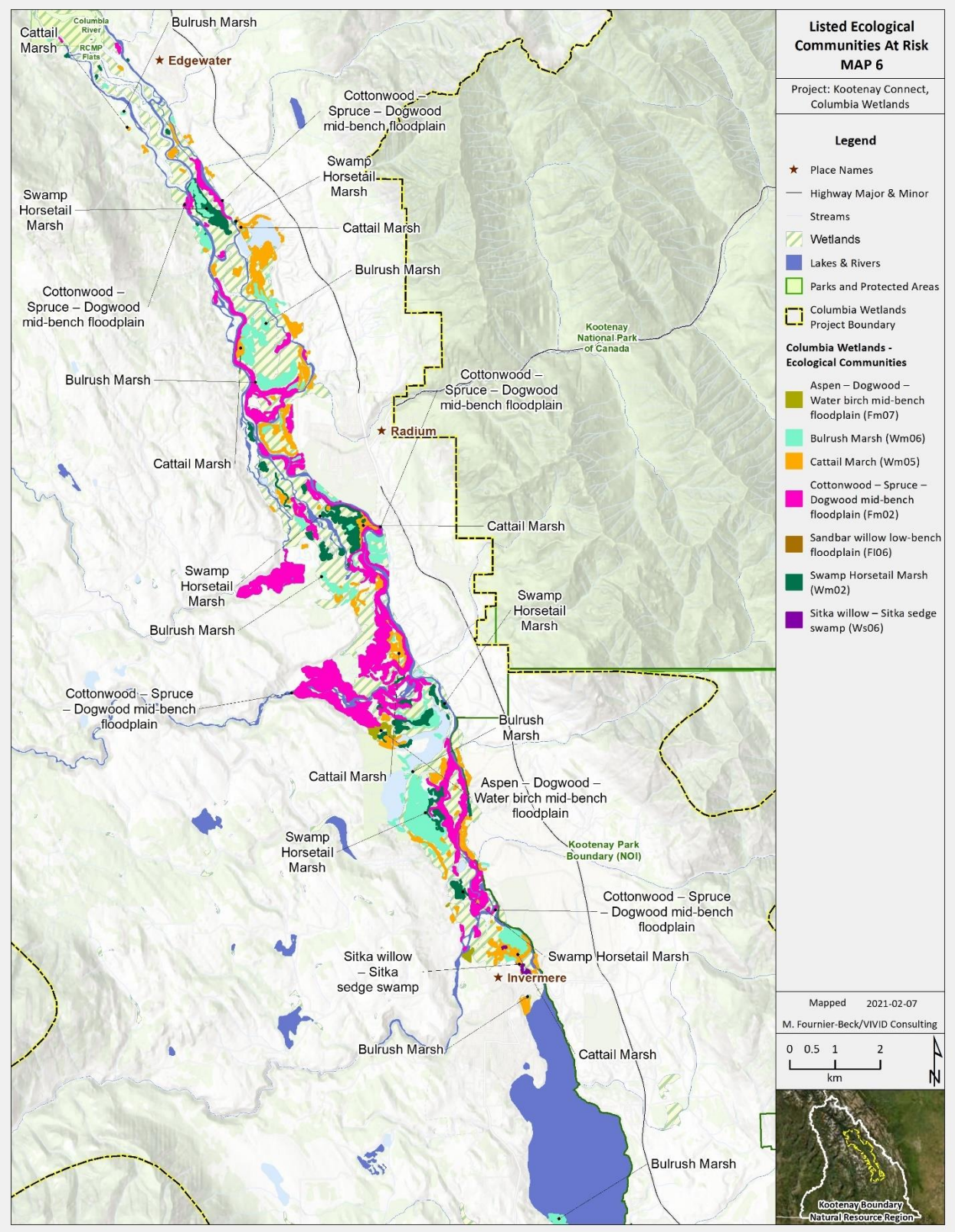
Appendix 5. At-risk ecological communities in the areas of the Columbia Wetlands near Parson and Castledale.



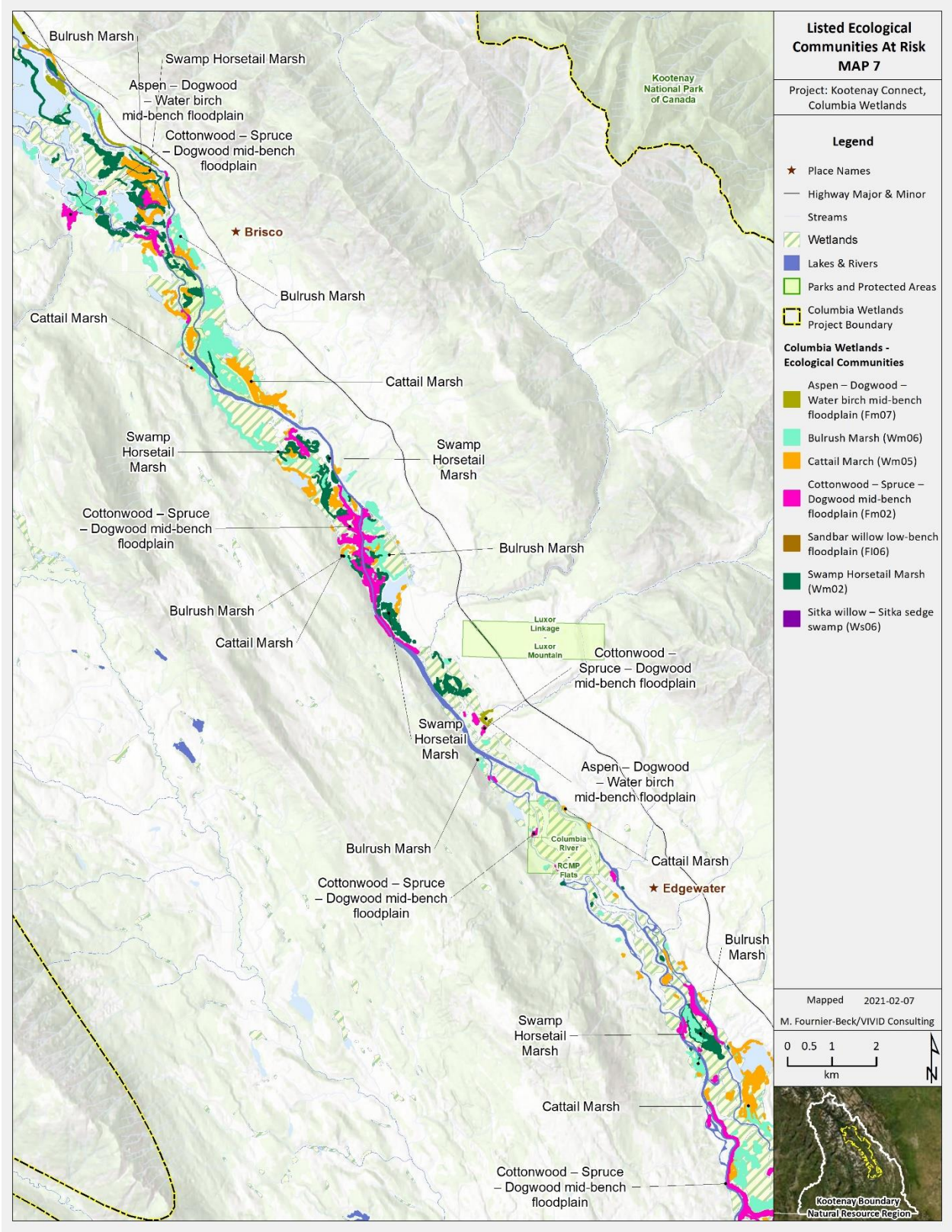
Appendix 6. At-risk ecological communities in the areas of the Columbia Wetlands near Harrogate, Spillimacheen and Brisco.



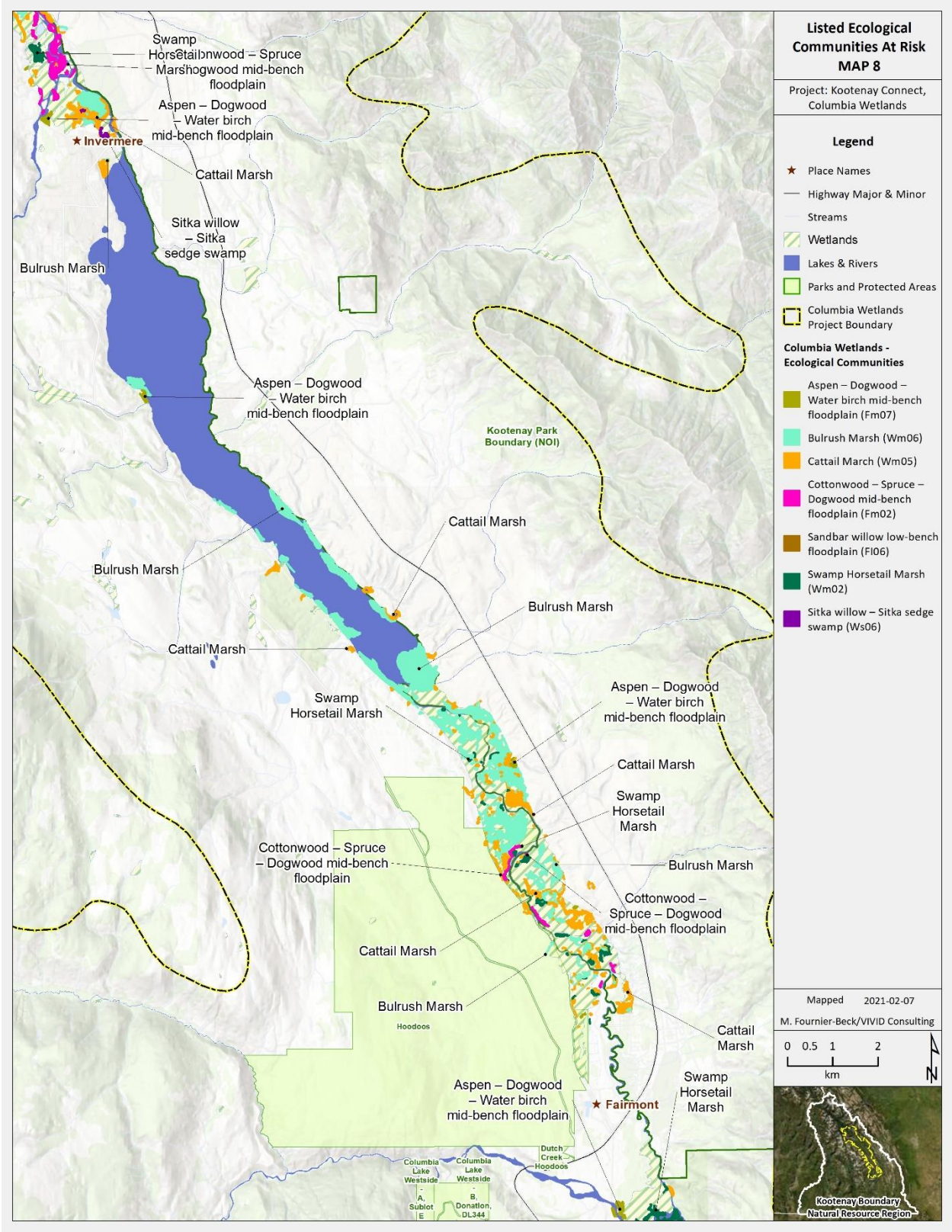
Appendix 7. At-risk ecological communities in the areas of the Columbia Wetlands near Edgewater, Radium, and North end of Lake Windermere.



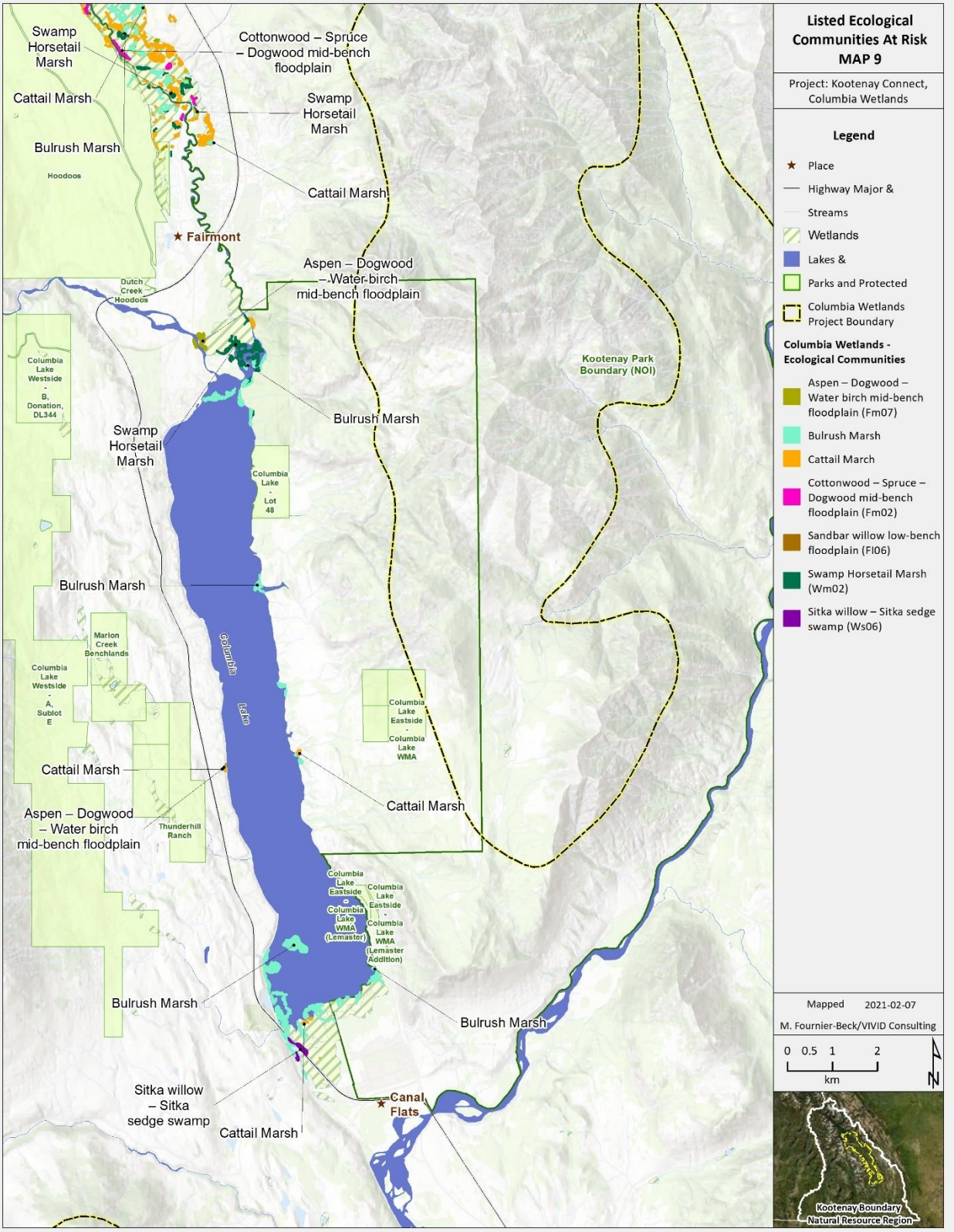
Appendix 8. At-risk ecological communities in the area of the Columbia Wetlands situated between Brisco and Edgewater.



Appendix 9. At-risk ecological communities in the area of the Columbia Wetlands near Fairmont and Lake Windermere.



Appendix 10. At-risk ecological communities in the areas of the Columbia Wetlands near Fairmont and Columbia Lake.



Appendix 11. Poster created to solicit information from the public on western painted turtle sighting locations.

Appendix 12. Lewis's woodpecker data from point counts in 2020.

Date	Study Area	Nest box/tree info						Time		Nest box/tree contents		Habitat features in surrounding area			
		Box ID # or tree #	Nest box or tree	Nest tree Species	Easting	Northing	Elevation	Start Time	End Time	# of adults	Species	Main Habitat (Ac Brn Py Other)	live tree canopy cover (%)	% shrub cover	% grass cover
23-Jun-20	Thunderhill Ranch/Marion Creek	L2	Nest box	At	578521	5565002	970	12:00	12:15	n/a	none	At	15	10	90
23-Jun-20	Thunderhill Ranch/Marion Creek	L55	Nest box	lch	578166	5565290	989	12:30	12:45	n/a	none	Larch	5	5	95
23-Jun-20	Thunderhill Ranch/Marion Creek	L54	Nest box	lch	578127	5565317	989	12:30	12:45	n/a	none	Larch	5	5	95
23-Jun-20	Thunderhill Ranch/Marion Creek	L52	Nest box	lch	578226	5566780	1000	13:11	13:26	n/a	none	Larch	5	25	50
23-Jun-20	Thunderhill Ranch/Marion Creek	L50	Nest box	lch	578257	5566744	1000	13:11	13:26	n/a	none	Larch	2	25	50
23-Jun-20	Thunderhill Ranch/Marion Creek	L59	Nest box	Py	579229	5563232	930	14:11	14:26	n/a	none	Fdi	30	0	70
23-Jun-20	Thunderhill Ranch/Marion Creek	L68	Nest box	Py	579063	5563858	936	14:52	15:07	n/a	none	Py	50	3	90
23-Jun-20	Thunderhill Ranch/Marion Creek	L61	Nest box	lch	578271	5566818	1000	13:12	13:27	n/a	none	lch, Fdi	45	40	60
23-Jun-20	Thunderhill Ranch/Marion Creek	L56	Nest box	lch	578258	5566859	1000	13:12	13:27	n/a	none	lch, Fdi	65	30	70
23-Jun-20	Thunderhill Ranch/Marion Creek	L67	Nest box	Pli	579275	5563281	920	14:12	14:27	n/a	none	Pli, Fdi	15	0	100
23-Jun-20	Thunderhill Ranch/Marion Creek	L58	Nest box	Py	579226	5563637	936	14:32	14:47	n/a	none	lch, Fdi	30	5	95

23-Jun-20	Thunderhill Ranch/Marion Creek	L66	Nest box	lch	579125	5563798	936	14:53	15:08	n/a	none	lch, Fdi	45	10	90
23-Jun-20	Thunderhill Ranch/Marion Creek	L70	Nest box	n/a	579399	5563856	936	15:12	15:27	n/a	none	Fdi	45	5	95
23-Jun-20	Thunderhill Ranch/Marion Creek	L1	Nest box	lch	579357	5562599	930	9:00	9:20	n/a	none	Fdi, lch	2	1	99
23-Jun-20	Thunderhill Ranch/Marion Creek	L5	Nest box	Fdi	579158	5562601	929	9:26	9:46	n/a	none	Fdi, lch	30	35	65
23-Jun-20	Thunderhill Ranch/Marion Creek	L4	Nest box	Ac	579156	5562423	964	9:50	10:10	n/a	none	Fdi, Pli	30	40	95
23-Jun-20	Thunderhill Ranch/Marion Creek	L65	Nest box	Fdi	578935	5563310	990	10:20	10:35	n/a	none	Fdi	30	1	99
23-Jun-20	Thunderhill Ranch/Marion Creek	L69	Nest box	Fdi	578933	5563392	991	10:53	11:08	n/a	none	Fdi	30	1	99
23-Jun-20	Thunderhill Ranch/Marion Creek	L64	Nest box	Fdi	578937	5563461	992	11:10	11:20	n/a	none	Fdi	40	10	90
23-Jun-20	Thunderhill Ranch/Marion Creek	L57	Nest box	Pli	578775	5563331	989	11:12	11:28	n/a	possible MOBL	Pli	1	1	
23-Jun-20	Thunderhill Ranch/Marion Creek	L63	Nest box	Fdi	578724	5563502	990	11:36	11:51	n/a	none	Pli	2	1	
23-Jun-20	Thunderhill Ranch/Marion Creek	L3	Nest box	n/a	578532	5564953	969	12:02	12:17	n/a	none	Ac	10	5	
23-Jun-20	Thunderhill Ranch/Marion Creek	L60	Nest box	lch	578222	5565237	989	12:32	12:48	n/a	none	lch, Fdi	30	35	
23-Jun-20	Thunderhill Ranch/Marion Creek	Hydro pole 56-05	Hydro pole	pole	578933	5563249	982	10:20	10:40	2	LEWO	Fdi	0	n/a	n/a
29-Jun-20	Zehnder Ranch	L35	Nest box	n/a	563374	5592455	1073	n/a	n/a	n/a	none	n/a	n/a	n/a	n/a
29-Jun-20	Zehnder Ranch	L36	Nest box	n/a	563366	5592499	1074	n/a	n/a	n/a	none	n/a	n/a	n/a	n/a
29-Jun-20	Zehnder Ranch	L37	Nest box	n/a	563531	5592397	1072	n/a	n/a	n/a	none	n/a	n/a	n/a	n/a
29-Jun-20	Zehnder Ranch	L38	Nest box	Telephone pole	563670	5592390	1040	11:17	11:32	n/a	EUST	Fdi	15	2	83
29-Jun-20	Zehnder Ranch	L44	Nest box	Fdi	563264	5592428	1033	11:41	11:56	n/a	none	Fdi	30	30	40
29-Jun-20	Zehnder Ranch	L39	Nest box	Snag	563409	5592522	1040	12:52	13:07	n/a	none	Fdi	15	5	80
29-Jun-20	Zehnder Ranch	L40	Nest box	Fdi	564577	5592064	1040	13:32	13:35	n/a	EUST	Fdi	10	5	85

29-Jun-20	Zehnder Ranch	L41	Nest box	n/a	563082	5.6E+07	1040	n/a	n/a	n/a	EUST	n/a	n/a	n/a	n/a
29-Jun-20	Zehnder Ranch	L42	Nest box	Snag	564684	5592066	1033	13:50	14:05	n/a	EUST	Fdi	1	5	94
29-Jun-20	Zehnder Ranch	L43	Nest box	n/a	563429	5592452	1075	n/a	n/a	n/a	none	n/a	n/a	n/a	n/a
29-Jun-20	Zehnder Ranch	LJZ01	Nest box	n/a	563294	5592541	1077	n/a	n/a	n/a	MOBL	n/a	n/a	n/a	n/a
03-Jul-20	Powerline South End	L19	Nest box	Py	581166	5557171	955	9:35	9:50	n/a	none	Fdi/Py	50	30	60
03-Jul-20	Powerline South End	L20	Nest box	n/a	581186	5557140	955	9:36	9:51	n/a	none	Fdi/Py	35	10	90
03-Jul-20	Powerline South End	L21	Nest box	n/a	581263	5557173	955	10:04	10:19	n/a	none	Fdi/Py	55	10	90
03-Jul-20	Powerline South End	L23	Nest box	Py	580202	5558044	990	10:39	10:55	n/a	none	Fdi/Py	15	5	95
03-Jul-20	Powerline South End	L29	Nest box	Fdi	579980	5558664	1012	11:22	11:37	n/a	none	Fdi/Py	20	5	95
03-Jul-20	Powerline South End	L26	Nest box	Py	579966	5558767	1011	11:42	11:57	n/a	none	Fdi/Py	5	10	90
03-Jul-20	Powerline South End	L33	Nest box	Py	579703	5560233	976	12:17	12:32	n/a	none	n/a	60	5	95
03-Jul-20	Powerline South End	L34	Nest box	Fdi	579662	5560335	972	12:40	12:55	n/a	none	Fdi	80	2	98
03-Jul-20	Powerline South End	Hydro Pole 55-06	Hydro pole	n/a	579200	5562027	972	14:00	14:15	2	LEWO	Ac/Fdi/Py	10	70	30
03-Jul-20	Powerline South End	Pole 56-02	Hydro pole	n/a	579061	5562585	945	14:29	14:44	n/a	none	Fdi	25	75	25
03-Jul-20	Powerline South End	L22	Nest box	Fdi	581113	5557212	959	10:00	10:15	n/a	n/a	Fdi/Py	70	20	65
03-Jul-20	Powerline South End	L24	Nest box	Py	580110	5558090	997	10:38	10:53	n/a	n/a	Fdi/Py	75	10	45
03-Jul-20	Powerline South End	L25	Nest box	Fdi	580153	5558130	999	10:55	11:10	n/a	n/a	Fdi/Py	60	5	65
03-Jul-20	Powerline South End	L27	Nest box	Py	580013	5558541	1012	11:19	11:34	n/a	n/a	Fdi/Py	30	5	80
03-Jul-20	Powerline South End	L28	Nest box	Py	579998	5558744	1000	11:40	11:55	n/a	n/a	Fdi/Py	30	20	75
03-Jul-20	Powerline South End	L31	Nest box	Fdi	579672	5560163	976	12:16	12:31	n/a	n/a	Fdi/Larch	30	5	80
03-Jul-20	Powerline South End	L30	Nest box	Fdi	579626	5560300	971	12:38	12:53	n/a	n/a	Fdi	70	5	40
03-Jul-20	Powerline South End	L32	Nest box	Fdi	579592	5560416	970	12:56	13:11	n/a	n/a	Fdi	65	10	80
03-Jul-20	Powerline South End	L62	Nest box	n/a	578866	5561021	973	13:29	13:38	n/a	n/a	n/a	n/a	n/a	n/a
05-Jul-20	Stark Rd, Invermere	LSTARK	tree	At	568497	5593661	855	17:05	17:20	2	LEWO	At/Fdi	5	5	90
07-Jul-20	Fairmont riverside golf course	L14	Nest box	Spruce	580450	5576489	801	5:37	5:39	n/a	Squirrel	Other	n/a	n/a	n/a

07-Jul-20	Fairmont riverside golf course	L17	Nest box	Spruce	580459	5576579	809	5:49	6:04	n/a	n/a	Spruce	5	5	65
07-Jul-20	Fairmont riverside golf course	L16	Nest box	Spruce	580486	5576667	812	6:10	6:25	n/a	n/a	Spruce	25	5	50
07-Jul-20	Fairmont riverside golf course	L18	Nest box	Spruce	580448	5576712	813	6:26	6:51	n/a	n/a	Spruce	10	10	40
07-Jul-20	Fairmont riverside golf course	L13	Nest box	Spruce	580355	5576618	813	6:44	6:59	n/a	n/a	Spruce	5	5	70
07-Jul-20	Fairmont riverside golf course	L15	Nest box	Spruce	580308	5576595	810	7:00	7:15	n/a	n/a	Spruce	5	0	95
07-Jul-20	Fairmont riverside golf course	LEWO 01	tree	Cottonwood	580251	5576638	809	7:16	7:31	n/a	LEWO	Cottonwood	2	1	99
07-Jul-20	Fairmont riverside golf course	LEWO 02	tree	Cottonwood	580278	5576499	809	10:40	10:55	n/a	LEWO	Cottonwood	5	0	90
07-Jul-20	Fairmont riverside golf course	LEWO 04	tree	Cottonwood	580258	5576105	814	9:48	10:03	n/a	LEWO	Cottonwood	5	2	70
07-Jul-20	East Kootenay	B. Elder N of 5003	"condo"	pole	580306	5576150	802	8:45	9:00	2	LEWO	Cottonwood	5	10	90
07-Jul-20	East Kootenay	Riverside Dr	tree	At	580331	5576376	802	9:20	9:27	2	LEWO	At, Fdi	5	5	95
07-Jul-20	East Kootenay	N of 402 Riverside Dr	tree	Ac	580270	5576067	802	9:45	10:30	2	LEWO	Cottonwood	10	35	65
07-Jul-20	East Kootenay	Pole 52-04	pole	pole	581397	5556796	962	11:04	11:20	n/a	n/a	Py	35	10	90
07-Jul-20	East Kootenay	Fairmont Meadows	tree	Cottonwood	580102	5577830		12:46	12:56	2	LEWO	Cottonwood	8	30	70
07-Jul-20	Fairmont riverside golf course	LEWO 03	tree	Cottonwood	580269	5576424	814	10:55	11:10	n/a	LEWO	Cottonwood	5	5	80
07-Jul-20	Ponderosa Heights area	LPOND01	tree	Don't know, bark stripped	581750	5559167	857	12:35	12:50	2	LEWO	Py, Fdi	15	2	90
09-Jul-20	Lake Enid	LEWO Enid	tree	n/a	562409	5600674	969	14:39	14:54	n/a	n/a	At	60	10	90
11-Jul-20	Ponderosa Heights area	LP0ND02	tree	Py	581839	5558338	861	16:35	16:50	2	LEWO	Py	5	5	70

Appendix 13. Data from 2019 and 2020 osprey inventories in the Columbia Valley.

Location name	Northing	Easting	2019 nest activity	2019 nest success (fledglings) (Y/N/presumed)	2020 nest activity	2020 nest success (fledglings) (Y/N/presumed)
Old Mill in Donald	487568	5704145	Y	Y	Y	Y
Bottom of Hartley Road, top of cell tower	498238	5692706	Y	N	N	N
Golden - LP Mill north end	501218	5684927	Y	N	Y	N
Golden - LP Mill south end	501277	5684379	N	N	N	N
13th Street S and 7th Ave in Town of Golden	502028	5682396	Y	N	Y	N
Hwy 95 S, at CP Railway Pond across from Day Road	504896	5679931	Y	N	Y	Y
Hwy 95 S, Champagne Road off Hwy 95S	505039	5679727	N	N	N	N
Hwy 95 S, near Lou's Feed Store (DD to monitor)	506900	5676032	Y	Y	Y	N
Hwy 95 S at Horse Creek North end, Austin Rd	507395	5673513	N	N	N	N
Horse Creek rock quarry site	507213	5673280	Y	N	Y	N
Hwy 95 S at Horse Creek South end	508317	5672306	Y	Y	N	N
Hwy 95 S, South of Nine Mile Slough	509511	5671022	N	N	Y	N
Hwy 95 S North of Judy's house; Hydro pole near swallow colony at about 16kms	510210	5670318	Y	N	N	N
Dickson Downs Rd at Judy Malones home	510846	5669517	Y	N	Y	N
Hwy 95 S tree nest in Columbia Wetlands near Birchlands Creek	512774	5667948	Y	Y	N	N
Canadian Timberframes	513969	5667201	N	N	N	N
Hwy 95 S at McMurdo Slough	515333	5666384	N	N	Y	N
Hwy 95 S, on east side of McMurdo Slough	515360	5666382	Y	Y	N	N
Columbia Valley B&B	515760	5665939	N	N	N	N
Hwy 95 S, 1km south of Mons Road (25kms south of Golden)	517394	5664998	Y	N	Y	N
Hwy 95S, ~26kms south of Golden (2677 Hwy95)	518702	5663866	n/a	n/a	Y	N
Hwy 95 S, ~28kms south of Golden	520568	5661842	Y	Y	Y	Y
Hwy 95 S, just north of Parson Store	522450	5659924	Y	Y	Y	Y
Hwy 95 S, Timber Inn, Parson	524531	5658477	Y	Y	Y	N
Hwy 95 S, south of Timber Inn, beside Wilfred's place	524988	5658171	Y	Y	Y	Y
Hwy 95 S, South of Parson School	526207	5657242	Y	Y	Y	Y
Hwy 95 S near Hildeguards house, about 250m above Hwy in field.	527816	5655758	Y	Y	N	N
Hwy 95 S	530941	5653663	N	N	N	N
Hwy 95 S, Quinn Creek Campground	531948	5653113	Y	N	Y	Y
Hwy 95 S	534149	5651579	Y	Y	Y	N
Hwy 95 S	536073	5650604	Y	Y	Y	Y
Hwy 95 S, Ben Hynes Loop Rd	537904	5648337	Y	Y	Y	N
Near Westside Rd xing in Spilli - up hill off Hwy 95 S ~400m	544800	5639788	Y	Y	Y	N
Spill xing east end	544566	5639534	N	N	N	N

Brisco Pole Treatment Facility	550969	5630693	Y	Y	Y	Y
Trescher's Field near barn	549912	5630945	Y	Y	Y	N
Trescher's Field west, on hydro line	549749	5630689	Y	N	Y	N
Radium xing	563761	5608098	Y	N	Y	N
New nest pole - Athalmere	569469	5596354	N	N	N	N
James Chabot Provincial Park	569268	5596096	N	N	Y	Y
Near Rona in Invermere	568847	5596040	Y	Y	Y	Y
Downtown Invermere, behind arena	569141	5595225	N	N	Y	Y
Dorothy Lake	569084	5594499	Y	Y	Y	Y
RDEK offices - Windermere Loop Rd	572650	5593879	Y	Y	Y	Y
North of Winderbury Nursery	572182	5591459	Y	Y	N	N
Behind Winderbury Nursery (Gail's nest)	572223	5590766	Y	Y	Y	N
Akisqnuk Offices - across the street	573056	5590459	Y	Y	Y	Y
Windermere Creek mouth	571559	5589936	Y	Y	Y	N
Akisqnuk Lakeshore Resort	575280	5587220	Y	Y	Y	N
1858 Victoria Avenue	572131	5589834	n/a	n/a	N	N
Wilmai Place	572387	5589995	n/a	n/a	N	N
Old tree nest, west side of Hwy	576455	5586835	N	N	N	N
~400m N of #3 Rd, on Hwy 95	576820	5586340	N	N	Y	N
#3 Rd at SE Windermere parking area, east side of Hwy 95	577147	5585838	Y	Y	Y	Y
North of Funtasia, west side of Hwy 95	578167	5583967	Y	N	Y	Y
Funtasia mini golf course	581331	5577284	Y	Y	Y	Y
Fairmont Airport	580255	5574882	N	N	Y	N
Columere marina - Columbia Lake	580325	5571480	Y	Y	N	N
Lot 48 Nest 2	581933	5570426	N	N	N	N
Lot 48 Nest 1	582017	5570120	Y	Y	Y	N
Pole 53-02 Hydro Line above west side of Columbia Lk	580828	5565189	N	N	Y	Y
Pole 54-04 Hydro Line above west side of Columbia Lk	580912	5559630	N	N	N	N
Pole 53-04 Hydro Line above west side of Columbia Lk	580941	5557777	N	N	N	N
Canal Flats	585723	5555701	Y	Y	Y	unknown

Appendix 14. Summary of the type of protection sought for each species or habitat feature.

Species or Habitat Feature	Type of Protection Sought	Application Submitted	Application status	Comments
Lewis's woodpecker	Critical Habitat expansion	no	n/a	No nests on crown land, therefore WHA's and WHF's cannot be applied for. Critical Habitat expansion to occur in either amendment to the LEWO recovery strategy or when an action plan is written.
alkali saltgrass - foxtail barley	WHA	yes	accepted	WHA application made for two ocurances on crown land. Decision pending.
mountain goat mineral lick	WHF	yes	approved	Two mineral licks approved as WHFs: Toby Creek and Canyon Creek
osprey	none	no	n/a	Only 1 osprey nest feature (not hyrdo pole) on crown land, but within the Columbia Wetlands Wildlife Management Area.
western painted turtle	none	no	n/a	No special status applied for.