Duncan Dam Project Water Use Plan

DDMWORKS-01 Lower Duncan River Argenta Slough Erosion Protection

Reference: DDMWORKS-01

*Ecological Inventory of Argenta Slough*

Study Period: June 14 to November 1, 2016

Ecofish Research Ltd., Suite F, 450 8th St., Courtenay, B.C. V9N 1N5

January 18, 2017
Ecological Inventory of Argenta Slough

Prepared for:
BC Hydro Water
6911 Southpoint Drive, 11th Floor
Burnaby, BC, V3N 4X8

January 18, 2017

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1. INTRODUCTION
Argenta Slough is a wetland complex on the floodplain of the Lower Duncan River, known to provide important wildlife habitat (Herbison et al. 2002). The lower portion of Argenta Slough is located adjacent to an actively-erosing meander bend of the Duncan River (a.k.a. Argenta bend), immediately upstream to the river’s outlet to Kootenay Lake (Figure 1). The Duncan Dam Water Use Plan (WUP) Consultative Committee expressed concern that continued channel migration and bank erosion at the meander bend could drain the lower portion of Argenta Slough, resulting in a loss of valuable habitat.

An erosion risk assessment was commissioned by BC Hydro (as part of DDMMON-01 - Argenta Slough Erosion Protection) to investigate the potential for physical works to mitigate bank erosion in the lower reach of the Duncan River. However, the cost estimates for the physical works exceeded the $150,000 allocated by the Duncan Dam WUP Consultative Committee to address erosion at Argenta bend. In addition, construction of the proposed physical works has the potential to cause environmental damage to Argenta Slough (Matsubara and Ellis 2013). Due to the cost and potential disturbance that the physical works could cause to the wetland, the Consultative Committee has rejected the proposed physical works to mitigate bank erosion at Argenta bend.

Ecofish Research Ltd. (Ecofish) was retained by BC Hydro to provide an Ecological Inventory for Lower Argenta Slough to better understand the potential loss of wetland habitat and function that may occur should the Duncan River breach that portion of the slough. Previous inventory work has been conducted by North Kootenay Consulting (Herbison 2006, 2015); these existing sources of information were updated and expanded upon to provide a scientific assessment of the biological values present in Lower Argenta Slough.

2. PROJECT OBJECTIVES
The objectives of the Ecological Inventory for Lower Argenta Slough are as follows:

1) Delineate and describe wetland type by area using existing information and orthophoto interpretation.

2) Provide an inventory of plant and wildlife species that may be present in the study area, including species at-risk and sensitive ecosystems.

3) Determine the likelihood of presence based on species occurrence records, range, distribution, and habitat requirements. A similar approach will also be taken for any ecological communities at-risk.

4) Describe and evaluate wetland function, as defined by the Federal Policy on Wetland Conservation (Government of Canada 1991), and the existing condition of wetland habitat that is present in Lower Argenta Slough.
Figure 1. Lower Argenta Slough in relation to Duncan Dam and Kootenay Reservoir.
3. STUDY AREA

Argenta Slough is a wetland complex located in the Duncan-Lardeau river valley in southeastern British Columbia. It is located in the Interior Cedar–Hemlock dry, warm West Kootenay biogeoclimatic variant (ICHdw1, NDT3), surrounded by Interior Cedar-Hemlock moist, warm biogeoclimatic subzone (ICHmw2). These biogeoclimatic zones are characterized as having warm, moist summers and mild winters with snowfall (Braumandle and Curran 1992).

The study area comprises the lower (southern) one-third of Argenta Slough, a linear wetland located on the east side of the Lower Duncan River floodplain (Map 1). The Lower Argenta Slough study area is approximately 0.25 km² and is located adjacent to an actively-eroding meander bend of the Duncan River, a short distance upstream from the north end of Kootenay Lake. The total length of Argenta Slough is approximately 3.2 km long, and the area of study involves the lower 800 m, from the southernmost berm (Berm 1, an abandoned beaver dam) to the slough’s outlet to the Lower Duncan River delta (Figure 2). All wetland-related habitats between the shore of Duncan River and Argenta Road were considered in this Ecological Inventory, as all of these habitats are inundated when Kootenay Lake backwaters the Duncan River during the spring freshet, and all have the potential to be permanently altered or lost if the Duncan River intersects the Lower Slough (Matsubara and Ellis 2013).

Figure 2. Lower Argenta Slough extends south from an abandoned beaver dam (a.k.a Berm 1) to Kootenay Lake delta (not pictured). Photo provided by BC Hydro.
4. METHODOLOGY

4.1. Wetland Delineation and Classification

Ecosystem mapping can be used to record site conditions and provide a framework for monitoring ecosystem response to management (RIC 1998). Wetland vegetation communities in Argenta Slough were delineated on orthophotos in ArcMAP (v. 10) in consideration of the Standard for Terrestrial Ecosystem Mapping in British Columbia (TEM) (RIC 1998, 2000), following Provincial wetland and terrestrial mapping classification schemes (MOF 2002, Mackenzie and Moran 2004, MOE 2006), and in consideration of local mapping projects (MOE 1991, Krebs et al. 2013, Herbison 2015, DataBC 2016 [VRI]). Wetland vegetation community classifications were further supported by photographs and comments from other local reports (Jackson et al. 2009, Jackson et al. 2014, Jackson et al. 2015, Krebs et al. 2013, Polzin and Rood 2013). Wetland community polygons were delineated by a terrestrial ecologist experienced in air photo interpretation and familiar with ecosystems in the ICH, on orthophotographs taken during low and high water conditions in 2009 and 2011, respectively. Polygons were delineated at a maximum scale of 1:800. A number of attributes were recorded for each polygon delineated through air photo interpretation. These included: decile (proportion of polygon dominated by a site series, i.e., association of vegetation species occurring on a site with similar moisture and nutrient regime), site series, site association, TEM map codes, and structural stage; areas for each polygon; assignments of mapsheet numbers and biogeoclimatic zones; and polygon descriptions from previous mapping work (Table 1). Terrain and soil attributes were not included in the database; however, they are reflected in adoption of the bioterrain approach to polygon delineation (RIC 1998). Additional background data sources were searched including Sensitive Ecosystem Inventory (SEI) and Terrestrial Ecosystem Mapping (TEM) projects; however, no projects were located in the vicinity of the Argenta Slough or in the ICHdw1 (DataBC 2016).
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FID</td>
<td>FID</td>
<td>Unique polygon identifier</td>
</tr>
<tr>
<td>Mapsheet</td>
<td>Mapsheet</td>
<td>1:20,000 mapsheet number</td>
</tr>
<tr>
<td>BEC zone</td>
<td>BEC_ZONE</td>
<td>The first-rank unit in the hierarchical Biogeoclimatic Ecosystem Classification (BGC) system¹</td>
</tr>
<tr>
<td>BEC subzone</td>
<td>BEC_SUBZONE</td>
<td>The second-rank unit in the BGC system¹</td>
</tr>
<tr>
<td>BEC variant</td>
<td>BEC_VRT</td>
<td>A third-rank unit in the BGC system occurring within particular subzones¹</td>
</tr>
<tr>
<td>Ecosystem type</td>
<td>Type</td>
<td>Group or class of wetland²</td>
</tr>
<tr>
<td>Wetland community map number</td>
<td>Number</td>
<td>Alphanumeric number for each wetland type delineated in Argenta Slough</td>
</tr>
<tr>
<td>Decile 1</td>
<td>SDEC_1</td>
<td>The proportion of the polygon covered by Component 1, in deciles. Deciles in components 1–3 must total 10. Decile 1 must be greater or equal to Decile 2, which must be greater or equal to Decile 3</td>
</tr>
<tr>
<td>Site series 1</td>
<td>SITES_S1</td>
<td>Site series. Site series is a vegetation community association based on the sites ability to produce specific climax vegetation within a particular BGC Subzone or Variant</td>
</tr>
<tr>
<td>Site association 1</td>
<td>SiteA_1</td>
<td>Association of physically or biologically similar ecosystems that would have similar vegetation at climax²</td>
</tr>
<tr>
<td>Site series map</td>
<td>SITEM_S1</td>
<td>Site series map code³</td>
</tr>
<tr>
<td>Structural stage 1</td>
<td>STRCT_S1</td>
<td>The structure of the vegetation cover at the time of survey, ranging</td>
</tr>
<tr>
<td>Structural stage modifier 1</td>
<td>STRCT_M1</td>
<td>Substage of structural stage used for stages 1-3¹</td>
</tr>
<tr>
<td>Decile 2</td>
<td>SDEC_2</td>
<td>See above</td>
</tr>
<tr>
<td>Site series 2</td>
<td>Site_S2</td>
<td>See above</td>
</tr>
<tr>
<td>Site association 1</td>
<td>SiteA_1</td>
<td>See above</td>
</tr>
<tr>
<td>Structural stage 2</td>
<td>STRCT_S2</td>
<td>See above</td>
</tr>
<tr>
<td>Structural stage modifier 2</td>
<td>STRCT_M2</td>
<td>See above</td>
</tr>
<tr>
<td>Comments</td>
<td>Comments</td>
<td>Additional pertinent information regarding the polygon</td>
</tr>
<tr>
<td>Confidence</td>
<td>Confidence</td>
<td>Confidence of assessment</td>
</tr>
<tr>
<td>Area</td>
<td>AREA</td>
<td>Area in m²</td>
</tr>
<tr>
<td>Previous ID</td>
<td>Poly_ID</td>
<td>Overlap with mapped polygon from previous mapping⁴</td>
</tr>
<tr>
<td>Previous ID</td>
<td>Pre_mapcd</td>
<td>Overlap with mapped polygon from previous mapping⁵</td>
</tr>
<tr>
<td>Previous label</td>
<td>Herbison14</td>
<td>Overlap with previous ecosystem label⁵</td>
</tr>
<tr>
<td>Previous description</td>
<td>Herb_bioph</td>
<td>Overlap with previous biophysical description⁵</td>
</tr>
<tr>
<td>Previous description</td>
<td>Herb_wildl</td>
<td>Overlap with previous wildlife description⁵</td>
</tr>
</tbody>
</table>

¹Described in Field Manual for Describing Ecosystems in the Field (MOFR 2010) and RIC 1998
² Mackenzie and Moran 2004
³ MOE 2006
⁴ Krebs et al. 2013
⁵ Herbison 2015 draft
4.2. Wetland Function and Condition

Wetland functions are defined as a process or series of processes that take place within a wetland. The condition of a wetland determines how well a wetland is performing its functions, and can be assessed by the presence, or absence, of certain indicators. Argenta Slough functions primarily as a wetland. We assessed the conditions of the wetland habitat by examining the hydrology and hydrologic connectivity, vegetation composition, wildlife use, and landscape connectivity of the study area. This is discussed in detail in the following subsections. There is currently inadequate data available to quantitatively assess wetland function and condition through the development of indicators; however, qualitative assessment is made where data are available. Socio-economic values identified in the federal policy, such as ecological services, were not considered in this assessment (Government of Canada 1991).

4.2.1. Hydrology and Connectivity

The formation, persistence, size, and function of wetlands are controlled by hydrologic processes. Some of the major hydrologic functions of wetlands include flood storage and mitigation, groundwater recharge, alterations to local climate, and erosion reduction. These typical hydrological functions could not be assessed with the limited data available, and are beyond the scope of this assessment. As this is an Ecological Inventory, hydrological function of Lower Argenta Slough was assessed in terms of wetland habitat availability and connectivity (described in Section 5.2.1).

Due to the lack of existing field data, assessment of wetland hydrological function and condition was largely qualitative. The assessment relied on a handful of air and ground photos, orthophoto images, and technical reports (Herbison 2006, 2015, Jackson et al. 2009, Matsubara and Ellis 2010, 2013, Polzin et al. 2010, Polzin and Rood 2014). In addition, daily precipitation and air temperature data¹ for the period 1985 to 2015 are available for the Duncan Lake Dam weather station 1142574 maintained by Environment Canada, and flow and, or level data² are available for the Water Survey Canada (WSC) gauge 08NH118, Duncan River Below Lardeau River, since 1963, and WSC gauge 08NH064, Kootenay Lake at Queens Bay, since 1931. These data were reviewed to provide a description of current and past climate and hydrological conditions at the site.

The hydrology of a wetland is largely responsible for the vegetation of the wetland, which in turn affects the value of the wetland to wildlife. The duration and seasonality of flooding and (or) soil saturation, groundwater level, soil type, and drainage characteristics exert a strong influence on the number, type, and distribution of plants and plant communities in wetlands. The hydrological condition of wetland habitat was further assessed from ecologically relevant data such as

¹ Data obtained from the Pacific Climate Impacts Consortium website https://pacificclimate.org/data/bc-station-data

² Historical and real-time data available from http://wateroffice.ec.gc.ca/.
vegetation composition and the ecological communities present in Lower Argenta Slough; these methods are described in Section 4.2.2.

4.2.2. Vegetation Composition

Vegetation community composition is largely influenced by the hydrology, soil moisture, and nutrient regime of a wetland. This data was unavailable and hence limited vegetation community descriptions. However, a search of ecosystems and species at-risk provided indication of what vegetation communities could occur on sites with moisture, nutrient, and hydrodynamic indexes similar to what is expected in Lower Argenta Slough and in similar biogeoclimatic zones (CDC 2016a). Conservation ranks were also assigned to mapped polygons, as appropriate. Furthermore, each mapped polygon was assigned a high, medium, or low ‘confidence in classification’ rank to account for the fact that no field work was conducted and background literature was limited in scope, data, and applicability.

4.2.3. Wildlife Use
A list of wildlife species potentially occurring within Argenta Slough was compiled from the BC Species and Ecosystem Explorer (CDC 2016b). All species occurring within the Interior Cedar Hemlock biogeoclimatic zone, Kootenay Lake Forest District, Kootenay Ministry of Environment Region (MOE Region 4), and the Central Kootenay Regional District were considered for their potential to occur within Argenta Slough based on habitat requirements. As the aforementioned location information is incomplete for some species within the BC Species and Ecosystem Explorer database, some species with incomplete location information were added back onto the list based on known habitat requirements. All species that are either provincially or federally designated as at-risk or regionally significant according to the Fish and Wildlife Compensation Plan Draft (BC Hydro 2012) or the Duncan-Lardeau Flats Conservation Properties Land Management Plan (Krebs et al. 2013) are noted. Species were then classified according to their likelihood of occurrence within Argenta Slough (Section 4.2.3.1). Species that have either been observed within Argenta Slough, or have a moderate likelihood of occurring within Argenta Slough were classified by habitat use (Section 4.2.3.2), and species that have been observed within Argenta Slough were classified by their potential dependence on the habitat provided within the Lower Argenta Slough (Section 4.2.3.3).

4.2.3.1. Likelihood of Wildlife Occurrence
The likelihood of wildlife species presence within Argenta Slough was classified as either: high, moderate, low or negligible. The classification criteria are defined as:

- High/Confirmed: The range and distribution of the species overlap or border with Argenta Slough, suitable habitat is present and the species has been detected within Argenta Slough. Species presence information was gleaned from Herbison (2015) and

- Moderate: The range and distribution of the species overlap or border with Argenta Slough and suitable habitat is likely present; however, the species has not been detected within Argenta Slough.
- Low: The range and distribution of the species may overlap or border with Argenta Slough; however, while suitable habitat may be present, Argenta Slough is unlikely to provide suitable habitat and the species is unlikely to occur within Argenta Slough.
- Negligible: The range, distribution or habitat requirements of the species do not overlap or border with Argenta Slough. It is very unlikely that the species is ever present within Argenta Slough.

Species with a high/confirmed or moderate likelihood of occurrence are listed in tables in Section 5.2.3 with further details on at-risk species provided in the text. A list of species with a low or negligible likelihood of occurrence is provided in Table 2.

4.2.3.2. Wildlife Habitat Use

For species with a moderate or high/confirmed likelihood of occurrence, consideration was given to the functions that Argenta Slough provides to each species in terms of breeding, foraging, and/or migratory stopover habitat, as per the classification scheme detailed in Table 2.

4.2.3.3. Likelihood of Potential Dependence

Wildlife species that have been confirmed to be present within Argenta Slough were classified as having a high, moderate, or low likelihood of being dependant on habitat within the Lower Argenta Slough. The degree to which individuals of each species may be dependent on Lower Argenta Slough is defined as:

- High: Wildlife species may be highly dependent on habitat within Lower Argenta Slough. The local populations depend on the habitat available within the Lower Argenta Slough for breeding, foraging and/or migratory stopover habitat and similar habitat may not be available within the seasonal ranges of the individuals that have been observed within the Slough.
- Moderate: Wildlife species confirmed presented in the Lower Argenta Slough; however, the species is not entirely dependent on Lower Argenta Slough. For example, the species has been confirmed to breed in Upper Argenta Slough or the species’ habitat requirements are more general and not closely linked to wetland habitat.
- Low: Wildlife species may be dependent on habitat within Argenta Slough; however, the species primarily breeds or forages in adjacent areas including riparian meadows and waterbodies such as Kootenay Lake.
Table 2. Wildlife habitat use classification scheme.

<table>
<thead>
<tr>
<th>Habitat Use</th>
<th>Likelihood of Habitat Use</th>
<th>Criteria Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breeding</td>
<td>Breeding and associated foraging habitat are provided directly by Lower Argenta Slough, with habitat suitability likely affected by potential hydrology changes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Confirmed</strong></td>
<td>Breeding confirmed (Herbison 2015).</td>
</tr>
<tr>
<td></td>
<td><strong>Probable</strong></td>
<td>Breeding is probable based on habitat requirements, species detectability, and previous level of survey effort.</td>
</tr>
<tr>
<td></td>
<td><strong>Possible</strong></td>
<td>Breeding is possible based on habitat requirements, species detectability, and previous level of survey effort.</td>
</tr>
<tr>
<td>Foraging</td>
<td>Foraging habitat is provided directly by Lower Argenta Slough but breeding habitat is either not provided by or not restricted to the Slough. Foraging habitat suitability would likely be affected by potential hydrology changes.</td>
<td></td>
</tr>
<tr>
<td>Foraging - Migratory Stopover</td>
<td><strong>Probable</strong></td>
<td>Occurrence was confirmed but timing of occurrence was unclear. Lower Argenta Slough falls within the migratory range of the species but not the breeding or overwintering range.</td>
</tr>
<tr>
<td></td>
<td><strong>Possible</strong></td>
<td>The species has not been observed but suitable foraging habitat is present. Lower Argenta Slough is within the migratory range of the species but not the breeding or overwintering range.</td>
</tr>
<tr>
<td>Foraging - Winter</td>
<td><strong>Confirmed</strong></td>
<td>Foraging was observed within open water near Carter Creek during the winter (Herbison 2015).</td>
</tr>
<tr>
<td></td>
<td><strong>Probable</strong></td>
<td>Occurrence was confirmed but timing of occurrence is not clear. Winter foraging is possible, particularly in association with the protected open waters near Carter Creek, based on species' winter range and habitat requirements.</td>
</tr>
<tr>
<td></td>
<td><strong>Possible</strong></td>
<td>Species has not been observed but winter foraging is possible, particularly in association with the protected open waters near Carter Creek, based on species' winter range and habitat requirements.</td>
</tr>
<tr>
<td>Foraging - Transient</td>
<td>Suitable foraging habitat exists within Lower Argenta Slough but is part of a much larger home range.</td>
<td></td>
</tr>
<tr>
<td>Adjacent Habitat</td>
<td>Consideration of adjacent habitat use was only given to species that were confirmed to have been observed during surveys of Lower Argenta Slough (Herbison 2015). This classification was used when primary habitat requirements are provided by adjacent habitat rather than directly by Lower Argenta Slough. Adjacent habitat includes the adjacent cottonwood stands, forest and caves, Duncan River, Kootenay Lake, and the Kootenay River.</td>
<td></td>
</tr>
</tbody>
</table>

4.2.4. Connectivity

Wetland connectivity is a highly dynamic process. Wetting and drying cycles determine the frequency with which water connects habitats, and wetlands can alternate from high connectivity during floods to extreme fragmentation during droughts. Hydrology not only affects the physical elements that define the connectivity of the landscape - it also shapes biological connectivity - the composition, abundance and fecundity of wetland biota, and thus the type and abundance of organisms that disperse.

Rigorous field and modelling methods for assessing physical and biological connectivity exist; however, due to data limitations, the assessment of wetland connectivity for Lower Argenta Slough was largely qualitative and focused on hydrological connectivity. The assessment relied on a handful of air photos, orthophoto images, and technical reports (Herbison 2006, 2015,
Jackson et al. 2009, Matsubara and Ellis 2010, Polzin et al. 2010, Polzin and Rood 2014), used to determine the spatial and temporal connectivity of wetland habitat.

5. RESULTS

5.1. Wetland Delineation and Classification

Lower Argenta Slough is a wetland complex composed of shallow water, seasonally flooded marsh, and flood/riparian forest ecosystems (Table 3, Map 2). Seasonally flooded marsh communities occupy the majority of the lower slough followed by cottonwood dominated riparian forests and then permanently inundated shallow water communities. The full wetland community mapping polygon shapefile has been provided as part of this deliverable.

The likelihood of rare or at-risk ecological communities can be partially predicted by the biogeoclimatic (BEC) zone and site series present. The ICHdw1 has few wetland areas and not many at-risk communities had been documented within this BEC zone at the time that this mapping was conducted. This may be due to a lack of survey effort in this BEC zone, as the classification scheme available at the time of mapping was based on few plots and very few plots had been installed in the wetter site series (Braumandle and Curran 1992, Mackillop 2012, Mackillop pers. comm., 2012, 2016). An updated guide for ecosystem classification and identification in the South-Central Columbia Mountains, that includes more refined classifications based on a higher number of plots, was released in September 2016 (Mackillop and Ehman 2016), after the project mapping was completed.
Table 3. Ecosystem types expected to occur in Lower Argenta Slough.

<table>
<thead>
<tr>
<th>Ecosystem Type</th>
<th>Wetland Community</th>
<th>Site Association or Site Series</th>
<th>Site Association or Site Series Name</th>
<th>TEM Map Code</th>
<th>Map Code Name</th>
<th>Area (m²)</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shallow Water</td>
<td>1a</td>
<td>Shallow water</td>
<td>-</td>
<td>WL</td>
<td>Wetland</td>
<td>15,114</td>
<td>1.51</td>
</tr>
<tr>
<td></td>
<td>1b</td>
<td>Shallow water</td>
<td>-</td>
<td>WL</td>
<td>Wetland</td>
<td>8,322</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>1c</td>
<td>Shallow water</td>
<td>-</td>
<td>WL</td>
<td>Wetland</td>
<td>366</td>
<td>0.04</td>
</tr>
<tr>
<td>Marsh</td>
<td>2a</td>
<td>Wm05/Wm06</td>
<td>Common cattail marsh/Great bulrush marsh</td>
<td>WL</td>
<td>Wetland</td>
<td>7,421</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>2b</td>
<td>Wm01 (Wm02)</td>
<td>Beaked sedge - water sedge (Swamp horsetail - Beaked sedge)</td>
<td>WL</td>
<td>Wetland</td>
<td>55,147</td>
<td>5.51</td>
</tr>
<tr>
<td></td>
<td>2c</td>
<td>Wm01 (Wf01)</td>
<td>Beaked sedge - Water sedge (Water sedge - Beaked sedge)</td>
<td>WL</td>
<td>Wetland</td>
<td>63,881</td>
<td>6.39</td>
</tr>
<tr>
<td></td>
<td>2d</td>
<td>Wm05 (Wm02)</td>
<td>Common cattail marsh (Swamp horsetail - Beaked sedge)</td>
<td>WL</td>
<td>Wetland</td>
<td>22,977</td>
<td>2.30</td>
</tr>
<tr>
<td>Flood/Forest</td>
<td>3a</td>
<td>Fm02</td>
<td>Cottonwood - Spruce - Red-osier dogwood</td>
<td>SH</td>
<td>Cottonwood - Mountain Alder Grass</td>
<td>23,353</td>
<td>2.34</td>
</tr>
<tr>
<td></td>
<td>3b</td>
<td>Fm02/03</td>
<td>Cottonwood - Spruce - Red-osier dogwood (CwHw - White Pine - Devil's Club)</td>
<td>HD</td>
<td>CwHw-White Pine-Devil's Club</td>
<td>19,223</td>
<td>1.92</td>
</tr>
</tbody>
</table>

* Note: brackets denoting second site series means that the association is close the bracketed association, the slash indicates that both ecosystems are present within the polygon.

5.2. Wetland Function and Condition

5.2.1. Hydrology

The hydrology of a wetland is largely responsible for the composition of vegetation of a wetland, which in turn affects the value of the wetland to wildlife. Due to the lack of site specific data, inferences on the hydrologic condition of the Lower Argenta Slough were made from locally available climate and hydrology data and reports.

Daily average air temperature at the Duncan Lake Dam weather station for the period 1985 to 2015 ranged from -2.4°C in January to 18.9°C in July (Figure 3). Over the last 10 years, the daily average temperature from November to March has increased by 3.7°C compared to the average temperature in the previous 20 years (1985-2005), providing evidence of warmer winters over recent years. This increase in temperature has the potential to provide more open water habitat during winter. Likewise, daily average temperatures during the growing season (April to October) have increased by 5.7°C in the last 10 years, compared to the previous 20 years. This increase in air temperature has likely resulted in an increase in evapotranspiration rates, potentially resulting in greater water level drawdown during the growing season.
Average annual precipitation at Duncan Lake Dam weather station for the period 1985 to 2015 was 661 mm. Minimum precipitation was 411 mm in 1987 and maximum precipitation was 829 mm in 2012. Precipitation is generally highest from November through January and lowest in April (Figure 3). Over the last 10 years, snowfall typically comprised 26% of the total annual precipitation, but has been as low as 13.4%, and typically occurs from December through February. Annual precipitation was higher than average in eight of the last ten years, with the highest precipitation on record (since 1985) for the months of January through March, June, July, September, and October occurring between 2011-2014. The lowest precipitation on record for August and September occurred in 2011. The seasonal and interannual hydrological response of wetland water levels to precipitation events is unknown.

**Figure 3.** Monthly mean, minimum, and maximum air temperature, and mean total monthly precipitation recorded at Duncan Lake Dam for the 1985-2015 period of record (PoR), and mean monthly air temperature and total precipitation for the last 10 years (2006-2015).

Besides precipitation, Lower Argenta Slough receives water inputs from Upper Argenta Slough and runoff from three seepage springs originating from the local hillside to the east of the slough. One of the springs, Carter Creek, is said to flow year-round and maintains open water habitat in the lower slough during winter months (Herbison 2015). It is unknown whether Lower Argenta Slough receives other groundwater inputs, or discharges water to the local aquifer; though Herbison (2015) has identified locations of potential subsurface recharge (Table 4).
Seasonally high groundwater tables may be associated with Duncan River. Herbison (2006) hypothesized that Upper Argenta Slough receives water inputs from Lower Duncan River via a spring, but the magnitude, timing, and duration of this input has not been measured. Groundwater monitoring at upland riparian sites along the Lower Duncan River since 2009, indicates a very close correlation in groundwater elevation and river stage (measured at the gauging station 08NH118) during the growing season (Polzin et al. 2010, Polzin and Rood 2014). The high correlation between river stage and groundwater levels were found at measurement sites located 4 m away from the river; the full horizontal extent of this relationship is unknown (wetland habitat within the lower slough is 30 m away from the river).

Wetland habitat in Argenta Slough appears to be associated with a channel depression that may have once been a former channel or floodplain channel of the Duncan River that was cut off from mainstem flow as the river changed course. Photos taken of the site (Herbison 2015) show water flowing through the wetland complex; however, the location, rate, timing, and duration of flow have not been recorded. In the past, beaver activity has had the effect of ponding water in Upper Argenta Slough and reducing water levels in Lower Argenta Slough (Herbison 2006); however, the effect of beaver activity on the hydrology of the site has not been documented in recent years. Continuous water levels have not been collected in the slough to date, and thus the annual range in water levels above and below the abandoned beaver dam 1 (Berm 1) has not been documented (Map 1).

Lake level and river flow data (WSC gauges 08NH064 and 08NH118 respectively), topographic survey data (Matsubara and Ellis 2010), upland riparian water elevation data (Polzin et al. 2010), and observations from a local biologist (Herbison 2015) provide some insight into the hydrological regime of Lower Argenta Slough. The slough is flooded annually when Kootenay Lake levels are at an elevation of 532.5 m or higher (Matsubara and Ellis 2013). This inundation event typically occurs in June, corresponding to the spring freshet (Figure 4), and based on lake level data from 2011-2015, may last from 4 days (2015) to 86 days (2012) (Figure 5). River flows typically peak in July or August (Figure 4); the effect of peak river flows on water levels at the slough has not been documented. Water level measurements made at upland riparian sites in the Duncan River delta have found water level to be influenced more by Kootenay Lake levels than by Duncan River flow and stage (Polzin et al. 2010). However, it is likely that the area of the slough is increased when lake waters are backwatered during high river flows. After the spring freshet, water levels in the slough are expected to slowly recede through late summer to perennial low levels in winter.
Figure 4. Mean monthly discharge for the Lower Duncan River at Station 08NH118 and mean monthly water levels for Kootenay Lake at Station 08NH064 from 1969 (post Duncan Dam construction) to 2015, and for the last 10 years (2006-2015).

Figure 5. Daily average water levels for Kootenay Lake at Station 08NH064 for the last 10 years (2006-2015), showing the timing and duration of potential inundation of the slough at a lake elevation of 532.5.
Wetland vegetation is known to reflect local hydrological flooding regimes. Thus, wetland ecosystem type and site associations (or series) provide further insight into the hydrology of the study area and are described in the following section (Section 5.2.2), and summarized in Table 4. Note that the confidence in some of these classifications is low due to lack of data (Section 5.1).

5.2.2. Vegetation Composition

The ecosystem types and vegetation communities that comprise the Lower Argenta Slough are a product of the local nutrient and moisture regime. In general, the site is expected to have a rich to very rich nutrient regime as it receives nutrients from upslope sources and from the Lower Duncan River. The majority of the slough is flooded in some years, and receives year-round moisture from upslope sources, the Lower Duncan River, and Kootenay Lake. This moisture provides very wet to wet soil conditions throughout the growing season. The pH is likely neutral in most of the slough that is receiving freshwater inputs, to slightly alkaline in the upper portion of the slough due to evapotranspiration (Mackenzie and Moran 2004).

The site conditions present in Lower Argenta Slough are known to support provincially at-risk ecosystems, and are likely to support others (Table 4). The provincially red-listed ecological community “Cottonwood - Spruce - Red-osier dogwood” (Fm02) was identified in the Lower Argenta Sough accounting for approximately 2.34 ha. Three provincially blue-listed ecosystems were identified in the Lower Argenta Sough. The largest blue-listed ecological community is the “Beaked sedge - water sedge (Swamp horsetail - Beaked sedge)” (Wm01(Wm02)) covering approximately 5.51 ha followed by the “Common cattail marsh (Swamp horsetail - Beaked sedge): (Wm05(Wm02)), accounting for approximately 2.30 ha. The smallest blue-listed community is the “Common cattail marsh/Great bulrush marsh (Wm05/Wm06) covering approximately 0.74 ha. The conservation value of ecological communities increases with size. Generally the minimum size of a community that will be tracked by the Province is 0.05 ha or 30 linear meters (CDC 2016a), thus those at-risk communities expected to be present in Lower Argenta Slough are of conservation value.

The potential of a site to support rare communities can be partially predicted by the site series and seral stage of a site. Within Lower Argenta Slough, the moist and rich site series with subsurface flow may support the red-listed Cottonwood - Spruce - Red-osier dogwood (Fm02) or Black Cottonwood/Common Snowberry – Roses (Fm01) ecological communities. The refined ecosystem classification for the ICHdw1 (Mackillop and Ehman 2016), released after the project mapping was completed, will help to predict the likelihood of these communities occurring in the Lower Argenta Slough.

It is currently unknown if any rare plants occur in Lower Argenta Slough. Small spike rush (Carex microcephala) (blue-listed, S3, G5) was reported on nearby, and potentially similar fluvial floodplain habitats, across the river mouth adjacent to Kootenay Lake in 1979, but is expected to be extirpated (CDC 2016a).

Ecosystem change and disturbance have been observed in Lower Argenta Slough both recently and historically due to climate change, invasive species, and land management in the Lower
Duncan wetland complex and adjacent waterbodies, as well as other factors (Krebs et al. 2013, T. Biebighauser in Herbison 2015).

These management activities have had local as well as downstream effects such as reduced fluvial disturbance and altered flow regimes, which may have led to succession to different and often more mature ecosystems. For example, fens and graminoid dominated wetland ecosystems have been lost at the head of Kootenay Lake (Krebs et al. 2013), and some of these may now be replaced by shrub and tree dominated ecosystems.

The community composition of some Provincially listed marsh communities likely present in Lower Argenta Slough is reported to have changed in the past 10 years. Herbison (2015) reports that the cattail marsh (blue-listed) used to be more extensive prior to 2010. As orthophotographs used in this report were from 2009 and 2011 it is possible that the extent and area of the cattail marsh was overestimated. In contrast, the blue-listed (potentially red-listed) great bulrush marsh may be increasing in permanent shallow water (Herbison 2015) due to increased availability of shallow water habitat and increase salinity.

Several invasive species have been observed in the Argenta Slough and Lower Duncan wetlands that may threaten the condition of the slough; including burdock species, Canada thistle, reed canary grass, bull thistle, common tansey, orange and yellow hawkweed, policemens helmet, and St. John’s Wort (Krebs et al. 2013, IAPP 2016). Other non-wetland invasive species recorded in the adjacent area (e.g., likely on roadside) that may become a threat if site conditions become drier are spotted knapweed, oxeye daisy, and chickory. Of particular note is reed canary grass (*Phalaris arundinacea*) which is abundant in Lower Argenta Slough and is known to produce a dense canopy that excludes most species (Mackenzie and Moran 2004). Krebs et al. (2013) determined that invasive plants pose a high threat to non-forested habitats in the area.
### Table 4. Wetland types, status, and function and condition in Lower Argenta Slough (Part 1 of 2).

<table>
<thead>
<tr>
<th>Ecosystem type</th>
<th>Wetland type</th>
<th>Site association or Site series code</th>
<th>Area (ha)</th>
<th>Conservation Rank</th>
<th>Hydrology</th>
<th>Vegetation</th>
<th>Other Features or Comments</th>
<th>Confidence in Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shallow Water</td>
<td>1a Shallow water</td>
<td>1.51</td>
<td>SNR</td>
<td>No status</td>
<td>GNR</td>
<td>Sluggish water; receives year-round flow from Carter Creek, subsurface seepage, and flooding during freshet.</td>
<td>Dense aquatic vegetation(^1).</td>
<td>Calcium carbonate deposits, reported to be locally unique and rare by local resident(^1).</td>
</tr>
<tr>
<td>1b Shallow water</td>
<td>0.83</td>
<td>SNR</td>
<td>No status</td>
<td>GNR</td>
<td>Sluggish, subsurface seepage, flooding during freshet.</td>
<td>Some aquatic vegetation.</td>
<td></td>
<td>L</td>
</tr>
<tr>
<td>1c Shallow water</td>
<td>0.04</td>
<td>SNR</td>
<td>No status</td>
<td>GNR</td>
<td>Subsurface seepage and flooding during freshet.</td>
<td></td>
<td></td>
<td>M</td>
</tr>
<tr>
<td>Marsh</td>
<td>2a Wm05/Wm06</td>
<td>0.74</td>
<td>Blue</td>
<td>S3 (2004)</td>
<td>G5</td>
<td>Subsurface seepage and flooding during freshet, water table likely below surface by end of summer due to evapotranspiration.</td>
<td>Cattail marsh with patches of bulrush, transitioning to reed canary grass and other grasses and sedges.</td>
<td>The condition and extent of the cattail marsh has been variable the past five plus years(^1), bulrush community may be similar red-listed community.</td>
</tr>
<tr>
<td>2b Wm01 (Wm02)</td>
<td>5.51</td>
<td>Blue</td>
<td>S4 (2010)</td>
<td>G4</td>
<td>Flooded some years(^1).</td>
<td>Transition from sedges to grasses, thickly vegetated.</td>
<td>Conservation rank is for Wm02 (Swamp horsetail - Beaked sedge) community, Wm01 is yellow-listed.</td>
<td>L</td>
</tr>
</tbody>
</table>

\(^1\) note brackets denoting second site series means that the association is close the bracketed association, the backslash indicates that both ecosystems are present within the

\(^1\)Herbison 2015 Draft

\(^2\)B.C. List Status are assigned based on the Subnational Conservation Status. Red includes any ecological community that is Extirpated, Endangered, or Threatened in B.C. Blue includes any ecological communities that are considered to be of Special Concern in B.C. These communities are particularly sensitive or vulnerable to human activities or natural

\(^3\)Provincial Conservation Status refers to the species or ecological communities conservation status in BC. S2 = imperiled, S3=special concern, vulnerable to extirpation or

\(^4\)Global Rank applies to the ecological community across its entire range. G2=imperiled, G3=vulnerable to extirpation or extinction, G4=apparently secure, GNR=unranked.
### Table 4. Wetland types, status, and function and condition in Lower Argenta Slough (Part 2 of 2).

<table>
<thead>
<tr>
<th>Ecosystem type</th>
<th>Wetland community map number</th>
<th>Site association or Site series code</th>
<th>Area (ha)</th>
<th>Conservation Rank</th>
<th>Hydrology</th>
<th>Vegetation</th>
<th>Other Features or Comments</th>
<th>Confidence in Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marsh</td>
<td>2c Wm01(Wf01)</td>
<td>6.39 Yellow S4 (2004) G4</td>
<td></td>
<td>Floods during freshet and high water events, east slope saturated from subsurface upslope flow.</td>
<td>Flava sedge and water sedge(^1), thick cover of other sedges and grasses including infilling with reed canary grass in some areas.</td>
<td>Woody debris has been washed up over much of the polygon. Could support red-listed Wm51 (three-way sedge) community.</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>2d Wm05(Wm02)</td>
<td>2.30 Blue S3 (2004) G5</td>
<td>Potential subsurface recharge(^1), considerable evapotranspiration.</td>
<td></td>
<td>Flora and fauna dependent on subsurface recharge.</td>
<td>Other salt tolerant sedges and grasses.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flood/Forest</td>
<td>3a Fm02</td>
<td>2.34 Red S2 (2010) GNR</td>
<td></td>
<td>Floods some years, water movement through root systems most of year.</td>
<td>Middle bench, cottonwood dominated floodplain forest with shrubs including willows and red-osier dogwood. Older sites may host young spruce.</td>
<td>Potential to support Fm01 (black cottonwood/common snowberry-roses) red-listed community</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>3b Fm02/03</td>
<td>1.92</td>
<td>Receiving subsurface flow from upslope and toe slope moisture from slough.</td>
<td></td>
<td>Moisture receiving site with cottonwood, alder, aspen, willow and other shrubs, transition to drier Douglas-fir dominated upslope forest.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)note brackets denoting second site series means that the association is close the bracketed association, the backslash indicates that both ecosystems are present within the

\(^2\)Herbison 2015 Draft

\(^3\)B.C. List Status are assigned based on the Subnational Conservation Status. Red includes any ecological community that is Extirpated, Endangered, or Threatened in B.C. Blue includes any ecological communities that are considered to be of Special Concern in B.C. These communities are particularly sensitive or vulnerable to human activities or natural processes.

\(^4\)Provincial Conservation Status refers to the species or ecological communities conservation status in BC. S2 = imperiled, S3=special concern, vulnerable to extirpation or extinction.

\(^5\)Global Rank applies to the ecological community across its entire range. G2=imperiled, G3=vulnerable to extirpation or extinction, G4=apparently secure, GNR=unranked.
5.2.3. Wildlife Use

5.2.3.1. Amphibians

Four amphibian species, including one species at-risk, have been observed within the Argenta Slough: Columbia Spotted Frog (*Rana luteiventris*), Long-toed Salamander (*Ambystoma macrodactylum*), Northern Pacific Treefrog (*Pseudacris regilla*), and Western Toad (*Anaxyrus boreas*) (Table 5) (Herbison et al. 2002). The Western Toad is federally listed as Special Concern under the *Species at Risk Act* (SARA 2002) and provincially blue-listed (Special Concern) (CDC 2016b). The provincial Conservation Framework categorizes the species with a relatively high Priority 2 under Goal 2 (preventing species from becoming at risk).

Breeding has been confirmed within Argenta Slough for the Western Toad and Northern Pacific Treefrog (Herbison 2015) and breeding is probable for the Columbia Spotted Frog and Long-toed Salamander. All four of these species are highly dependent on Lower Argenta Slough. One additional amphibian species that has not been observed but has a moderate likelihood of occurring is Northern Leopard Frog (*Pseudacris regilla*), which is federally listed as Endangered and provincially red-listed (Extirpated, Endangered or Threatened) (Table 5) (CDC 2016b).
## Table 5. Amphibian species with a high/confirmed or moderate likelihood of occurring within Argenta Slough.

<table>
<thead>
<tr>
<th>Dependency on Lower Argenta Slough</th>
<th>Name(^1)</th>
<th>Scientific Name</th>
<th>Likelihood of Presence</th>
<th>Habitat Use</th>
<th>Federal Designation</th>
<th>Provincial Designation</th>
<th>Identified Wildlife(^2)</th>
<th>Regionally Significant(^3)</th>
<th>Highest Conservation</th>
<th>Highest Conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>high</td>
<td>Columbia Spotted Frog</td>
<td><em>Rana luteiventris</em></td>
<td>high/confirmed</td>
<td>breeding - probable</td>
<td>NAR (May 2000)</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long-toed Salamander</td>
<td><em>Ambystoma macrodactylum</em></td>
<td>high/confirmed</td>
<td>breeding - probable</td>
<td>NAR (Apr 2006)</td>
<td>Yellow</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Northern Pacific Treefrog</td>
<td><em>Pseudacris regilla</em></td>
<td>high/confirmed</td>
<td>breeding - confirmed</td>
<td>Yellow</td>
<td>1,2,3</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Western Toad</td>
<td><em>Anaxyrus boreas</em></td>
<td>high/confirmed</td>
<td>breeding - confirmed</td>
<td>SC (Nov 2012)</td>
<td>Yellow</td>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Northern Leopard Frog</td>
<td><em>Lithobates pipiens</em></td>
<td>moderate</td>
<td>breeding - possible</td>
<td>E (Apr 2009)</td>
<td>Blue</td>
<td>y</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Search criteria for species included all species within the Interior Cedar Hemlock (ICH) Biogeoclimatic Zone, Kootenay Lake Forest District, Kootenay MOE Region, and Central Kootenay Regional District.

\(^2\) Identified under the Identified Wildlife Management Strategy.

\(^3\) Regional significance is based on wildlife species identified within the Fish and Wildlife Compensation Plan Draft (BC Hydro 2012) and the Duncan-Lardeau Flats Conservation Properties Land Management Plan (Krebs et al. 2013).

\(^4\) Conservation Framework Goals are as follows: Goal 1: Contribute to global effects and ecosystem conservation; Goal 2: Prevent species and ecosystems from becoming at risk; and Goal 3: Maintain the diversity of native species and ecosystems.

\(^5\) This value represents the highest conservation priority assigned to a Conservation Framework Goal under the Conservation Framework. Values range from 1 (highest) to 6 (lowest).
5.2.3.2. Avian Species

A total of 67 avian species have been observed within Argenta Slough (Table 6, Table 7). Breeding has been confirmed for five of these species: American Bittern (*Botaurus lentiginosus*), Marsh Wren (*Cistothorus palustris*), Pied-billed Grebe (*Podilymbus podiceps*), Red-winged Blackbird (*Agelaius phoeniceus*), and Sora (*Porzana carolina*) (Table 6). All confirmed nest sites were located upstream of Beaver Dam 1 (Herbison 2015), thus, there is only a moderate potential these species would be dependent on habitat(s) within Lower Argenta Slough. The American Bittern is provincially blue-listed (CDC 2016b) and is the only at-risk species confirmed to breed within Argenta Slough. Two other blue-listed avian species, the Eared Grebe (*Podiceps nigricollis*) and Great Blue Heron (*Ardea herodias herodias*) have also been observed in Argenta Slough and could potentially breed within or near the slough; however any Great Blue Heron nests would be readily detectable so it is assumed that the Great Blue Heron predominantly uses the slough for foraging. The Horned Grebe (*Podiceps auritus*) is another at-risk species (assessed as Special Concern by COSEWIC) that has been observed in Argenta Slough and potentially breeds in the area. There is a high potential that Eared Grebes, Horned Grebes, and Great Blue Herons would be dependent on Lower Argenta Slough.

Argenta Slough also provides valuable foraging habitat, including migratory stopover and overwintering habitat to several species of waterfowl (Herbison 2015) (Table 7). The provincially blue-listed Tundra Swan (*Cygnus columbianus*) has been observed where the inflow of Carter Creek maintains open water during the winter, along with Canada Geese (*Branta canadensis*), Mallards (*Anas platyrhyncos*), and Trumpeter Swans (*Cygnus buccinator*) (Herbison 2015). These overwintering species are associated with a high potential dependency on Lower Argenta Slough. Five additional species at-risk have been documented foraging in the area: Common Nighthawk (*Chordeiles minor*) is federally listed as Threatened under SARA, Bobolink (*Dolichonyx oryzivorus*) is provincially blue-listed and has been assessed as Threatened by Committee on the Status of Endangered in Canada (COSEWIC), Lewis’s Woodpecker (*Melanerpes lewis*) and Olive-sided Flycatcher (*Contopus cooperi*) are provincially blue-listed and federally listed as Threatened under SARA, and Western Grebe (*Aechmophorus occidentalis*) is provincially red-listed and has been assessed as Special Concern by COSEWIC. While Common Nighthawks and Olive-sided Flycatchers likely forage directly over Argenta Slough there is a low potential that they are dependent on Lower Argenta Slough. Bobolinks and Lewis’s Woodpecker are more closely associated with adjacent riparian habitats, and Western Grebes are more closely associated with the adjacent riverine and lake habitats. Bobolinks were considered to have a moderate potential dependency on habitat within Lower Argenta Slough. There is a low potential that Lewis’s Woodpecker and Western Grebes are dependent on Lower Argenta Slough.

Several other avian species have been assigned a moderate likelihood of occurring within Argenta Slough based on habitat requirements and range (Table 8). While all at-risk species were considered and habitat information within the BC Species and Ecosystems Explorer database was considered, where location information was missing, there may be additional not-
at-risk avian species with a moderate likelihood of occurring within Argenta Slough that are not listed within Table 8.
Table 6. Avian species with a high/confirmed likelihood of occurring within Argenta Slough that are also confirmed to breed or potentially breed in the area.

<table>
<thead>
<tr>
<th>Dependency on Lower Argenta Slough</th>
<th>Name1</th>
<th>Habitat Use</th>
<th>Federal Designation</th>
<th>Provincial Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Scientific</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>high American Coot</td>
<td>Fulica americana</td>
<td>breeding - probable</td>
<td>NAR (May 1991)</td>
<td>Yellow</td>
</tr>
<tr>
<td>high American Wigeon</td>
<td>Anas americana</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1,2,3</td>
</tr>
<tr>
<td>high Barrow's Goldeneye</td>
<td>Bucephala islandica</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1</td>
</tr>
<tr>
<td>high Blue-winged Teal</td>
<td>Anas discors</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1</td>
</tr>
<tr>
<td>high Bufflehead</td>
<td>Bucephala albeola</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1,2,3</td>
</tr>
<tr>
<td>high Cinnamon Teal</td>
<td>Anas cyanoptera</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>2</td>
</tr>
<tr>
<td>high Eared Grebe</td>
<td>Podiceps nigricollis</td>
<td>breeding - probable</td>
<td>Blue</td>
<td>1,2</td>
</tr>
<tr>
<td>high Green-winged Teal</td>
<td>Anas crecca</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>3</td>
</tr>
<tr>
<td>high Horned Grebe</td>
<td>Podiceps auritus</td>
<td>breeding - probable</td>
<td>SC (Apr 2009)</td>
<td>Yellow</td>
</tr>
<tr>
<td>high Northern Pintail</td>
<td>Anas acuta</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>2</td>
</tr>
<tr>
<td>high Northern Shoveler</td>
<td>Anas clypeata</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1,2,3</td>
</tr>
<tr>
<td>high Ring-necked Duck</td>
<td>Aythya collaris</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1,2,3</td>
</tr>
<tr>
<td>high Ruddy Duck</td>
<td>Oxyura jamaicensis</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1,2,3</td>
</tr>
<tr>
<td>high Solitary Sandpiper</td>
<td>Tringa solitaria</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>2</td>
</tr>
<tr>
<td>high Virginia Rail</td>
<td>Raja limicola</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>2</td>
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<tr>
<td>high Wilson’s Snipe</td>
<td>Gel Pinnis delicata</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>2</td>
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<tr>
<td>high Yellow-headed Blackbird</td>
<td>Xanthocephalus xanthocephalus</td>
<td>breeding and overwintering - probable</td>
<td>Yellow</td>
<td>2</td>
</tr>
<tr>
<td>high Common Goldeneye</td>
<td>Bucephala clangula</td>
<td>breeding and overwintering - probable</td>
<td>Yellow</td>
<td>2</td>
</tr>
<tr>
<td>high Hooded Merganser</td>
<td>Lophodytes cucullatus</td>
<td>breeding and overwintering - probable</td>
<td>Yellow</td>
<td>1,2,3</td>
</tr>
<tr>
<td>Great Blue Heron, herodias</td>
<td>Andra herodias herodias</td>
<td>breeding - probable</td>
<td>Blue</td>
<td>1</td>
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<tr>
<td>high Marsh Wren</td>
<td>Cistothorus palustris</td>
<td>breeding - confirmed</td>
<td>Blue</td>
<td>y</td>
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<tr>
<td>high Red-winged Blackbird</td>
<td>Agelaius phoeniceus</td>
<td>breeding - confirmed</td>
<td>Yellow</td>
<td>1</td>
</tr>
<tr>
<td>high Sora</td>
<td>Porsana carolina</td>
<td>breeding - confirmed</td>
<td>Yellow</td>
<td>1</td>
</tr>
<tr>
<td>high Pied-billed Grebe</td>
<td>Podilymbus podiceps</td>
<td>breeding - confirmed</td>
<td>Yellow</td>
<td>1</td>
</tr>
<tr>
<td>high Belted Kingfisher</td>
<td>Megaceryle alcyon</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>2</td>
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<tr>
<td>high Northern Rough-winged Swallow</td>
<td>Stbdigopteryx s:ventennis</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>2</td>
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<tr>
<td>high Northern Waterthrush</td>
<td>Parkesia noveboracensis</td>
<td>breeding - probable</td>
<td>Yellow</td>
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<tr>
<td>high Pacific Wren</td>
<td>Tringa flavipes</td>
<td>breeding - probable</td>
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<td>1,2,3</td>
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<tr>
<td>high Spotted Sandpiper</td>
<td>Actitis macularis</td>
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<td>Yellow</td>
<td>3</td>
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<tr>
<td>high Kittdeer</td>
<td>Charadrius vociferus</td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>2</td>
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<tr>
<td>high Northern Harrier</td>
<td>Circus cyaneus</td>
<td>breeding - possible</td>
<td>NAR (May 1993)</td>
<td>Yellow</td>
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<tr>
<td>high Ring-billed Gull</td>
<td>Larus delawarensis</td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>3</td>
</tr>
<tr>
<td>moderate Eastern Kingbird</td>
<td>Tyrannus tyrannus</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>2</td>
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<tr>
<td>moderate Orange-crowned Warbler</td>
<td>Ocythopsis celata</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>3</td>
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<tr>
<td>moderate Song Sparrow</td>
<td>Melosopia melodia</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1,2,3</td>
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<tr>
<td>moderate Tree Swallow</td>
<td>Tachycineta bicolor</td>
<td>breeding - probable</td>
<td>Yellow</td>
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<tr>
<td>moderate Great Horned Owl</td>
<td>Bubo virginianus</td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>1,2,3</td>
</tr>
<tr>
<td>moderate Osprey</td>
<td>Pandion haliaetus</td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>1,2,3</td>
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</tbody>
</table>

1 Search criteria for species included all species within the Interior Cedar Hemlock (ICH) Biogeoclimatic Zone, Kootenay Lake Forest District, Kootenay MOE Region, and Central Kootenay Regional District.

2 Identified under the Identified Wildlife Management Strategy.

3 Regional significance is based on wildlife species identified within the Fish and Wildlife Compensation Plan Draft (BC Hydro 2012) and the Duncan-Lardeau Flats Conservation Properties Land Management Plan (Krebs et al. 2013).

4 Conservation Framework Goals are as follows: Goal 1: Contribute to global effects and ecosystem conservation; Goal 2: Prevent species and ecosystems from becoming at risk; and Goal 3: Maintain the diversity of native species and

5 This value represents the highest conservation priority assigned to a Conservation Framework Goal under the Conservation Framework. Values range from 1 (highest) to 6 (lowest).
Table 7. **Avian species with a high/confirmed likelihood of occurring within Argenta Slough or immediately adjacent habitats, but are unlikely to breed within Argenta Slough.**

<table>
<thead>
<tr>
<th>Dependency on Lower Argenta Slough</th>
<th>Name(^1)</th>
<th>Scientific</th>
<th>Habitat Use</th>
<th>Federal Designation</th>
<th>BC List</th>
<th>Provincial Designation</th>
<th>Conservation Framework Goal(^5)</th>
<th>Highest Conservation Framework Priority(^5)</th>
</tr>
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<tbody>
<tr>
<td>high</td>
<td>Canvasback</td>
<td>Aythya valisneria</td>
<td>foraging - migratory stopover - probable</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>Greater Scaup</td>
<td>A. marila</td>
<td>foraging - migratory stopover - probable</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
<td>2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Least Sandpiper</td>
<td>Calidris minualla</td>
<td>foraging - migratory stopover - probable</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
<td>2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesser Scaup</td>
<td>A. affinis</td>
<td>foraging - migratory stopover - probable</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
<td>2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pacific Loon</td>
<td>Gavia pacifica</td>
<td>foraging - migratory stopover - probable</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
<td>2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red-breasted Merganser</td>
<td>Mergus serrator</td>
<td>foraging - migratory stopover - probable</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
<td>2 3 4 5 6 7</td>
<td></td>
<td></td>
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<tr>
<td>Semi-palmated Plover</td>
<td>Charadrius semipalmatus</td>
<td>foraging - migratory stopover - probable</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
<td>2 3 4 5 6 7</td>
<td></td>
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<tr>
<td>Semi-palmated Sandpiper</td>
<td>C. pusilla</td>
<td>foraging - migratory stopover - probable</td>
<td>Unknown</td>
<td>2</td>
<td>2</td>
<td>2 3 4 5 6 7</td>
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<tr>
<td>Snow Goose</td>
<td>Chenchaenulescens</td>
<td>foraging - migratory stopover - probable</td>
<td>Yellow</td>
<td>3</td>
<td>5</td>
<td>2 3 4 5 6 7</td>
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<tr>
<td>Canada Goose</td>
<td>Branta canadensis</td>
<td>foraging - overwintering - confirmed</td>
<td>Yellow</td>
<td>1, 2, 3</td>
<td>6</td>
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<tr>
<td>Mallard</td>
<td>Anas platyrhynchos</td>
<td>foraging - overwintering - confirmed</td>
<td>Yellow</td>
<td>3</td>
<td>5</td>
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<td></td>
</tr>
<tr>
<td>Trumpeter Swan</td>
<td>Cygnus buccinator</td>
<td>foraging - overwintering - confirmed</td>
<td>NAR (May 1996)</td>
<td>Yellow</td>
<td>3</td>
<td>5</td>
<td>2 3 4 5 6 7</td>
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<tr>
<td>Tundra Swan</td>
<td>C. columbianus</td>
<td>foraging - overwintering - confirmed</td>
<td>Blue</td>
<td>3</td>
<td>4</td>
<td>2 3 4 5 6 7</td>
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<tr>
<td>moderate</td>
<td>Bobolink</td>
<td>Dolichonyx oryzivorus</td>
<td>foraging - transient</td>
<td>T (Apr 2010)</td>
<td>Blue</td>
<td>y</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Eurasian Wigeon</td>
<td>Anas penelope</td>
<td>foraging - transient</td>
<td>No Status</td>
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<tr>
<td>low</td>
<td>American Dipper</td>
<td>Cinclus mexicanus</td>
<td>foraging - transient</td>
<td>NAR (May 1997)</td>
<td>Yellow</td>
<td>1</td>
<td>5</td>
<td></td>
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<tr>
<td>Common Loon</td>
<td>Gavia immer</td>
<td>adjacent</td>
<td>Yellow</td>
<td>1, 2, 3</td>
<td>6</td>
<td>2 3 4 5 6 7</td>
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<td></td>
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<tr>
<td>Common Merganser</td>
<td>Mergus merganser</td>
<td>adjacent</td>
<td>Yellow</td>
<td>3</td>
<td>5</td>
<td>2 3 4 5 6 7</td>
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<td></td>
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<tr>
<td>Common Nighthawk</td>
<td>Chordeiles minor</td>
<td>foraging - transient</td>
<td>NAR (May 2007)</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
<td>2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Lewis's Woodpecker</td>
<td>Melanerpes lewis</td>
<td>adjacent</td>
<td>T (Apr 2010)</td>
<td>1-T (Jul 2012)</td>
<td>Blue</td>
<td>Y (May 2004)</td>
<td>y</td>
<td>2</td>
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<tr>
<td>Mountain Bluebird</td>
<td>Sialia currucoides</td>
<td>adjacent</td>
<td>Yellow</td>
<td>1</td>
<td>4</td>
<td>2 3 4 5 6 7</td>
<td></td>
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<tr>
<td>Northern Pygmy-Owl</td>
<td>Glaucidium gnoma</td>
<td>adjacent</td>
<td>Yellow</td>
<td>2</td>
<td>3</td>
<td>2 3 4 5 6 7</td>
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<td></td>
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<tr>
<td>Olive-sided Flycatcher</td>
<td>Contopus cooperi</td>
<td>adjacent</td>
<td>T (Nov 2007)</td>
<td>1-T (Feb 2010)</td>
<td>Blue</td>
<td>y</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Vaux's Swift</td>
<td>Chaetura vauxi</td>
<td>adjacent</td>
<td>Yellow</td>
<td>2</td>
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<td>2 3 4 5 6 7</td>
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<tr>
<td>Warbling Vireo</td>
<td>Vireo gilvus</td>
<td>adjacent</td>
<td>Yellow</td>
<td>1, 2, 3</td>
<td>6</td>
<td>2 3 4 5 6 7</td>
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<tr>
<td>Western Bluebird</td>
<td>Sialia mexicana</td>
<td>adjacent</td>
<td>Yellow</td>
<td>1, 2</td>
<td>4</td>
<td>2 3 4 5 6 7</td>
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<td></td>
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<tr>
<td>Western Grebe</td>
<td>Aechmophorus occidentalis</td>
<td>adjacent</td>
<td>SC (May 2014)</td>
<td>Red</td>
<td>y</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Yellow-rumped Warbler</td>
<td>Setophaga coronata</td>
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<td>Yellow</td>
<td>3</td>
<td>5</td>
<td>2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Search criteria for species included all species within the Interior Cedar Hemlock (ICH) Biogeoclimatic Zone, Kootenay Lake Forest District, Kootenay MOE Region, and Central Kootenay Regional District.

\(^2\) Identified under the Identified Wildlife Management Strategy.

\(^3\) Regional significance is based on wildlife species identified within the Fish and Wildlife Compensation Plan Draft (BC Hydro 2012) and the Duncan-Lardeau Flats Conservation Properties Land Management Plan (Krebs et al. 2013).

\(^4\) Conservation Framework Goals are as follows: Goal 1: Contribute to global effects and ecosystem conservation; Goal 2: Prevent species and ecosystems from becoming at risk; and Goal 3: Maintain the diversity of native species and ecosystems.

\(^5\) This value represents the highest conservation priority assigned to a Conservation Framework Goal under the Conservation Framework. Values range from 1 (highest) to 6 (lowest).
### Table 8. Avian species with a moderate likelihood of occurring within Argenta Slough.

<table>
<thead>
<tr>
<th>Name1</th>
<th>Scientific</th>
<th>Habitat Use</th>
<th>Federal Designation</th>
<th>BC List</th>
<th>Identified Wildlife2</th>
<th>Regionally Significant</th>
<th>Highest Conservation Framework Goal4</th>
<th>Highest Conservation Framework Priority5</th>
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<tr>
<td>Common</td>
<td>Scientific</td>
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<tr>
<td>American Goldfinch</td>
<td><em>Spinus tristis</em></td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>2</td>
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<tr>
<td>Gadwall</td>
<td><em>Anas strepera</em></td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>1,2,3</td>
<td>6</td>
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<tr>
<td>Merlin</td>
<td><em>Falco columbarius</em></td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>1,2,3</td>
<td>6</td>
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<tr>
<td>Northern Saw-whet Owl</td>
<td><em>Aegolius acadicus</em></td>
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<td>Yellow</td>
<td>3, 5</td>
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<tr>
<td>Redhead</td>
<td><em>Aythya americana</em></td>
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<td>Yellow</td>
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<td>Rufous Hummingbird</td>
<td><em>Selasphorus rufus</em></td>
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<td>Yellow</td>
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<td>2</td>
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<tr>
<td>Violet-green Swallow</td>
<td><em>Tachycineta thalassina</em></td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Willow Flycatcher</td>
<td><em>Empidonax traillii</em></td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Wilson’s Phalarope</td>
<td><em>Phalaropus tricolor</em></td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Wilson’s Warbler</td>
<td><em>Cardellina pusilla</em></td>
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<td>Yellow</td>
<td>2, 2</td>
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<td>Wood Duck</td>
<td><em>Aix sponsa</em></td>
<td>breeding - possible</td>
<td>Yellow</td>
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<td>1</td>
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<tr>
<td>Yellow Warbler</td>
<td><em>Setophaga petechia</em></td>
<td>breeding - possible</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Common Tern</td>
<td><em>Sterna hirundo</em></td>
<td>foraging - migratory stopover</td>
<td>NAR (May 1998)</td>
<td>Unknown</td>
<td>2</td>
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<tr>
<td>Greater White-fronted Goose</td>
<td><em>Anser albifrons</em></td>
<td>foraging - migratory stopover</td>
<td>Yellow</td>
<td>2</td>
<td>4</td>
<td></td>
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<tr>
<td>Double-crested Cormorant</td>
<td><em>Phalacrocorax auritus</em></td>
<td>foraging - migratory stopover</td>
<td>NAR (May 1978)</td>
<td>Blue</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Northern Shrike</td>
<td><em>Lanius excubitor</em></td>
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<td>Yellow</td>
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<td>4</td>
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<tr>
<td>Bald Eagle</td>
<td><em>Haliaeetus leucocephalus</em></td>
<td>foraging</td>
<td>Yellow</td>
<td>1,2,3</td>
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<tr>
<td>Cliff Swallow</td>
<td><em>Petrochelidon pyrhonota</em></td>
<td>foraging</td>
<td>Yellow</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Red-tailed Hawk</td>
<td><em>Buteo jamaicensis</em></td>
<td>foraging</td>
<td>NAR (May 1995)</td>
<td>Yellow</td>
<td>1,2,3</td>
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<td>Short-eared Owl</td>
<td><em>Asio flammeus</em></td>
<td>foraging</td>
<td>SC (Mar 2008) - 1-SC (Jul 2012)</td>
<td>Blue</td>
<td>Y (May 2004)</td>
<td>2</td>
<td>2</td>
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</tr>
<tr>
<td>Yellow-breasted Chat</td>
<td><em>Icteria virens</em></td>
<td>foraging</td>
<td>E (Nov 2011) - 1-E (Jun 2003)</td>
<td>Red</td>
<td>Y (May 2004)</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Barred Owl</td>
<td><em>Strix varia</em></td>
<td>foraging - transient</td>
<td>Yellow</td>
<td>1,2,3</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golden Eagle</td>
<td><em>Aquila chrysaetos</em></td>
<td>foraging - transient</td>
<td>NAR (May 1996)</td>
<td>Yellow</td>
<td>2</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Search criteria for species included all species within the Interior Cedar Hemlock (ICH) Biogeoclimatic Zone, Kootenay Lake Forest District, Kootenay MOE Region, and Central Kootenay Regional District.
2 Identified under the Identified Wildlife Management Strategy.
3 Regional significance is based on wildlife species identified within the Fish and Wildlife Compensation Plan Draft (BC Hydro 2012) and the Duncan-Lardeau Flats Conservation Properties Land Management Plan (Krebs et al. 2013).
4 Conservation Framework Goals are as follows: Goal 1: Contribute to global effects and ecosystem conservation; Goal 2: Prevent species and ecosystems from becoming at risk; and Goal 3: Maintain the diversity of native species and ecosystems.
5 This value represents the highest conservation priority assigned to a Conservation Framework Goal under the Conservation Framework. Values range from 1 (highest) to 6 (lowest).

The potential dependency of species on habitat(s) within Lower Argenta Slough was only assessed for species that have been observed within Argenta Slough (i.e., those with a high/confirmed potential of occurrence within Argenta Slough).
5.2.3.3. Mammals

Six mammal species, including two at-risk species, have been observed within Argenta Slough: American Beaver (*Castor canadensis*), American Water Shrew (*Sorex palustris*), Common Muskrat (*Ondatra zibethicus*), North American River Otter (*Lontra canadensis*), North American Water Vole (*Microtus richardsoni*), and Townsend’s Big-eared Bat (*Corynorhinus townsendii*) (Table 9) (Herbison 2015). The American Water Shrew and Townsend’s Big-eared Bat are provincially blue-listed (CDC 2016b). The American Beaver, American Water Shrew, Common Muskrat, and North American Water Vole likely breed within Argenta Slough and are likely highly dependent on Lower Argenta Slough. The North American River Otter and Townsend’s Big-eared Bat are more closely associated with adjacent habitats and likely do not rely on habitat within Argenta Slough for breeding and are thus associated with a moderate and low potential, respectively, to be dependent on Lower Argenta Slough. An additional 17 mammal species have a moderate likelihood of occurring within the slough, including two at-risk species: Grizzly Bears (*Ursus arctos*) (assessed as Special Concern by COSEWIC and considered regionally significant) may forage within Argenta Slough as part of a larger home range, and Little Brown Myotis (*Myotis lucifugus*) (federally listed as Endangered under SARA) may forage over Argenta Slough.

Argenta Slough falls within a legally designated Mule Deer (*Odocoileus hemionus*) ungulate winter range (UWR) (u-4-001 91-MD_121) (MOE 2007); legislated under Section 12 of the *Forests and Range Practices Act* (FRPA 2002) Government Actions Regulation (GAR 2004); however, Argenta Slough itself likely provides little suitable winter foraging habitat due to the lack of snow interception cover and available winter forage. The associated legislated Order and the general wildlife measures restricts forest harvesting within the UWR unless it is for the purpose of improving the quality of the winter range, removing danger trees or approved by statutory decision maker (MOE 2007). Argenta Slough may provide foraging habitat to other regionally significant ungulates such as Moose (*Alces americanus*) and White-tailed Deer (*Odocoileus virginianus*) (Table 9).
Table 9. Mammal species with a high/confirmed or moderate likelihood of occurring within Argenta Slough.4

<table>
<thead>
<tr>
<th>Dependency on Lower Argenta Slough</th>
<th>Name</th>
<th>Scientific Name</th>
<th>Likelihood of Presence</th>
<th>Habitat Use</th>
<th>Federal Designation</th>
<th>Provincial Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>high</td>
<td>American Beaver</td>
<td>Castor canadensis</td>
<td>high/confirmed</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>3 5</td>
</tr>
<tr>
<td>high</td>
<td>American Water Shrew</td>
<td>Sorex palustris</td>
<td>high/confirmed</td>
<td>breeding - probable</td>
<td>Blue</td>
<td>1,2,3 6</td>
</tr>
<tr>
<td>high</td>
<td>Common Muskrat</td>
<td>Ondatra zibethicus</td>
<td>high/confirmed</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1,2,3 6</td>
</tr>
<tr>
<td>high</td>
<td>North American Water Vole</td>
<td>Microtus richardsoni</td>
<td>high/confirmed</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1,3 5</td>
</tr>
<tr>
<td>moderate</td>
<td>North American River Otter</td>
<td>Lontra canadensis</td>
<td>high/confirmed</td>
<td>foraging - transient</td>
<td>Yellow</td>
<td>2 4</td>
</tr>
<tr>
<td>low</td>
<td>Townsend’s Big-eared Bat</td>
<td>Corynorhinus townsendi</td>
<td>high/confirmed</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>2 2</td>
</tr>
<tr>
<td>low</td>
<td>American Black Bear</td>
<td>Ursus americanus</td>
<td>moderate</td>
<td>foraging - transient</td>
<td>NAR (May 1999)</td>
<td>Yellow</td>
</tr>
<tr>
<td>low</td>
<td>American Mink</td>
<td>Neovison vison</td>
<td>moderate</td>
<td>breeding - probable</td>
<td>Yellow</td>
<td>1,2,3 6</td>
</tr>
<tr>
<td>low</td>
<td>Cougar</td>
<td>Puma concolor</td>
<td>moderate</td>
<td>foraging - transient</td>
<td>Yellow</td>
<td>1 4</td>
</tr>
<tr>
<td>low</td>
<td>Coyote</td>
<td>Canis latrans</td>
<td>moderate</td>
<td>foraging - transient</td>
<td>Yellow</td>
<td>1,2,3 6</td>
</tr>
<tr>
<td>low</td>
<td>Elk</td>
<td>Cervus elaphus</td>
<td>moderate</td>
<td>foraging - transient</td>
<td>Yellow</td>
<td>y 1 5</td>
</tr>
<tr>
<td>low</td>
<td>Grizzly Bear</td>
<td>Ursus arctos</td>
<td>moderate</td>
<td>foraging - transient</td>
<td>SC (May 2002)</td>
<td>Blue</td>
</tr>
<tr>
<td>low</td>
<td>Least Weasel</td>
<td>Mustela nivalis</td>
<td>moderate</td>
<td>foraging - possible</td>
<td>Yellow</td>
<td>2,3 4</td>
</tr>
<tr>
<td>low</td>
<td>Little Brown Myotis</td>
<td>Myotis lucifugus</td>
<td>moderate</td>
<td>foraging - possible</td>
<td>E (Nov 2013)</td>
<td>1-E (Dec 2014)</td>
</tr>
<tr>
<td>low</td>
<td>Long-tailed Weasel</td>
<td>Mustela frenata</td>
<td>moderate</td>
<td>foraging - possible</td>
<td>Yellow</td>
<td>1,2,3 6</td>
</tr>
<tr>
<td>low</td>
<td>Meadow Vole</td>
<td>Microtus pennsylvanicus</td>
<td>moderate</td>
<td>foraging - transient</td>
<td>Yellow</td>
<td>1,2,3 6</td>
</tr>
<tr>
<td>low</td>
<td>Moose</td>
<td>Alces americanus</td>
<td>moderate</td>
<td>foraging - possible</td>
<td>Yellow</td>
<td>1,2,3 6</td>
</tr>
<tr>
<td>low</td>
<td>Mule Deer</td>
<td>Odocoileus hemionus</td>
<td>moderate</td>
<td>foraging - possible</td>
<td>Yellow</td>
<td>y 1,2,3 6</td>
</tr>
<tr>
<td>low</td>
<td>Raccoon</td>
<td>Procyon lotor</td>
<td>moderate</td>
<td>foraging - possible</td>
<td>Yellow</td>
<td>1,2,3 6</td>
</tr>
<tr>
<td>low</td>
<td>Silver-haired Bat</td>
<td>Lasiomys isabellinus</td>
<td>moderate</td>
<td>foraging - possible</td>
<td>Yellow</td>
<td>2 2</td>
</tr>
<tr>
<td>low</td>
<td>Striped Skunk</td>
<td>Mephitis mephitis</td>
<td>moderate</td>
<td>foraging - possible</td>
<td>Yellow</td>
<td>1,2,3 6</td>
</tr>
<tr>
<td>low</td>
<td>White-tailed Deer</td>
<td>Odocoileus virginianus</td>
<td>moderate</td>
<td>foraging - possible</td>
<td>Yellow</td>
<td>y 1,2,3 6</td>
</tr>
</tbody>
</table>

1 Search criteria for species included all species within the Interior Cedar Hemlock (ICH) Biogeoclimatic Zone, Kootenay Lake Forest District, Kootenay MOE Region, and Central Kootenay Regional District.
2 Identified under the Identified Wildlife Management Strategy.
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5 This value represents the highest conservation priority assigned to a Conservation Framework Goal under the Conservation Framework. Values range from 1 (highest) to 6 (lowest).

4 The potential dependency of species on habitat(s) within Lower Argenta Slough was only assessed for species that have been observed within Argenta Slough (i.e., those with a high/confirmed potential of occurrence within Argenta Slough).
5.2.3.4. Reptiles

Three reptile species, including one at-risk species, have been observed within Argenta Slough: Painted Turtle (*Chrysemys picta*), Common Gartersnake (*Thamnophis sirtalis*), and Terrestrial Gartersnake (*Thamnophis elegans*) (Herbison 2015) (Table 10). The Painted Turtle is federally listed as Special Concern and provincially blue-listed (CDC 2016b). Painted Turtles breed within Argenta Slough at a known nesting site upstream of Beaver Dam 1 (Herbison 2013) and are thus associated with a moderate potential dependency on the Lower Argenta Slough. The Northern Rubber Boa (*Charina bottae*) (federally listed as Special Concern under SARA), has also been observed within a minimum of 1.5 km of Argenta Slough (DataBC 2016) and has thus been categorized as having a high/confirmed likelihood of occurring within Argenta Slough (Table 10). The Common Gartersnake, Terrestrial Gartersnake and Northern Rubber Boa are associated with low potential dependency on Lower Argenta Slough.
### Table 10. Reptile species with a high/confirmed likelihood of occurring within Argenta Slough.

<table>
<thead>
<tr>
<th>Dependency on Lower Argenta Slough</th>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Habitat Use</th>
<th>Federal Designation COSEWIC Status</th>
<th>SARA Schedule</th>
<th>BC List Identified Wildlife</th>
<th>Regional Significance</th>
<th>Highest Conservation Framework Goal</th>
<th>Highest Conservation Framework Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>moderate</td>
<td>Painted Turtle</td>
<td><em>Chrysemys picta</em> pop. 2</td>
<td>breeding - confirmed</td>
<td>SC (Apr 2006)</td>
<td>1-SC (Dec 2007)</td>
<td>Blue</td>
<td>y</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>low</td>
<td>Common Gartersnake</td>
<td><em>Thamnophis sirtalis</em></td>
<td>breeding - probable</td>
<td>SC (May 2003)</td>
<td>1-SC (Jan 2005)</td>
<td>Yellow</td>
<td>y</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Northern Rubber Boa</td>
<td><em>Charina bottae</em></td>
<td>breeding - possible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Terrestrial Gartersnake</td>
<td><em>Thamnophis elegans</em></td>
<td>breeding - probable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Terrestrial Gartersnake</td>
<td><em>Thamnophis elegans</em></td>
<td>breeding - probable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Search criteria for species included all species within the Interior Cedar Hemlock (ICH) Biogeoclimatic Zone, Kootenay Lake Forest District, Kootenay MOE Region, and Central Kootenay Regional District.

2. Identified under the Identified Wildlife Management Strategy.

3. Regional significance is based on wildlife species identified within the Fish and Wildlife Compensation Plan Draft (BC Hydro 2012) and the Duncan-Lardeau Flats Conservation Properties Land Management Plan (Krebs et al. 2013).

4. Conservation Framework Goals are as follows: Goal 1: Contribute to global effects and ecosystem conservation; Goal 2: Prevent species and ecosystems from becoming at risk; and Goal 3: Maintain the diversity of native species and ecosystems.

5. This value represents the highest conservation priority assigned to a Conservation Framework Goal under the Conservation Framework. Values range from 1 (highest) to 6 (lowest).
5.2.4. Connectivity

From a hydrological perspective, wetland and riparian habitat within Lower Argenta Slough is highly connected during periods of high water level, particularly during the spring freshet when the slough is flooded by Kootenay Lake (as described in Section 5.2.1), and less connected during low water periods (Map 3; see also photo documentation in Herbison 2015). However, the timing and duration of this connectivity has not been documented, and can only be estimated based on Kootenay Lake levels (as described in Section 5.2.1) and a handful of photographs. Map 3 consists of two orthophoto images of Lower Argenta Slough, one taken on April 30, 2009 when Duncan River discharge was 73 m$^3$/s, and the other on July 11, 2011 when river flows were 215 m$^3$/s. The difference in wetted area of shallow water habitat between low and high water levels in these images is approximately 21,147 m$^2$; this equates to almost a doubling of wetted area within Lower Argenta Slough (Map 3). It is expected that hydrological connectivity between the Upper Slough and Lower Slough shallow water habitats also increases during backwater events. However, without water level data from both the Upper and Lower Slough, it is not possible to know the timing and duration of hydrologic connection between these habitats.

Beaver activity also plays a large role in the hydrologic connectivity of the Upper and Lower Sloughs. In the past, beaver dams have decreased the hydrologic connection between these two areas. Beaver activity may also affect the hydrologic connection between habitats within the Lower Slough; however, this has not been documented.

With respect to vegetation community composition, hydrological connection may influence wetland vegetation by facilitating the movement of propagules between habitats, providing a cue for germination through the delivery of water, and/or by modifying hydraulic habitat (Thoms et al. 2016). The degree of habitat connection can also influence the movement of wildlife. Map 2 shows a high degree of linear connection between shallow water vegetation communities, marsh, and eastern flood/forest communities (specifically Fm02, map number 3b), which may act as corridors for wildlife movement, provided that habitat conditions are suitable. Other communities, like the red-listed Cottonwood-Spruce-Red-osier dogwood vegetation community (Fm02/03, map number 3a) exist in two isolated, almost linear patches, located directly adjacent to Lower Duncan River; though the northern patch may be connected to similar habitat in Upper Argenta Slough, and the southern patch could be accessed from the other flood forest community (Fm02, map number 3b).
6. SUMMARY
The Argenta Slough Ecological Inventory is summarized below and in Table 11. There are a number of data gaps and limitations that restrict wetland delineation and classification, and impede an overall quantitative assessment of ecological function and condition of the Lower Argenta Slough; these have been outlined throughout the report and summarized below.

6.1. Wetland Delineation and Classification
The Lower Argenta Slough is a wetland complex that supports shallow water, seasonally flooded marsh, and flood/riparian forest ecosystems. Wetland ecosystem types and vegetation communities were identified and delineated to the extent possible in consideration of minimal background information, including limited data on vegetation species and soil composition. Ecosystems were also delineated on photographs from 2009 and 2011. Further, the biogeoclimatic classifications and site series in the ICHdw1 were in the process of being reclassified with more detailed inventory information at the time the mapping for this project was conducted. Lastly, it is expected that the vegetation composition of the Lower Argenta Slough is changing and that delineations may not best represent the current state of the slough.

6.2. Wetland Function and Condition

6.2.1. Hydrology and Connectivity
Due to the lack of existing water level and flow data, assessment of wetland hydrological function and condition was largely qualitative. Inferences on the hydrologic condition of the Lower Argenta Slough were made from locally available climate and hydrology data and reports.

Local climate data show warmer air temperatures in both winter and the growing season in recent years, coupled with increased precipitation for all months except April and July. An increase in air temperature has likely resulted in an increase in evapotranspiration rates, potentially resulting in greater water level drawdown during the growing season. These changes have likely resulted in alterations to the vegetation community composition.

Water levels within the slough are highly affected by Kootenay Lake backwatering during the spring freshet; however, the duration and timing of these floods is variable. After the spring freshet, water levels in the slough are expected to slowly recede through late summer to perennial low levels in winter. Lower Argenta Slough may receive groundwater inputs from Lower Duncan River when river stage is high.

From a hydrological perspective, wetland and riparian habitat within Lower Argenta Slough is highly connected during periods of high water level, particularly during the spring freshet when the slough is flooded by Kootenay Lake, and less connected during low water periods. However, the timing and duration of this connectivity has not been documented.

Temperature data is currently being collected at the Lower Slough. Changes to the temperature regime could be due to a number of reasons, including groundwater inputs, lowering of water levels due to evaporation or drainage, and/or river flooding.
In the past, beaver activity has had the effect of ponding water in Upper Argenta Slough and reducing water levels in Lower Argenta Slough (Herbison 2006); however, the effect of beaver activity on the hydrology of the site has not been documented in recent years.

6.2.2. Vegetation Composition
Ecosystems at-risk occurring in the Lower Argenta Slough include blue-listed Common cattail marsh (Wm05) and Great bulrush communities (Wm06), and likely include the red-listed Cottonwood – Spruce – Red-osier dogwood (Fm02) or black cottonwood/ common snowberry – roses (Fm01) and Swamp horsetail – Beaked sedge (Wm51) communities and may include the three-way sedge community (Wm51). It is currently unknown if any rare plants occur in Lower Argenta Slough. Considering the expected soil nutrient and moisture regime, it is possible that other communities at-risk, as well as rare plants occur in the Lower Argenta Slough.

6.2.3. Wildlife Use
Three at-risk species have been confirmed to breed in Argenta Slough: American Bittern, Western Toad and Painted Turtle; however no American Bittern or Painted Turtle nests sites have been detected downstream of Beaver Dam 1. Lower Argenta Slough has been confirmed to provide rearing habitat to Western Toads. An additional three at-risk species have been detected in Argenta Slough and potentially breed there: Eared Grebe, Horned Grebe and American Water Shrew. Furthermore, Northern Rubber Boas have been detected near Argenta Slough and potentially breed in the vicinity.

Argenta Slough provides foraging habitat to a number of at-risk species, including: Tundra Swan, Great Blue Heron, Lewis’s Woodpecker, Olive-sided Flycatcher and Bobolink. Argenta Slough also provides migratory stopover and avian overwintering habitat. Argenta Slough falls within a legally designated UWR; however, Lower Argenta Slough is unlikely to provide critical winter foraging habitat for Mule Deer due to a lack of snow interception cover and exposed winter vegetation.

All of these at-risk, regionally significant, and migratory species may have a high to moderate dependency on Lower Argenta Slough; however, targeted surveys have not been conducted and thus, there is a lack of understanding of critical wildlife habitat functions provided by Lower Argenta Slough.
Table 11. Argenta Slough Ecological Inventory summary, including wetland types, status, and function and condition.

<table>
<thead>
<tr>
<th>Ecosystem type</th>
<th>Wetland community map number</th>
<th>Site association or Site series code</th>
<th>Area (ha)</th>
<th>Conservation Rank</th>
<th>Hydrology</th>
<th>Vegetation Composition</th>
<th>Wildlife</th>
<th>Connectivity</th>
<th>Other Features or Comments</th>
<th>Confidence in Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shallow Water</td>
<td>1a Shallow water 1.51</td>
<td>SNR No status GNR</td>
<td></td>
<td></td>
<td></td>
<td>Dense aquatic vegetation(^1)</td>
<td>Likely provides abundant forage for ungulates, small mammals, and waterfowl(^1).</td>
<td>Potentially high, especially when connected to upstream and downstream shallow water habitat.</td>
<td>California carbonate deposits, reported to be locally unique and rare by local resident(^1).</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>1b Shallow water 0.83</td>
<td>SNR No status GNR</td>
<td></td>
<td></td>
<td></td>
<td>Sluggish, subsurface seepage, flooding during fresher.</td>
<td>Some aquatic vegetation.</td>
<td>Potentially high, especially when connected to upstream and downstream shallow water habitat.</td>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>1c Shallow water 0.04</td>
<td>SNR No status GNR</td>
<td></td>
<td></td>
<td></td>
<td>Subsurface seepage and flooding during fresher.</td>
<td>Low given its small size, may have high hydrologic connection during high flows and flooding events.</td>
<td></td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Marsh</td>
<td>2a Wm05/Wm06 0.74</td>
<td>Blue S3 (2004) G5</td>
<td></td>
<td></td>
<td></td>
<td>Subsurface seepage and flooding during fresher, water table likely below surface by end of summer due to evapotranspiration.</td>
<td>Cattail marsh with patches of bulrush, transitioning to reed canary grass and other grasses and sedges.</td>
<td>Common Muskrat, American Bittern, Red-winged Blackbird and other marsh birds(^1).</td>
<td>Medium connectivity - small area, but stretches the length of shallow water habitat identified and described as 1a.</td>
<td>The condition and extent of the cattail marsh has been variable the past five plus years(^1), bulrush community may be similar red-listed community.</td>
</tr>
<tr>
<td></td>
<td>2b Wm01 (Wm02) 5.51</td>
<td>Blue S4 (2010) G4</td>
<td></td>
<td></td>
<td></td>
<td>Flooding some years(^1). Transition from sedges to grasses, thickly vegetated.</td>
<td>Northern Harrier, Garter Snake, White-tailed Deer, Elk, and Bobolink. In some years, Western Toad hatchlings have been observed(^1).</td>
<td>Medium connectivity - though only one large patch, its large area encompasses much of the western side of the slough.</td>
<td>Conservation rank is for Wm02 (Swamp horsetail - Beaked sedge) community, Wm01 is yellow-listed.</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>2c Wm01 (Wd01) 6.39</td>
<td>Yellow S4 (2004) G4</td>
<td></td>
<td></td>
<td></td>
<td>Floods during fresher and high water events, east slope saturated from subsurface upslope flow.</td>
<td>Flava sedge and water sedge(^1), thick cover of other sedges and grasses including infilling with need grasses and sedges in some areas.</td>
<td>Western toadlets utilize in fall and winter of 1st year and the spring of the year(^1). Water Vole and Water Shrew recorded in 1980s. Meadow Voles, Common Snipe, Great Blue Heron observed foraging(^1).</td>
<td>High connectivity throughout mid-to lower sections. A small patch exists next to Lower Duncan River which has low connectivity</td>
<td>Woody debris has been washed up over L much of the polygon. Could support red-listed Wm01 (three-way sedge) community.</td>
</tr>
<tr>
<td></td>
<td>2d Wm05 (Wm02) 2.30</td>
<td>Blue S3 (2004) G5</td>
<td></td>
<td></td>
<td></td>
<td>Potential subsurface recharge(^1), considerable evapotranspiration.</td>
<td>Cattails, other salt tolerant sedges and grasses. Changed from marsh (pre 2008) to shallow open water much of the year by 2011. May be receiving water infiltrating underground from the river.</td>
<td>Medium connectivity - two linear patches run parallel to each other, separated by Wm01 (2c) habitat. Potentially connected to similar habitat in Upper Argenta Slough.</td>
<td></td>
<td>Brackish</td>
</tr>
<tr>
<td>FloodForest</td>
<td>3a Fm01 2.24</td>
<td>Red S2 (2010) GNR</td>
<td></td>
<td></td>
<td></td>
<td>Floods some years, water movement through root systems most of year.</td>
<td>Middle bench, cottonwood dominated floodplain forest with shrubs including willows and red-osier dogwood. Older sites may host young spruce.</td>
<td>Mature cottonwood provide valuable nesting habitat to several avian species and young trees and shrubs provide valuable forage for ungulates.</td>
<td>Medium connectivity - northern patch likely connected to similar habitat in the upper slough. Area of southwestern patch large, but disconnected from similar habitat; though accessible to the linear corridor of the Fm02/03 (3b) community.</td>
<td>Potential to support Fm01 (black cottonwood/ common snowberry - roses) red-listed community</td>
</tr>
<tr>
<td></td>
<td>3b Fm02/03 1.92</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>Receives subsurface flow from upslope and toe slope moisture from slough. Moisture receiving site with cottonwood, alder, aspen, willow and other shrubs, transition to richer Douglas-fir dominated upland forest.</td>
<td>High connectivity - habitat stratches the length of the lower slough and may be connected to similar habitat in the upper slough.</td>
<td></td>
<td></td>
<td>M</td>
</tr>
</tbody>
</table>

\(^1\) Note: brackets denoting second site series means that the association is close the bracketed association, the backslash indicates that both ecosystems are present within the polygon.  
\(^2\) Herbison 2015 Draft  
\(^3\) B.C. List Status are assigned based on the Subnational Conservation Status. Red includes any ecological community that is Extirpated, Endangered, or Threatened in B.C. Blue includes any ecological communities that are considered to be of Special Concern in B.C. These communities are particularly sensitive or vulnerable to human activities or natural events. Yellow communities are expected to be secure.  
\(^4\) Provincial Conservation Status refers to the species or ecological communities conservation status in BC. S2 = imperiled, S3 = special concern, vulnerable to extirpation or extinction.  
\(^5\) Global Rank applies to the ecological community across its entire range. G2 = imperiled, G3 = vulnerable to extirpation or extinction, G4 = apparently secure, GNR = unranked.
REFERENCES


Thoms, M.C., M.C. Reid, and M.A. Reid. 2016. Ecological significance of hydrological connectivity for wetland plant communities on a dryland floodplain river, MacIntyre River, Australia. Aquatic Sciences, 78(1), 139-158. DOI: 10.1007/s00027-015-0414-7

PERSONAL COMMUNICATION


PROJECT MAPS
Map 2. Argenta Slough Wetland Vegetation Communities

Legend
- Lower Argenta Slough
- Ecosystem Type (Vegetation community map number)
  - Shallow Water
    - 1a
    - 1b
    - 1c
  - Marsh
    - 2a
    - 2b
    - 2c
    - 2d
  - Flood/Forest
    - 3a
    - 3b
Appendix A. Wildlife species with a low or negligible likelihood of occurrence within Argenta Slough
Table 1. Amphibian and avian species with a low or negligible likelihood of occurring within Argenta Slough.

<table>
<thead>
<tr>
<th>Species Group</th>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>amphibian</td>
<td>Coeur d'Alene Salamander</td>
<td><em>Plethodon idahoensis</em></td>
</tr>
<tr>
<td>avian</td>
<td>American Kestrel</td>
<td><em>Falco sparverius</em></td>
</tr>
<tr>
<td></td>
<td>Barn Swallow</td>
<td><em>Hirundo rustica</em></td>
</tr>
<tr>
<td></td>
<td>Black Swift</td>
<td><em>Cypseloides niger</em></td>
</tr>
<tr>
<td></td>
<td>Black Tern</td>
<td><em>Chlidonias niger</em></td>
</tr>
<tr>
<td></td>
<td>Boreal Owl</td>
<td><em>Aegolius funereus</em></td>
</tr>
<tr>
<td></td>
<td>Brown Creeper</td>
<td><em>Certhia americana</em></td>
</tr>
<tr>
<td></td>
<td>Chestnut-backed Chickadee</td>
<td><em>Poecile rufescens</em></td>
</tr>
<tr>
<td></td>
<td>Evening Grosbeak</td>
<td><em>Coccothraustes vespertinus</em></td>
</tr>
<tr>
<td></td>
<td>Harlequin Duck</td>
<td><em>Histrionicus histrionicus</em></td>
</tr>
<tr>
<td></td>
<td>Herring Gull</td>
<td><em>Larus argentatus</em></td>
</tr>
<tr>
<td></td>
<td>Long-billed Curlew</td>
<td><em>Numenius americanus</em></td>
</tr>
<tr>
<td></td>
<td>MacGillivray's Warbler</td>
<td><em>Geothlypis tolmiei</em></td>
</tr>
<tr>
<td></td>
<td>Mourning Dove</td>
<td><em>Zenaida macroura</em></td>
</tr>
<tr>
<td></td>
<td>Northern Hawk Owl</td>
<td><em>Surnia ulula</em></td>
</tr>
<tr>
<td></td>
<td>Pacific-slope Flycatcher</td>
<td><em>Empidonax difficilis</em></td>
</tr>
<tr>
<td></td>
<td>Palm Warbler</td>
<td><em>Setophaga palmarum</em></td>
</tr>
<tr>
<td></td>
<td>Pileated Woodpecker</td>
<td><em>Dryocopus pileatus</em></td>
</tr>
<tr>
<td></td>
<td>Prairie Falcon</td>
<td><em>Falco mexicanus</em></td>
</tr>
<tr>
<td></td>
<td>Red-eyed Vireo</td>
<td><em>Vireo olivaceus</em></td>
</tr>
<tr>
<td></td>
<td>Ruffed Grouse</td>
<td><em>Bonasa umbellus</em></td>
</tr>
<tr>
<td></td>
<td>Steller's Jay</td>
<td><em>Cyanocitta stelleri</em></td>
</tr>
<tr>
<td></td>
<td>Swainson's Thrush</td>
<td><em>Catharus ustulatus</em></td>
</tr>
<tr>
<td></td>
<td>Veery</td>
<td><em>Catharus fuscescens</em></td>
</tr>
<tr>
<td></td>
<td>Vesper Sparrow</td>
<td><em>Poecetes gramineus</em></td>
</tr>
<tr>
<td></td>
<td>Western Meadowlark</td>
<td><em>Sturnella neglecta</em></td>
</tr>
<tr>
<td></td>
<td>Western Screech-Owl, <em>macfarlanei</em> subspecies</td>
<td><em>Megascops kennicottii macfarlanei</em></td>
</tr>
<tr>
<td></td>
<td>Western Wood-Pewee</td>
<td><em>Contopus sordidulus</em></td>
</tr>
<tr>
<td></td>
<td>White-throated Swift</td>
<td><em>Aeronautes saxatalis</em></td>
</tr>
<tr>
<td></td>
<td>Dusky Grouse</td>
<td><em>Dendragapus obscurus</em></td>
</tr>
<tr>
<td></td>
<td>Forster's Tern</td>
<td><em>Sterna forsteri</em></td>
</tr>
<tr>
<td></td>
<td>Purple Finch</td>
<td><em>Haemorhous purpureus</em></td>
</tr>
<tr>
<td></td>
<td>Red Crossbill</td>
<td><em>Loxia curvirostra</em></td>
</tr>
<tr>
<td></td>
<td>Rock Wren</td>
<td><em>Salpinctes obsoletus</em></td>
</tr>
</tbody>
</table>

Search criteria included all species within the Interior Cedar Hemlock (ICH) Biogeoclimatic Zone, Kootenay Lake Forest District, Kootenay MOE Region, and Central Kootenay Regional District (CDC 2016a).
Table 2. Mammal and reptile species with a low or negligible likelihood of occurring within Argenta Slough.

<table>
<thead>
<tr>
<th>Species Group</th>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>mammal</td>
<td>American Badger</td>
<td>Taxidea taxus</td>
</tr>
<tr>
<td></td>
<td>American Marten</td>
<td>Martes americana</td>
</tr>
<tr>
<td></td>
<td>Big Brown Bat</td>
<td>Eptesicus fuscus</td>
</tr>
<tr>
<td></td>
<td>Bighorn Sheep</td>
<td>Ovis canadensis</td>
</tr>
<tr>
<td></td>
<td>Californian Myotis</td>
<td>Myotis californicus</td>
</tr>
<tr>
<td></td>
<td>Caribou (southern mountain population)</td>
<td>Rangifer tarandus pop. 1</td>
</tr>
<tr>
<td></td>
<td>Fisher</td>
<td>Pekania pennanti</td>
</tr>
<tr>
<td></td>
<td>Fringed Myotis</td>
<td>Myotis thysanodes</td>
</tr>
<tr>
<td></td>
<td>Grey Wolf</td>
<td>Canis lupus</td>
</tr>
<tr>
<td></td>
<td>Hoary Bat</td>
<td>Lasiurus cinereus</td>
</tr>
<tr>
<td></td>
<td>Long-eared Myotis</td>
<td>Myotis evotis</td>
</tr>
<tr>
<td></td>
<td>Long-legged Myotis</td>
<td>Myotis volans</td>
</tr>
<tr>
<td></td>
<td>Mountain Goat</td>
<td>Oreamnos americanus</td>
</tr>
<tr>
<td></td>
<td>North American Porcupine</td>
<td>Erethizon dorsatum</td>
</tr>
<tr>
<td></td>
<td>Northern Pocket Gopher, segregatus subspecies</td>
<td>Thomomys talpoides segregatus</td>
</tr>
<tr>
<td></td>
<td>Red-tailed Chipmunk, simulans subspecies</td>
<td>Neotamias ruficaudus simulans</td>
</tr>
<tr>
<td></td>
<td>Wolverine, luscus subspecies</td>
<td>Gulo gulo luscus</td>
</tr>
<tr>
<td>reptile</td>
<td>Northern Alligator Lizard</td>
<td>Elgaria coerulea</td>
</tr>
<tr>
<td></td>
<td>Western Skink</td>
<td>Plestiodon skiltonianus</td>
</tr>
</tbody>
</table>

Search criteria included all species within the Interior Cedar Hemlock (ICH) Biogeoclimatic Zone, Kootenay Lake Forest District, Kootenay MOE Region, and Central Kootenay Regional District (CDC 2016a).