

Technical Memorandum



Prepared for:	Denise Foster, Chair, Save the Estuary Land Society	Date:	September 23, 2024
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Reference:	Support for Assessing Current and Potential Connectivity of Aquatic Features in the French Creek Estuary Nature Preserve	Project Number:	EA4555

BACKGROUND

LGL Limited (“LGL”) was retained by the Save the Estuary Land Society (SELS) to assess the current and potential connectivity of the aquatic resources in the French Creek Estuary Nature Preserve (FCENP) located in the Regional District of Nanaimo (RDN) bordered by Highway 19A, Columbia Drive, Viking Way and Admiral Tyron Boulevard (Figure 1). The information within this technical memo will be incorporated in a management plan currently in development by a collaboration of representatives from:

- SELS;
- Friends of French Creek Estuary Society;
- Arrowsmith Naturalists;
- Mid-Vancouver Island Habitat Enhancement Society;
- Mount Arrowsmith Biosphere Region Institute;
- BC Parks Foundation; and,
- RDN.

The FCENP is owned by BC Parks Foundation (80%) and RDN (20%). The management plan will be designed to manage community use while protecting and restoring the environment. The assessment completed by LGL included a review of reports previously prepared on the aquatic features within the FCENP, followed by a site visit. The main goal of the environmental support was to identify the wetland features on the FCENP (not including the French Creek Estuary) and enhancement opportunities for the aquatic habitats that can be included in a management plan for the FCENP. The

objective of the site visit was to delineate the aquatic features and classify these where possible. This Technical Memo details LGL's assessment of the aquatic features and their potential connectivity within the FCENP focused on their classification and delineation to identify enhancement opportunities to improve overall habitat within the FCENP. Based on a desktop review of a previous hydrological reports (Northwest Hydraulic Consultants Ltd., 2023) LGL assumed that the removal of the dike initially installed between 1968 to 1972 is not feasible; therefore, flooding from the estuarine environment into the FCENP and reconnecting old stream channels within the FCENP to the estuary is not an option.



Figure 1. Location of French Creek Estuary Nature Preserve (FCENP) in the Regional District of Nanaimo (RDN).

METHODS

The following reports were reviewed as part of the desktop analysis:

- Wetland Mapping – French Creek Estuary Land (Giesen and Foster, N.D.)
- Restoring the French Creek Estuary (Haist, 2023)

- French Creek Estuary high level options assessment for restoring the French Creek estuarine habitat (Northwest Hydraulic Consultants Ltd., 2023)

During the site visit, a tablet (e.g., iPad) and submeter GPS (Geode) were used to delineate the high-water mark (HWM) of the aquatic features. The classification of wetlands in the FCENP was based on the Wetlands of British Columbia: A Guide to Identification (MacKenzie and Moran, 2004). Classification, and according to this guide, is not always possible in areas of past anthropogenic disturbances including but not limited to the introduction of invasive plants or past introduction of non-native fill.

The site visit was completed on July 23, 2024, by LGL biologist Karen Truman and Ryan Batten of Beacon Botanical Research. Wetland delineation was based on the observed HWM and followed the guidance provided in the Riparian Areas Protection Regulation (RAPR), which identifies the HWM by changes in vegetation structure, loss of obligate hydrophytes, and absence of wetland soil characteristics (Ministry of Forest, Lands, Natural Resource Operations and Rural Development, 2019). The assessment of wetlands and other watercourses and hydrological connectivity relied on surface observations only. LGL did not assess groundwater conditions or sub-surface water flows.

Wetland classification relied solely upon the vegetation present in the wetlands; soil conditions could not be assessed as per permit conditions issued by the RDN that did not allow ground disturbance due to archaeological concerns.

RESULTS AND DISCUSSION - WETLAND DISTRIBUTION AND CONNECTIVITY ASSESSMENT

Additional wetlands were identified within the FCENP than previously assessed in the report by Giesen and Foster (N.D.). The wetlands were similar in pattern to those identified in along the alignment of the old relic channels present before the construction of the dike; however, where some areas were previously identified as a watercourse, LGL identified and delineated these areas as wetlands (Figure 2). The numbering of wetlands followed methods adopted in Giesen and Foster (N.D.).



Figure 2. Wetlands within the French Creek Estuary Nature Preserve (FCENP) identified in July 2024 by LGL Limited.

The assessment focused on the classification of the wetlands to understand the ecology, status and potential for enhancement. Wetlands 1-12, with the exception of Wetland 11, were classified as a Red-Alder - Skunk Cabbage (*Alnus rubra* - *Lysichiton americanus*) swamp (Ws52). could not be classified as per Mackenzie and Moran (2004). Wetland 11 could not be classified as a wetland by MacKenzie and Moran, (2004) however is classified as a reservoir (RE) in Terrestrial Ecosystem Mapping (TEM) A RE is an artificial basin created by the impoundment of water behind a human made structure such as a dam, berm, dike, or wall. Wetland 11 also indicated past influence of beaver activity; however, no recent beaver sign was noted. The area previously identified as Wetland 4 was classified in July 2024 as a ditch that transferred flows from the north into Wetland 5.

Swamps are wetlands where standing or gently moving water occurs seasonally or persists for long periods, leaving the subsurface continuously waterlogged (MacKenzie and Moran, 2004). The water table may seasonally drop below the rooting zone of vegetation, creating aerated conditions at the surface. Swamps are nutrient-rich,

productive sites where abundant available nutrients are supplied by groundwater flow. The classification of the wetlands as Red-Alder - Skunk Cabbage swamps include some variety in the vegetation composition; however, the hydrology, soils (likely) and elevational gradient were consistent throughout the FCENP (Figure 3). Early diking of the FCENP has reduced the wetness of the wetlands and therefore altered some of the vegetation composition between the wetlands. The plant community is dependent on specific wetland soil conditions and can differ within the same wetland (South Coast Conservation Program. 2010).



Figure 3. Elevational Gradient throughout the FCENP.

The Red-Alder - Skunk Cabbage swamp is a provincially red-listed wetland, which is defined as an ecological community that has or is a candidate for endangered or threatened status in BC. Endangered ecological communities are facing imminent extirpation or extinction and threatened communities are likely to become endangered if limiting factors are not reversed (BC CDC, 2024).

Red-Alder - Skunk Cabbage swamps are found in the Coastal Douglas-fir, moist maritime Biogeoclimatic subzone 11 site series (CDFmm/11) and are associated with nutritionally rich low-lying depressions commonly associated with streams and rivers

(Mackenzie and Moran, 2004, South Coast Conservation Program. 2010). Red-Alder - Skunk Cabbage swamps are found on south-eastern Vancouver Island from its most southerly tip northward to between Courtenay and Parksville therefore are at the northern extent of their documented range (Figure 4).

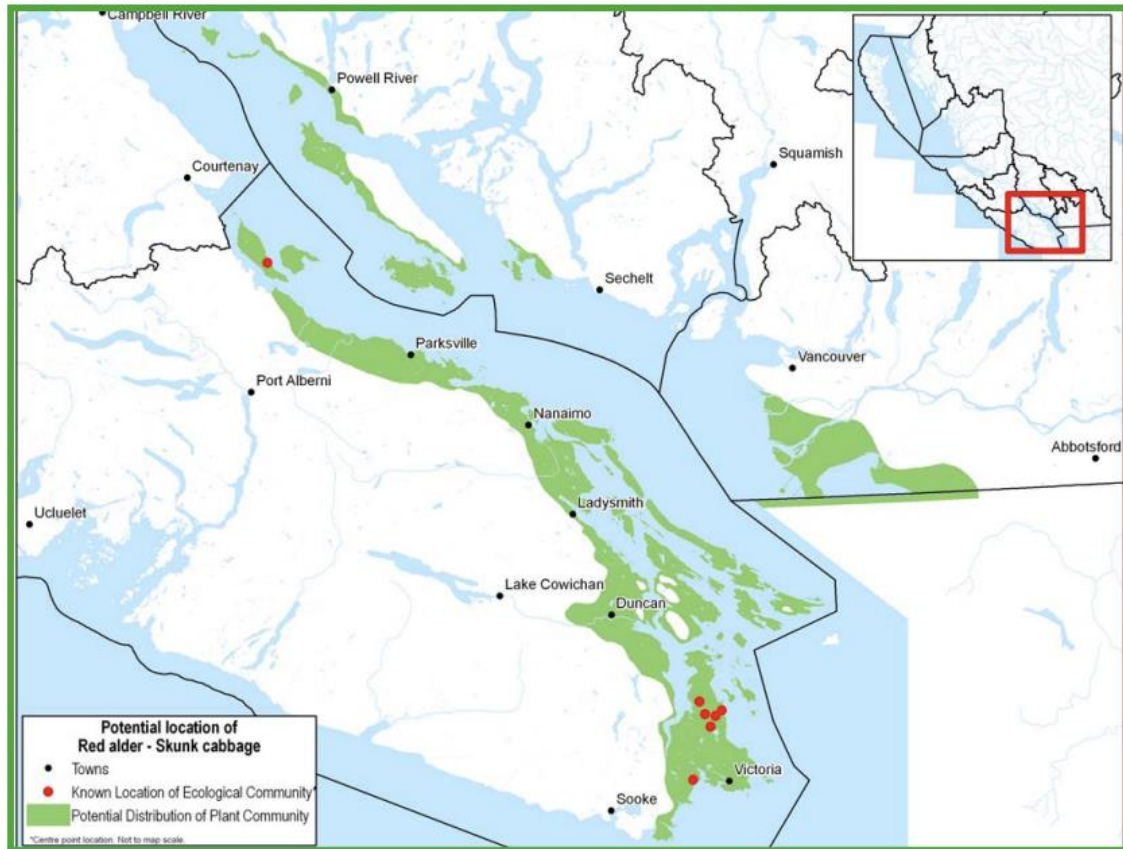


Figure 4. Potential Range of Red Alder – Skunk Cabbage in southern BC (South Coast Conservation Program, 2010).

Soils are deep and fine textured 'muck' in Red-Alder – Skunk Cabbage swamps with high water tables (Mackenzie and Moran, 2004). The high-water tables and absence of elevated microsites prevents the wetland from succeeding to a conifer-forest. Skunk Cabbage and Lady Fern (*Athyrium filix-femina*) were prominent in the herb layer; however, some sites had a dominance of Slough Sedge (*Carex obnupta*). Small patch clonal species like Douglas Spirea (*Spirea douglasii*) and Common Cattail (*Typha latifolia*) were present in Wetland 1; however, this does not change the broader scale community type as is the same situation when Slough Sedge dominates instead of Skunk Cabbage (Figure 4). Skunk cabbage was present in the wetter swamps and was found in Wetland 5.

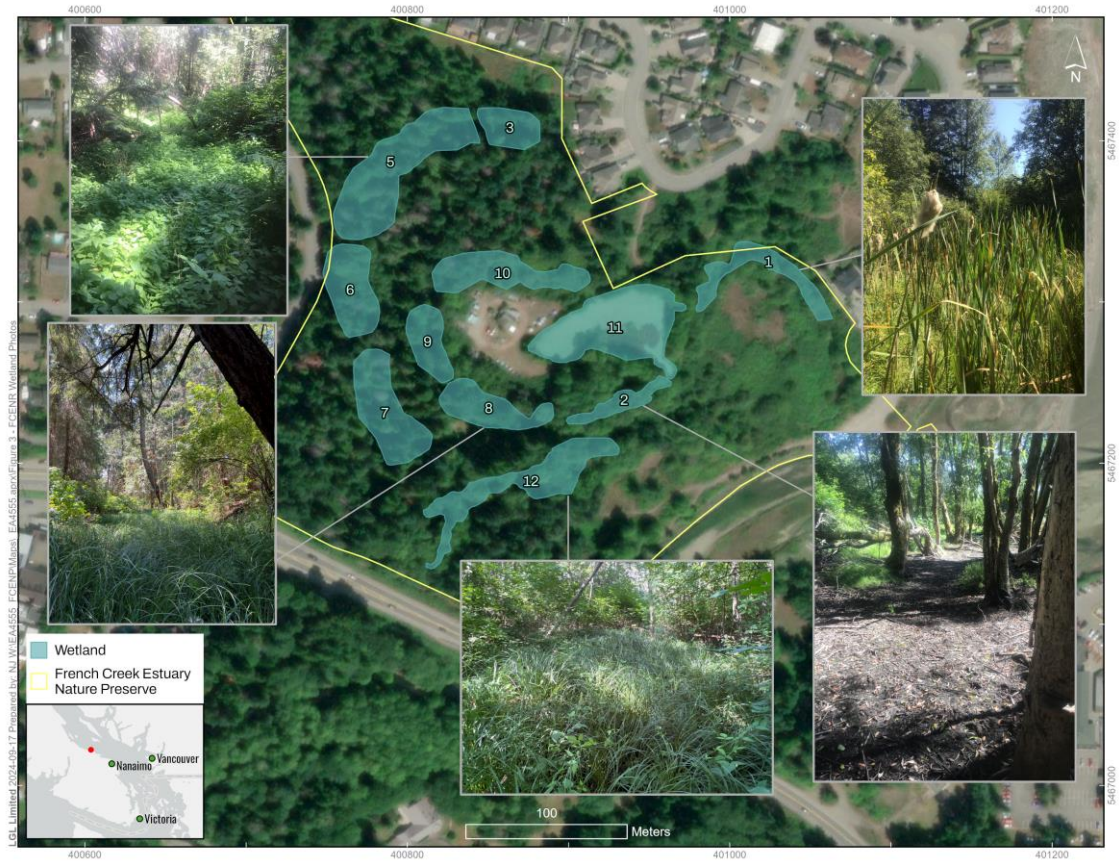


Figure 5. Representative wetland photos within the French Creek Estuary Nature Preserve (FCENP)

Red-Alder - Skunk Cabbage swamps are susceptible to invasive plant species, especially after land clearing (South Coast Conservation Program, 2010). Reed Canary Grass (*Phalaris arundinacea*) is commonly found in wetlands where clearing has occurred for grazing or development. Reed Canary Grass was present on the southwestern portion of Wetland 1 (Photo 1). Another invasive plant, Yellow Flag Iris (*Iris pseudocorus*) was present in 'islands' in Wetland 11 (Photo 2). Both Reed Canary Grass and Yellow Flag Iris form dense patches in wetlands preventing native plants from surviving (Metro Vancouver, 2024a and 2024b). Reed Canary Grass can change the water level and flow in wetlands (Metro Vancouver, 2024a) and Yellow Flag Iris can slow waterflow enough to cause waterbodies to dry out (Metro Vancouver, 2024b). Management of invasive plants is challenging once they are established because control methods can damage the natural wetland features (Metro Vancouver, 2024a).



Photo 1. Reed Canary Grass in Wetland 1.



Photo 2. Yellow Flag Iris in Wetland 11, red arrow denotes plant location.

Yellow Archangel (*Lamium* sp.), commonly referred to as Lamium, was found in Wetland 9 and like the previous two species can outcompete native plants by its fast growth and dense growth pattern (Photo 3). This invasive plant of concern is not currently regulated in BC (Metro Vancouver, 2024c) but it is a favoured ground cover used in gardening and can grow up to a meter a year.



Photo 3. Presence of Yellow Archangel in Wetland 9.

Prevention and control strategies differ amongst invasive plant species; however, the strategies for all three species recommend follow-up monitoring for several years. Below is a description of control strategies summarized in Metro Vancouver's Best Management Practices for Reed Canary Grass and Yellow Flag Iris (Figure 6. Best Management Practices for Reed Canary Grass (Metro Vancouver 2024a). Yellow Archangel can be effectively controlled by both manual and chemical treatment techniques (Metro Vancouver 2024c).

CONTROL STRATEGY	TECHNIQUES	SUITABLE SITES	NOTES
Cultural	Plant a variety of native grasses, shrubs and trees, creating shade that will discourage growth of reed canarygrass	All sites	- Requires at least a five-year commitment - Not suitable for sites that flood - Can be used with other control methods
Manual	Dig out the entire plant, including the roots	Individual plants, sites less than 10 square metres	- Causes minimal harm to surrounding plants - Easiest when the soil is wet - Any roots left in the soil may re-sprout
	Cover plants with cardboard, mulch or landscape fabric	Sensitive sites or dense sites with few other plants or other obstacles	- Cover should stay in place at least one year - Cut or mow first to help with cover placement - Challenging to install around other plants

Restore the area with native plants. Monitor and remove any reed canarygrass regrowth. It is most important to remove regrowth during the first two years after planting native species, as it helps the native plants to establish and grow large enough to compete with the reed canarygrass.

Figure 6. Best Management Practices for Reed Canary Grass (Metro Vancouver 2024a).

CONTROL STRATEGY	TECHNIQUES	SUITABLE SITES	NOTES
Manual	Pull or dig up the entire plants including the roots	Individual plants, sites less than 1 square metre, sensitive sites; sites on land or in water	- Repeated pulling required - Any roots left in the ground may re-sprout - May spread fragments or ripe seeds - Challenging to move and dispose of the heavy plants and soil
	Cut aboveground plants, then cover the site with pond liner or heavy PVC matting	Dense sites with few other plants or other obstacles; sites on land or in water	- Expensive - Cover should extend beyond the infestation and be secured at the edges - Cover stays in place 4-12 months
	Cut plants at the base	Aquatic sites with at least 5 centimetres of water year-round	- Access to suitable sites may be difficult - Adjacent sites on land also need to be controlled

For all control techniques, monitoring is required for several years. Wait for one year after control to see if native plants re-establish. If necessary, restore the area with native or non-invasive plants.

Figure 7. Best Management Practices for Yellow Flag Iris (Metro Vancouver 2024b).

RECOMMENDATIONS

The limited presence of Red-Alder – Skunk Cabbage swamps remaining on the east coast of Vancouver Island due to past development pressures offers a unique opportunity to enhance this type of swamp within the FCENP. We offer the following recommendations for consideration of enhancement for the wetlands in the FCENP:

1. Conduct a hydrological assessment to understand how the installation of culverts through trail berms in between Wetlands 5 and 3, and 8 may influence

the water table and retention time while considering value of trail berms within trail network.

2. Assess groundwater flow/recharge in a hydrological assessment to wetlands to enhance the swamps as they are also fed by groundwater in addition to surface water.
3. Decide which Red-Alder – Skunk Cabbage swamps should be enhanced and in what order based on hydrological connections with both surface and groundwater.
4. Consider removing fill with a dense presence of Himalayan Blackberry (*Rubus armeniacus*) near the southeastern end of Wetland 1 to enlarge this wetland. This would require approval under the provincial *Water Sustainability Act* and require a permit from the RDN.
5. Create an invasive species plan for wetland associated species, including Yellow Iris from Wetland 11, Reed Canary Grass from Wetland 1 and Yellow Archangel from Wetland 9. Removal of invasive plant species in wetlands would require a permit from the RDN, under the provincial *Water Sustainability Act* and possibly require the presence of an archeological monitor. Annually review the site for the presence of invasive plants in the wetlands.
6. Install wildlife cameras to monitor wetland water levels using a timelapse setting.
7. Consider adding anchored floating loaf sites (platforms) for wildlife such as waterfowl in Wetland 11.
8. Design trails to viewing points for a wetland, while avoiding circumnavigating the wetland to reduce impacts on wildlife.

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