Appendix 12. Wetland Mitigation Program Closure Memo

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MEMO

To: Dana Eye and Jayme Brooks, Environment and Climate Change Canada;
Carl Johansson, Impact Assessment Agency of Canada;
Clayton Smith, BC Environmental Assessment Office

From: Brent Matsuda, Vegetation and Wildlife Program Manager, Site C

CC: Greg Scarborough, Environmental Manager, Site C
Karen von Muehldorfer, Regulatory Manager, Site C

Subject: Site C Wetland Mitigation and Compensation Program and status of compliance with FDS Conditions 11.1 – 11.4 and EAC Condition 12.

Date: July 10, 2025

1.0 Introduction

In 2015 BC Hydro developed the Site C Clean Energy Project's ('the Project') Vegetation and Wildlife Mitigation and Monitoring Plan (VWMMP) to describe the mitigation, offsetting and monitoring measures to reduce the overall impacts of the Project on vegetation and ecological communities and wildlife resources.

Prepared in accordance with the Site C Project's Environmental Assessment Certificate (EAC) and Federal Decision Statement (FDS), the VWMMP includes a sub-plan for Wetland Mitigation and Compensation ('the Plan') which describes how BC Hydro will address Project impacts resulting in the unavoidable loss of wetland areas and functions supporting migratory birds, species at risk, and the current use of lands and resources by Indigenous Nations.

Reservoir filling was completed in November 2024 and the Site C Project is now in Operation (4 of 6 generating units are now online). Given completion of reservoir fill and land development impacts, BC Hydro has now calculated the amount of wetland habitat lost as a result of the Project.

The purpose of this Memo is to provide an update on the Wetland Mitigation and Compensation Plan and the regulatory conditions related to the measurement of wetland impacts and offsetting, and the methodologies developed by the Project and the Vegetation and Wildlife Technical Committee (VWTC; joint committee of Provincial and Federal agency biologists required by the Project's Conditional Water Licence) to satisfy these conditions. It explains how, by the end of 2027, BC Hydro will have fulfilled the requirements of the EAC and FDS conditions as per the Plan in terms of replacing lost wetland functions and compensation in terms of area.

Specifically, this Memo describes:

- Regulatory requirements regarding mitigation, compensation, and monitoring to offset the impacts of the Project on wetlands;
- Methods used to assess and measure the extent of wetlands impacted in terms of area and function now that the Project's land development activities are completed;

- Details of the calculations of wetland loss impacts in terms of area and function and how both have been mitigated and compensated by rebuilding, restoring, and creating new wetlands; and
- How the mitigation and compensation offsetting efforts have now exceeded losses to satisfy compliance conditions and program closure.

2.0 Regulatory Requirements

The Wetland Mitigation and Compensation Plan was developed in accordance with FDS Condition 11 and EAC Condition 12.

FDS Condition 11 requires measures for offsetting impacted wetlands. Relevant excerpts from this Condition include:

- 11.2. The Proponent shall develop a plan that addresses potential effects of the Project on wetland habitat used by migratory birds, species at risk and for current use of lands and resources for traditional purposes.
- 11.3. The Proponent shall, in developing the plan, describe how the mitigation hierarchy and the ***objective of no net loss of wetland functions*** were considered.
- 11.4. Describes various components to be described in the plan.

EAC Condition 12 also requires measures for offsetting impacted wetlands. Relevant excerpts from this Condition are:
Develop a wetland mitigation and compensation plan that must include:

- A defined mitigation hierarchy that prioritizes mitigation actions to be undertaken, including but not limited to:
    - Avoid direct effects where feasible;
    - Minimize direct effects where avoidance is not feasible;
    - Maintain or improve hydrology where avoidance is not feasible;
    - ***Replace like for like where wetlands will be lost, in terms of functions and compensation in terms of area*;**
    - Improve the function of existing wetland habitats; and,
    - Create new wetland habitat.

We highlight through the above-bolded text, differences in the wording of the EAC and FDS conditions. FDS Condition 11.3 requires meeting an objective of "*no net loss of wetland functions*" but does not require the replacement of wetland area lost. EAC Condition 12 requires the replacement of "*like for like where wetlands will be lost, in terms of functions*", but adds that BC Hydro must achieve, "*compensation in terms of area"* without specifying a compensation goal (e.g., 1:1 for area).

BC Hydro considers the FDS and EAC references to "no net loss" and "replacing wetland functions" to mean that the sum of wetland functions created by Project compensation works exceeds that of the sum of wetland functions lost/impacted due to Project activities. This approach recognizes that some functions may have a net loss while others a net gain (i.e., not all lost functions will be equally gained and vice-versa).

Similarly, BC Hydro considers the FDS and EAC references to compensation for area and no net loss to mean that the area of wetlands created or restored by the Project should be greater than the area of impacted wetlands.

The VWTC accepted this approach in March 2021, which is described in Section 6.0 below. Overall, our approach shows that by the end of 2027, BC Hydro's wetland compensation efforts will result in a net positive wetland compensation (i.e., gain in terms of both area and wetland functions) to satisfy compliance with the FDS and EAC Conditions.

3.0 Wetland Mitigation and Compensation Approach

The Plan follows the below Wetland Mitigation Hierarchy:

1. Avoid wetland impacts wherever possible
2. Compensate for wetland impacts that cannot be avoided
3. Measure wetland losses and gains through the Wetland Function Assessment which takes into account various wetland function metrics
4. Seek suitable candidate locations or wetlands for compensation, and,
5. Create, restore or protect wetlands to offset effects.

Following the Plan, BC Hydro undertook the steps below to determine the appropriate compensation for offsetting lost wetlands:

1. Determine impacted wetland area: Develop a quantifiable assessment of the extent of wetland impacts once all Project land development activities were completed. This included a hierarchical series of GIS assessments of partially affected wetlands
2. Develop a qualifiable assessment of functions for impacted wetlands
3. Complete a detailed measure of compensation wetland area (constructed or re-built) and functions
4. Conduct an assessment of wetland area and functions impacted by the Project compared to wetland area and function offsets created by the Project

Details regarding these steps are described below.

Wetland Area Impacts

In 2015, BC Hydro estimated approximately 700 hectares (ha) of wetlands would be impacted by the Project. However, this was not confirmed or ground-truthed and was conservatively assessed using limited Terrestrial Ecosystem Mapping (TEM) data available at the time.

In 2024-2025, upon completion of reservoir fill and land-disturbing activities, BC Hydro conducted a re-assessment indicating that 299 ha of wetland has been impacted by the Project. The discrepancy between the 2015 and 2025 assessments is described below.

Data and Ground-truthing

The initial desktop TEM assessment in 2015 used 2006 LiDAR (Light Detection and Ranging) data and orthophotos. A more detailed and qualitative re-assessment (Detailed Wetlands Assessment;

DWA) was conducted later in 2015 focused on the TEM wetland polygons and refined by examining updated orthophotos to determine wetland boundaries occurring within the polygons.

The 2024-2025 re-assessment which assessed 299 ha of wetland impacted by the Project is based on the below information sources:

1. Ground-truthed wetlands delineated by foresters during vegetation clearing
2. Wetlands monitored/ground-truthed by the multi-year Wetlands Monitoring Program
3. As-built mapping based on Project Environmental Completion Reports
4. Detailed Wetlands Assessment (DWA; refined desktop assessment focused on TEM wetland polygons then cross-checked with updated orthophotos)
5. TEM data if no other details were available on a wetland type (e.g., non-classified wetlands; Watson Slough)

An example of some of the differences between the 2015 and 2025 assessed boundaries are shown in Figure 1. The pink polygons show areas that were field-verified during tree clearing. The orange polygons show wetlands that were identified by the DWA and verified during tree clearing. The light blue polygons show wetlands that were missed by TEM but confirmed during tree clearing. The red polygons are those that were identified in 2015 by TEM but confirmed in the field as non-existent. They were therefore excluded from the assessment.

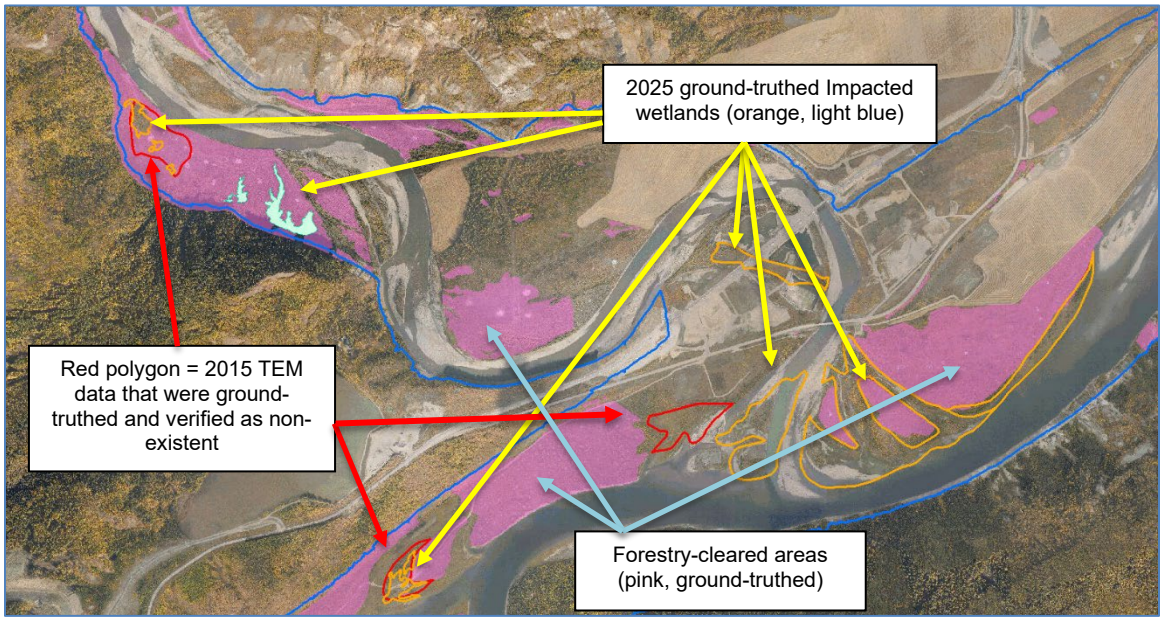

Figure 1. Example of mapping (Halfway River) showing impacted wetlands per 2015 data (red = TEM) versus 2025 data and ground truthing (orange, light blue). The pink shaded areas show areas cleared and ground-truthed. The red polygons show wetlands identified from 2015 data that do not exist as verified by ground-truthing. The orange and blue polygons show wetlands that were verified through ground-truthing as existing. The dark blue outline indicates the reservoir boundary.

Consideration of Partially Affected Wetlands

Because the full effects of the Project were not known in 2015, BC Hydro adopted a conservative approach to delineating potential impacts to wetlands. Consequently, many wetlands appeared in the original Project footprint that were not affected by the Project. At the time, boundaries were conservatively delineated as the full Project footprint and the extent of activities was not known. However, this became clearer post-reservoir-fill. For the 2025 wetland impact assessment, a Project Impact Area (PIA) was refined to more clearly delineate the extent of true wetlands impacted by Project activities. This resulted in the 2025 assessment completed after reservoir filling and land clearing showed that fewer wetlands were impacted than that estimated in 2015.

For wetlands that occurred along the boundaries of the PIA, a threshold was set so that if ≥25% of the wetland area was impacted by the Project, we included the entire area of that wetland even if it continued outside the Project boundary. For wetlands where <25% of the wetland area overlapped into the PIA, only the amount inside the PIA was included.

Figure 2 shows an example of this approach at Septimus Siding Road within the dam site area. The boundary of the 2015 assessment area is demarcated by the black line. The yellow shaded polygons show the wetlands within this area that were assessed as impacted in 2015. The 2015 assessment included the full extent of each of these wetlands regardless of how much of the wetland(s) occurred in the Project area.

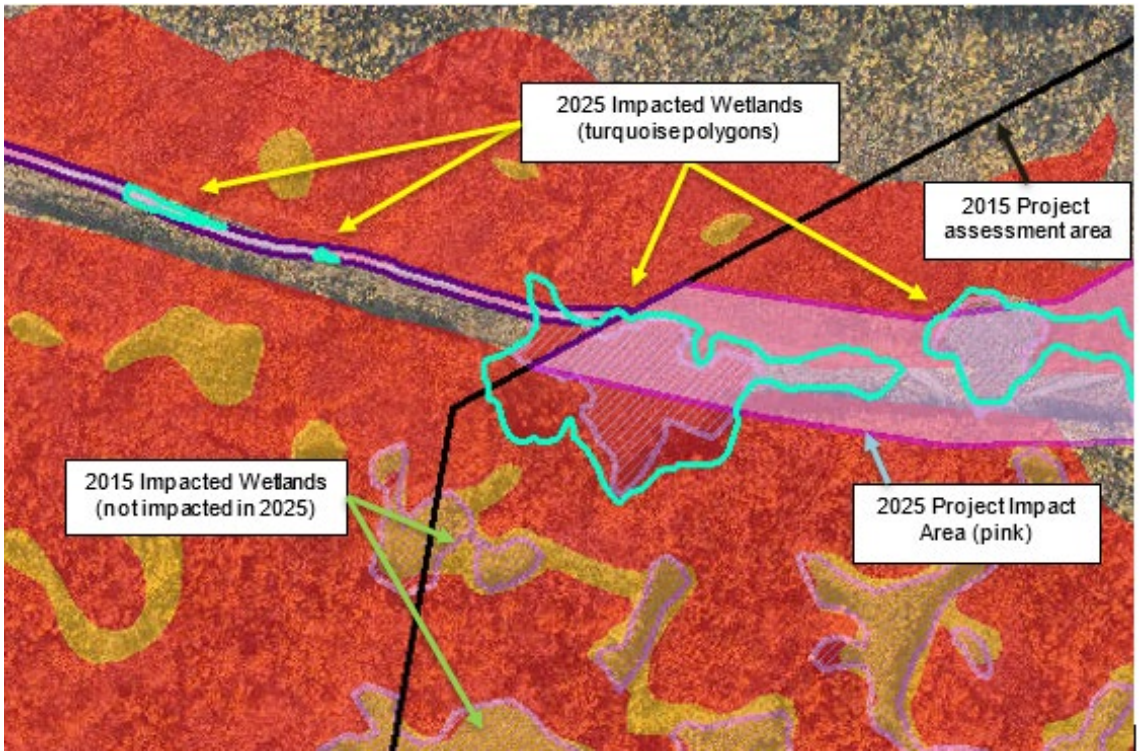

Figure 2. An example (Septimus Road) of wetlands depicting the 25% threshold for partial or full inclusion as impacted in the 2025 assessment. The orange polygons are wetlands identified in the 2015 analysis by the DWA. The blue polygons identify verified wetlands overlapping into the ground-truthed 2025 impact area (shown in pink shade).

Within the transmission line construction corridor only wetlands directedly impacted by infilling due to road, laydown, or tower infrastructure were treated as impacted. After the 2015 assessment, many towers and roads were relocated in the detailed design phase to avoid impacting wetlands (avoidance as the first step in the wetland mitigation hierarchy). In addition, for the 2025 assessment, wetlands that were affected only by the removal of surrounding tall growing vegetation were not treated as impacted as their overall wetted area remained intact.

Conclusion Regarding Area of Impacted Wetlands

Based on the above considerations, the updated area of wetlands impacted by the Project's construction footprint and reservoir amounts to 299 ha, broken down into the eight wetland classes (Table 1). These categories were used in the original assessment in 2015 and allowed a comparison of changes in area from the conservative estimation based on the TEM information to include data from the DWA and ground-truthed wetland occurrence for the 2025 re-assessment (DUC 2025).

Table 1. Total impacted wetland area (ha) for each wetland type (=wetland class) from the updated/re-assessed 2025 BC Hydro Wetland Impact Footprint (DUC 2025).

Wetland Class	Area in Hectares
Shallow Open Water (OW)	97.27
Willow Sedge (WS)	33.94
Willow Horsetail Sedge Riparian (WH)	125.6
Sedge or Cattail (SE)	20.77
Tamarack Sedge (TS)	8.78
Scrub Birch – Water Sedge Fen (Wf02)	2.15
Narrow-leaved cotton- grass – Shore sedge Fen (Wf13)	1.34
Labrador Tea-Sphagnum (BT:Sb)	9.14
Total	**298.99**

5.0 Wetland Functional Assessment

In addition to assessing the areal extent of wetlands lost and gained through compensation, FDS Condition 11.3 and EAC Condition 12 required an assessment of wetland function lost and gained. As there are many different types of wetlands serving a multitude of functions, BC Hydro partnered with Ducks Unlimited Canada (DUC) and developed a Wetland Function Assessment (WFA) methodology to assess the extent of wetland functions lost while creating new wetlands or restoring old wetlands to compensate for wetland losses. The WFA was discussed and adjusted throughout 2016-2018 and was accepted and considered complete by the VWTC on April 26, 2018 (Appendix A, page 4).

The original WFA (NPS 2018[1]) included three components: (1) classification of wetland types and areas within the area to be affected by Site C, (2) selection of wetland indicator species, and (3)

[1] NPS (Native Plant Solutions) is a subsidiary of Ducks Unlimited Canada. NPS did the original WFA in 2018. Due to a change in scope for NPS, DUC conducted the 2024-2025 re-assessment.

identification of important wetland habitat functions. The WFA considers the importance of wetland functions for specific wildlife and plant groups during important periods of their lifecycles (DUC 2025). The wetland habitat functional groups include migratory birds, amphibians, bats, fauna species at risk, flora species at risk and species important to Aboriginal land use. For some groups, functions were further subdivided to generate a total of 12 "function types" (Table 2).

The assessment involves calculating the degree of loss of each wetland habitat function for each respective wetland type or class (i.e., SE, TS, etc.; see Table 1). The functional losses for each wetland type can be combined to estimate the total functional losses for each wetland function (e.g., functional losses of migratory bird breeding habitat in Tamarack Sedge wetland, Willow Sedge wetland, etc. have all been combined to represent the total functional loss of migratory bird breeding habitat; Table 2).

Twelve wetland functions were used in the original WFA which DUC re-assessed in 2024-2025. Some categories overlap (e.g., amphibian breeding habitat can also be amphibian feeding habitat; bats can also feed in roosting areas). A breakdown of the 12 wetland functions for each of the wetland types included amongst the 299 ha of impacted wetlands is presented in Table 2 below.

Table 2. Summary of total wetland functional area loss by function and wetland class.

Function Type	Wetland Class								Total
	OW:	WS:	WH:	SE:	TS:	Wf02:	Wf13:	BT: sb	
Migratory Birds - Nesting	0.00	3.68	13.61	8.19	0.68	0.29	0.16	0.56	27.16
Migratory Birds – Brood-Rearing	54.71	0.00	0.00	3.89	0.00	0.27	0.17	0.00	59.05
Migratory Birds – Feeding	38.35	2.15	7.97	5.05	0.20	0.25	0.10	0.21	54.27
Migratory Birds - Migration	49.57	2.37	8.78	2.38	0.25	0.22	0.10	0.26	63.94
Amphibian – Breeding	24.32	2.83	10.47	5.19	0.73	0.18	0.11	0.76	44.59
Amphibian - Feeding	0.00	4.85	17.94	2.97	1.25	0.31	0.19	1.31	28.82
Amphibian – Hibernation	32.42	11.31	41.87	0.00	0.00	0.00	0.00	0.00	85.60
Bats – Feeding	9.12	4.24	15.70	1.95	1.64	0.20	0.13	1.71	34.69
Bats - Roosting	0.00	12.73	47.10	0.00	1.10	0.00	0.00	1.14	62.07
Fauna Species at Risk	7.77	2.02	26.21	4.74	1.37	0.15	0.09	1.17	43.52
Floral – Species at Risk	0.00	1.43	18.55	1.88	3.19	0.11	0.04	2.52	27.72
Species Important to Aboriginal Land Use	0.00	6.03	22.33	1.38	1.46	0.14	0.09	2.54	33.98

6.0 Wetland Compensation

Wetland Area Losses and Gains

Working with DUC, BC Hydro undertook wetland compensation in the form of wetland creation and wetland "rebuilds" to find, assess, and build or rebuild wetlands. Compensation is calculated by considering additionality – the benefits that accrue due to actions conducted to mitigate wetland loss or loss of wetland functions. Constructing a wetland is a considered compensation because if the wetland wasn't constructed it wouldn't exist. Wetland rebuilds (i.e., restoration) are considered compensation because, without intervention, those wetlands would have been lost (drained and returned to riverine or terrestrial system) once their water control structures reach ~30 years old. This was the point at which the water control structures tend to fail or are decommissioned due to high maintenance or replacement costs. The 'rebuilds' concept was accepted by the Canadian Wildlife Service of Environment and Climate Change Canada on March 15, 2021 and by the BC Ministry of Environment and Climate Change Strategy as being suitable for wetland compensation on March 15, 2021 (see Appendices B and C respectively).

To date, through our work with DUC, BC Hydro has established 269.7 ha of created or restored wetland offsets among five wetlands in the Peace Region (Table 3). Of the five wetlands, Golata Ranch was a new wetland built on agricultural land where no wetland previously existed. This wetland is a ~50 ha marsh/sedge wetland across a seven-hectare pond with 14 smaller ponds of varying sizes (Figure 4). The remaining four wetlands were rebuild and restoration projects.

Construction of a new wetland complex, designed by DUC, is currently underway in Area A at the Site C dam site (Figures 5a-c). This will result in an additional 35 ha of new wetlands completed by December 2027 bringing the total area of compensation wetlands to 304.7 ha. Overall Table 3 shows that the planned and completed wetland compensation will result in a 5.7 ha gain in wetland area compared to the area of impacted wetlands (299 ha).

Table 3. Restored or Created Wetlands – Compensation for 299 ha Wetland Loss

Wetlands Created or Restored to Date	**Size (hectares)**
Golata Canyon Ranch	49.6
Doig-Beatton East Marsh	21.2
Doig-Beatton West Marsh	20.1
Cutbank Lake	152.3
Scott Lake	26.5
SUB-TOTAL	**269.7**
Wetlands Planned	
Area A	35
TOTAL	**304.7**

Before (August 2019)

After (August 2020)

Figure 4. Golata Canyon Ranch Wetland showing Before and After photos of wetlands created. This was the first wetland project completed for the Site C Wetland Mitigation and Compensation program.

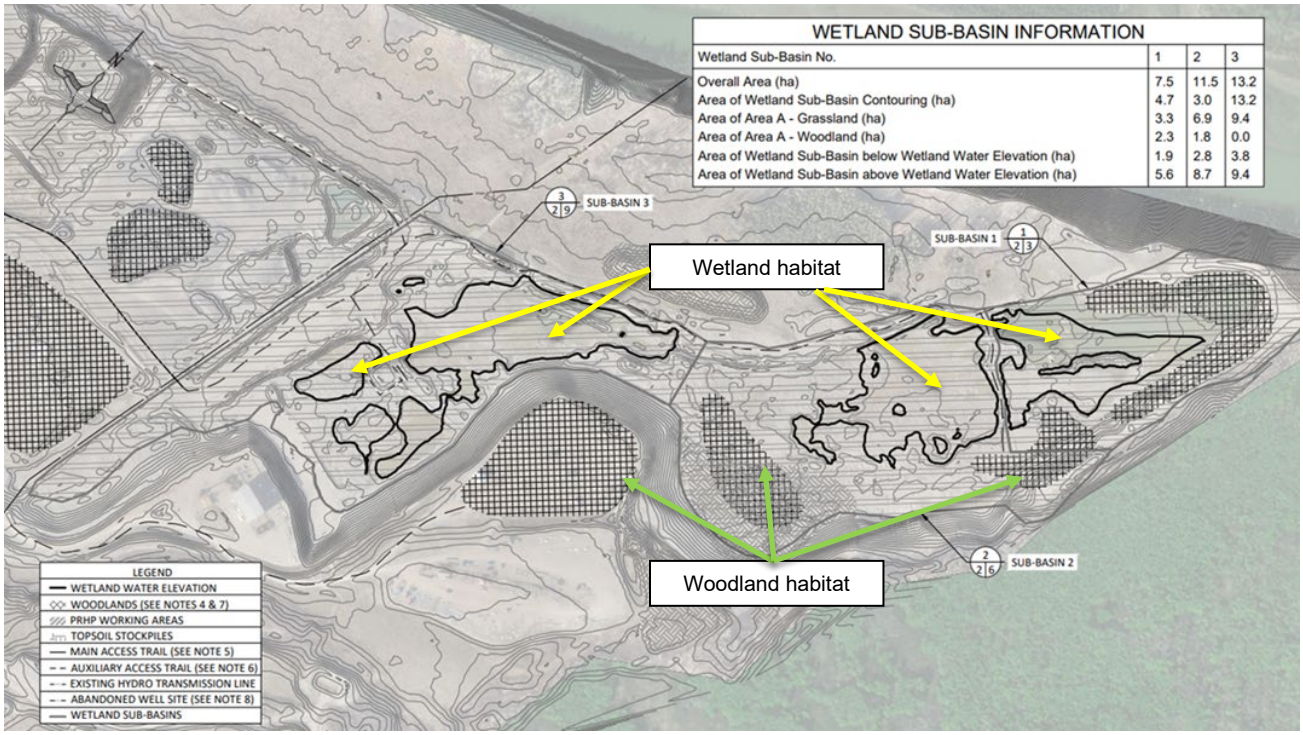

Figure 5a. Design plan for Area A includes wetland and woodland construction.

Figure 5b. Area A: Physical reclamation within Basins 1 – 3 which included contouring, topsoil placement, ripping and furrowing, coarse woody debris placement and native grass seeding. This photo was taken in August 2024 showing some of the woody debris placement.

Figure 5c. Aerial drone photo of Basin 3 showing the wetland created in this section with distribution of coarse woody debris. This area has also been seeded so vegetation will be expected to grow in over time. Photo taken in August 2024.

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Table 4. Total functional hectare loss from the 299-hectare Site C Wetland Impact Footprint and total functional hectare gains from the completed habitat compensation projects to date plus estimated gain from completed Area A and overall net functional balance.

	Wetland Function Types (Represented as "functional hectares")												
	Wildlife												
	Migratory Birds - Nesting	Migratory Birds - Brood-rearing	Migratory Birds - Feeding	Migratory Birds - Migration	Amphibians - Breeding	Amphibians - Feeding	Amphib Hibernation	Bats - Feeding	Bats - Roosting	Species-At-Risk	Plants - Primary Secondary Species	Aboriginal Land Use	**Overall Functional Balance**
Total loss: Wetland Impact Footprint	**27.2**	**59.1**	**54.3**	**63.9**	**44.6**	**28.8**	**85.6**	**34.7**	**62.1**	**43.5**	**27.7**	**34.0**	
Total gain from the five completed habitat compensation projects to date	32.9	79.2	67.9	75.3	52.4	20.9	69.3	27.2	32.4	28.5	9.0	15.5	
1. Golata Canyon Ranch	*15.1*	*8.4*	*10.6*	*6.6*	*10.6*	*6.6*	*4.8*	*5.0*	*4.1*	*9.0*	*2.9*	*n/a*	
2. Doig-Beatton East Marsh	*3.0*	*8.1*	*6.6*	*7.3*	*5.0*	*1.3*	*4.7*	*2.0*	*0.7*	*2.7*	*0.7*	*0.9*	
3. Doig-Beatton West Marsh	*3.6*	*5.5*	*5.1*	*5.1*	*4.1*	*1.8*	*4.1*	*2.0*	*1.9*	*2.7*	*0.9*	*1.4*	
4. Scott Lake	*1.3*	*10.3*	*7.8*	*9.8*	*5.3*	*1.0*	*7.5*	*2.4*	*1.7*	*2.1*	*1.1*	*1.3*	
5. Cutbank Lake	*9.9*	*46.9*	*37.8*	*46.5*	*27.4*	*10.2*	*48.2*	*16.3*	*24.0*	*12.0*	*3.4*	*11.9*	
Estimated gain from Area A once completed	5.7	14.9	12.1	12.7	9.0	2.1	7.2	3.4	0.0	5.0	1.3	1.0	
Total gain from above compensation projects	**38.6**	**94.1**	**80.0**	**88.0**	**61.4**	**23.0**	**76.5**	**31.1**	**32.4**	**33.5**	**10.3**	**16.5**	
Net functional balance (gains minus losses)	**11.4**	**35.0**	**25.7**	**24.1**	**16.8**	**-5.8**	**-9.1**	**-3.6**	**-29.7**	**-10**	**-17.4**	**-17.5**	**19.9**

Wetland Function Losses and Gains

Using the WFA methodology, DUC determined the wetland functional losses for the impacted wetlands and gains from the compensation wetlands for each wetland category. Note that these are not spatial hectares, but functional hectares, which are derived by inputting the spatial hectares for each wetland type into a model accounting for wetland functions gained from the various wetland creation and restoration projects completed to date for Site C and entering the data to assess losses and gains for each wetland function.

As indicated in Table 4, wetland compensation measures implemented to date have resulted in a net positive gain in wetland functions. Note that some functions within wetland systems will overlap. For example, amphibians and bats will still feed in breeding and roosting habitats. As wetlands mature, it is anticipated that additional functions will establish over time, likely mitigating some of the currently deficient functions.

Wetland Mitigation and Compensation Program Summary

The WFA determined that there was an overall net gain in wetland functions resulting from the creation, rebuilding, and restoration of wetland habitats which has also resulted in no net loss of wetland area. The wetland compensation projects completed to date, along with the planned works in Area A, will achieve an overall net positive outcome in both area (Table 3) and function (Table 4).

In support of this assessment, DUC is in the process of finalizing the formal write-up of the Wetland Mitigation and Compensation Plan for the Site C Wetland Mitigation and Compensation Program. This plan will provide detailed information on the methods used for wetland creation and restoration, as well as the WFA methodology and calculations used to evaluate functional losses and gains. This will be added as an addendum to this Memo upon completion. An additional addendum will be prepared following the completion of wetland works in Area A to document final outcomes to support the WFA results accordingly.

Closure

Based on these results, BC Hydro anticipates that we will meet the requirements of FDS 11 and EAC Condition 12 by the end of 2027 in terms of replacing lost wetland functions and compensation in terms of area.

We would like to request any feedback to this Memo by July 31, 2025 such that we can proceed to closeout further discussion of these FDS and EAC conditions. And we would be happy to discuss this information with you at your earliest convenience.

Please let me know if you have any questions.

Sincerely,

Brent Matsuda, M.Sc., R.P.Bio.

References

BC Hydro Distribution, British Columbia Transmission Corporation, Fisheries and Oceans Canada, and the Ministry of Water, Land and Air Protection. 2003. Approved Work Practices for Managing Riparian Vegetation. A Guide to Incorporating Riparian Environmental Concerns into the Management of Vegetation in BC Hydro's Transmission and Distribution Corridors.

DUC (Ducks Unlimited Canada). 2025. Site C Clean Energy Project. Updated Functional Assessment for Wetland Impact Footprint. May 15, 2025.

NPS (Native Plant Solutions). 2018. Assessment of Wetland Function for the Site C Clean Energy Project. Prepared for BC Hydro.

Appendix A:
Wetland Functional Assessment Acceptance by the Vegetation and Wildlife Technical Committee
(see page 4)

July 8, 2020 CLIFF 257282

VIA EMAIL

Ted White, Director and Comptroller of Water Rights
Water Management Branch
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
3rd Floor, 2975 Jutland Rd.
Victoria, BC

Regarding: Review of Mitigation and Monitoring Plans for BC Hydro, Site C Project

Dear Mr. White:

We have been advised and briefed on the Site C mitigation and monitoring plans by biologists who are part of the Vegetation and Wildlife Technical Committee (VWTC). We want to thank you for this opportunity to provide comments on these plans as requested in your letter of May 14, 2020.

The Ministry of Environment and Climate Change Strategy (ENV) and The Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (FLNRORD) have compiled this review of the status of Vegetation and Wildlife programs relevant to the Site C project. The water management decisions associated with the pending diversion of the Peace River for the Site C project represent an important milestone in its development. This milestone presents an opportunity to evaluate progress on the mitigation and monitoring work completed to date and to provide documentation necessary for this project to support fulfilling its environmental obligations.

There are 32 Mitigation and Monitoring Plans (Program Plans) within the purview of the VWTC that are fully developed or currently under development. These plans pertain in total to more than 100 species. The attached review focussed on 3 key areas:

1. Have the mitigation or monitoring plans met review criteria and concerns of the VWTC members and are they considered complete and operational.
2. Has appropriate and relevant work (scope and timing) detailed within each relevant plan been implemented consistent with the plan.

Ministry of Environment and Climate Change Strategy
Ecosystems Branch

Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Northeast Region

3. What, if any, issues or obstacles exist relevant to successful plan completion and/or implementation.

We recognize that there is considerable uncertainty associated with environmental outcomes of a project of this scope. Our reviews are mindful of that uncertainty and the need to accommodate for it within mitigation and monitoring programs.

We would highlight the following items with respect to that review:

1. There are many Program Plans that have been completed to the satisfaction of the VWTC and BC Hydro deserves credit for that effort.
2. There is a suite of program plans that remain in development. These are of concern given the immediacy of the current and potential impacts. These are documented in the last section of our review. Program plans for Bats (Program Area 4), Cavity Nesting Species (Program Area 10), River to Reservoir Memo (Program Area 22) and the Accounting Framework (Program Area 23) are of special concern. The attached review provides specific illustration of the current issues and challenges to be met by BC Hydro.
3. We have noted, within our review, uncertain overlap between mitigation programs outlined under the VWTC and FAHTC purviews. To date, there are gaps in this review as current information has yet to be provided to the VWTC. As a result, a review cannot be completed to determine consistency with the plans. An example are the issues outlined in review of Plan 2.2 Downstream Vegetation Monitoring
4. Additional challenges have been cited by the VWTC in receiving timely responses for planning documents by BC Hydro. A specific example cited by VWTC was lack of reporting relevant to mitigation and monitoring measures associated with the Construction and Environmental Management Plan (CEMP).
5. We note that there are a few programs where implementation of some aspects appears to be lagging. As an example, we would point to issues outlined in in review of Plan 2.1 Wetland Function Assessment.
6. As described by the VWTC, a program developed for monitoring the effects on beavers is being implemented. The VWTC was unaware of this program and has not had opportunity to review or comment.
7. Monitoring programs associated with projects of this scope have a lot of uncertainty. Project effects and the success of mitigation efforts are difficult to predict and as a result require long-term and consistent monitoring and adaptive approaches to mitigation. The resources necessary to ensure that these are in place for the long term will be key to the success of these mitigation and monitoring efforts.

Again, we would like to thank you for the opportunity to provide review and comment. Please feel free to contact us with and questions or clarification.

Sincerely,

Alec Dale, Executive Director

Karrilyn Vince, Regional Executive Director

Program Plan Development Overview

Program plans that have been reviewed, revised and are considered complete by the VWTC

Plan 1 Ungulate Winter Range (UWR)

Plan Development – the loss of 393 hectares of UWR 9-001 due to reservoir clearing and future flooding required that BC Hydro and FLNRORD develop amendment and/or replacement areas for the lost habitat, previously conserved under the Government Action Regulations under FRPA.

Plan implementation – BC Hydro owned lands on the north bank that provide winter range for mule deer and elk will be managed like a UWR and do make up for the lost area for those two species. The loss of good wintering habitat for moose is being accounted for by a UWR amendment/replacement process undertaken by FLNRORD, to which BC Hydro contributed $10,000 to assist in ensuring First Nations involvement in the process.

Issues – There are no issues currently for BC Hydro to address and the province in progressing on the candidate amendment/replacement polygons for a moose UWR with public consultation expected this fall.

Plan 2.1 Wetland Function Assessment

Plan Development - A complex tool developed by Native Plant Solution (subsidiary of Ducks Unlimited) to facilitate the evaluation of wetland function and value to bird species (as a surrogate for overall function). The Wetland Function Assessment has been reviewed extensively by the VWTC and is considered complete as of 26 April 2018.

Plan Implementation –Implementation of the Wetland Function Assessment tool is related to the Wetland Monitoring Program (Plan 2.3) and the implementation of wetland mitigation. Information gathered within the Wetland Monitoring Program will be used (via this tool) to better inform overall wetland function impacts resulting from Site C and to measure the extent and value of wetland mitigation programs.

Issues – While the tool and associated monitoring are fully developed or implemented, there have been no recent mitigation works reported on by BC Hydro. Initial mitigation discussions engaged Ducks Unlimited, however the VWTC is not aware of any progress in this area. Although monitoring will better inform impacts overall, there are wetlands which are or will be lost due to Site C and mitigation works need to be initiated to account for those.

Plan 2.2 Downstream Vegetation Monitoring

Plan Development - This program is designed to monitor changes in vegetation downstream of the dam site following diversion and eventual damming to better inform project impacts. This includes monitoring riparian vegetation changes, effects on ecosystems at risk, and effects on plant species at risk. The plan has relevance to Plan 11.2 (Rare Plant Inventory). The monitoring plan has been reviewed by the VWTC and is considered complete as of 15 March 2019.

Plan Implementation – Works under this monitoring plan have been initiated. Components have been in progress since 2016 (Rare Plant Inventories) and formal surveys associated with this plan were reported on by BC Hydro in 2019.

Issues – As part of this review the VWTC has been made aware of a related riparian vegetation mitigation and monitoring program associated with the Fisheries and Aquatic program. the VWTC has not had opportunity to review and provide input to the Fisheries and Aquatic Habitat Technical Committee (FAHTC) related program. These two program components require review and, if necessary, reconciliation and revision.

Plan 2.3 Wetland Monitoring

Plan Development – This program is designed to better inform baseline and construction phase wetland condition throughout wetland areas affected by construction. This program plan provides valuable input to the Wetland Function Assessment. The plan has been reviewed by the VWTC and is considered complete as of 30 Aug 2018.

Plan Implementation – Baseline and construction phase monitoring began in 2018.

Issues - This is one of many monitoring plans that are designed to, in part, better inform actual project impacts due to limitations of the Environmental Impact Assessment (EIA) in this area. As with many of these monitoring plans, the VWTC annually reviews progress and responds to suggested improvements and modifications from BC Hydro or provides recommended changes proactively. BC Hydro has been supportive of this adaptive approach to plan implementation and this will need to continue.

Plan 5.1 Snakes – Downstream Monitoring

Plan Development – This program is designed to better inform effects of dam construction and operation on the distribution of suitable habitat and on the distribution and abundance of garter snakes downstream of the dam. This plan has been consolidated with Plan 6.1 (Downstream Amphibian Monitoring). The plan has been reviewed by the VWTC and is considered complete as of 9 Jan 2018.

Plan Implementation – Monitoring to better inform the baseline began in 2018 and continues to date.

Issues – This is one of many monitoring plans that are designed to, in part, better inform actual project impacts due to limitations of the EIA in this area. As with many of these monitoring plans, the VWTC annually reviews progress and responds to suggested improvements and modifications from BC Hydro or provides recommended changes proactively. BC Hydro has been supportive of this adaptive approach to plan implementation and this will need to continue.

Plan 5.2 Snakes – Hibernacula Mitigation and Monitoring

Plan Development – This plan was developed to guide mitigation for the loss of garter snake hibernacula due to the Site C project. The program includes components for development of artificial hibernacula structures, measures to monitor and reduce risk from road mortality, and

monitor effectiveness of mitigation measures. It has been reviewed by the VWTC and is considered complete as of 29 Jan 2018.

Plan Implementation – Garter snake hibernacula are scheduled for installation in summer 2020.

Issues – Ongoing re-alignments to Highway 29 continue to have implications for selection and siting of artificial hibernacula. It is also uncertain what the effects of restriction due to COVID-19 have been on construction schedules. Affected hibernacula will not be lost until reservoir filling, however the effects of clearing on snake use of existing hibernacula is uncertain. Construction and associated monitoring of artificial hibernacula should be implemented as scheduled to facilitate discovery and acclimatization by snakes.

Plan 6.1 Amphibians Downstream Monitoring

Plan Development – This program is designed to better inform effects of dam construction and operation on the distribution of suitable habitat and on the distribution and abundance of garter snakes downstream of the dam. This plan has been consolidated with Plan 6.1 (Downstream Amphibian Monitoring). The plan has been reviewed by the VWTC and is considered complete as of 9 Jan 2018.

Plan Implementation – Monitoring to better inform the baseline began in 2018 and continues to date.

Issues – This is one of many monitoring plans that are designed to, in part, better inform actual project impacts due to limitations of the EIA in this area. As with many of these monitoring plans, the VWTC annually reviews progress and responds to suggested improvements and modifications from BC Hydro or provides recommended changes proactively. BC Hydro has been supportive of this adaptive approach to plan implementation and this will need to continue.

Plan 8.3 Breeding and Migratory Birds – Common Nighthawk Monitoring

Plan Development – This program plan was designed to better document distribution and abundance of Common Nighthawk (listed species under the federal at Risk Act - SARA), document habitats associated with its distribution, and to determine to what extent BC Hydro retained and managed lands could be used to mitigate for loss of habitat. The program plan was reviewed by the VWTC. It is considered complete as of 14 June 2017.

Plan Implementation – Common nighthawk monitoring surveys have been implemented since 2018 within the Site C area generally and within BC Hydro retained and managed lands.

Issues – The value of BC Hydro owned lands as mitigation habitat for Common Nighthawk will be informed to a large extent by the Accounting Framework (Program Plan 23). This is currently in development and not currently capable of providing that information, particularly the additionality benefits to Common Nighthawk in securing and managing these lands. Ongoing development and finalization of the Accounting Framework is of highest priority to the VWTC and needs to be completed by 2021 to facilitate this type of evaluation.

Plan 9 Ground Nesting Raptors

Plan Development – This program was developed to better inform the effects of the Site C project on two ground nesting raptor species (Northern Harrier and Short-eared Owl). The plan has been reviewed by the VWTC and is considered complete as of 22 August 2016.

Plan Implementation – Monitoring was initiated in 2019.

Issues – There are no concerns currently. Results from this monitoring will inform future mitigation efforts if any are deemed necessary. This is one of many monitoring plans that are designed to, in part, better inform actual project impacts due to limitations of the EIA in this area. As with many of these monitoring plans, the VWTC annually reviews progress and responds to suggested improvements and modifications from BC Hydro or provides recommended changes proactively. BC Hydro has been supportive of this adaptive approach to plan implementation and this will need to continue.

Plan 11.1 Experimental Plant Translocation Program (ERPT)

Plan Development – This program was developed as an experimental approach to mitigate for the loss of rare plant population associated with the Site C Project. The plan is informed by Plan 11.2 (Regional Rare Plant Inventories) and resulting Conservation Data Centre (CDC) rank changes. The plan has undergone extensive review by the VWTC, has had annual modifications (consistent with the plan) and is considered complete as of 6 Nov 2019.

Plan Implementation – The ERPT has been fully implemented. Monitoring of experimental out-plantings continues.

Issues – There are no issues currently. Ongoing monitoring is necessary to determine effectiveness.

Plan 11.2 Rare Plant Inventory (Regional Surveys)

Plan Development – This program was developed to improve information on the abundance, distribution, and habitat characteristics of rare plant populations within the Regional Assessment Area. Methods in the program are consistent with provincial rare plant inventory guidance. The program plan has been reviewed by the VWTC and relevant ENV experts and is considered complete as of 15 November 2017.

Plan Implementation – This program was initiated 2015 and were implemented annually until 2018. Results of the monitoring have informed subsequent CDC status re-assessments and have resulted in changes to Plan 11.1 (Experimental Rare Plant Translocation).

Issues – There are no issues currently.

Plan 12 Sharp-tailed Grouse (also under CEMP)

Plan Development – This plan was finalized following direction from the Fish Hydro Policy Committee regarding duration of effect monitoring. The decision tree for grouse monitoring was accepted by the VWTC on December 12, 2007.

Plan Implementation – The update provided by BC Hydro on July 7 2020 indicates that Sharp-tailed Grouse monitoring has occurred as planned to date.

Issues – There has been insufficient time available to review monitoring results provided. The VWTC is concerned that no grouse were observed lekking or at all during the surveys. This will require subsequent follow-up.

Plan 15 Other Raptors (components under the CEMP)

Plan Development – This program plan was developed to mitigate for Site C project effects to 6 species or raptors. The program was reviewed by the VWTC and is considered complete as of 16 November 2016.

Plan Implementation – Implementation consists of measure to mitigate construction related issues which are incorporated into the CEMP and mitigation measures developed for Wetlands and Non-wetland Migratory Bird Compensation under separate plans.

Issues – there has been no reporting to date regarding activities implemented under the CEMP relative to this plan.

Plan 16 Other Species at Risk (components under CEMP; particularly butterflies)

Plan Development – This plan was developed to outline mitigation measures for a suite of species at risk not specifically indicated under Site C approval conditions. These included 14 species of butterflies, 1 species of dragonfly, western toad, 4 species of waterbirds, 13 species of songbirds, 3 species of marsh birds, and 2 raptor species. Some are now considered under separate plans (e.g., Plan 9 Ground Nesting Raptors covers the raptor species). Mitigation measures included within are diverse. For some species groups they rely heavily on actions incorporated into the CEMP (e.g., Butterfly Seeding Plan) or for measures associated with other program plans. The VWTC reviewed this plan and it was considered complete as of 16 November 2016. Changes to species status however (e.g., Bank Swallow) necessitate revisions to this plan.

Plan Implementation – Plan implementation is uncertain for some components. For those where complete plans are in place implementation is as described in relevant plans (Wetland Monitoring and Mitigation, Ground Nesting Raptors, various migratory bird plans (8.1-8.5). For others, particularly butterflies, implementation of measures outlined in the CEMP is uncertain.

Issues – On September 26, 2016 the VWTC indicated to the comptroller of water rights that no additional mitigation or monitoring was required, however, in some cases, it is unclear how and if the implementation intended within the approved plan is being conducted and if it is being conducted appropriately, especially to measures incorporated into the CEMP. This is a significant issue as it hinders the regulatory agencies ability to assess performance and progress in these areas. Additionally, plans with dates past the approval date have been provided for review (e.g. the Other Species at Risk is dated March 21, 2017 and the Plant Seeding Program for Butterfly Larval Food Plants and Adult Nectar Source Plants is dated March 22, 2017. A general response to this discrepancy is required. This plan also references the need for an accounting framework, which to date is still under development (see plan 23 below).

Other species at risk: There are outstanding unresolved issues regarding the extent of mitigation proposed for Bank Swallow (now federally listed under Species at Risk Act). These are the subject of ongoing discussions at the VWTC and of particular interest to Canadian Wildlife Service. Resolution of mitigation measures is necessary well prior to reservoir filling.

Bank Swallow Mitigation and Monitoring

Plan Development - A site specific management plan was developed to address issues around known bank swallow colonies at Howe Pit, the most recent draft was provided in May 2019. This plan was developed to outline mitigation options and compensation plans for this site.

Plan Implementation – BC Hydro has indicated that due to on-site issues, e.g., instability, the Howe Pit compensation site has not been fully implemented.

Issues – CWS will continue to review the program and provide advice related to the installation of suitable compensation habitat for this colony. CWS has also provided advice on the adaptation of this management plan for the broader Site C project area and maintains that this is a key management plan to reduce the potential for adverse effects to a federally listed species. BC Hydro also indicated on March 27, 2020 that a report was being drafted to summarize the findings of bank swallow habitat use and availability surveys along the Peace River.

Invertebrates: The implementation of the butterfly seeding program and the implementation details themselves seem to be lacking or missing. The committee is aware of an update from BC Hydro, dated July 7 2020 that dictates a seed mix that appears to be only partially what was agreed to in the approved plan and does not provide an update on implementation of the various phases indicated in the approved plan. The VWTC notes that the plan states that modifications to the phases will be communicated to the VWTC. Reporting to the VWTC and/or FLNRORD ecosystems division (who receives CEMP-related information) on this program had not occurred at all until July 7 2020, and this reporting is lacking information as per the approved plan.

Plan 17 Furbearers

Plan Development – The VWTC reviewed the effects of the Site C project on 3 aquatic furbearer species (beavers, muskrats, and river otters) and agreed with BC Hydro that no further mitigations were necessary beyond those associated with Riparian and Wetland Mitigation programs. VWTC considered this approach appropriate (BC Hydro letter to Comptroller of Water Rights 26 September 2016).

Plan Implementation – None specifically required.

Issues – The VWTC has recently (week of July 6) learned of a new proposed project to study the effects of the headpond development associated with the diversion tunnels on beavers. The VWTC has not been given opportunity to review this project, although requests for relevant permits have been submitted to regional FLNORD staff and the permit was expected to have decision the same week the committee learned of the program.

Plan 18 Ungulate Calving Habitat

Plan Development – There is no specific plan for this program area. BC Hydro proposed to mitigate for this by retention and management of BC Hydro lands for Wetlands, Breeding and Migratory Birds, and Ground Nesting Raptors. VWTC considered this approach appropriate (BCH letter to CWR 26 September 2016).

Plan Implementation – Dependent on relevant management of BCH owned and managed mitigation properties. Management plans have been developed and reviewed by VWTC.

Issues – No reporting regarding implementation have been provided to regulatory agencies or VWTC to date.

Plan 19 Mineral Licks

Plan Development – There is no specific plan for this program area. This issue was discussed at the VWTC and it was determined that no relevant mitigations are available or necessary (BC Hydro letter to CWR 26 September 2016).

Plan Implementation – None specifically required.

Issues – None.

Plan 20 Bear and Carnivore Habitats

Plan Development – There is no specific plan for this program area. This has been reviewed by the VWTC. Relevant mitigation is detailed regarding carnivore den sites within the CEMP (BCH letter to CWR 26 September 2016).

Plan Implementation – Dependent on relevant implementation of measure within the CEMP

Issues – Reporting to regulatory agencies involved in the VWTC has not occurred. VWTC members received materials July 7, 2020 and have not had opportunity to review in detail.

Plans Reviewed and Considered Complete by VWTC and incorporated in the Construction and Environmental Monitoring Plan (CEMP)

Plan 6.2 Amphibians - Migration Monitoring

Plan Development – There is no specific plan for this program area. Relevant mitigation is detailed within the CEMP. This has been reviewed by the VWTC and is considered complete.

Plan Implementation – Dependent on relevant implementation of measure within the CEMP.

Issues – Reporting to regulatory agencies involved in the VWTC has not occurred. VWTC members received materials July 7, 2020 and have not had opportunity to review in detail.

Plan 8.5 Breeding and Migratory Birds – Nest Monitoring

Plan Development – This plan was developed to mitigate and monitor disturbance of breeding migratory birds in and adjacent to the Project Activity Zone, including the area immediately

downstream of the dam where risks to migratory bird nests could occur during construction, reservoir filling and operation. The focus of the program will be on monitoring avian species nesting on the ground and low in vegetation in the riparian zone of the reservoir and downstream of the dam, which is where impacts to nesting migratory birds have the greatest potential to occur.

Plan Implementation – Surveys will begin during the breeding season after reservoir diversion and will continue through construction and the first ten years of operations.

Issues – CWS submitted comments on this plan February 9, 2018 and BC Hydro has indicated they are in the process of revising this plan.

Plan 12 Sharp-tailed Grouse – this program plan is outlined above, and relevant measures were incorporated into the CEMP.

Plan 13 Lighting Effects

Plan Development – There is no stand-alone plan for this program area. The VWTC reviewed the proposed mitigation approaches within the CEMP and agreed that they were sufficient (BC Hydro letter to CWR 20 June 2016).

Plan Implementation – Dependent on relevant implementation of measure within the CEMP.

Issues – Reporting to regulatory agencies involved in the VWTC has not occurred. VWTC members received materials July 7, 2020 and have not had opportunity to review in detail.

Plan 14 Carnivore Den Sites – see comments for Plan 20 (Bear and Carnivore Habitats above).

Plan 16 Other Species at Risk – this program plan is outlined above, and relevant measures were incorporated into the CEMP.

Plan 21 Soil Management, Site Restoration and Revegetation

Plan Development – This program plan was developed and incorporated in its entirety into the CEMP. The plan was reviewed by the VWTC and is considered complete as of June 2016.

Plan Implementation – Dependent on relevant implementation of measure within the CEMP.

Issues – The VWTC and regulatory agencies have not received any reporting to date regarding implementation of measures for this plan.

Program Plans that were mandated by Comptroller of Water Rights oversight and determination and are considered sufficient by the VWTC.

Plan 3 Fishers

Plan Development – This plan mandates interim replacement of lost denning habitat with den boxes and development of fisher cold weather resting den site coarse woody debris piles. The extent of mitigation was of contention between BC Hydro and regulatory agencies. Mitigation

extent was resolved and directed by the Comptroller of Water Rights. The plan has been revised to reflect this direction. It has recently been provided to the VWTC for final review.

Plan Implementation – Fisher mitigation has been implemented. Artificial den boxes were installed in 2019. Construction of appropriate large woody debris piles have been required where appropriate and possible of contractors clearing the reservoir and powerlines.

Issues – Implementation of the fisher den box program in 2019 required substantive logistic assistance from the VWTC. Large woody debris pile construction has been inconsistent in quality and has required contractors to address concerns. Compliance monitoring for clearing contractors requires more attention to rectify this issue.

Plans Currently Under Development and Review

Plan 4 Bats

Plan Development – this plan was originally developed and agreed to by the VWTC to mitigate for loss of roosting habitat as a result of reservoir clearing and dam site construction. It is currently under review and subject to major revisions as a result of the development of the Portage Mountain Quarry and the resulting loss and disturbance to what would be considered critical habitat for 2 federally endangered bat species. The VWTC has provided comment on a draft of this plan (Fall 2019) but has not yet seen a revised version.

Plan Implementation – Bat houses have been deployed and should be monitored with reporting due annually to the VWTC.

Issues – Revisions to the plan are ongoing and BC Hydro has been supportive of such to date. This ongoing adaptive revision will have to continue. Reporting on progress of implementation and monitoring should be occurring, but during this review the VWTC discovered no recent reporting from 2019. This should be considered outstanding. Additionally, monitoring and reporting specific to Portage Mountain will need to continue in concert with review from the VWTC, with adaptive management considerations, should adverse effects be discovered. It is this unknown potential for significant adverse affects to critical habitat that has led to discussions of compensation. Consequently, a parallel process for research to help better understand impacts of habitat change to bats and bat habitat requirements in the northeast of BC has been developed by the VWTC for implementation by various researchers. This compensation program will require continual reporting and review via the VWTC. Unfortunately, the compensation provided by BC Hydro is not considered sufficient by the VWTC and a panel of bat experts to fully implement the necessary work.

Plan 7 Eagles

Plan Development – this plan was originally developed and considered complete by the VWTC. New information regarding effectiveness, design and installation provided by FLNRORD experts have re-opened this plan for revision. A revised version of the eagle plan has not yet been reviewed by the VWTC.

Plan Implementation – Limited nesting structures have been deployed to date (3) and while more were planned for this summer, there have been delays which are outlined in the issues section below. Reporting on use of the 3 nesting platforms and program progress this summer will be made available annually to the VWTC.

Issues – As identified above, the design changes recommended by the VWTC are being incorporated by BC Hydro, however Covid-19 delayed some of the deployment of the alternate nesting structures and the VWTC has concern over timing to ensure the structures are available for discovery by displaced eagles. Consideration of Covid-safe operations to continue progress on this program should begin soon.

Plan 8.1 Breeding and Migratory Birds – Songbird Monitoring

Plan Development – This program plan was designed to better inform the effects of the Site C project on breeding and migratory songbirds. In addition, its outcome will inform mitigation measures necessary to compensate for these effects. The VWTC reviewed this plan (dated 20 June 2018). It is considered draft but acceptable for interim implementation.

Plan Implementation – Song monitoring has been implemented as part of the mitigation program annually since 2016.

Issues – Canadian Wildlife Service retains outstanding concerns regarding some aspects of the sampling methodologies and associated power to detect changes. BC Hydro has addressed ENV and FLNRORD concerns. The provincial agencies would defer to CWS concerns regarding this plan as they have the most relevant expertise and authority. This is one of many monitoring plans that are designed to, in part, better inform actual project impacts due to limitations of the EIA in this area. As with many of these monitoring plans, the VWTC annually reviews progress and responds to suggested improvements and modifications from BC Hydro or provides recommended changes proactively. BC Hydro has been supportive of this adaptive approach to plan implementation and this will need to continue.

Plan 8.2 Breeding and Migratory Birds – Waterbird and Shorebird Monitoring

Plan Development – This plan was developed to further inform the effects of the Site C project on species of waterbirds and shorebirds and consists of monitoring programs associated with the Peace River directly and with relevant wetlands. The plan (dated 20 August 2018) has been reviewed by the VWTC. It is considered draft but acceptable for interim implementation.

Plan Implementation – Waterbird monitoring has been implemented as part of the mitigation program annually since 2017.

Issues – BC Hydro has addressed ENV and FLNRORD concerns. The provincial agencies would defer to CWS concerns regarding this plan as they have the most relevant expertise and authority. This is one of many monitoring plans that are designed to, in part, better inform actual project impacts due to limitations of the EIA in this area. As with many of these monitoring plans, the VWTC annually reviews progress and responds to suggested improvements and modifications from BC Hydro or provides recommended changes proactively. BC Hydro has been supportive of this adaptive approach to plan implementation and this will need to continue.

Plan 8.4 Breeding and Migratory Birds – Woodpeckers (probably monitoring component which is tied into plan 10.

Plan Development – This monitoring program plan was developed to better inform Site C effects and potential mitigation opportunities for woodpeckers. It is directly linked to the Cavity Nesting Species Mitigation and Monitoring Plan (Plan 10). The plan was reviewed by the VWTC and the subject of workshops with Canadian Wildlife Service experts and is considered complete as of 14 March 2018. This is one of many monitoring plans that are designed to, in part, better inform actual project impacts due to limitations of the EIA in this area. As with many of these monitoring plans, the VWTC annually reviews progress and responds to suggested improvements and modifications from BC Hydro or provides recommended changes proactively. BC Hydro has been supportive of this adaptive approach to plan implementation and this will need to continue.

Plan Implementation – Woodpecker monitoring surveys were implemented in 2018 and 2019.

Issues – None currently.

Plan 10 Cavity Nesting Species

Plan Development – This program plan was designed to guide mitigation and monitoring efforts for a suite of cavity nesting species including passerines, waterfowl, woodpeckers, raptors, passerines and owls. It has been reviewed by the VWTC and is considered under development. The plan considers nest boxes/snag creation, cavity recruitment, and long-term habitat management as mitigation strategies.

Plan Implementation – Implementation to date, has consisted solely on the construction, placement and monitoring of nest boxes. Nest boxes were installed starting in 2017.

Issues – Outstanding concerns exist regarding the inapplicability of nest boxes for many of the cavity nesting species considered under this plan. Woodpeckers are of particular concern. There has been little to no progress reported on the other mitigation approaches outlined in the plan (snag creation, cavity recruitment, habitat retention and management). These remain a priority area for the VWTC to have resolved by 2021.

Plan 22 River to Reservoir Memo

Plan Development – This program plan is also referred to as “Effects of Fish Habitat Offset Projects on Migratory Birds”. It has been developed in response to a specific federal condition attached to the project approval certificate. The program plan is designed to outline the benefits to migratory birds (primarily but not limited to waterbirds). It has been reviewed by the VWTC and the latest version (dated 8 November 2019) and is considered under development.

Plan Implementation – Not currently implemented.

Issues – There are outstanding issues with the characterization of benefits of various fish and aquatic habitat mitigation to migratory birds CWS retains the necessary expertise in this area. The provincial agencies on the VWTC have reviewed this plan. The provincial agencies would

defer to CWS concerns regarding this plan as they have the most relevant expertise and authority. CWS submitted comments on the November 2019 report on March 20, 2020. Key outstanding issues included the need for a summary of habitat gains and losses, additional detail regarding how this plan is intended to support migratory birds (not just piscivorous birds), and further consideration of bird-specific program design.

Plan 23 Accounting Framework

Plan Development – This plan has been developed to characterize the benefits of various mitigation programs (with the exception of Wetlands for which Program Plan 2.1 the Wetland Function Assessment addresses) relative to the effects of the Site C project. It is also a potential useful tool in aiding site selection for potential offsetting and compensation projects. The accounting framework is currently in draft stage and has been developed initially, only to provide assessment relative to a select number of migratory bird species at risk. It was most recently reviewed by the VWTC in April 2019. The VWTC has indicated that the framework approach appears to be appropriate but needs considerable development before it will serve the purpose for which it was intended.

Plan Implementation – Not currently implemented.

Issues – This framework is key to informing the scope of any residual compensation program arising from the Site C project. It has been a priority of the VWTC since 2016, however development was not initiated until quite some time later. The framework currently does not have the capacity to deal with some important issues. Two key gaps are the lack of ability to evaluate additionality associated with the securement and future management of habitat compensation lands and the very limited taxonomic breadth at current (relevant to a select number of migratory bird species at risk). This remains a very high priority for the VWTC to have resolved by 2021.

BC Hydro
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Appendix B:
Wetland Rebuild Acceptance by Environment and Climate Change Canada

Matsuda, Brent

From: Brooks, Jayme (EC) <jayme.brooks@canada.ca>
Sent: 2021, March 15 2:12 PM
To: Simons, Brock; 'Eric C Lofroth'; 'Corey Erwin'; 'Johnson, Marianne FLNR:EX'
Cc: Pinkus, Susan; Scarborough, Greg; 'Jonathan Abell'; Site C Compliance Reporting; 'Hansen, Inge-Jean FLNR:EX'
Subject: RE: VWTC - Additionality for Rebuilding Aging Constructed Wetland Infrastructure

Hi Brock,

Thank you for the updated information and for the opportunity to discuss. CWS has no further comments or questions on the proposed additionality for DUC rebuild projects as part of Site C's wetland compensation requirements.

Regards,

Jayme

Jayme Brooks

Senior Environmental Assessment Officer / Canadian Wildlife Service
Environment and Climate Change Canada / Government of Canada
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From: Simons, Brock <Brock.Simons@bchydro.com>
Sent: March 12, 2021 2:46 PM
To: Brooks, Jayme (EC) <jayme.brooks@canada.ca>; 'Eric C Lofroth' <eclofroth@gmail.com>; 'Corey Erwin' <Corey.Erwin@gov.bc.ca>; 'Johnson, Marianne FLNR:EX' <Marianne.Johnson@gov.bc.ca>
Cc: Pinkus, Susan <Susan.Pinkus@bchydro.com>; Scarborough, Greg <Greg.Scarborough@bchydro.com>; 'Jonathan Abell' <jabell@ecofishresearch.com>; Site C Compliance Reporting <SiteC.Compliance.Reporting@bchydro.com>; 'Hansen, Inge-Jean FLNR:EX' <IngeJean.Hansen@gov.bc.ca>
Subject: RE: VWTC - Additionality for Rebuilding Aging Constructed Wetland Infrastructure

Hello all,

At the last VWTC meeting on 19 February, with the assistance of Ross Curtis and Bruce Harrison of Ducks Unlimited Canada, we discussed the attached revised document providing the rationale for calculating additionality for rebuilding aging wetland infrastructure. My understanding of the conclusion of that discussion was that the VWTC is now satisfied with the rationale and the supporting information provided in that attached document.

If my understanding of the conclusion of that discussion is correct, could you please confirm this is writing on behalf of your respective agencies? That written confirmation will provide the confidence necessary for Ducks to proceed with the rebuilds laid out in the attached document as part of Site C's wetland compensation requirements.

Please let me know if further discussion or information on this subject is required, and I'll do my best to facilitate.

Thank you for the help, and have a great weekend,

Brock

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From: Simons, Brock
Sent: 2021, February 03 5:37 PM
To: Brooks, Jayme (EC) <jayme.brooks@canada.ca>; Eric C Lofroth <eclofroth@gmail.com>; 'Corey Erwin' <Corey.Erwin@gov.bc.ca>; 'Johnson, Marianne FLNR:EX' <Marianne.Johnson@gov.bc.ca>
Cc: Pinkus, Susan <Susan.Pinkus@bchydro.com>; Scarborough, Greg <Greg.Scarborough@bchydro.com>; 'Jonathan Abell' <jabell@ecofishresearch.com>; Site C Compliance Reporting <SiteC.Compliance.Reporting@bchydro.com>; 'Hansen, Inge-Jean FLNR:EX' <IngeJean.Hansen@gov.bc.ca>; Ross Curtis <r_curtis@ducks.ca>; Bruce Harrison <b_harrison@ducks.ca>; 'ted@hg-llc.com' <ted@hg-llc.com>
Subject: RE: VWTC - Additionality for Rebuilding Aging Constructed Wetland Infrastructure

Hello all,

As requested, Ross Curtis and Bruce Harrison at Ducks Unlimited Canada (DUC; cc'd on this email) have provided details regarding aging constructed wetlands that have been decommissioned in recent years, as well as financial rationale to explain why that decommissioning was unavoidable and certain to continue without a specific funding injection. I have added that information as Section 3 and Appendix 1 to the memo that I previously sent for explaining the proposed approach for calculating additionality for rebuilding aging constructed wetland infrastructure. Please see attached and let me know if this provides the information that you were looking for.

Regards,

Brock

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From: Brooks, Jayme (EC) <jayme.brooks@canada.ca>
Sent: 2020, December 17 4:45 PM
To: Eric C Lofroth <eclofroth@gmail.com>; Simons, Brock <Brock.Simons@bchydro.com>; 'Corey Erwin' <Corey.Erwin@gov.bc.ca>; 'Johnson, Marianne FLNR:EX' <Marianne.Johnson@gov.bc.ca>
Cc: Pinkus, Susan <Susan.Pinkus@bchydro.com>; Scarborough, Greg <Greg.Scarborough@bchydro.com>; 'Jonathan Abell' <jabell@ecofishresearch.com>; Site C Compliance Reporting <SiteC.Compliance.Reporting@bchydro.com>; 'Hansen, Inge-Jean FLNR:EX' <IngeJean.Hansen@gov.bc.ca>
Subject: [External] RE: VWTC - Additionality for Rebuilding Aging Constructed Wetland Infrastructure

Hi Brock,

CWS is also supportive of the DU proposal as a means to meet a portion of the wetland compensation requirements for Site C. We also have no further comments on DU's approach to calculating the avoided loss ratio, but would like to further discuss how it will be counted toward total compensation requirements.

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Jayme

Jayme Brooks

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Sent: December 15, 2020 9:14 AM
To: 'Simons, Brock' <Brock.Simons@bchydro.com>; Brooks, Jayme (EC) <jayme.brooks@canada.ca>; 'Corey Erwin' <Corey.Erwin@gov.bc.ca>; 'Johnson, Marianne FLNR:EX' <Marianne.Johnson@gov.bc.ca>
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For MOECCS

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To: 'Eric C Lofroth' <eclofroth@gmail.com>; 'Brooks, Jayme (EC)' <jayme.brooks@canada.ca>; 'Corey Erwin' <Corey.Erwin@gov.bc.ca>; 'Johnson, Marianne FLNR:EX' <Marianne.Johnson@gov.bc.ca>
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I am hoping that we can discuss this in detail at the meeting on Friday.

Regards,

Brock

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From: Simons, Brock
Sent: 2020, October 30 6:01 PM
To: 'Hansen, Inge-Jean FLNR:EX' <IngeJean.Hansen@gov.bc.ca>; 'Eric C Lofroth' <eclofroth@gmail.com>; 'Brooks, Jayme (EC)' <jayme.brooks@canada.ca>; 'Corey Erwin' <Corey.Erwin@gov.bc.ca>
Cc: Pinkus, Susan <Susan.Pinkus@bchydro.com>; Scarborough, Greg <Greg.Scarborough@bchydro.com>; 'Jonathan Abell' <jabell@ecofishresearch.com>; Site C Compliance Reporting <SiteC.Compliance.Reporting@bchydro.com>; Ted Gullison <ted@hg-llc.com>
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Please let me know if you have any questions or identify any information gaps that will help inform those discussions.

Regards,

Brock

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BC Hydro
Power smart

Appendix C:
Wetland Rebuild Acceptance by the BC Ministry of Environment and Climate Change Strategy

Matsuda, Brent

From: Eric C Lofroth <eclofroth@gmail.com>
Sent: 2021, March 16 9:35 PM
To: Simons, Brock; 'Brooks, Jayme (EC)'; 'Corey Erwin'; 'Johnson, Marianne FLNR:EX'
Cc: Pinkus, Susan; Scarborough, Greg; 'Jonathan Abell'; Site C Compliance Reporting; 'Hansen, Inge-Jean FLNR:EX'; Eric Lofroth
Subject: RE: VWTC - Additionality for Rebuilding Aging Constructed Wetland Infrastructure

Brock,

Apologies for not replying earlier. I did have a discussion regarding this issue with Corey a couple of weeks ago.

Based on that discussion MOECCS confirms that it is satisfied with the material provided (rationale, additionality calculations) and are in support of BC Hydro pursuing this approach to achieve some of the required mitigation for wetland loss. Further to that we wish to make two additional points:

1. That this, as we have discussed, will not represent all of the wetland mitigation work that BC Hydro will undertake as part of their Site C responsibilities. MOECCS recognizes that there has been work done to date on the Golata property but also notes that there are additional opportunities (and challenges) associated with mitigating for loss of the more challenging wetland types,
2. MOECCS would also recommend that BC Hydro and Ducks Unlimited explore all possibilities to examine re-design or re-configuration of any water control structures and associated landform changes to create wetland types that have been typically more challenging to develop. Although these projects to represent the “low hanging fruit” as described during our last call (Feb 19) they also provide an opportunity for DUC to apply creative approaches to this process that may be of benefit to the Site C wetland mitigation program.

Sincerely

Eric Lofroth
For MOECCS

Eric C Lofroth MSc RPBio
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Victoria, BC V9E 2B1
C: 250-634-0117
H: 250-744-0063
eclofroth@gmail.com

From: Simons, Brock <Brock.Simons@bchydro.com>
Sent: March 12, 2021 2:46 PM
To: 'Brooks, Jayme (EC)' <jayme.brooks@canada.ca>; 'Eric C Lofroth' <eclofroth@gmail.com>; 'Corey Erwin' <Corey.Erwin@gov.bc.ca>; 'Johnson, Marianne FLNR:EX' <Marianne.Johnson@gov.bc.ca>
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Subject: RE: VWTC - Additionality for Rebuilding Aging Constructed Wetland Infrastructure

Hello all,

At the last VWTC meeting on 19 February, with the assistance of Ross Curtis and Bruce Harrison of Ducks Unlimited Canada, we discussed the attached revised document providing the rationale for calculating additionality for rebuilding aging wetland infrastructure. My understanding of the conclusion of that discussion was that the VWTC is now satisfied with the rationale and the supporting information provided in that attached document.

If my understanding of the conclusion of that discussion is correct, could you please confirm this is writing on behalf of your respective agencies? That written confirmation will provide the confidence necessary for Ducks to proceed with the rebuilds laid out in the attached document as part of Site C's wetland compensation requirements.

Please let me know if further discussion or information on this subject is required, and I'll do my best to facilitate.

Thank you for the help, and have a great weekend,

Brock

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E brock.simons@bchydro.com

From: Simons, Brock
Sent: 2021, February 03 5:37 PM
To: Brooks, Jayme (EC) <jayme.brooks@canada.ca>; Eric C Lofroth <eclofroth@gmail.com>; 'Corey Erwin' <Corey.Erwin@gov.bc.ca>; 'Johnson, Marianne FLNR:EX' <Marianne.Johnson@gov.bc.ca>
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Subject: RE: VWTC - Additionality for Rebuilding Aging Constructed Wetland Infrastructure

Hello all,

As requested, Ross Curtis and Bruce Harrison at Ducks Unlimited Canada (DUC; cc'd on this email) have provided details regarding aging constructed wetlands that have been decommissioned in recent years, as well as financial rationale to explain why that decommissioning was unavoidable and certain to continue without a specific funding injection. I have added that information as Section 3 and Appendix 1 to the memo that I previously sent for explaining the proposed approach for calculating additionality for rebuilding aging constructed wetland infrastructure. Please see attached and let me know if this provides the information that you were looking for.

Regards,

Brock

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From: Brooks, Jayme (EC) <jayme.brooks@canada.ca>
Sent: 2020, December 17 4:45 PM
To: Eric C Lofroth <eclofroth@gmail.com>; Simons, Brock <Brock.Simons@bchydro.com>; 'Corey Erwin' <Corey.Erwin@gov.bc.ca>; 'Johnson, Marianne FLNR:EX' <Marianne.Johnson@gov.bc.ca>
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BC Hydro

Appendix 13. 2025 Wetland Monitoring Report

Site C Clean Energy Project
Wetland Monitoring Program
2025 Annual Report

DATE: MARCH 31, 2026

PRESENTED TO:

BC Hydro
Site C Environment
333 Dunsmuir Street, 6th floor
Vancouver, BC V6B 5R3
Attention: Brent Matsuda

PRESENTED BY:

EcoLogic Consultants Ltd.
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North Vancouver, BC V7P 3T2
Phone: 604-803-7146

and

Tetra Tech Canada Incorporated
on behalf of Saulteau EBA Environmental Services Joint Venture (SEES JV)
885 Dunsmuir Street, Suite 1000
Vancouver, BC V6C 1N5
Phone: 604-685-0275

EXECUTIVE SUMMARY

BC Hydro developed a Wetland Monitoring Program (the Program) for the Site C Clean Energy Project to address, in part, requirements outlined in the Federal Decision Statement (FDS) condition 11 and Environmental Assessment Certificate (EAC) condition 12:

- ***FDS condition 11.4.1****. Baseline data on the biogeochemical, hydrological and ecological functioning of the wetlands and associated riparian habitat in the area affected by the Designated Project, including: ground and surface water quality and quantity; vegetation cover; biotic structure and diversity; migratory bird abundance, density, diversity and use; species at risk abundance, density, diversity and use; and current use of the wetlands for traditional purposes by Aboriginal people, including the plant and wildlife species that support that use.*

- ***FDS condition 11.4.3****. An approach to monitor and evaluate any changes to baseline conditions, as defined in condition 11.4.1 and identify improvements based on monitoring data.*

- ***EAC condition 12****. The EAC Holder must monitor construction and operation activities that could cause changes in wetland functions.*

The Program consists of two components: baseline wetland monitoring, which is focused on gathering information on the physical, ecological, biogeochemical, and hydrological conditions of wetlands prior to construction activities; and wetland monitoring during construction and operations, which is focused on gathering information to evaluate changes from baseline conditions due to Site C Project activities.

The 2025 field program focused on the construction phase monitoring of wetlands that were sampled in 2020. A total of 20 wetlands were sampled in 2025, with all sites located along the transmission line. Data on the physical, ecological, biogeochemical, and hydrological conditions collected at each of the 2025 wetlands are presented in this report.

The 2025 wetland program marks the start of the operation monitoring which will occur again in 2026 and 2027. After the 2027 monitoring program, all wetlands will have been assessed three times, including the baseline assessments and two and five-year assessment, which should allow for an analysis of change in wetland parameters and a determination of the need to continue monitoring each wetland (i.e., if change is not present and/or not ongoing, then further monitoring is not likely to result in useful additional data). As 2025 was the first year of construction monitoring, no conclusions can be made regarding the impact of Project effects on wetlands.

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ACRONYMS & ABBREVIATIONS

Term	Definition
CC	Coefficient of conservatism
DWM	Detailed Wetland Mapping
EAC	Environmental Assessment Certificate
FDS	Federal Decision Statement
FQI	Floristic Quality Index
the Program	Wetland Monitoring Program
the Project	Site C Clean Energy Project
PAZ	Project activity zone
ROW	Right-of-way
TEM	Terrestrial Ecosystem Mapping

Wetland Type Codes:

Term	Definition
BT	Black spruce-Labrador tea-sphagnum
TS	Tamarack - Sedge
SE	Sedge wetland
WS	Willow sedge wetland

1. INTRODUCTION

1.1 PROJECT CONDITIONS

BC Hydro developed a Baseline and Construction Phase Wetland Monitoring Program (NPS 2020) for the Site C Clean Energy Project (the Project) to address, in part, requirements outlined in the Federal Decision Statement (FDS) condition 11 and Environmental Assessment Certificate (EAC) condition 12.

> ***FDS condition 11.4.1****. Baseline data on the biogeochemical, hydrological and ecological functioning of the wetlands and associated riparian habitat in the area affected by the Designated Project, including: ground and surface water quality and quantity; vegetation cover; biotic structure and diversity; migratory bird abundance, density, diversity and use; species at risk abundance, density, diversity and use; and current use of the wetlands for traditional purposes by Aboriginal people, including the plant and wildlife species that support that use.*
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>
> ***EAC condition 12****. The EAC Holder must monitor construction and operation activities that could cause changes in wetland functions.*

1.2 PROJECT OVERVIEW

The Wetland Monitoring Program (the Program; NPS 2018) consists of two components:

1. Baseline wetland monitoring – gathers information (i.e., biogeochemical, hydrological, and ecological) on wetlands prior to construction activities, including verification of ecosystem mapping and wetland condition.
2. Construction and operations wetland monitoring – gathers information at two and five-year intervals after initiation of construction to evaluate changes from baseline conditions due to Project activities.

The Program is designed to allow for the following:

- Collection of baseline data on the biogeochemical, hydrological, and ecological functioning of the wetlands and associated riparian habitat in the area affected by the Project;
- An evaluation of the change to baseline wetland conditions due to the Project;
- Selection of mitigation measures for loss of wetland areas and functions, including reclamation, improvement, creation, and protection (BC Hydro 2015); and

- Flexibility in the monitoring program to allow for further refinement in the characterization of baseline and affected wetlands, as data become available.

This 2025 annual report focuses on the completion of the construction monitoring phase of the Project, with all of the 20 wetlands targeted for assessment previously sampled using the full BC Hydro Site C Vegetation and Wildlife Wetland Monitoring Program: Baseline and Construction Phase Wetland Monitoring (NPS 2020).

1.3 STUDY AREA

The study area includes three distinct areas within the project activity zone (PAZ) and the downstream area of the dam site:

1. The reservoir footprint (the future inundation zone), which is composed of the Western Reservoir, Middle Reservoir, Eastern Reservoir, Lower Reservoir, and the Dam Site Area;
2. The transmission line, separated into Phase A and Phase B; and
3. The downstream area.

2. METHODS

2.1 SITE SELECTION

The 2025 field program involved monitoring 20 wetlands that were sampled in 2018 and 2020. Sites were selected based on the program sampling design of re-assessing (operation phase wetland monitoring) wetlands every five years (NPS 2020). The wetlands selected for 2025 consisted of four wetland types (Table 2.1-1). All of the targeted 2025 wetlands were located along the transmission line, primarily within the cleared corridor.

Table 2.1-1. Target Number and Type of Construction Phase Wetlands for 2025

Wetland Type	Code	2025 Target
Black spruce-Labrador tea-sphagnum	BT	2
Tamarack - Sedge	TS	3
Sedge wetland	SE	9
Willow sedge wetland	WS	6

2.2 FIELD METHODOLOGY

Field surveys were conducted to collect site-level information for site-level data categories (Table 2.2-1). The surveys used standardized methodologies to collect a wide range of physical and ecological characteristics of each wetland. Any observed changes or disturbances such as vegetation removal, soil disturbance, dust deposition, and alterations to hydrology were also described for each wetland using the condition assessment forms created by NPS (2020).

The following field data were collected through the 2025 field program:

- Field plot data;
- Spatial data of plot locations and wetland delineation;
- Plot photographs;
- Vegetation floristic quality index data;
- Analytical data (laboratory analysis of water quality); and
- Wetland condition assessments.

Comprehensive and detailed methods are provided in the *BC Hydro Site C Wetland Monitoring Program Field Manual; Baseline and Construction Phase* (Appendix D of NPS 2020).

Table 2.2-1. Baseline and Construction Phase Wetland Monitoring Program: Data Categories and Parameters

Category	Parameter	Monitoring Phase [a]	Federal Condition 11.4.1
Site Information	Photo stations	B/C	–
	Site diagram	B/C	–
	Wetland ecosystem classification	B/C	–
Physical Parameters	Wetland delineation	B/C *	–
	Adjacent ecosystems	B/C *	–
	Slope position	B	–
Ecological Parameters	Cover type and percent open water	B/C	Biotic structure, biotic diversity
	Vegetation cover and communities present	B/C	Vegetation cover, biotic structure, biotic diversity
	Successional stage and structural stage	B/C	Biotic structure, biotic diversity
	Incidental wildlife observations	B/C	Biotic structure, biotic diversity
Biogeochemical Parameters	Water quality sampling	B/C *	Groundwater quality, surface water quality
	Soil profiles	B	–
Hydrological Parameters	*Hydrology*	B/C	–
	Water depth	B/C	Surface water quantity
	Inlets/outlets	B/C	–

[a] B = baseline field monitoring; C = construction phase monitoring
* = reduced construction phase monitoring
Italicized parameters indicate key parameters that will be used to define wetland types.
Source: NPS 2020

2.3 Ecosystem Classification and Mapping

The existing Site C ecosystem mapping for the PAZ includes three distinct but related products: Terrestrial Ecosystem Mapping (TEM); broad habitat mapping; and Detailed Wetland Mapping (DWM). The existing ecosystem classification and mapping is based on *A Field Guide for Identification and Interpretation of Ecosystems of the Northeast Portion of the Prince George Forest Region* (DeLong et al., 1990), *Wetlands of British Columbia* (MacKenzie and Moran 2004), and older units created for the Project (2006 to 2012) by regional forest ecologists (Andrusiak and Simpson 2012).

In order to achieve the stated goals of the monitoring program and to satisfy the federal and provincial approval conditions for the Project, it is important that the wetland classification used is structured to accommodate the current provincial classification (i.e., DeLong et al., 2011 and Mackenzie and Moran

2004). Therefore, Table 2.3-1 presents a crosswalk table that uses a "best fit" process to correlate existing PAZ ecosystem classification and current provincial classification system units. The crosswalk table was created by Tetra Tech and refined by EcoLogic for the wetland field program (NPS 2018). All wetlands were classified using the current Site Association descriptions to ensure a consistent mapping product. The older Wetland Types used when mapping the PAZ have been retained in the database as they are used for the wetland compensation program, but future analysis of change over time in the monitored wetlands will use the current provincial site association classification to enable proper comparisons (for instance not comparing impacts between a SE marsh and a SE fen).

Table 2.3-1. Crosswalk of Existing PAZ Ecosystem Classification and Current Provincial Ecosystem Mapping Codes

	Existing PAZ Ecosystem Units		Current Provincial Ecosystem Units	
Wetland Class	Wetland Type (Map Code)	Vegetation Community Description	Site Association	Vegetation Community Description
Bog	BT	Sb – Labrador tea – Sphagnum	Wb03	Black spruce – Lingonberry – Peat-moss
	BT	Assumed Wb05 included in BT	Wb05	Black spruce – Water sedge – Peat-moss
	TS	Tamarack - Sedge	Wb06	Tamarack – Water sedge – Fen moss
	BT	-	Wb08	Black spruce – Soft-leaved sedge – Peat-moss bog
	BT	-	Wb09	Black spruce – Common horsetail – Peat-moss
Fen	SE	Sedge Wetland	Wf00	Fen (unclassified)
	SE	Sedge Wetland	Wf01	Water sedge – Beaked sedge
	-	-	Wf02	Scrub birch – water sedge
Marsh	SE	Sedge Wetland	Wm00	Marsh (unclassified)
	SE	Sedge Wetland	Wm01	Beaked sedge – Water sedge
	SE	Sedge Wetland	Wm02	Swamp horsetail – Beaked Sedge
	SE	Sedge Wetland	Wm03	Awned sedge
	SE	Sedge Wetland	Wm04	Common spike-rush
	SE	Sedge Wetland	Wm05	Cattail
	SE	Sedge Wetland	Wm06	Great bulrush
	SE	Sedge Wetland	Wm15	Bluejoint – Beaked sedge
Swamp	-	-	Ws00	Swamp (unclassified)
	WS	Willow Sedge Wetland	Ws02	Mountain alder – Pink spirea – Sitka sedge
	WS	Willow Sedge Wetland	Ws03 (Ws14)	Bebb's willow – Bluejoint
	WS	Willow Sedge Wetland	Ws04	Drummond's willow – Beaked sedge

Wetland Class	Existing PAZ Ecosystem Units		Current Provincial Ecosystem Units	
	Wetland Type (Map Code)	Vegetation Community Description	Site Association	Vegetation Community Description
	WS	Willow Sedge Wetland	Ws05	MacCalla's willow – Beaker sedge
	WS	Willow Sedge Wetland	Ws06	Sitka willow – Sitka sedge
	-	-	Ws07	Spruce – Common horsetail – Leafy moss
	-	-	Ws15	SwSb – Labrador tea – Glow moss
Open Water	OW	Shallow open water	OW	Shallow Open Water (unclassified)
Floodplain	WH	Willow – Horsetail – Sedge – Riparian Wetland	Fl00	Low bench floodplain (unclassified)
	WH	Willow – Horsetail – Sedge – Riparian Wetland	Fl03	Pacific willow – Red-osier dogwood – Horsetail
	WH	Willow – Horsetail – Sedge – Riparian Wetland	Fl06	Sandbar willow
	-	-	Fm00	Mid bench floodplain (unclassified)
	Fm02 (09)*	ActSw - Red-osier dogwood	Fm02 (112)	Cottonwood – Spruce – Red-osier dogwood

Notes: *Map codes do not exist for the floodplain site associations. The site series associated with the Fm02 changed from 09 to 112 in the updated field guide (DeLong et al., 2011). Wetland Types: TS = tamarack – sedge; BT = black spruce-Labrador tea-sphagnum; SE = sedge wetland; WS = willow sedge wetland; OW = open water; WH = willow – horsetail – sedge – riparian wetland.

2.4 FLORISTIC QUALITY INDEX

2.4.1 Introduction

To supplement the vegetation sampling methods outlined in Section 4.0 of the *BC Hydro Site C Wetland Monitoring Program Field Manual* (NPS 2020), a vegetation monitoring technique was implemented that uses random sample plots to facilitate the calculation of the Floristic Quality Index (FQI) of wetlands. The FQI is a measurement of the quality of wetland vegetation communities and has been found to be a good indicator of plant conditions, habitat quality, and wetland health. The FQI was developed from a 2013 University of Alberta study titled the *Floristic Quality Assessment for Marshes in Alberta's Northern Prairie and Boreal Regions* (Wilson et al., 2013). Iterations of the FQI have been used as part of wetland monitoring protocols across Canada and the United States. FQI has been intensively researched and is now being used as an indicator across North America because it can be adapted to a region's unique vegetation assemblages (Washington 1984; Rooney and Rogers 2002; Bourdaghs et al., 2006).

Each wetland vegetation species identified within a wetland is assigned a coefficient of conservatism (CC) value; the CC value for each species is based on an average value between 0-10 that is assigned by a group of expert botanists. The CC value is an indicator of a species' tolerance to disturbance and specificity to a particular habitat type (e.g., species adapted to disturbed areas have a low CC value, whereas species with

specific habitat requirements and are not tolerant of disturbance have higher CC values; Cretini and Steyer 2011). The CC values used to analyze the 2022 wetland data were obtained from a list of CC values compiled by the BC Wildlife Federation (2018). The CC values used are wetland specific and based on the plant communities found in British Columbia, east of the Cascade Mountains.

In general, the following categories and definitions were used for the CC values:

- **0** – non-native species and ruderal species growing on waste ground;
- **1–3** – species commonly found in a wide variety of conditions with a high tolerance to disturbance;
- **4–6** – species usually found within a specific plant community, but tolerant of moderate disturbance;
- **7–8** – species found in advanced stages of succession that tolerate minor disturbance; and
- **9–10** – species with very low tolerance to disturbance.

The FQI equation shown below was used to calculate FQI scores. The equation is unbiased by species richness and provides a measurement of wetland health:

$$\mathbf{FQI = Mean\ CC_N\ /\ 10\ (\sqrt{N}\ /\ \sqrt{S})\ *\ 100}$$

Where:
CC_N = Coefficient of Conservatism for all species
N = Number of native species
S = Total number of species

The FQI results for each wetland are compared across monitoring years to highlight consistencies and/or differences in the datasets, and ultimately to identify trends in wetland health over time.

2.4.2 FQI Standards and Field Protocols

The following standards and field protocols were used for vegetation FQI sampling:

- The standard seven-letter code naming system established for British Columbia (BC MOE and MOF 2010) was used for recording observed species. Naming conventions used for vegetation species were from the British Columbia Species and Ecosystem Explorer (BC CDC 2025);
- Floristic Quality Index plots were established and surveyed within each wetland being monitored. Three pairs of quadrats (six quadrats in total) were deployed randomly throughout each wetland. A power analysis conducted by Wilson et al., (2013) showed that six quadrats were sufficient to detect differences in species richness between monitored wetlands within the same type or class;
- Each wetland is broadly divided into thirds and one pair of quadrats is established within each of the three sampling areas. The quadrats are tossed in a randomly selected cardinal direction to add randomness to the location;
- Quadrat pairs were positioned directly beside each other;

- Each quadrat measures one square meter. Quadrats were measured in the field with a square PVC tube quadrat measuring 1 m in length and width;
- Quadrat data were recorded on standard FQI field sheets using the standard naming convention established for the Wetland Monitoring Program;
- Within each of the quadrats, all herbaceous, shrub, and tree species and their percent cover were recorded. Percent cover estimations included overlapping vegetation and therefore the total percent cover could be greater than 100%. For example, if an overhead shrub species covered 100% of the quadrat, the percent cover of herbaceous species present in the understory were still recorded;
- Percent cover of live vegetation was estimated for each species present using the recording increment vegetation cover method shown in Table 2.4-1 and from the comparison charts for estimation of foliage cover from the 2010 Field Manual for Describing Terrestrial Ecosystems (BC MOE and MOF 2010) whereby percent cover is recorded in increasing increments based on the cover range (e.g. 0.1% cover for a single plant, but to the nearest 10% for a species that fell within the 30-100% range); and
- Photos of each quadrat were taken to further document the wetland vegetation community being monitored. Photos were taken using the Solocator Application (Civi Corp Pty Limited 2025) for iPhones, which records the cardinal direction the photo was taken in and the UTM location of the photo.

Table 2.4-1. Increments used for Recording Vegetation Cover for the Wetland FQI Quadrats as Adapted from the Ecological Land Survey Site Description Manual (ASRD 2003)

Cover Range	Recording Increment (%)	Examples (%)
A single plant	Exactly 0.1	0.1
Several plants	Exactly 0.5	0.5
1-10%	To the nearest 1	1, 2, 3, 5, 8
10-30%	To the nearest 5	10, 15, 25
30-100%	To the nearest 10	30, 40, 50, 60, 70, 80, 90

The wetland indicator status for each species was obtained from the United States Department of Agriculture's (USDA 2025) Natural Resource Conservation Service (NRCS) Plants Database and is described below in Table 2.4-2. When available, the Alaska wetland region was used. In the event that the Alaska status was not provided, the wetland status for the Great Plains region was used as a substitute.

Table 2.4-2. Wetland Indicator Status Codes and Descriptions (Adapted from USDA 2025)

Indicator Code	Indicator Status	Description
OBL	Obligate Wetland	Almost always occur in wetlands
FACW	Facultative Wetland	Usually occur in wetlands, but may occur in non-wetlands
FAC	Facultative	Occur in wetlands and non-wetlands

FACU	Facultative Upland	Usually occur in non-wetlands, but may occur in wetlands
UPL	Obligate Upland	Almost never occur in wetlands

3. RESULTS

3.1 SUMMARY OF 2025 FIELD SURVEY EFFORT

Field surveys were completed from August 15-18, 2025, along the transmission line. A total of 20 wetlands were sampled, including all of the targeted wetlands as per the sampling plan (Table 3.1-1; Figure 3.1-1).

Table 3.1-1. Summary of Wetlands Sampled in 2025

Plot	Wetland Class	Site Association	Wetland Type*	Last Sample Date
WL020	Bog	Wb06	TS	2020
WL021	Fen	Wf02	SE	2020
WL100	Swamp	Ws03	WS	2020
WL101	Marsh	Wm03	SE	2020
WL102	Fen	Wf02	SE	2020
WL103	Marsh	Wm01	SE	2020
WL105	Marsh	Wm01	SE	2020
WL106	Swamp	Ws14	WS	2020
WL107	Swamp	Ws05	WS	2020
WL108	Swamp	Ws14	WS	2020
WL109	Marsh	Wm05	SE	2020
WL110	Marsh	Wm03	SE	2020
WL111	Marsh	Wm01	SE	2020
WL112	Marsh	Wm05	SE	2020
WL113	Bog	Wb06	TS	2020
WL114	Bog	Wb05	BT	2020
WL115	Bog	Wb06	TS	2020
WL116	Swamp	Ws07	WS	2020
WL117	Swamp	Ws07	WS	2020
WL118	Bog	Wb03	BT	2020

*Wetland Types: TS = tamarack – sedge; BT = black spruce-Labrador tea-sphagnum; SE = sedge wetland; WS = willow sedge wetland

Site C Wetland Monitoring

Location of 2025 Sample Sites

Legend

- 2025 Wetland Sample Site
- Community
- Wetlands
- Transmission Line
- Highway

0 2 4 6 8 km

1:270,000

N

Date: 2025-12-10
Map Number: BCHWL-001
Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983

EcoLogic consultants

3.2 WETLAND SUMMARIES

3.2.1 Bog Overview

Five bogs were sampled in 2025, comprising two wetland types (BT and TS) and three site associations (Table 3.2-1). Three of the bogs (WL020, WL115, WL118) are located in the transmission line right-of-way (ROW) are considered to be not functional as they have been partially or entirely modified by clearing and/or grubbing from construction activities, and some were modified by construction roads. The two bogs (WL113 and WL114) that occur adjacent to the ROW are properly functioning with conditions largely unchanged since 2018. Plates 3.2-1 to 3.2-15 provide comparisons of each wetland from 2018, 2020 and 2025 to illustrate changes (or lack thereof) in vegetation structure and disturbance.

No water samples were obtained from the bogs in 2025 due to a lack of surface water. Only one of these sites had sufficient water to obtain a sample in 2020 (WL114).

Table 3.2-1. Summary of Bogs Sampled in 2025

Plot	Site Association	Wetland Type	2018 Structural Stage	2020 Structural Stage	2025 Structural Stage	Condition Comments
WL020	Wb06	TS	3a	2b	3a	Not functional. Cleared and grubbed in 2018 and 2020, the wetland was starting to recover in 2025 with increase total plant cover and shrub cover. The wetland is also bisected by a construction road.
WL113	Wb06	TS	3b*	3b*	3b*	Properly functioning. This wetland sample plot is located adjacent to the ROW. It was not affected by powerline construction; however, it is likely that a portion of the wetland was modified by the old transmission line and therefore not included in the mapped polygon.
WL114	Wb05	BT	7*	7*	7*	Properly functioning. This wetland sample plot is located adjacent to the ROW. It was not affected by powerline construction; however, it is likely that a portion of the wetland was modified by the old transmission line and therefore not included in the mapped polygon.
WL115	Wb06	TS	3b*	3a	3a	Not functional. The portion of the wetlands within the ROW was cleared and grubbed for construction. In 2025 the total shrub cover continues to increase, but only 1% tamarack was recorded which may indicate that modified site conditions are more swamp-like than bog-like.

Plot	Site Association	Wetland Type	2018 Structural Stage	2020 Structural Stage	2025 Structural Stage	Condition Comments
WL118	Wb03	BT	3b*	3a	3a	Not functional. Cleared in 2018, the wetland was starting to recover in 2025 with significant growth of conifers.

Notes: *Structural stage 3d is more appropriate to described tall stunted trees, but the code was not available in 2018, so the original codes have been retained. Wetland Types - TS = tamarack – sedge; BT = black spruce-Labrador tea-sphagnum; See Appendix A for structural stage and successional status descriptions.

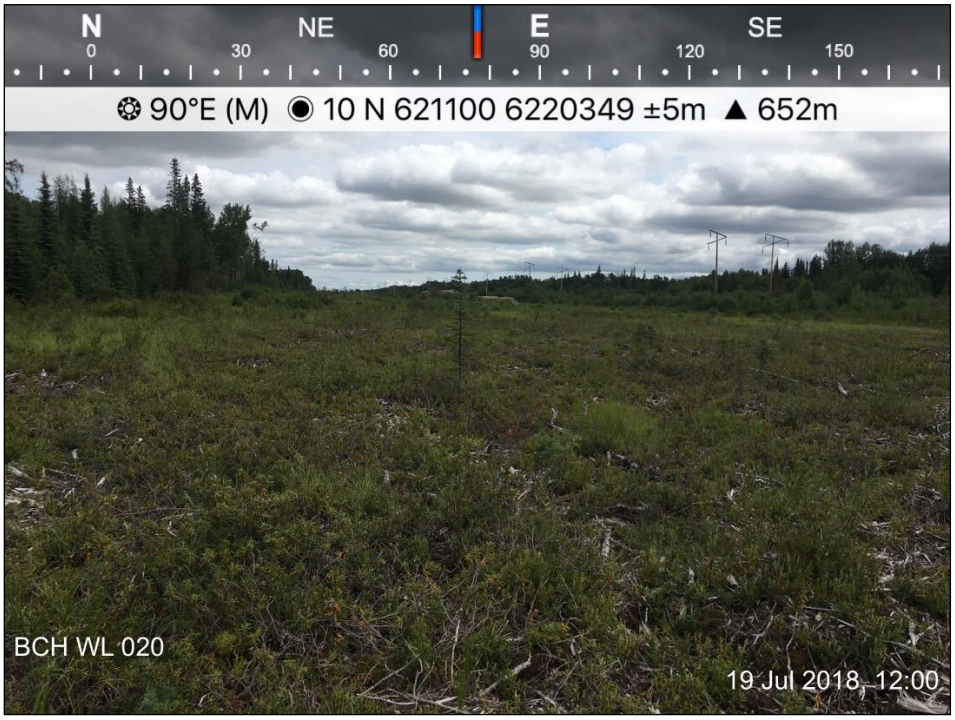

Plate 3.2-1 Wb06 Tamarack – Water sedge – Fen moss bog at wetland WL020 along the transmission line in 2018.

Plate 3.2-2. Wb06 Tamarack – Water sedge – Fen moss bog at wetland WL020 along the transmission line in 2020.

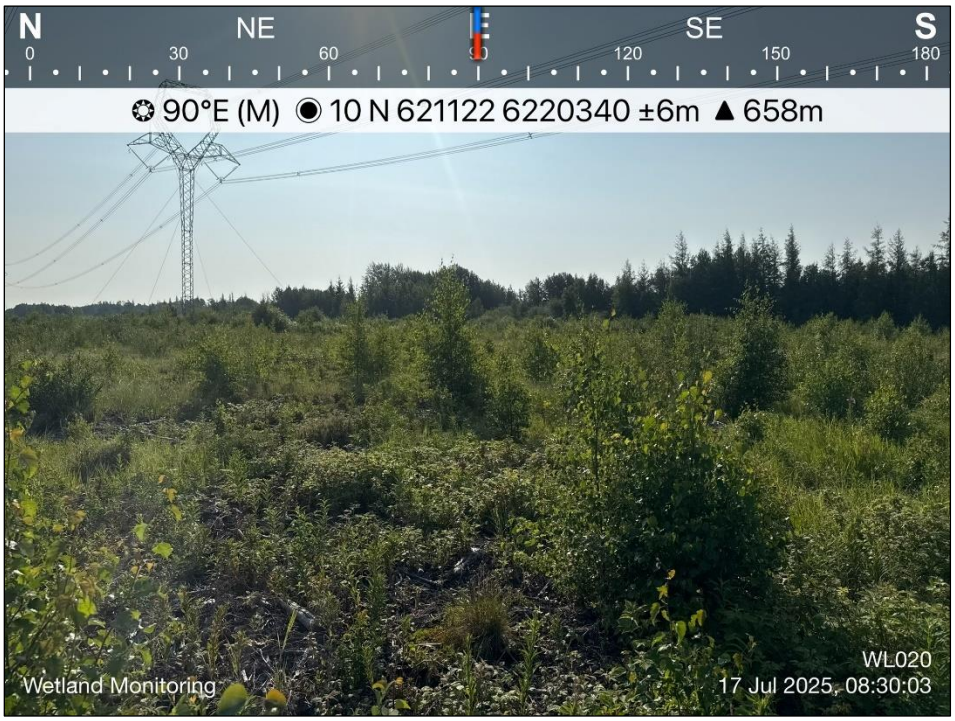

Plate 3.2-3. Wb06 Tamarack – Water sedge – Fen moss bog at wetland WL020 along the transmission line in 2025.

Plate 3.2-4. Wb06 Tamarack – Water sedge – Fen moss bog at wetland WL113 along the transmission line in 2018.

Plate 3.2-5. Wb06 Tamarack – Water sedge – Fen moss bog at wetland WL113 along the transmission line in 2020.

Plate 3.2-6. Wb06 Tamarack – Water sedge – Fen moss bog at wetland WL113 along the transmission line in 2025.

Plate 3.2-7. Wb05 Black spruce – Water sedge – Peat-moss bog at wetland WL113 along the transmission line in 2018.

Plate 3.2-8. Wb05 Black spruce – Water sedge – Peat-moss bog at wetland WL113 along the transmission line in 2020.

Plate 3.2-9. Wb05 Black spruce – Water sedge – Peat-moss bog at wetland WL113 along the transmission line in 2025.

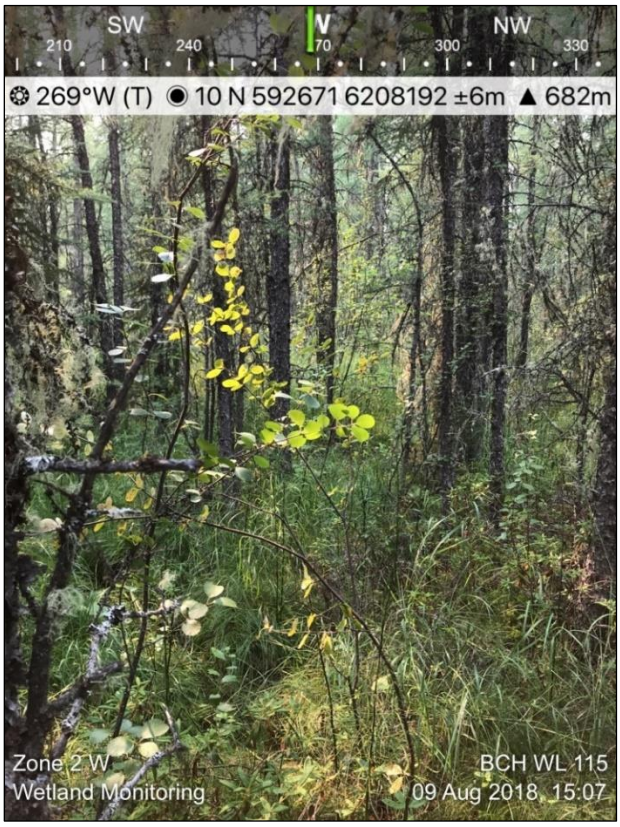

Plate 3.2-10. Wb06 Tamarack – Water sedge – Fen moss bog at wetland WL115 along the transmission line in 2018.

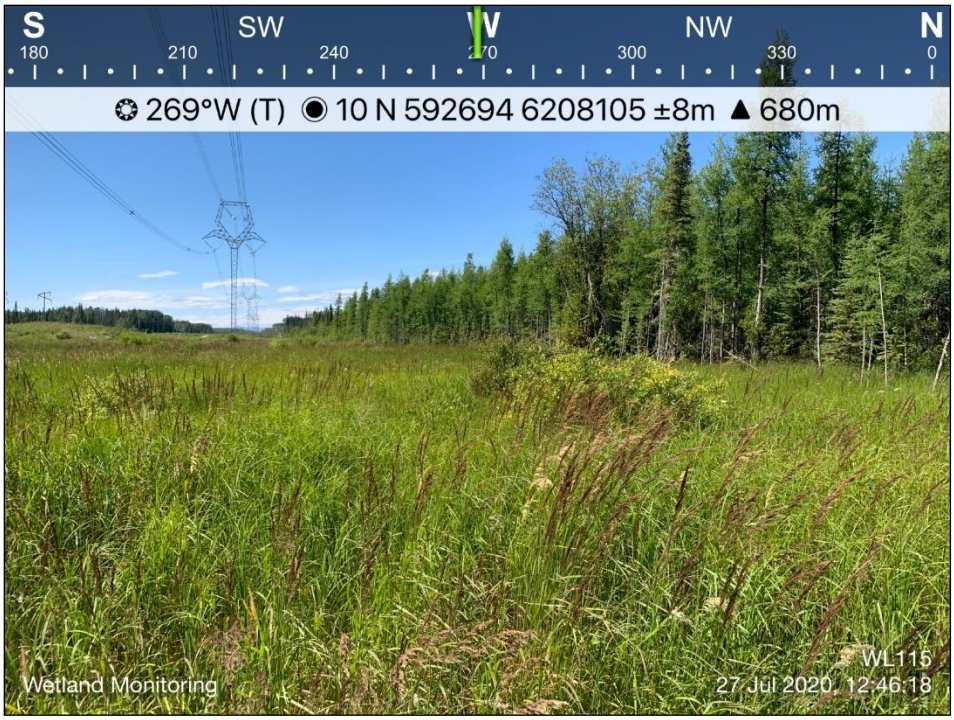

Plate 3.2-11. Wb06 Tamarack – Water sedge – Fen moss bog at wetland WL115 along the transmission line in 2020.

Plate 3.2-12. Wb06 Tamarack – Water sedge – Fen moss bog at wetland WL115 along the transmission line in 2025.

Plate 3.2-13. Wb03 Black spruce – Lingonberry – Peat-moss bog at wetland WL118 along the transmission line in 2018.

Plate 3.2-14. Wb03 Black spruce – Lingonberry – Peat-moss bog at wetland WL118 along the transmission line in 2020.

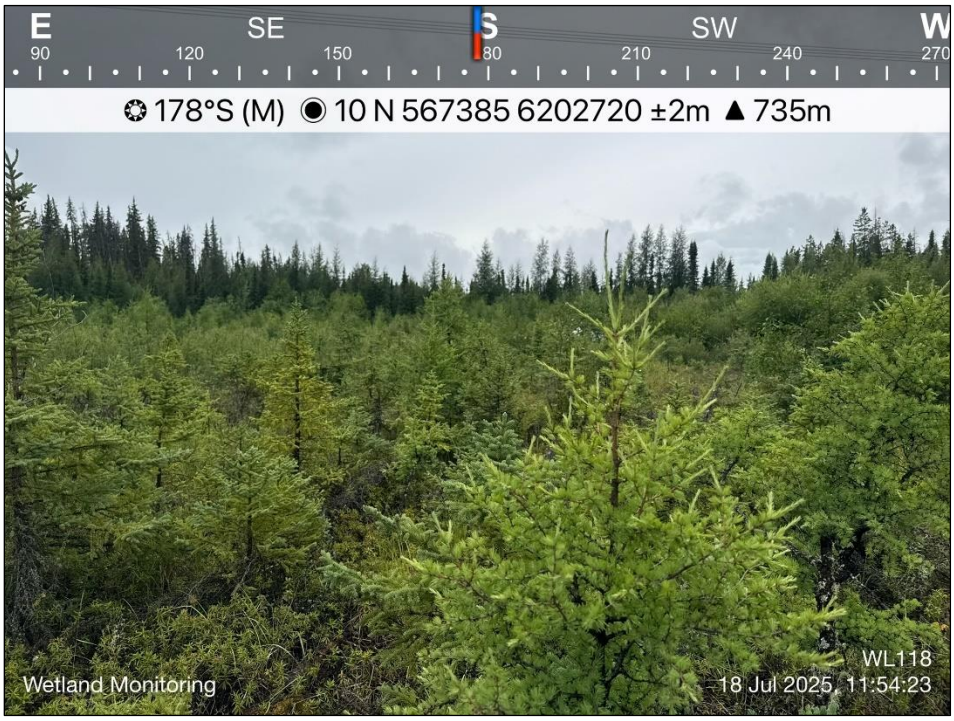

Plate 3.2-15. Wb03 Black spruce – Lingonberry – Peat-moss bog at wetland WL118 along the transmission line in 2025.

3.2.2 Fen Overview

Two SE fens were sampled in 2025 (Table 3.2-2), both representing Wf02 site associations. Both wetlands are considered to be partially functional as they were cleared in 2018 for construction activities, and both have modified surface and/or groundwater regimes from construction roads, a gas pipeline, or beaver activity. The two fens are starting to regenerate post-disturbance, but the current vegetation communities do not contain the expected composition of Wf02 fens. Photos 3.2-16 to 3.2-21 provide comparisons of each wetland from 2018, 2020 and 2025 to illustrate changes (or lack thereof) in vegetation structure and disturbance.

No water samples were collected in 2025 from the two fens due to a lack of surface water.

Table 3.2-2. Summary of Fens Sampled in 2025

Plot	Site Association	Wetland Type	2018 Structural Stage	2020 Structural Stage	2025 Structural Stage	Condition Comments
WL021	Wf02	SE	3a	3a	3a	Partially functional. Cleared in 2018, and construction road bisects wetland. Shrubs are starting to regrow, including tamarack, indicting that this wetland may have had a bog component before the ROW was cleared.
WL102	Wf02	SE	3a	3a	3a	Partially functional. Cleared and grubbed in 2018. Hydrology modified by beaver activity and a gas pipeline. Shrubs starting to regrow, however more willow than scrub birch indicating that the site may not return to Wf02 conditions.

Notes: Wetland Type - SE = sedge wetland; See Appendix A for structural stage and successional status descriptions.

Plate 3.2-16. Wf02 Scrub birch – water sedge fen at WL021 along the transmission line in 2018 (plot number was incorrectly labelled in 2018)

Plate 3.2-17. Wf02 Scrub birch – water sedge fen at WL021 along the transmission line in 2020.

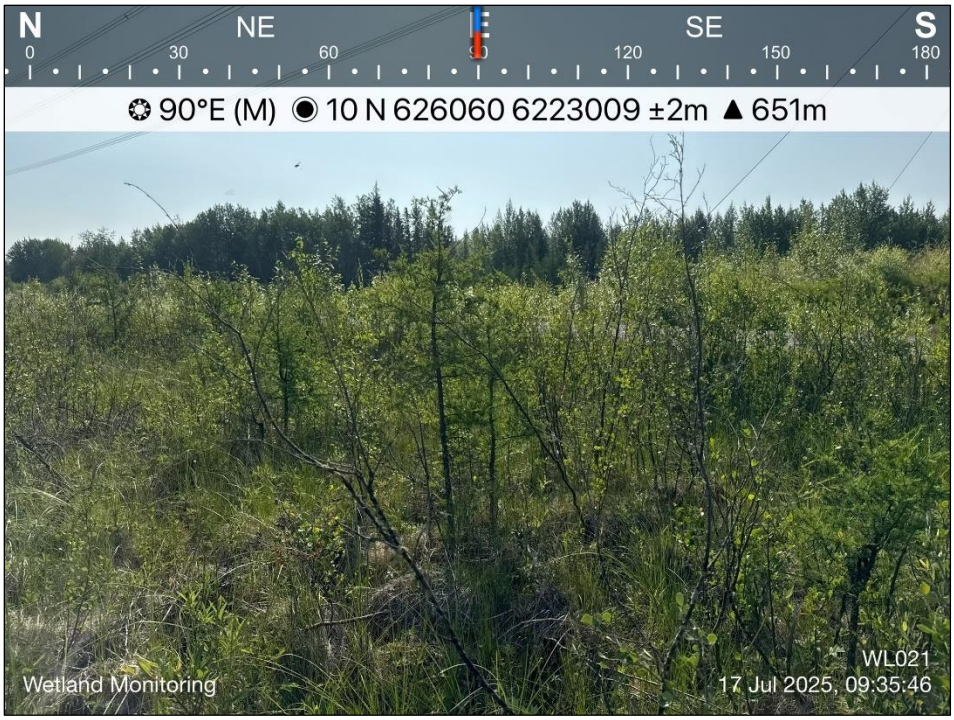

Plate 3.2-18. Wf02 Scrub birch – water sedge fen at WL021 along the transmission line in 2025.

Plate 3.2-19. Wf02 Scrub birch – water sedge fen at WL102 along the transmission line in 2018.

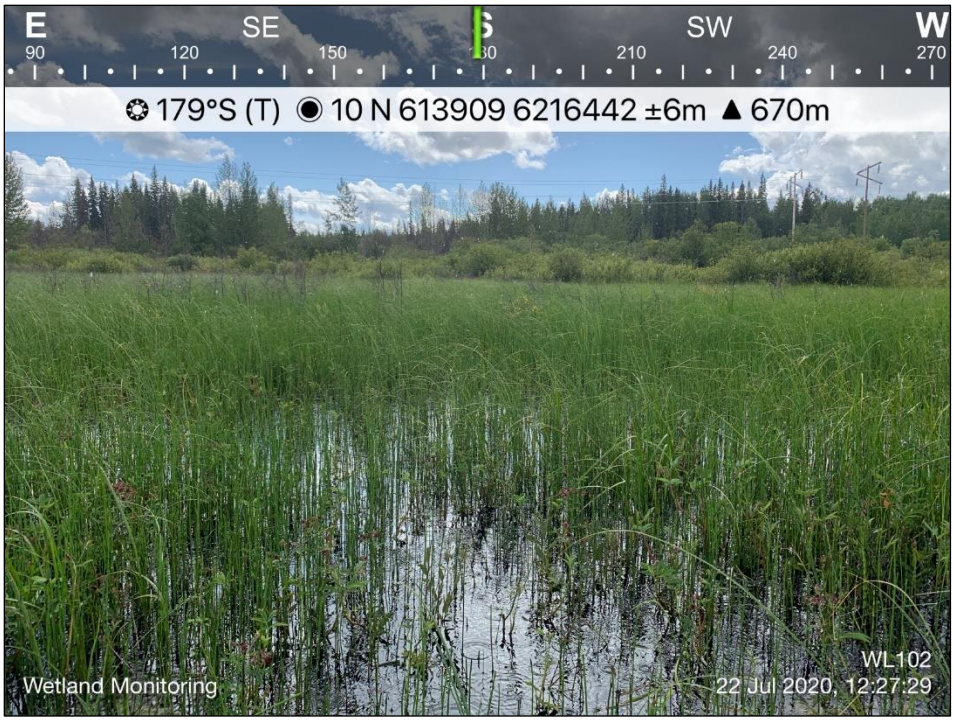

Plate 3.2-20. Wf02 Scrub birch – water sedge fen at WL102 along the transmission line in 2020.

Plate 3.2-21. Wf02 Scrub birch – water sedge fen at WL102 along the transmission line in 2025.

3.2.3 Marsh Overview

Seven marshes were sampled in 2025 (Table 3.2-3) along the transmission line, comprising one wetland type (SE) and three site associations. Only one wetland (WL101) is considered to be properly functioning while the other six are partially functioning. Multiple wetlands appear to be undergoing a drying trend indicated by a lack of surface water, increased shrub cover, and changes in vegetation composition. Surface water conditions have been modified at two wetlands (WL103 and WL105) from a gas pipeline and beaver activity. Photos 3.2-22 to 3.2-42 provide comparisons of each wetland from 2018, 2020 and 2025 to illustrate changes (or lack thereof) in vegetation structure and disturbance.

Table 3.2-3. Summary of Marshes Sampled in 2025

Plot	Site Association	Wetland Type	2018 Structural Stage	2020 Structural Stage	2025 Structural Stage	Condition Comments
WL101	Wm03	SE	2b	2b	2b	Functional. Stable wetland with no increase in shrub cover or significant change in vegetation composition.
WL103	Wm01	SE	2b	2b	2b	Partially functional. Water levels modified by beavers, with shrubs growth observed 2020 mostly dead in 2025.
WL105	Wm01	SE	2b	2b	2b	Partially functional. Hydrology modified by pipeline, and some clearing and grubbing from powerline construction. Vegetation community changing, with increase in horsetail cover.
WL109	Wm05	SE	2b	2b	2b	Partially functional. Appears to be in a drying trend, with a reduction in cattail cover and increase in grass cover.
WL110	Wm03	SE	2b	2b	2b	Partially functional. Appears to be in a drying trend, with an increase in shrub cover.
WL111	Wm01	SE	2b	2b	3b	Partially functional. Wetland appears to be on a drying trend and shrub cover is increasing (from 0% in 2018 to 20% in 2025).
WL112	Wm05	SE	2b	2b	2b	Partially functional. Large decline in cattail cover and increase in herb diversity suggests a drying trend in wetland.

Notes: Wetland Type - SE = sedge wetland; See Appendix A for structural stage and successional status descriptions.

Only one marsh (WL103) contained surface water in 2025, therefore only one water sample was collected. Table 3.2-4 provides a comparison of the laboratory and field water quality for 2018, 2020 and 2025 for WL103.

Table 3.2-4. Comparison of Water Quality Data for WL103 for 2018, 2020, and 2025

Parameter	Units	2018	2020	2025
Laboratory Analysis				
pH	pH Units	-	7.76	8.17
Electrical Conductivity (EC)	µS/cm	-	203	318
Total Dissolved Solids (TDS)	µg/L	240,000	-	<3,000
Total Suspended Solids (TSS)	µg/L	98,800	114,000	-
Alkalinity (total as $CaCO_3$)	µg/L	150,000	112,000	183,000
Phosphorus - Total	µg/L	266	564	50
Total Kjeldahl Nitrogen (TKN)	ug/L	3,500	3170	1,330
Field Measurements				
Field Turbidity	NTU	99.2	5.68	0.49
Field Temperature	°C	19.5	20.3	22.1
Field Dissolved Oxygen	mg/L	3.99	0.29	10.6
Field Conductivity	µS/cm	226	521	289.9
Field pH	pH Units	7.76	7.3	8.4

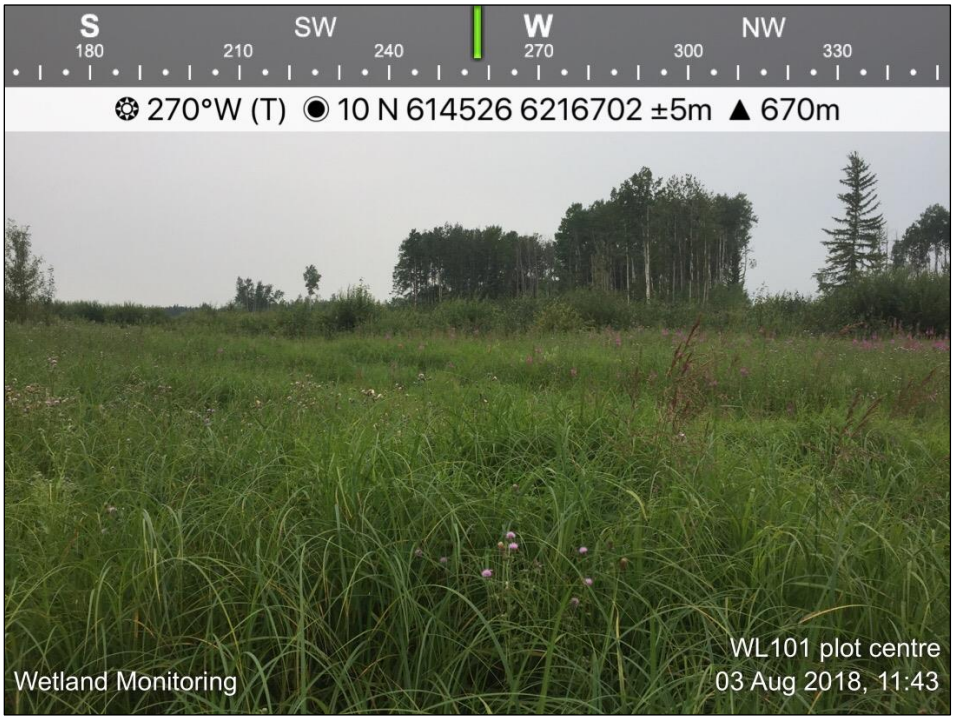

Plate 3.2-22. Wm03 Awned sedge marsh at WL101 along the transmission line in 2018.

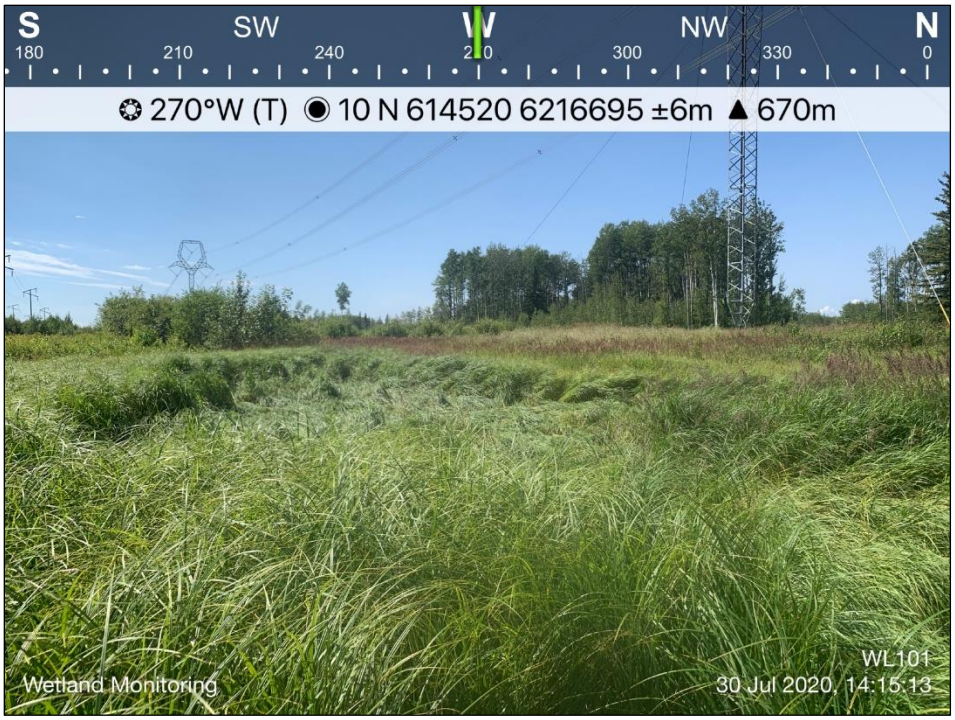

Plate 3.2-23. Wm03 Awned sedge marsh at WL101 along the transmission line in 2020.

Plate 3.2-24. Wm03 Awned sedge marsh at WL101 along the transmission line in 2025.

Plate 3.2-25. Wm01 Beaked sedge - Water sedge marsh at WL103 along the transmission line in 2018.

Plate 3.2-26. Wm01 Beaked sedge - Water sedge marsh at WL103 along the transmission line in 2020.

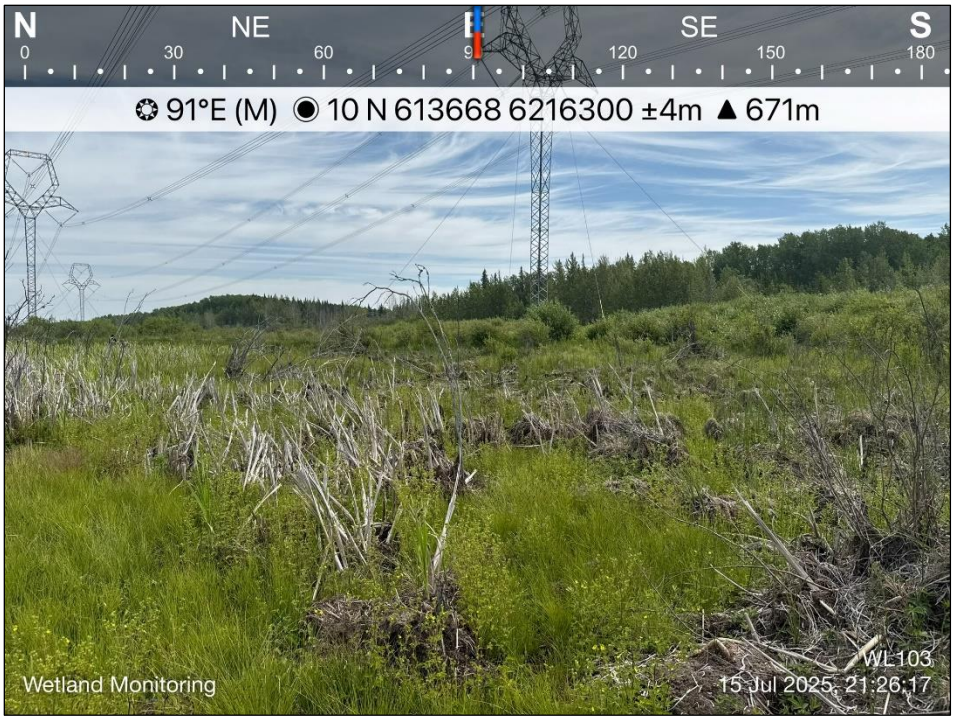

Plate 3.2-27. Wm01 Beaked sedge - Water sedge marsh at WL103 along the transmission line in 2025.

Plate 3.2-28. Wm01 Beaked sedge - Water sedge marsh at WL105 along the transmission line in 2018.

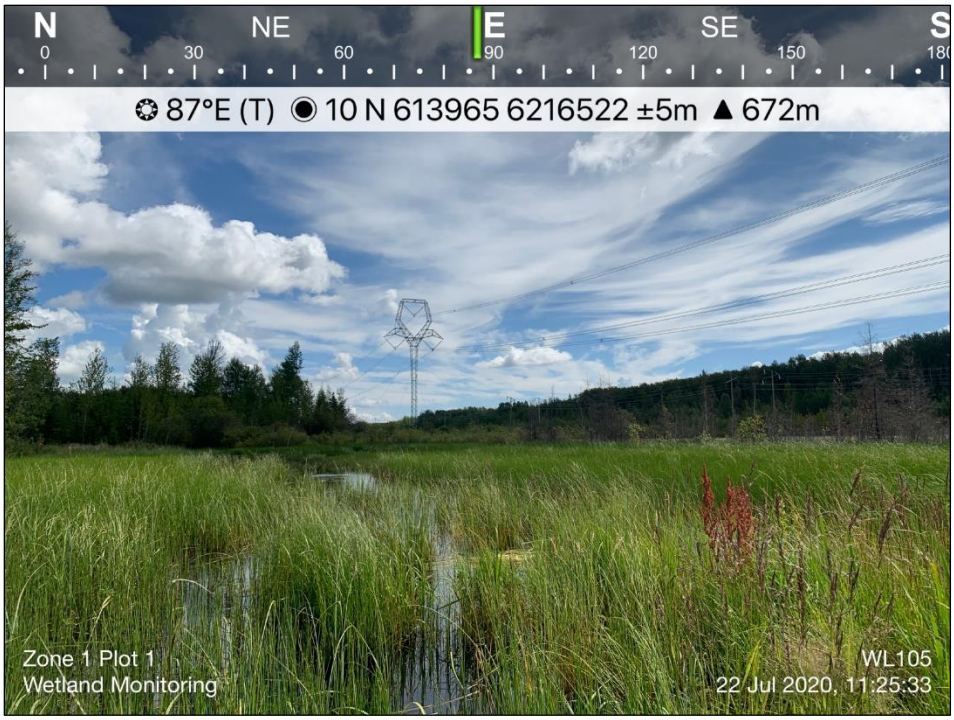

Plate 3.2-29. Wm01 Beaked sedge - Water sedge marsh at WL105 along the transmission line in 2020.

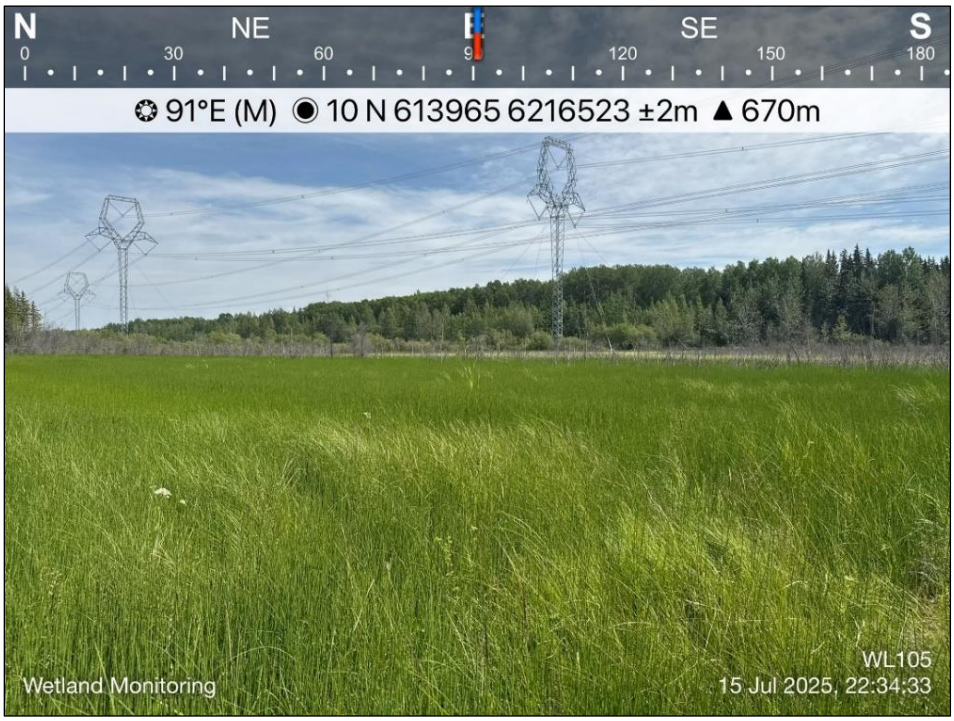

Plate 3.2-30. Wm01 Beaked sedge - Water sedge marsh at WL105 along the transmission line in 2025.

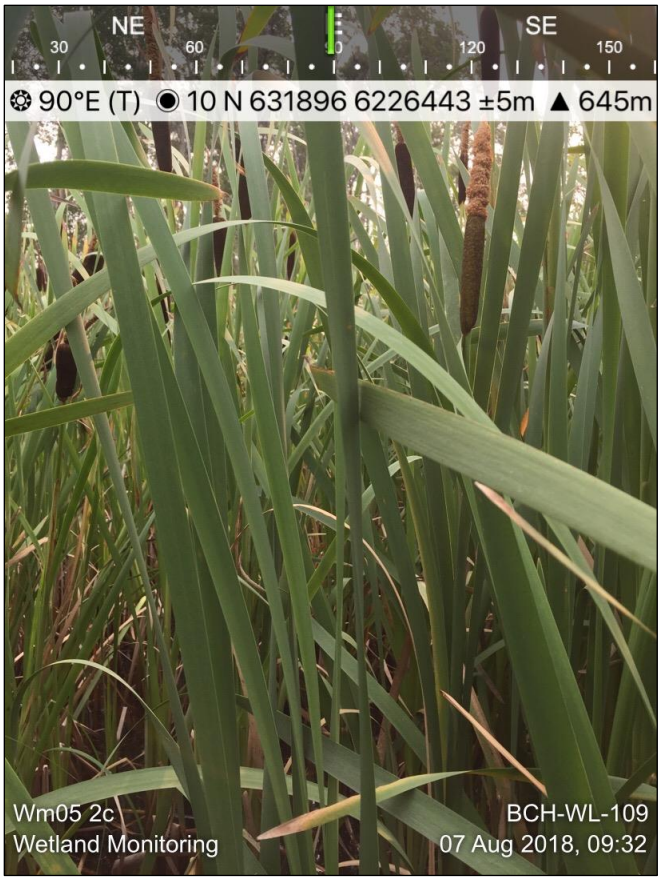

Plate 3.2-31. Wm05 Cattail marsh at WL109 along the transmission line in 2018.

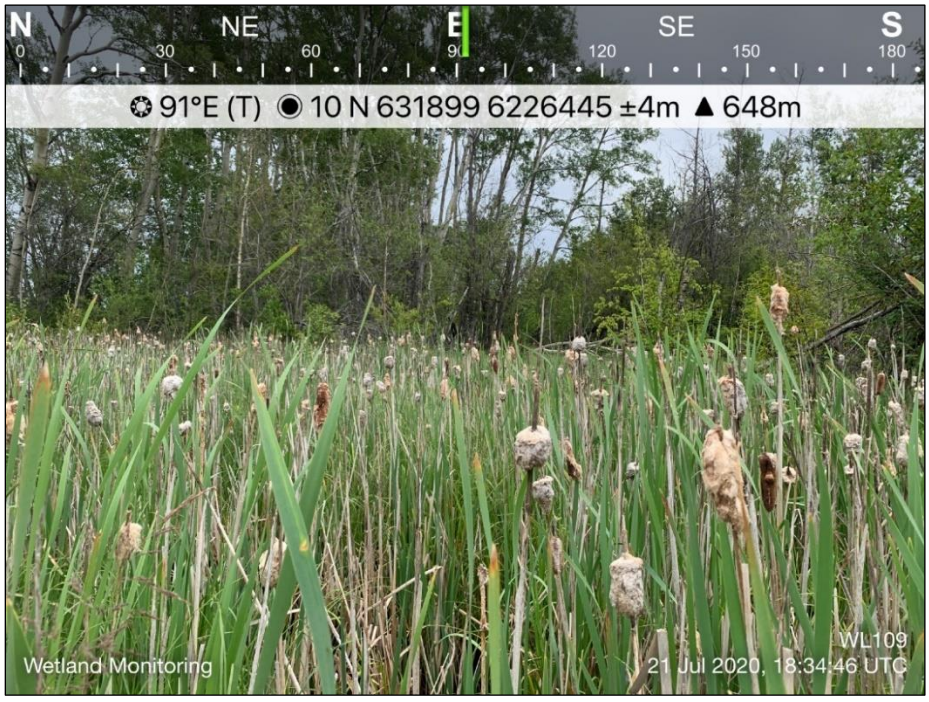

Plate 3.2-32. Wm05 Cattail marsh at WL109 along the transmission line in 2020.

Plate 3.2-33. Wm05 Cattail marsh at WL109 along the transmission line in 2025.

Plate 3.2-34. Wm03 Awned sedge marsh at WL110 along the transmission line in 2018.

Plate 3.2-35. Wm03 Awned sedge marsh at WL110 along the transmission line in 2020.

Plate 3.2-36. Wm03 Awned sedge marsh at WL110 along the transmission line in 2025.

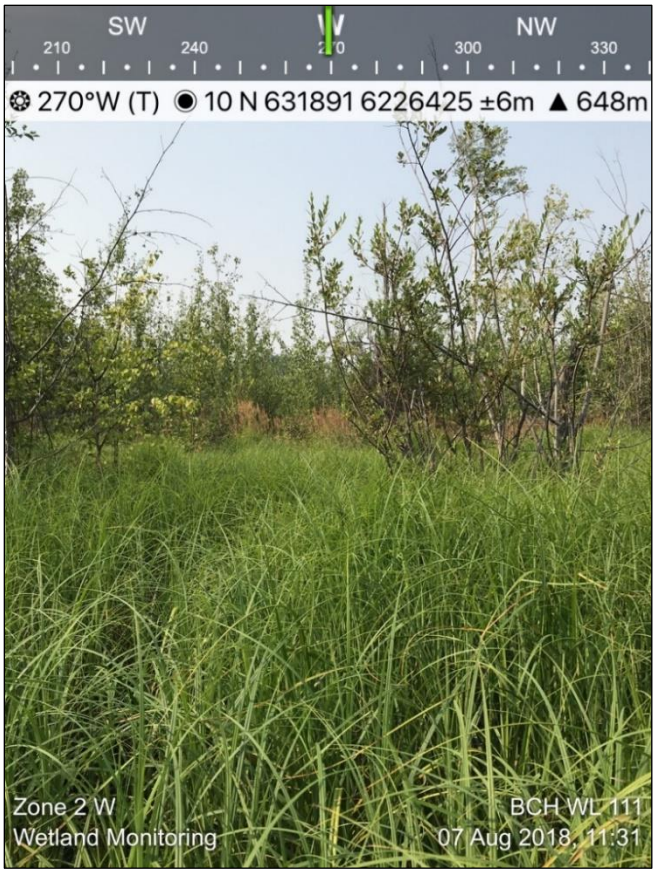

Plate 3.2-37. Wm01 Beaked sedge - Water sedge marsh at WL111 along the transmission line in 2018.

Plate 3.2-38. Wm01 Beaked sedge - Water sedge marsh at WL111 along the transmission line in 2020.

Plate 3.2-39. Wm01 Beaked sedge - Water sedge marsh at WL111 along the transmission line in 2025.

Plate 3.2-40. Wm05 Cattail marsh at WL112 along the transmission line in 2018.

Plate 3.2-41. Wm05 Cattail marsh at WL112 along the transmission line in 2020.

Plate 3.2-42. Wm05 Cattail marsh at WL112 along the transmission line in 2025.

3.2.4 Swamp Overview

Six swamps (WS wetland type) were sampled in 2025, comprising three site associations (Table 3.2-5). One swamp (WL100) was considered properly functioning with little change observed since the 2018 and 2020 assessments. Three swamps (WL106, WL107, and WL108) were found to be partially functional due to vegetation clearing in 2018 or 2020 with some regeneration occurring. Two swamps (WL116 and WL117) were considered to be not functional as they were treed wetlands that were cleared and grubbed that have limited conifer regeneration. Photos 3.2-43 to 3.2-60 provide comparisons of each wetland from 2018, 2020 and 2025 to illustrate changes (or lack thereof) in vegetation structure and disturbance.

Table 3.2-5. Summary of Swamps Sampled in 2025

Plot	Site Association	Wetland Type	2018 Structural Stage	2020 Structural Stage	2025 Structural Stage	Condition Comments
WL100	Ws03	WS	3b	3b	3b	Functional. Wetland appears to be stable with little change since 2018.
WL106	Ws14	WS	3a	3b	3a	Partially functional. Extensive shrub clearing since 2020.
WL107	Ws05	WS	3a	3b	3a	Partially functional. Partial shrub clearing since 2020.
WL108	Ws14	WS	3b	2b	3b	Partially functional. Extensive shrub clearing from 2018 to 2020 has partially regenerated in 2025.
WL116	Ws07	WS	5	2b	3b	Not functional. Wetland cleared and grubbed. Increased shrub cover since 2020, but limited conifer regeneration and vegetation composition does not reflect Ws07 community.
WL117	Ws07	WS	5	1	3a	Not functional. Wetland cleared, grubbed and bisected by powerline construction road. Significant vegetation growth since 2020, but composition does not reflect Ws07 community.

Notes: Wetland Type - WS = willow sedge wetland; See Appendix A for structural stage and successional status descriptions.

As the majority of the swamps were dry in 2025, only one water sample was collected from WL106. Table 3.2-6 provides a comparison of the laboratory and field water quality for 2018, 2020 and 2025 for WL106.

Table 3.2-6. Comparison of Water Quality Data for WL106 for 2018, 2020, and 2025

Parameter	Units	2018	2020	2025
Laboratory Analysis				
pH	pH Units	-	7.77	7.76
Electrical Conductivity (EC)	µS/cm	-	488	542

Parameter	Units	2018	2020	2025
Total Dissolved Solids (TDS)	µg/L	468,000	-	16,900
Total Suspended Solids (TSS)	µg/L	327,000	190,000	-
Alkalinity (total as CaCO3)	µg/L	206,000	218,000	160,000
Phosphorus - Total	µg/L	1,320	9330	1360
Total Kjeldahl Nitrogen (TKN)	ug/L	4,460	16,200	6,430
Field Measurements				
Field Turbidity	NTU	17.1	10.47	4.66
Field Temperature	^{o}C	16.7	21.4	16.2
Field Dissolved Oxygen	mg/L	1.05	1.3	2.5
Field Conductivity	µS/cm	576	613	442.2
Field pH	pH Units	7.01	7.19	7.21

Plate 3.2-43. Ws03 Bebb's willow – Bluejoint swamp at WL100 along the transmission line in 2018.

Plate 3.2-44. Ws03 Bebb's willow – Bluejoint swamp at WL100 along the transmission line in 2020.

Plate 3.2-45. Ws03 Bebb's willow – Bluejoint swamp at WL100 along the transmission line in 2025.

Plate 3.2-46. Ws14 Bebb's willow – Bluejoint swamp at WL106 along the transmission line in 2018.

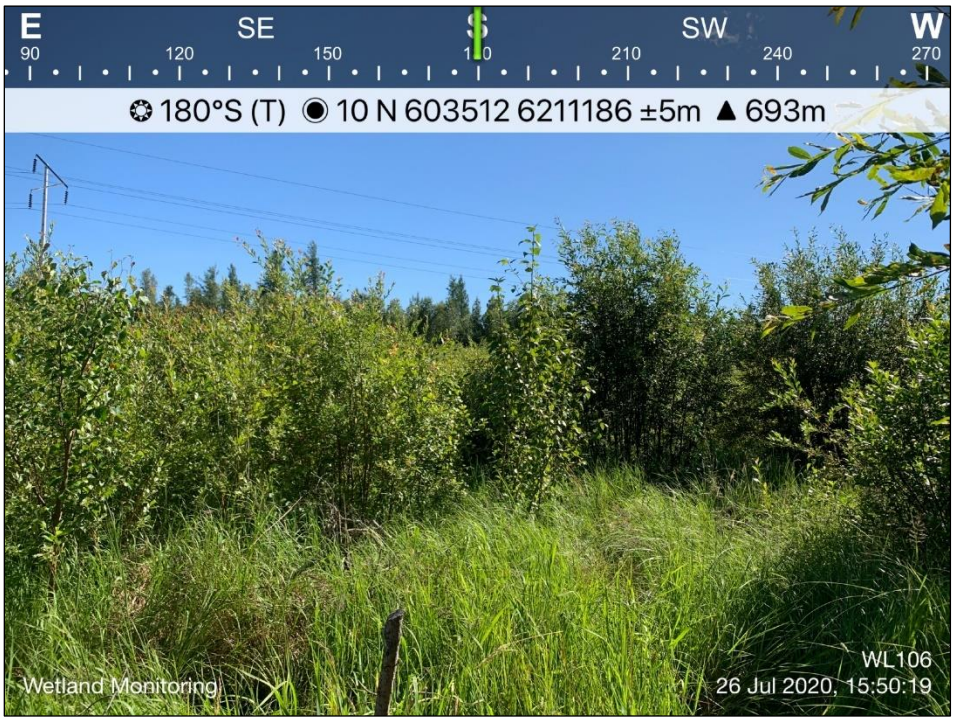

Plate 3.2-47. Ws14 Bebb's willow – Bluejoint swamp at WL106 along the transmission line in 2020.

Plate 3.2-48. Ws14 Bebb's willow – Bluejoint swamp at WL106 along the transmission line in 2025.

Plate 3.2-49. Ws05 MacCalla's willow - Beaked sedge swamp at WL107 along the transmission line in 2018.

Plate 3.2-50. Ws05 MacCalla's willow - Beaked sedge swamp at WL107 along the transmission line in 2020.

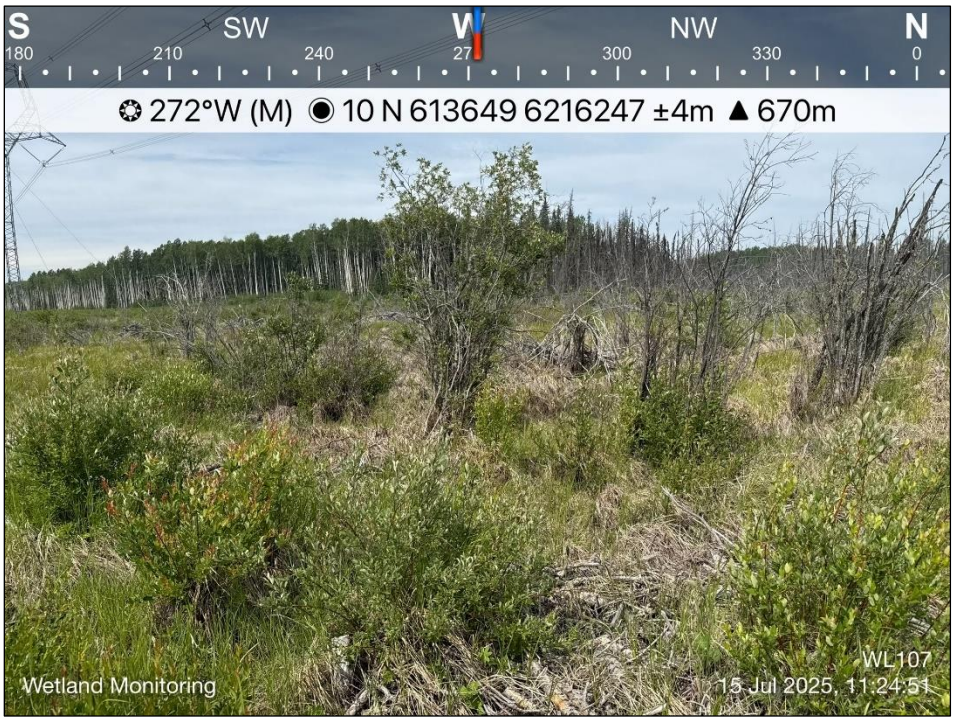

Plate 3.2-51. Ws05 MacCalla's willow - Beaked sedge swamp at WL107 along the transmission line in 2025.

Plate 3.2-52. Ws14 Bebb's willow – Bluejoint swamp at WL108 along the transmission line in 2018.

Plate 3.2-53. Ws14 Bebb's willow – Bluejoint swamp at WL108 along the transmission line in 2020.

Plate 3.2-54. Ws14 Bebb's willow – Bluejoint swamp at WL108 along the transmission line in 2025.

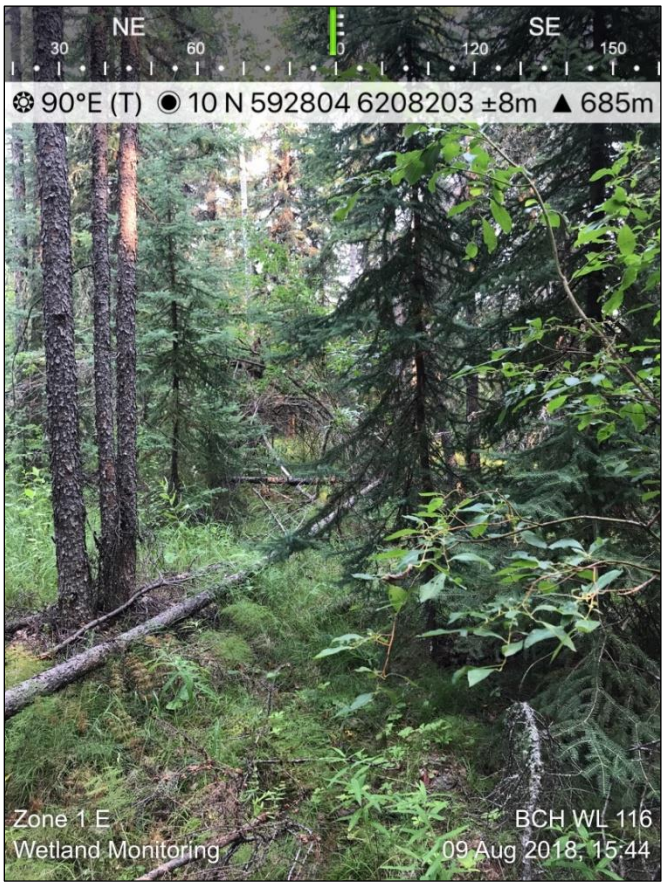

Plate 3.2-55. Ws07 Spruce – Common horsetail – Leafy moss swamp at WL116 along the transmission line in 2018.

Plate 3.2-56. Ws07 Spruce – Common horsetail – Leafy moss swamp at WL116 along the transmission line in 2020.

Plate 3.2-57. Ws07 Spruce – Common horsetail – Leafy moss swamp at WL116 along the transmission line in 2025.

Plate 3.2-58. Ws07 Spruce – Common horsetail – Leafy moss swamp at WL117 along the transmission line in 2018.

Plate 3.2-59. Ws07 Spruce – Common horsetail – Leafy moss swamp at WL117 along the transmission line in 2020.

Plate 3.2-60. Ws07 Spruce – Common horsetail – Leafy moss swamp at WL117 along the transmission line in 2025.

3.3 FLORISTIC QUALITY INDEX

Floristic Quality Index (FQI) assessments were conducted at all 20 of the wetlands visited in 2025. Seventeen of those wetlands were previously assessed in 2018 and 2020, and three of the wetlands (WL020, WL021 and WL105) were only assessed in 2020 (the FQI methods were not fully adopted until the later parts of the 2018 field program so the initial dataset is incomplete). As such, data comparisons were able to be made between monitoring years, and consistencies and/or differences between the datasets could be identified.

3.3.1 Species Richness

Species richness was calculated for each wetland assessed in 2018, 2020 and 2025 individually (Figure 3.3-1), then the data were combined and plotted by wetland type (Figure 3.3-2). Species richness varied between individual wetlands and between monitoring years. In general, species richness appears to be higher in swamps and bogs than in fens and marshes, although the differences may be small.

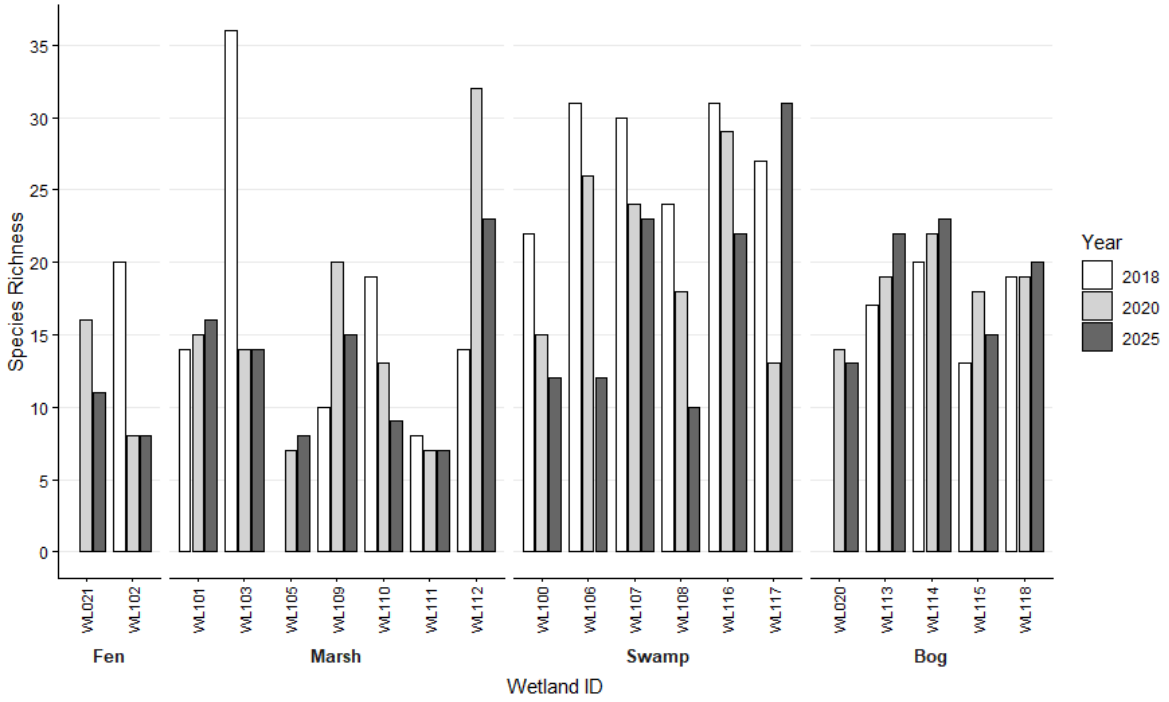

Figure 3.3-1. Individual Species Richness for each Wetland Assessed in 2018, 2020 and 2025

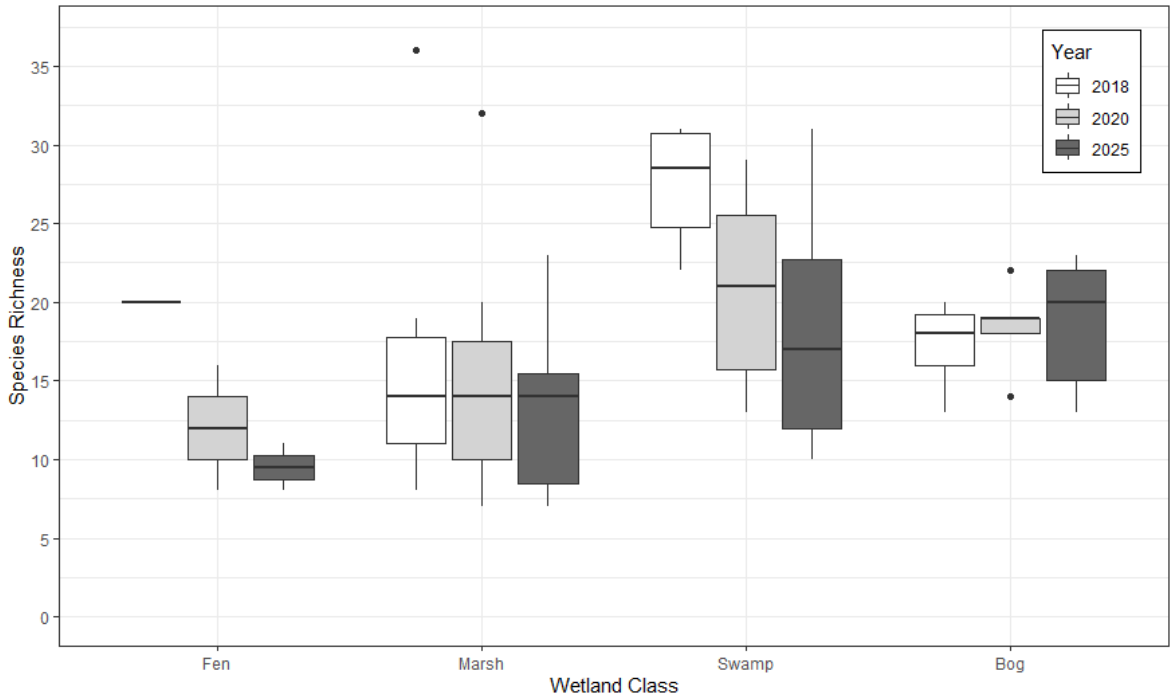

Figure 3.3-2. Comparison of Species Richness by Wetland Class (2018, 2022 and 2025)[1]

[1] For each boxplot, the horizontal line is the median, the box is the 25th-75th percentile, and the vertical whiskers indicate the range of the data. Points that are beyond the whisker are outliers.

3.3.2 Coefficient of Conservatism Values

The distribution of CC values assigned to the vegetation species found in each wetland type was plotted for 2018, 2020 and 2025 (Figures 3.3-3 to 3.3-6). The distribution of CC values within each wetland type followed similar patterns in 2018, 2020 and 2025. The marsh and swamp histograms have symmetric, unimodal patterns and most commonly, plants had CC values of 2 and 3. The fen and bog histograms have a bimodal pattern, and most commonly, plants had CC values of 2 and 5. None of the wetlands contained species with CC values above eight.

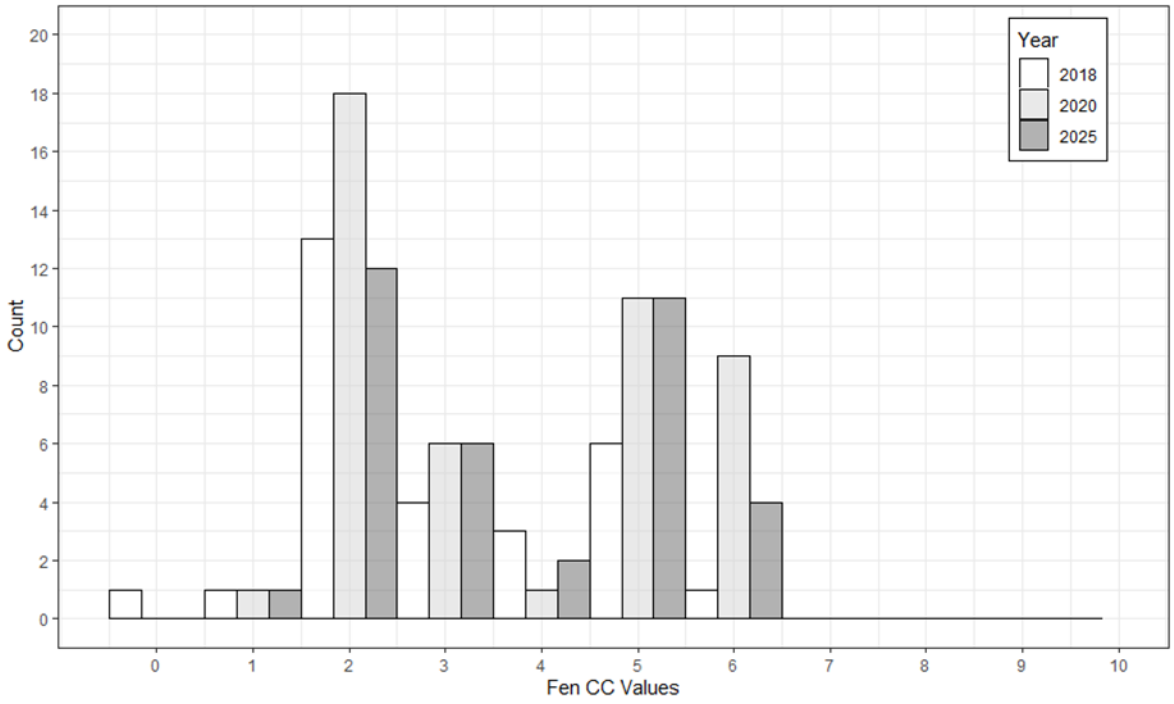

Figure 3.3-3. Coefficient of Conservatism Value Distribution for Fens Assessed in 2018, 2020 and 2025

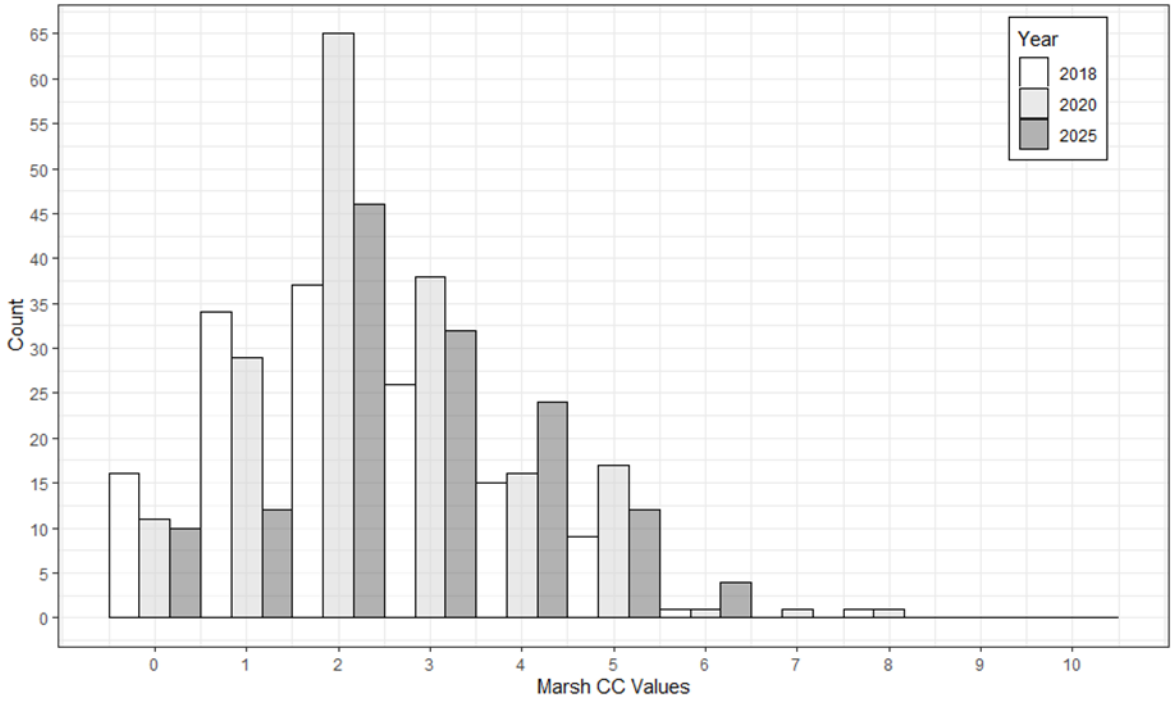

Figure 3.3-4. Coefficient of Conservatism Value Distribution for Marshes Assessed in 2018, 2020 and 2025

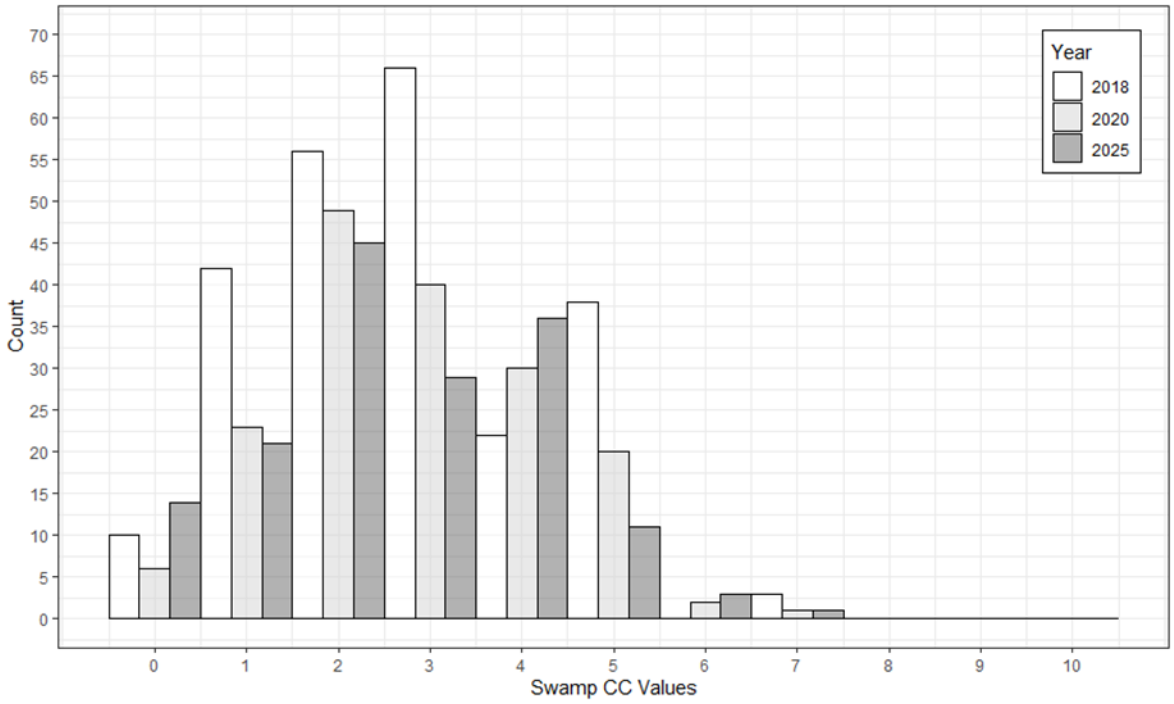

Figure 3.3-5. Coefficient of Conservatism Value Distribution for Swamps Assessed in 2018, 2020 and 2025

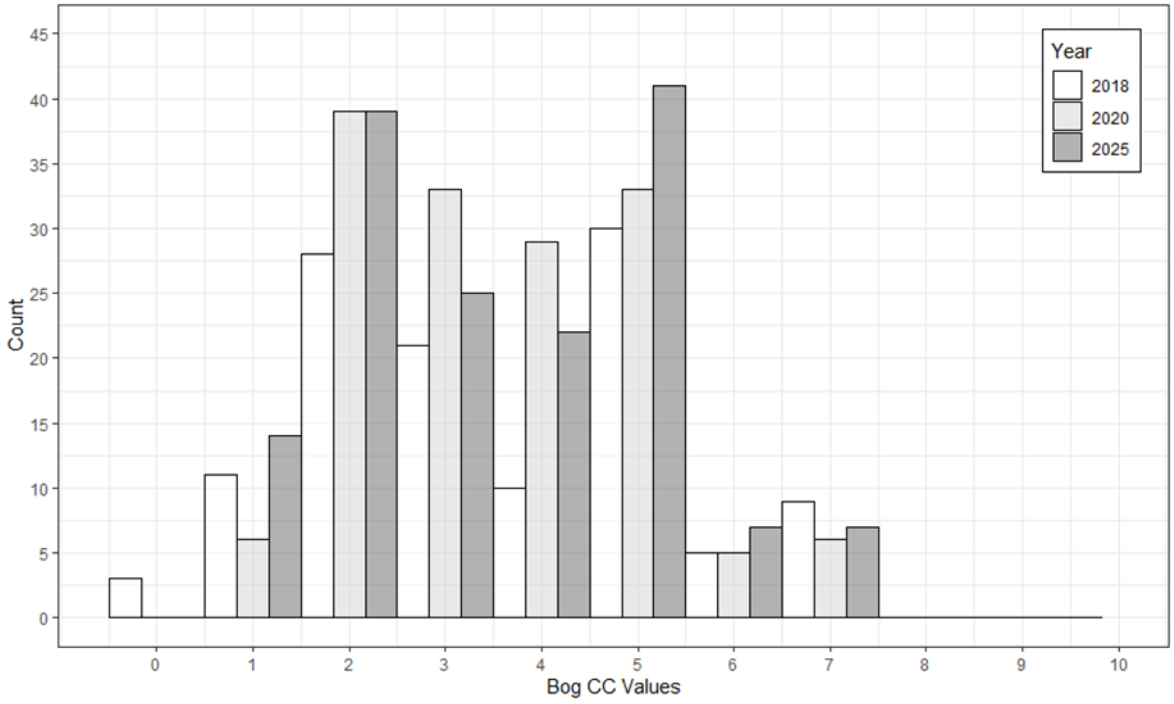

Figure 3.3-6. Coefficient of Conservatism Value Distribution for Bogs Assessed in 2018, 2020 and 2025

3.3.3 Wetland Indicator Species

The percentage of wetland indicator species varied between individual wetlands and between monitoring years (Figure 3.3-7). Fens, marshes and bogs had relatively high percentages of wetland indicators across all years. Of all four wetland types, swamps had the lowest median percentage of wetland indicator species each year (Figure 3.3-8).

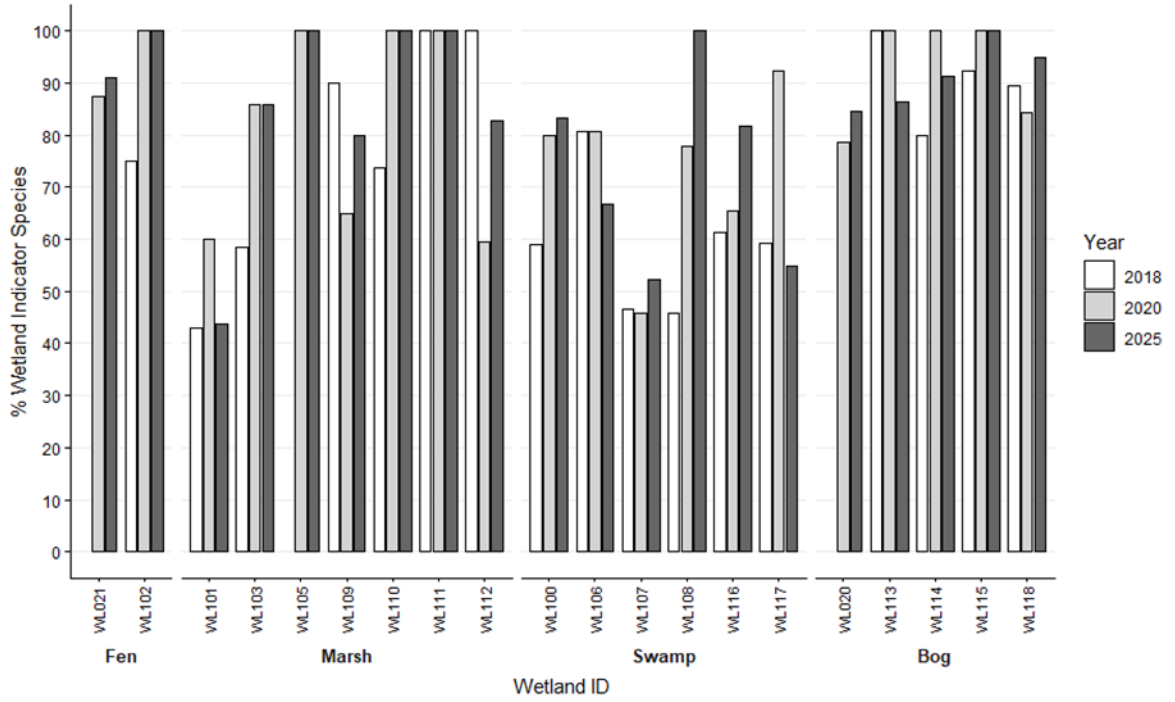

Figure 3.3-7. Percentage of Wetland Indicator Species Identified for Each Wetland Assessed in 2018, 2020 and 2025

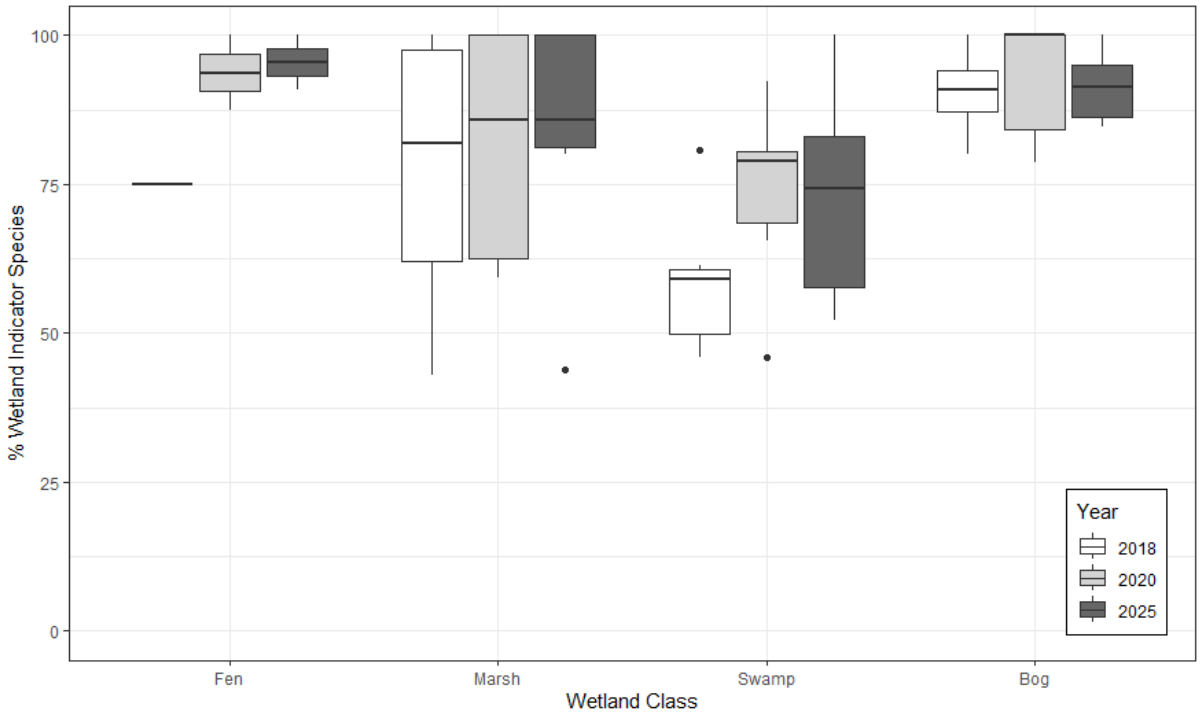

Figure 3.3-8. Comparison of %Wetland Indicator Species by Wetland Class (2018, 2020 and 2025)

3.3.4 Non-Native Vegetation Species

Non-native vegetation species were detected in 12 of the 20 wetlands (Figure 3.3-9) and were more prevalent in marshes and swamps (Figure 3.3-10). The median percentage of non-native vegetation species in fens, marshes, swamps, and bogs remained low (10% or lower) across monitoring years.

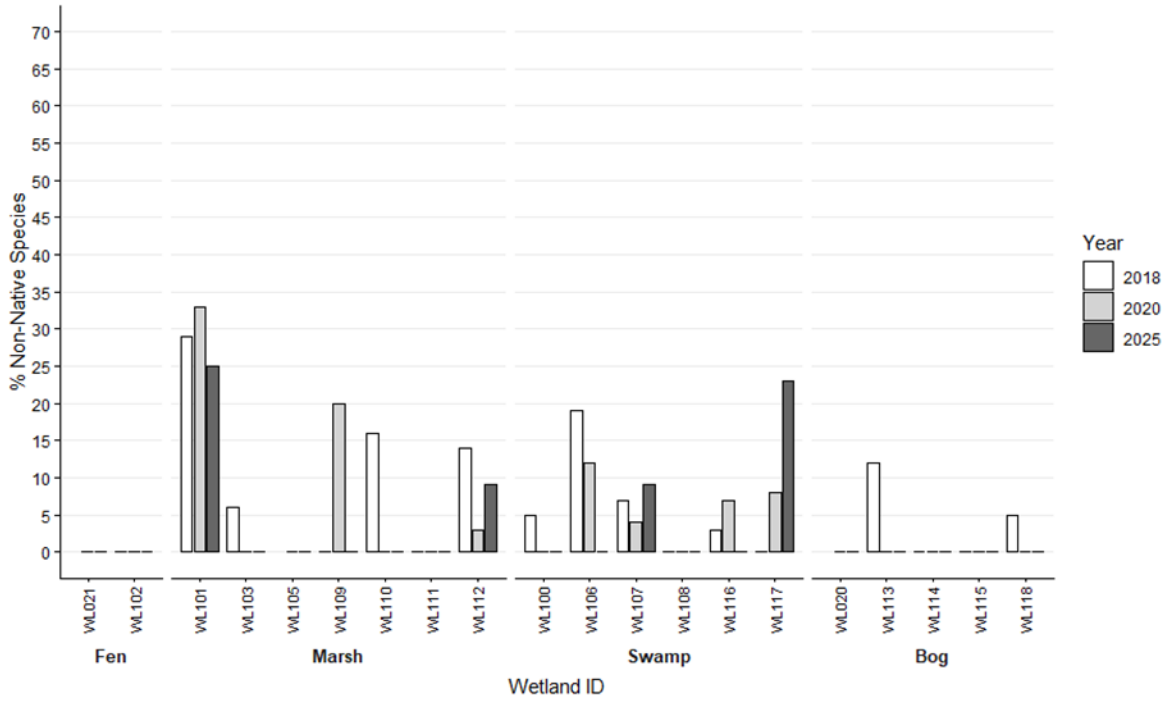

Figure 3.3-9. Percentage of Non-native Vegetation Species Identified for each Wetland (2018, 2020 and 2025)

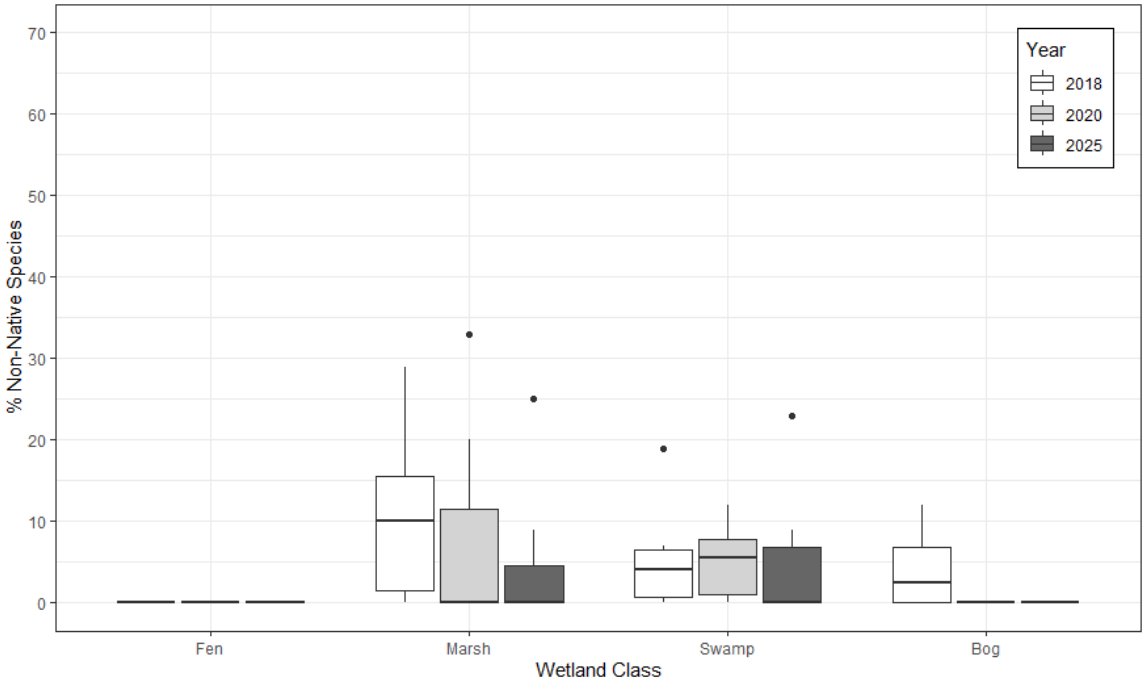

Figure 3.3-10. Comparison of %Non-native Species by Wetland Class (2018, 2020 and 2025)

3.3.5 FQI Score

Individual FQI scores varied between individual wetlands (Figure 3.3-11) and between monitoring years. Across all monitoring years, bogs and fens had higher median FQI scores than marshes and swamps (Figure 3.3-12).

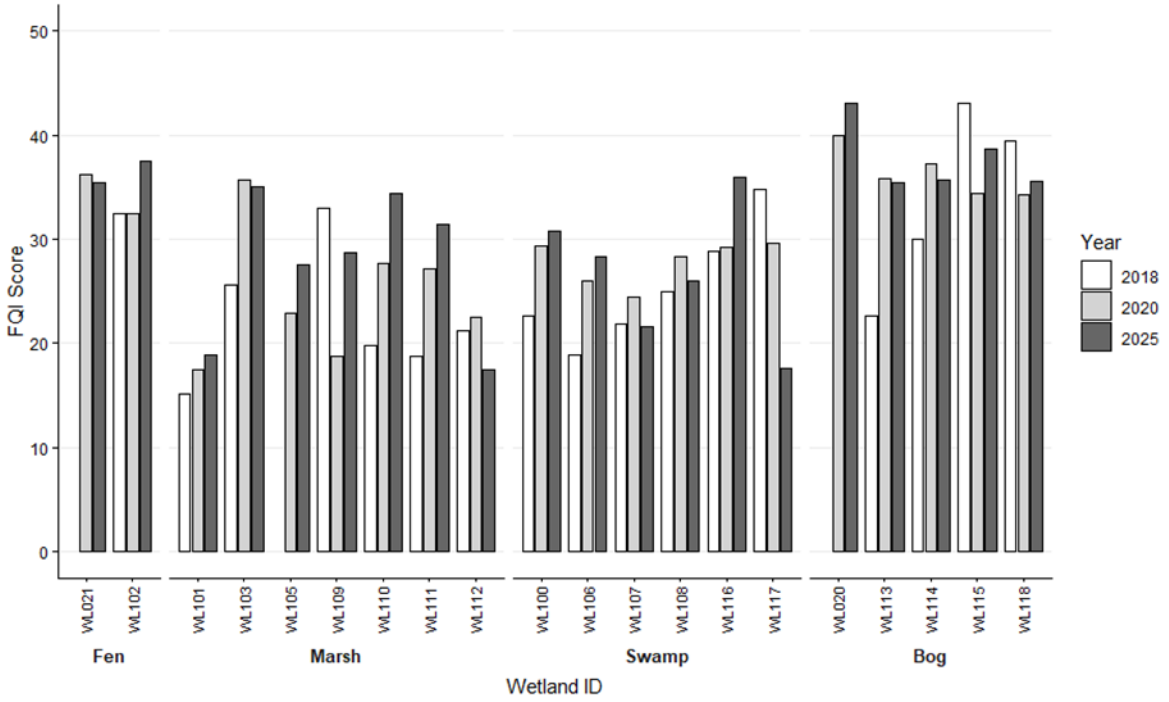

Figure 3.3-11. Individual FQI Scores for Each Wetland Assessed in 2018, 2020 and 2025

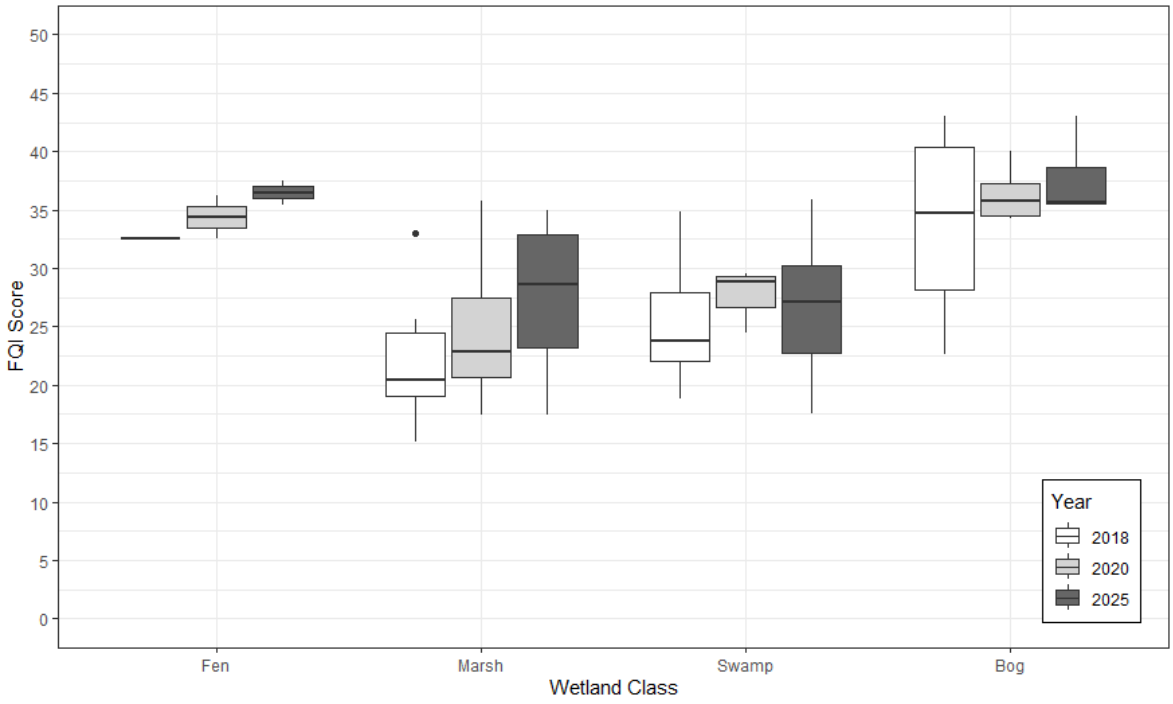

Figure 3.3-12. Comparison of FQI Scores by Wetland Class (2018, 2020 and 2025)

3.3.6 FQI Discussion

Due to the small sample size (n) of wetlands monitored in 2025, and the sample size imbalance between wetland types (e.g., n=2 for fens, and n=7 for marshes), patterns in FQI data cannot be identified with any confidence at the present time. Conclusions about patterns among monitoring years or wetland types will be made when the data from all wetlands and monitoring years is pooled and undergoes appropriate statistical analysis.

Overall, the results of the data analysis illustrated that the vegetation communities at the monitored wetlands were relatively consistent between 2018, 2020 and 2025. Slight variations in species richness, distribution of CC values, percentage of wetland indicator species, and percentage of non-native vegetation species between the three monitoring years are expected for wetland vegetation communities and could be due to a number of factors, including differing weather patterns, wetland water levels, anthropogenic or project-related impacts, survey timing, and placement of quadrat locations.

Species richness can easily be influenced by establishment of non-native or weedy vegetation species and therefore is not always the best indicator of a healthy wetland. In addition, there are a number of naturally occurring wetland vegetation communities that have characteristically lower species richness but would still be considered healthy, intact, late succession wetland vegetation communities (e.g., poor fens). To adjust for the nuances that come with vegetation species richness in wetlands, we compared the distribution of CC values assigned to the vegetation species identified within the wetland types. Based on the three years of data available, bogs, and fens appear to have more species that do not tolerate disturbance and are found in advanced stages of succession (higher CC values) compared to marshes and swamps.

On average, FQI was found to be the highest in bogs and lowest in marshes; these FQI scores are expected because bogs often contain a unique combination of plant species that are adapted to the acidic, nutrient-poor, water level stable conditions typical of bogs (e.g., a number of *Vaccinium* and *Drosera* species are often restricted to bogs; Mackenzie and Moran 2004). In addition, bog vegetation is often very slow growing, not tolerant of disturbances, and can be easily outcompeted if conditions, such as water level, change. Marshes on the other hand, have a higher potential for non-native species, and often contain native species that are less specialized, less tolerant of disturbance and changing conditions, and are often found in other environments.

4. SUMMARY OF WETLAND SAMPLING: 2016–2025

A total of 128 wetlands within the PAZ have been assessed since the beginning of the Program in 2016 (Table 4-1). Starting in 2018, with the development of a standard methodology (NPS 2020), wetlands surveyed in 2016 and 2017 were re-sampled so that all data were collected in a consistent manner. Of the 128 wetlands, 43 are located in the reservoir and are no longer monitored. The five downstream wetlands and 80 transmission line wetlands will be continued to be monitored.

Table 4-1. Summary of Wetland Sampling (2016-2025)

General Location	Pre-NPS Methodology		Baseline and/or Construction Monitoring			Construction Monitoring		Operation Monitoring
	2016	2017	2018	2019	2020	2021	2022	2025
Downstream	-	-	-	5	-	5	-	-
Transmission Line	53	-	21	37	40	40	21	20
Reservoir	3	6	36	7	-	-	-	-
Total:	**56**	**6**	**57**	**49**	**40**	**45**	**21**	**20**

Since 2018, all wetland sampling has been completed as per the *BC Hydro Site C Vegetation and Wildlife Wetland Monitoring Program: Baseline and Construction Phase Wetland Monitoring* (Appendix D of NPS 2020). The use of a current and standardized methodology allows for detailed classification of each wetland to the provincial Site Association level (Table 4-2). All wetlands assessed beyond 2021 fall under the Construction and Operation Phase Monitoring portion of the project.

Table 4-2. Wetlands Sampled from 2018 to 2025

Wetland Class	Site Association	Vegetation Community	No. Sampled					
			2018	2019	2020	2021	2022	2025
Reservoir Footprint								
Bog	Wb06	Tamarack – Water sedge – Fen moss	1					
Fen	Wf00	Fen (unclassified)	1					
Swamp	Ws00	Swamp (unclassified)	4					
	Ws02	Mountain alder – Pink spirea – Sitka sedge		1				
	Ws05	MacCalla's willow – Beaked sedge	1					
	Ws15	SwSb – Labrador tea – Glow moss	1					
Marsh	Wm00	Marsh (unclassified)	1					
	Wm02	Swamp horsetail – Beaked sedge	1					
	Wm03	Awned sedge	2					
	Wm04	Common spike-rush	1					
	Wm05	Cattail	1					
	Wm06	Great bulrush	1					

Wetland Class	Site Association	Vegetation Community	No. Sampled					
			2018	2019	2020	2021	2022	2025
Open Water	OW	Shallow Open Water (unclassified)	1					
Floodplain	Fl00	Low bench floodplain (unclassified)	8	1				
	Fl03	Pacific willow – Red-osier dogwood – Horsetail	1	1				
	Fl06	Sandbar willow	4	4				
	Fm00	Mid bench floodplain (unclassified)	2					
	Fm02	Cottonwood – Spruce – Red-osier dogwood	5					
		Reservoir Footprint Total:	**36**	**7**	**0**	**0**		
Downstream								
Swamp	Ws02	Mountain alder – Pink spirea – Sitka sedge		1		1		
Floodplain	Fl00	Low bench floodplain (unclassified)		2		2		
	Fl06	Sandbar willow		2		2		
		Downstream Total:		**5**		**5**		
Transmission Line								
Bog	Wb03	Black spruce – Lingonberry – Peat-moss	1	6	1	6		1
	Wb05	Black spruce – Water sedge – Peat-moss	1		2		1	1
	Wb06	Tamarack – Water sedge – Fen moss	3	7	4	7		3
	Wb08	Black spruce – Soft-leaved sedge – Peat-moss		7		7		
	Wb09	Black spruce – Common horsetail – Peat-moss			1		1	
Fen	Wf01	Water sedge – Beaked sedge		3	1	3	1	
	Wf02	Scrub birch – Water sedge	2	1	2	1		2
Swamp	Ws00	Swamp (unclassified)	1		2		2	
	Ws03	Bebb's willow – Bluejoint		1	2	1		1
	Ws04	Drummond's willow – Beaked sedge	1					
	Ws05	MacCalla's willow – Beaked sedge			3		2	1
	Ws07	Spruce – Common horsetail – Leafy moss	1		2		1	2
	Ws14	Mountain Alder – Bebb's Willow – Bluejoint	2		2			2
Marsh	Wm00	Marsh (unclassified)		1	1	1		
	Wm01	Beaked sedge – Water sedge	4	3	5	4	2	3
	Wm02	Swamp horsetail – Beaked sedge	1	1		1		
	Wm03	Awned sedge	1	4	8	5	8	2
	Wm05	Cattail	2		2			2
	Wm15	Bluejoint – Beaked sedge		2		3	1	
Open Water	OW	Shallow Open Water (unclassified)		1	2	1	2	
		Transmission Line Total:	**21**	**37**	**40**	**40**	**21**	**20**
		Grand Total:	**57**	**49**	**40**	**45**	**21**	**20**

5. WETLAND SAMPLING PLAN: 2022–2027

As per *BC Hydro Site C Vegetation and Wildlife Wetland Monitoring Program: Baseline and Construction Phase Wetland Monitoring* (NPS 2020), wetlands are sampled two years after the initial baseline assessment, then every five years after that for up to 30 years of project operations, or when no additional changes are detected (Table 5-1). The baseline assessments were completed for all 128 wetlands by 2020 and monitored after two years of construction by 2022. No monitoring occurred during 2023 and 2024, and the first set of 20 wetlands were monitored five years later in 2025 (i.e. the wetlands monitored in 2025 had baseline assessments completed in 2018, and construction monitoring completed in 2020).

A summary of the total number of wetlands that have been sampled to date is presented in Table 5-1. This includes: 1) wetlands that have been re-assessed after the baseline visit; and 2) the expected number of wetlands to be sampled in 2026 and 2027. The first year that the five-year monitoring assessments will be completed for all wetlands in the study will be 2027. After the 2027 monitoring is complete, the data can be analysed to determine if changes have occurred and used to decide if the monitoring program should continue.

Table 5-1. Summary of Wetlands Sampled from 2016 to 2025 and Planned Monitoring for 2026 and 2027

	Pre-NPS Methodology		Baseline and/or Construction Monitoring			Construction Monitoring			Operation Monitoring			
General Location	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Downstream	-	-	-	5	-	5	-	-	-	-	5	-
Transmission Line	53	-	21	37	40	40	21	-	-	20	38	21
Reservoir	3	6	36	7	-	-	-	-	-	-	-	-
Total:	**56**	**6**	**57**	**49**	**40**	**45**	**21**	**0**	**0**	**20**	**43**	**21**

The specific wetland sites that were sampled from 2016 to 2025, and those that will be sampled from 2026 and 2027, are presented in Table 5-2. Wetlands located within the reservoir area are not included in the construction and operation monitoring and OWL110 was removed from the sampling plan.

Table 5-2. Wetlands Sampled from 2016 to 2025 and Planned Construction Monitoring for 2026 and 2027

General Location	Site	Pre-NPS Methodology				Baseline and/or Construction Monitoring				Operation Monitoring			
		2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Downstream	WL203				x		x					x	
	WL204				x		x					x	
	WL205				x		x					x	
	WL206				x		x					x	
	WL207				x		x					x	

General Location	Site	Pre-NPS Methodology				Baseline and/or Construction Monitoring				Operation Monitoring			
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Reservoir	WL001			x									
	WL002	x		x									
	WL003			x									
Reservoir (cont'd)	WL004	x		x									
	WL005			x									
	WL006	x		x									
	WL007			x									
	WL008			x									
	WL009			x									
	WL010			x									
	WL011			x									
	WL012			x									
	WL013			x									
	WL014			x									
	WL015			x									
	WL016			x									
	WL017			x									
	WL018			x									
	WL019			x									
	WL022			x									
	WL023			x									
	WL024			x									
	WL025			x									
	WL026			x									
	WL027			x									
	WL028			x									
	WL029			x									
	WL030			x									
	WL031			x									
	WL032			x									
	WL033			x									
	WL034			x									
	WL035			x									
	WL036			x									

General Location	Site	Pre-NPS Methodology				Baseline and/or Construction Monitoring				Operation Monitoring			
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Reservoir (cont'd)	WL037			x									
	WL038			x									
	WL208				x								
	WL209				x								
	WL210				x								
	WL211				x								
	WL212				x								
	WL213				x								
	WL214				x								
Transmission Line	BR2				x		x					x	
	MWL02	x			x		x					x	
	MWL08	x			x		x					x	
	MWL09	x			x		x					x	
	MWL10	x			x		x					x	
	MWL12	x			x		x					x	
	MWL13	x			x		x					x	
	MWL14	x			x		x					x	
	MWL18	x			x		x					x	
	MWL19	x			x		x					x	
	MWL33	x			x		x					x	
	MWL58	x			x		x					x	
	MWL59	x			x		x					x	
	MWL62	x			x		x					x	
	MWL69	x			x		x					x	
	MWL72	x			x		x					x	
	OWL001	x				x		x					x
	OWL011	x					x	x					x
	OWL021	x				x		x					x
	OWL026	x				x		x					x
	OWL027	x				x		x					x
	OWL030	x				x		x					x
	OWL032	x				x		x					x
	OWL034	x				x		x					x
	OWL035	x				x		x					x

General Location	Site	Pre-NPS Methodology				Baseline and/or Construction Monitoring				Operation Monitoring			
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Transmission Line (cont'd)	OWL053	x				x		x					x
	OWL060	x				x		x					x
	OWL061	x					x	x					x
	OWL063	x				x		x					x
	OWL067	x				x		x					x
	OWL070	x				x		x					x
	OWL071	x				x		x					x
	OWL073	x				x		x					x
	OWL102		x			x		x					x
	OWL103		x			x		x					x
	OWL107		x			x		x					x
	OWL109		x			x		x					x
	OWL110		x			x							
	PI1				x		x					x	
	PI2				x		x					x	
	PI4				x		x					x	
	PR				x		x					x	
	WL020	x		x		x					x		
	WL021	x		x		x					x		
	WL100			x		x					x		
	WL101	x		x		x					x		
	WL102	x		x		x					x		
	WL103	x		x		x					x		
	WL104	x		x		x	x					x	
	WL105	x		x		x					x		
	WL106	x		x		x					x		
	WL107			x		x					x		
	WL108	x		x		x					x		
	WL109			x		x					x		
	WL110			x		x					x		
	WL111			x		x					x		
	WL112			x		x					x		
	WL113			x		x					x		
	WL114			x		x					x		

General Location	Site	Pre-NPS Methodology				Baseline and/or Construction Monitoring				Operation Monitoring			
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Transmission Line (cont'd)	WL115	x		x		x					x		
	WL116	x		x		x					x		
	WL117		x	x		x					x		
	WL118	x		x		x					x		
	WL200				x		x					x	
	WL201				x		x					x	
	WL202	x			x		x					x	
	WL215	x			x		x					x	
	WL216				x		x					x	
	WL217				x		x					x	
	WL218	x			x		x					x	
	WL219	x			x		x					x	
	WL220	x			x		x					x	
	WL221	x			x		x					x	
	WL222				x		x					x	
	WL223				x		x					x	
	WL224	x			x		x					x	
	WL225	x			x		x					x	
	WL226				x		x					x	
	WL228	x			x		x					x	
	WL229				x		x					x	

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APPENDIX A. DEFINITION OF STRUCTURAL STAGE CODES

Structural stage codes and structural stage modifiers are used to describe the vegetation structure and appearance in each ecosystem unit. Structural stage codes describe the relative age of a given ecosystem (i.e., shrub-dominated vs. old-growth forest) while the modifiers are used to provide additional descriptions of structural stages (BC MOE and MOF 2010). Note that while the successional status has been included in the summary tables for each wetland class, it has been loosely applied as the codes used to describe successional status in British Columbia were developed for forested communities and are not directly applicable to non-forested wetlands.

Structural Stage

Structural Stage	Description
Post-disturbance stages or environmentally induced structural development	
1 Sparse/bryoid	Initial stages of primary and secondary succession; bryophytes and lichens often dominant, can be up to 100%; time since disturbance less than 20 years for normal forest succession, may be prolonged (50–100+ years) where there is little or no soil development (bedrock, boulder fields); total shrub and herb cover less than 20%; total tree layer cover less than 10%.
1a Sparse	Less than 10% vegetation cover.
Stand initiation stages or environmentally induced structural development	
2 Herb	Early successional stage or herbaceous communities maintained by environmental conditions or disturbance (e.g., snow fields, avalanche tracks, wetlands, grasslands, flooding, intensive grazing, intense fire damage); dominated by herbs (forbs, graminoids, ferns); some invading or residual shrubs and trees may be present; tree layer cover less than 10%, shrub layer cover less than or equal to 20% or less than 1/3 of total cover, herb-layer cover greater than 20%, or greater than or equal to 1/3 of total cover; time since disturbance less than 20 years for normal forest succession; many herbaceous communities are perpetually maintained in this stage.
2a Forb-dominated	Herbaceous communities dominated (greater than 1/2 of the total herb cover) by non-graminoid herbs, including ferns.
2b Graminoid-dominated	Herbaceous communities dominated (greater than 1/2 of the total herb cover) by grasses, sedges, reeds, and rushes.
2c Aquatic	Herbaceous communities dominated (greater than 1/2 of the total herb cover) by floating or submerged aquatic plants; does not include sedges growing in marshes with standing water (which are classed as 2b).
3 Shrub/Herb	Early successional stage or shrub communities maintained by environmental conditions or disturbance (e.g., snow fields, avalanche tracks, wetlands, grasslands, flooding, intensive grazing, intense fire damage); dominated by shrubby vegetation; seedlings and advance regeneration may be abundant; tree layer cover less than 10%, shrub layer cover greater than 20% or greater than or equal to 1/3 of total cover.

Structural Stage	Description
3a Low shrub	Communities dominated by shrub layer vegetation less than 2 m tall; may be perpetuated indefinitely by environmental conditions or repeated disturbance; seedlings and advance regeneration may be abundant; time since disturbance less than 20 years for normal forest succession.
3b Tall shrub	Communities dominated by shrub layer vegetation that are 2–10 m tall; may be perpetuated indefinitely by environmental conditions or repeated disturbance; seedlings and advance regeneration may be abundant; time since disturbance less than 40 years for normal forest succession.
3c Short stunted trees	dominated or characterized by conifer or deciduous tree species < 2 m tall stunted by extreme edaphic, climatic, or repeated disturbance factors; stand structure perpetuated indefinitely.
3d Tall stunted trees	Dominated or characterized by conifer or deciduous tree species 2–10 m tall stunted by extreme edaphic, climatic, or repeated disturbance factors; stand structure perpetuated indefinitely.
Stem exclusion stages	
4 Pole/Sapling	Trees greater than 10 m tall, typically densely stocked, have overtopped shrub and herb layers; younger stands are vigorous (usually greater than 10–15 years old); older stagnated stands (up to 100 years old) are also included; self-thinning and vertical structure not yet evident in the canopy - this often occurs by age 30 in vigorous broadleaf stands, which are generally younger than coniferous stands at the same structural stage; time since disturbance is usually less than 40 years for normal forest succession; up to 100+ years for dense (5,000–15,000+ stems per hectare), stagnant stands.
5 Young Forest	Self-thinning has become evident, and the forest canopy has begun differentiation into distinct layers (dominant, main canopy, and overtopped); vigorous growth and a more open stand than in the pole/sapling stage; time since disturbance is generally 40–80 years but may begin as early as age 30, depending on tree species and ecological conditions.
Understory re-initiation stage	
6 Mature Forest	Trees established after the last disturbance have matured; a second cycle of shade-tolerant trees may have become established; understories become well developed as the canopy opens up; time since disturbance is generally 80−250 years.
Old-growth stage	
7 Old Forest	Old, structurally complex stands composed mainly of shade-tolerant and regenerating tree species, although older seral and long-lived trees from a disturbance such as fire may still dominate the upper canopy; snags and coarse woody debris in all stages of decomposition typical, as are patchy understories; understories may include tree species uncommon in the canopy, due to inherent limitations of these species under the given conditions; time since disturbance generally greater than 250 years.

Structural Stage Modifiers are used to describe the overstorey structure of a forested stand, often related to disturbance history or edaphic conditions (BC MOE and MOF 2010).

Structural Stage Modifiers

Modifier	Description
s - single storied	Closed forest stand dominated by the overstory crown class (dominant and co-dominant trees); intermediate and suppressed trees account for less than 20% of all crown classes combined, advance regeneration in the understory is generally sparse.
t - two storied	Closed forest stand co-dominated by distinct overstory and intermediate crown classes; the suppressed crown class is lacking or accounts for less than 20% of all crown classes combined, advance regeneration is variable.
m - multistoried	Closed forest stand with all crown classes well represented; each of the intermediate and suppressed classes account for greater than 20% of all crown classes combined, advance regeneration is variable.
o - open	Forest stand with very open main and intermediate crown classes (totaling less than 25% cover); substantial understorey light levels commonly result in well-developed shrub and/or herb understorey.

Stand composition modifiers are used to provide additional descriptions of structural stages 3–7 and indicate the dominance of the standby broadleaf, conifers, or a mixed forest (BC MOE and MOF 2010).

Stand Composition Modifiers

Modifier	Description
C - coniferous	Greater than 3/4 of total tree layer cover is coniferous.
B - broadleaf	Greater than 3/4 of total tree layer cover is broadleaf.
M - mixed	Neither coniferous nor broadleaf account for greater than 3/4 of total tree layer cover.

Successional status describes a temporal stage of a given ecosystem type in relation to its expected stable state for a given environment (BC MOE and MOF 2010). It is generally used to describe the development of a community after a large-scale disturbance (natural or human). The successional system was developed for forested ecosystems but can be generally applied to other communities to describe the current status of the community relative to what is expected to occur on the site (BC MOE and MOF 2010).

Appendix 14. 2025 Experimental Rare Plant Translocation Program Annual Report

Experimental Rare Plant Translocation Program
2025 Annual Report

Date: March 2, 2026

Version A.1: Issued for Review - December 1, 2025
Version B.2: Issued for Use - March 2, 2026

PRESENTED TO:

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EXECUTIVE SUMMARY

As a condition of federal and provincial approvals for the Site C Project, BC Hydro established the Experimental Rare Plant Translocation (ERPT) program to support the long-term viability of rare plant species affected by development. The program aims to establish secure populations in analogous habitats within the Peace Region and is continuously refined to reflect emerging science and lessons learned. Implementation is delivered in partnership with First Nation–owned businesses, local contractors, and technical specialists, with target species selected using federal and provincial conservation ranking systems.

In 2025, no in-situ seed collection occurred; however, 20 grams of Canada mountain-ricegrass (*Piptatheropsis canadensis*) seed were collected *ex-situ* to support future propagation. Propagation efforts focused on priority species, including continued refinement of stratification methods for Torrey's sedge (*Carex torreyi*) due to consistently low germination rates since 2020. While tall wood beauty (*Drymocallis arguta*) was successfully propagated, it is no longer a program priority following its recent status change from Blue-listed to Yellow-listed. Taxonomic review confirmed that previously salvaged rock selaginella (*Selaginella rupestris*) was misidentified as the more common cliff selaginella (*Selaginella scopulorum*); true rock selaginella remains rare in the region. Sixty-one individuals representing three focal species were translocated to three sites in June 2025.

Analysis of five species across nine sites indicates variable but generally high transplant survival, with limited recruitment. Torrey's sedge demonstrated 100% survivorship at the site analyzed, with reproductive maturity beginning two years post-transplant and increasing reproductive output over time; however, no recruits were detected. Canada mountain-ricegrass survival stabilized at 60% following transplantation, with plants becoming reproductive after two years and maintaining moderate flowering, though no recruits were confirmed. Prairie buttercup exhibited generally high survival across sites, variable reproductive output, and localized recruitment at two sites, suggesting early signs of successful establishment. Slender penstemon maintained high survival at one site but declined markedly at two others, possibly due to site-specific conditions and the effects of recent drought and extreme heat events.

Across species, recruitment was consistently low despite observed flowering, indicating that seed germination and establishment may be constrained by moisture limitations and other environmental factors. Overall, results underscore the importance of site and microsite selection, particularly moisture-retaining habitats, in supporting long-term establishment under increasingly dry conditions, while reinforcing the value of continued adaptive management and long-term monitoring.

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ACRONYMS & ABBREVIATIONS

Term	Definition
1G	1-gallon Pot
50P	50 mm Plug
75P	75 mm Plug
B.C. CDC	B.C. Conservation Data Centre
EAC	Environmental Assessment Certificate
EIL	Erosion Impact Line
ERPT	Experimental Rare Plant Translocation
ENSCONET	European Native Seed Conservation Network
PAZ	Potential Activity Zone
PRS	Potential Recipient Site
spp.	The abbreviation "spp." (plural) indicates "several species".
sp.	The abbreviation "sp." refers to a single species.

1. INTRODUCTION

As part of the federal and provincial regulatory approvals of the Site C Project (Project), BC Hydro is required to fulfill Environmental Assessment Certificate (EAC) Condition 9 and 14, as well as, Decision Statement Condition 16, select subsections (Appendix A). In partial fulfillment of meeting these Conditions, BC Hydro committed to the creation of an Experimental Rare Plant Translocation (ERPT) program to support the viability of target rare plant species affected by the Project.

The ERPT program is designed to establish new populations of target rare plant species in areas that are secure, contain analogous habitat to the source populations, and are within the Peace Region. This program uses an experimental approach to identify critical factors affecting germination, establishment, growth, and survival of the target species. The results of which inform the scope of the design such that informed variations on salvage, propagation, and transplant methods can be employed. The ERPT program is updated on an ongoing basis to incorporate relevant information related to target rare plant species and translocation methods as it emerges.

The program is founded on collaborative working relationships with First Nation-owned, local businesses, and other consultants, and benefits from their shared knowledge and experience. The knowledge acquired and lessons learned can be employed to maximize the success of the program and can be shared among the partners to increase the overall understanding of these systems within the community of contributors.

This report summarizes the measures and activities undertaken in 2025 for the ERPT program. Included is a summary of the plant species of conservation concern included in the program and the general methods and activities completed for the four phases of the program: Phase 1 - propagule collection; Phase 2 - *ex-situ* propagation; Phase 3 - translocation implementation; and Phase 4 - post-translocation care, maintenance, and monitoring. Information gained from the 2025 program will inform improvements to the Project methods and management in 2026.

1.1 PLANT SPECIES INCLUDED IN THE PROGRAM AND THEIR CONSERVATION RANKS

An informed understanding of a species' conservation status requires consideration at global, national, and local scales. The conservation status for each target species was determined using standardized methodologies for species assessments from government agencies at these multiple relevant conservation scales. The conservation status for each target rare plant species was derived from the listing under the *Species at Risk Act*, the NatureServe Global Conservation Status (e.g., G1, G1G2), the NatureServe Subnational Rank (e.g., S1, S2), and the British Columbia Conservation Data Centre (B.C. CDC) Rank (i.e., Red-listed, Blue-listed or Yellow-listed).

1.1.1 Listing under the Species at Risk Act

Under Canada's federally regulated *Species at Risk Act* (SARA), protected species at risk are listed under Schedule 1 as special concern, threatened, endangered, extirpated, or extinct.

1.1.2 NatureServe Conservation Priority Global Rank

NatureServe establishes ranks that characterize the relative rarity and threats of a native species at several geographic scales within specified geographic boundaries. This includes G-ranks, which assess a species' status at the global level (Table 1.1-1), and S-ranks, which assess a species' status at a subnational (i.e., province or state) level (Table 1.1-2).

Table 1.1-1 NatureServe Global Conservation Status Ranks and Definitions

NatureServe Subnational Rank [1]	Definition
G1 (Critically Imperiled)	Critically imperiled globally because of extreme rarity (often five or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.
G1 (Critically Imperiled) to G2 (Imperiled)	A Range Rank (i.e., G1G2) is used when existing information on an element straddles the criteria defining two separate ranks. See associated rank definitions.
G1 (Critically Imperiled) to G3 (Vulnerable)	A Range Rank (i.e., G1G3) is used when existing information on an element straddles the criteria defining two separate ranks. See associated rank definitions.
G2 (Imperiled)	Imperiled globally because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation globally.
G2 (Imperiled) to G3 (Vulnerable)	A Range Rank (i.e., G2G3) is used when existing information on an element straddles the criteria defining two separate ranks. See associated rank definitions.
G3 (Vulnerable)	Vulnerable globally due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
G3 (Vulnerable) to G4 (Apparently Secure)	See associated rank definitions.
G4 (Apparently Secure)	Uncommon but not rare; some cause for long-term concern due to declines or other factors
G4 (Apparently Secure) to G5 (Secure)	See associated rank definitions.
G5 (Secure)	Common, widespread, and abundant globally.
GNA (Not Applicable)	A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

[1]*The NatureServe ranks and definitions at the national (N ranks) and global level (G ranks) are available on the NatureServe website.*

1.1.3 B.C. Conservation Data Centre Priority Rank

The B.C. CDC establishes a conservation priority rank for species within the province based on rarity, intrinsic vulnerability, environmental specificity, threats, and long- and short-term trends in population size; the ranking process is consistent with the NatureServe assessment protocol. Species that the B.C. CDC defines as at-risk are categorized as either Red-listed or Blue-listed depending on their rank status, potential threats, and current level of protection (Table 1.1-2).

Table 1.1-2. NatureServe Subnational and B.C. CDC Conservation Status Ranks and Definitions

NatureServe Subnational Rank[1]	Definition	B.C. CDC Rank
S1 (Critically Imperiled)	Critically imperiled in the province because of extreme rarity (often five or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.	Red-listed (any species that is a candidate for extirpated, endangered, or threatened status in BC.)
S1 (Critically Imperiled) to S2 (Imperiled)	A Range Rank (i.e., S1S2) is used when existing information on an element straddles the criteria defining two separate ranks. See associated rank definitions.	
S1 (Critically Imperiled) to S3 (Vulnerable)	See associated rank definitions.	
S2 (Imperiled)	Imperiled in the nation or province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or province.	
S2 (Imperiled) to S3 (Vulnerable)	See associated rank definitions.	Blue-listed (any species or ecosystem that is of special concern)
S3 (Vulnerable)	Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.	
S3 (Vulnerable) to S4 (Apparently Secure)	See associated rank definitions.	
S4 (Apparently Secure)	Uncommon but not rare; some cause for long-term concern due to declines or other factors.	Yellow-listed (any species or ecosystem that is at the least risk of being lost)
S4 (Apparently Secure) to S5 (Secure)	See associated rank definitions.	

NatureServe Subnational Rank[1]	Definition	B.C. CDC Rank
S5 (Secure)	Common, widespread, and abundant in the nation or state/province.	
SNA (Not Applicable)	A conservation status rank is not applicable because the species is not a suitable target for conservation activities.	n/a

[1]A Range Rank (i.e., S2S3) is used when existing information on an element straddles the criteria defining two separate ranks.

1.1.4 Plant Species included in the ERPT Program

The B.C. CDC annually assesses the provincial conservation ranks of vascular plants and bryophytes in the province. This annual assessment incorporates new information about the abundance and distribution of the province's flora, as well as newly recognized threats (or lack thereof) to known populations. The ranking update published by the B.C. CDC in 2025 (B.C. CDC 2025) changed the conservation status rank of 77 taxa in the province relative to their status in 2024, based on new information on abundance, distribution, and/or threats to these species. Changes were made to the ranks of two species within the ERPT program (Table 1.1-3). The provincial rank for tall wood beauty (*Drymocallis arguta*) has been changed from Blue- to Yellow-listed. Due to this rank change, tall wood beauty has been excluded from the program as it is no longer considered a rare plant. The NatureServe provincial status for Torrey's sedge (*Carex torreyi*) has been changed from S3? to S3; however, the B.C. CDC provincial status (blue-listed) remains unchanged. Rock selaginella (*Selaginella rupestris*) and Rocky Mountain willowherb (*Epilobium saximontanum*) remain in the program despite uncertainties in identification and verification of these species. The program will be updated as new information becomes available.

Table 1.1-3. Species included in the Experimental Rare Plant Translocation Program in 2025

	Scientific Name	Common Name	B.C. CDC Provincial Rank	NatureServe Provincial Status	NatureServe Global Status
1	Canada mountain-ricegrass	*Piptatheropsis canadensis*	Red	S1 (2019)	G4G5 (2016)
2	Dryland sedge	*Carex xerantica*	Blue	S3 (2019)	G5 (2016)
3	Prairie buttercup	*Ranunculus rhomboideus*	Blue	S2S3 (2019)	G5 (2016)
4	Rocky Mountain willowherb	*Epilobium saximontanum*	Blue	S3 (2019)	G5 (1984)
5	Rock selaginella	*Selaginella rupestris*	Red	S2 (2019)	G5 (2016)
6	Slender penstemon	*Penstemon gracilis*	Blue	S3 (2019	G5 (2016)
7	Sprengel's sedge	*Carex sprengelii*	Blue	S3 (2019)	G5 (2016)

	Scientific Name	Common Name	B.C. CDC Provincial Rank	NatureServe Provincial Status	NatureServe Global Status
8	Torrey's sedge	*Carex torreyi*	Blue	S3 (2025)	G4G5 (2016)
9	Tall wood beauty	*Drymocallis arguta*	Yellow	S4? (2025)	G5 (2015)

2. GENERAL METHODS

2.1 PHASE 1. PROPAGULE COLLECTION

The standards for collecting and storing propagules for *ex-situ* conservation (e.g., timing, sampling, labelling, cleaning, processing, stratification, sowing, provenance) incorporate guidance outlined in Maslovat (2009) and by the European Native Seed Conservation Network (ENSCONET 2009).

2.1.1 *In-situ* Seed Collection

In-situ seed collection did not occur in 2025. In past years, field botanists collected seeds from naturally occurring populations within the Peace Region and from individuals translocated in previous years. Propagule collection occurred throughout the growing season and took into consideration local plant phenology. Field teams collected a sufficient amount of healthy seeds for propagation without taking more than the 20% of the mature seeds available.

2.1.2 *Ex-situ* Seed Collection

Nursery staff collected seeds from the nursery stock derived from previous year's seed collection efforts. Nursery staff sorted the seeds to remove non-viable seeds (i.e., empty or poorly developed), and the remaining seeds were cleaned and dried (where necessary) to maximize viability. Cleaning included the removal of waste material from around the seed capsule, and the use of sieves, hand separation, or air separation. Seeds were then placed in cold storage at the nursery to maintain seed quality and longevity. The provenance, seed collection procedures, and quantity collected were recorded.

2.2 PHASE 2. *EX-SITU* PROPAGATION

Ex-situ propagation involved seed stratification and subsequent plant propagation for each individual target species in a nursery environment between 2018 and 2025. Curation protocols and recommendations (ENSCONET 2009) and professional horticultural experience were used to inform the methods for this aspect of the program (see description below).

Through the pre-treatment process, seeds have been treated to simulate the natural conditions for breaking seed dormancy and initiating germination. Seeds were scarified and/or stratified as relevant for species-specific germination requirements. Scarification treatments included a short hot-water bath or sandpaper application, while stratification included immersing the seeds into cold temperatures with moisture to simulate natural germination conditions. Seeds that were not intended for planting in the subsequent year were not treated and are being stored as insurance for potential future use.

Propagation methods were developed based on the ecological conditions observed at the source populations, and included several measures and considerations (Vallee et al. 2004; Maslovat 2009) such as:

- Examination of the ecological and, if available, translocation literature to determine experimental trials, including optimum founder size (i.e., number of individuals and composition of life stages), reproductive status relevant to propagation for each rare plant species, and outplanting requirements;
- Review of common garden experiments as a potential source of horticultural information for a specific target species;
- Exploration and implementation of a range of techniques (e.g., varying soil substrate) to determine the most effective propagation options for each target species;
- Multiple germination trials to determine viability; and
- Holding back source propagules in an *ex-situ* collection as material for future propagation.

All utilized *ex-situ* propagation methods have been documented, including the following:

- Provenance (i.e., origin of material collected);
- Type of material collected (e.g., seed, live plant);
- Location and date of collection; and
- Growing conditions such as potting media, temperature of propagation area, watering, and treatment of seeds.

2.3 PHASE 3. TRANSLOCATION

Translocation implementation included four components: (i) recipient site selection; (ii) transport and plant preparation; (iii) selection of planting locations within the habitat matrix; and (iv) translocation to recipient sites.

2.3.1 Recipient Site Selection

Selection of suitable recipient sites, based on the species-specific preferred habitat characteristics, was informed by the extensive existing information collected for Site C along with the expert knowledge of qualified botanists and ecologists who performed the field verification work (see Appendix B provided by Eagle Cap). Selected sites contained habitat analogous to the source populations and were situated in areas that are unlikely to be developed in the foreseeable future. All sites selected are located within the Peace Region.

In 2025, qualified botanists from Eagle Cap undertook the process of identifying additional suitable recipient sites for Canada mountain-ricegrass as the existing sites were not large enough to accommodate all of the plants. Additionally, plantings were distributed across multiple locations to avoid oversaturating any single site and to enhance the likelihood of establishment success and security. In the spring, Eagle Cap had also undertaken the process of identifying suitable recipient sites for tall wood beauty before the

rank change was announced in the fall. The following text summarizes the recipient site selection process for Canada mountain-ricegrass (refer to Appendix B for further details).

Before verifying and selecting recipient sites in the field, a desktop review was conducted to identify potential locations. The desktop review included literature reviews for each priority species to evaluate current and relevant species information such as habitat and translocation requirements, with a particular focus on reviewing new information that had been published since 2025. The updated B.C. CDC database was reviewed to ensure that all existing occurrences known were incorporated into the analysis, and queries were run on the Project's rare plant database to extract any habitat information that had been recorded during earlier years of the ERPT program.

Aerial imagery and GIS attributes were visually evaluated to identify locations with potentially suitable ecological and logistical characteristics that would maximize opportunities for successful translocation. GIS layers that were assessed for these analyses included: (i) aerial imagery of the Peace River region; (ii) property ownership (provided by BC Hydro); (iii) known element occurrences of the target species; (iv) potential recipient sites identified during earlier years of the Project; (v) the Site C Project Activity Zone (PAZ); and (vi) the Site C preliminary Erosion Impact Line (EIL). This analysis resulted in the following criteria that were identified as indicative of suitable Potential Recipient Sites (PRS):

1. accessible via road or boat during the entire growing season;
2. outside of the Site C PAZ;
3. not located below the reservoir preliminary EIL (i.e., a precautionary estimate of the amount of erosion that could occur over a 100-year period);
4. located on Crown land or BC Hydro land near the Peace River;
5. within range of cell service;
6. not requiring access through a locked gate or other landowner permission;
7. contained appropriate habitat for the priority species;
8. contained low densities of non-native plants;
9. contained low levels of existing and reasonably foreseeable future anthropogenic disturbance;
10. greater than one kilometre from known sites of the same taxon;
11. not already occupied by the rare plant species; and
12. located close to a water source.

This list of desirable PRS qualities describes a hypothetical ideal site such that not all criteria were likely to be satisfied. For example, field botanists attempted to avoid occupied sites when reviewing potential planting locations; however, this was only partially successful because suitable planting sites were often found to host target rare plant species. As a result, no site is likely to fulfill all the listed criteria, and trade-offs will always be necessary to ensure that the work could proceed.

Recipient sites were selected primarily based on known species-specific habitat characteristics, and in part based on distance to other planting sites, with the aim of distributing them over a wide geographical extent. In some instances, a site was found to contain suitable habitat for several ERPT target species in proximity, and so separate assessments of the microsite features were completed for each target species. Several of the target species occur together in wild populations, and thus their co-occurrence is consistent with natural conditions.

Evaluating Area E as a potential recipient site for Canada mountain-ricegrass was a primary goal in 2025. Eagle Cap performed field verifications between June 5th and 7th and determined that Area E met most of the requirements of an ideal recipient site. The undisturbed native grassland in proximity to the aggregate pit were determined to be the most suitable location for translocating Canada mountain-ricegrass. If desired, secondary locations in disturbed grassland and revegetated areas of the decommissioned pit were also marked as possible translocation sites (Appendix B).

During field verification activities (for both Canada mountain-ricegrass and tall woody beauty), one new occurrence of fennel-leaved desert-parsley (*Lomatium foeniculaceum* ssp*. foeniculaceum*) and one new patch of Canada mountain-ricegrass were documented (Appendix B).

2.3.2 Transport and Plant Preparation

Adult plants in 1-gallon pots were shipped from NATS nursery on June 2, 2025, and arrived at Dunvegan Gardens (Dunvegan) in Fort St. John on June 5, 2025 (Plate 2.3-1). The plants were housed at the garden centre until they were picked up by the planting crew on June 6, 2025. The plants were stored and watered at the crew's accommodation throughout the week until transplanted to the recipient sites (Plate 2.3-2). All plants arrived in good condition (Plate 2.3-2 and Plate 2.3-3), with only minor desiccation observed on the sedges (Plate 2.3-4).

Plate 2.3-1. Plant shipment picked up from Dunvegan Gardens in Fort St. John (June 6, 2025)

Plate 2.3-2. Canada mountain-ricegrass, Sprengel's sedge, and Torrey's sedge pre-planting (June 6, 2025)

Plate 2.3-3. Abundant seedheads on Canada mountain-ricegrass (June 6, 2025)

Plate 2.3-4. Minor desiccation observed on sedges (June 6, 2025)

2.3.3 Selection of Planting Locations within the Habitat Matrix

Planting locations within the larger habitat matrix at a recipient site were identified as those that were relatively easy to access, corresponded with known ecological conditions that support the species, supported plant diversity that is similar to the source populations, were on stable substrates that are not expected to undergo erosion or deposition, had low abundance of invasive plants, and were not accessible to cattle or used intensely by native herbivores. There was limited variability in the planting patterns within species, thereby minimizing constraints on comparability across sites within species. Within species, the planting plans sought to:

- establish plant groupings such that there were similar conditions in terms of microsite conditions (e.g., soils, slope, aspect);
- create plant groupings to encourage pollinator visitation; and
- space individuals to minimize potential trampling during planting and monitoring and to minimize intraspecific competition for resources (e.g., minimize density-dependent effects on survival).

2.3.4 Translocation to Recipient Sites

The specific timing windows for planting were determined based on past years' experience regarding the average first and last frost-free days for Fort St. John, as well as plant phenology, the development stage of the propagated plants, the local weather, and soil moisture conditions.

Translocation in 2025 occurred on June 8th and June 10th. Translocation implementation focused on planting trials at recipient sites that have greater long-term security than the locations of the source material. The recipient sites are within the known distribution range for the target plants within the Peace Region and have similar habitat to the location of the source material. Translocation efforts have also focused on out-planting larger individuals because adult translocated plants have shown higher survival than translocated seedlings (Dalrymple et al., 2012; Bush 2022). Implementation of the translocation planting included the following:

- placement of plants into optimal microhabitats at the recipient sites, and in a spatial pattern suitable to the rare plant's biology as observed at the source populations or otherwise known;
- installation of durable, long-lasting tags to label individual plants, along with flagging tape to label plant groupings;
- installation of rose collars on select species to deter herbivory, and installation of zip tie rings to improve detection of plants for monitoring (where applicable);
- code systems to differentiate various experimental trials as needed to retain as much information as possible on the pathway of a given plant (e.g., from seed collection to planting) to facilitate annual assessments of success;
- marked boundaries for plants, plant groupings, and translocation site boundaries using GPS points and imported into the Project GIS system;

- care and maintenance at the time of planting, such as watering and creation of microhabitats as necessary;
- documentation of each translocation effort (including time spent on each phase), which included the methods used to prepare and transport the material from the nursery to the recipient site, pre-translocation site preparation, environmental conditions, method of re-introduction, care and maintenance activities, planting density, and spatial pattern; and
- post-translocation follow-up to assess the health and status of a sample and to check for other possible problems, such as desiccation, pest insects, trampling, herbivory, or vandalism at a translocation site.

2.4 PHASE 4. MONITORING

Two levels of monitoring were conducted in 2025: interim monitoring and population[1] monitoring (previously referred to as year-end monitoring). Interim monitoring occurred at a frequency that permitted the timely identification of threats such as vandalism, desiccation, or herbivory, and allowed for subsequent mitigation measures to address these issues. Population monitoring included an assessment of:

(i) Survivorship - to determine if individuals are surviving beyond the initial transplant year;

(ii) Maturity - to determine if individuals are maturing to the flowering and fruiting stages;

(iii) Reproduction - to determine if individuals are successfully producing seeds; and

(iv) Recruitment - to determine if seeds from the population germinate successfully at the site and contributing to a second generation.

The following population traits were assessed during the monitoring program:

- plant presence (summarized as number of live/dead/absent individuals);
- vegetative growth (width or height) and/or health (qualitative assessment);
- flower production per individual;
- seed production per individual; and
- spatial extent of the population.

Interim monitoring activities also re-evaluated sites for one or more of the following to identify successes and failures to improve the survival of future plantings:

- invasive species presence, especially in close proximity to the translocated plants, and/or any species that may have inadvertently been introduced to the site during the translocation;
- herbivory or other possible problems (e.g., pest insects, trampling, ungulate grazing);

[1] In this report, populations are defined as the group of plants originating from the translocation efforts.

- human disturbance; and
- microsite habitat preferences.

Information gained from monitoring implementation of the various experimental translocation approaches used will help to identify which approaches are effective and to isolate inadequacies in specific methods, all within an adaptive management framework.

2.5 DATA ANALYSIS

The monitoring data were cleaned and organized into a single MS Excel file, with the data separated into different sheets corresponding to translocation data and monitoring data by year (2020-2025). Sheets were imported into the R statistical environment (R Core Team 2025) for data management, summary, and analysis.

There was variation in species' translocation and data collection histories (e.g., different sites, number of cohorts[2], transplant and monitoring years), which necessitated separate data management and analysis steps for each. In cases where individuals were measured twice in a single year (e.g., measured both during summer transplantation and subsequent fall monitoring), the values from the latter date were retained for analysis in order to capture accurate survival data.

Generally, the same approach was taken for each species with slight variation in the data presented and years summarized. After importing each sheet into R, the data was cleaned and organized using the 'dplyr' package (Wickham et al., 2023). The different data sheets were first bound together into long format, and variables were created to facilitate the analysis:

- **Survivorship** – a binary variable (1/0), where any plant found to be 'present' in a particular year receives a '1' and any plant found to be 'absent' or 'dead' receives a '0'. Individuals found to be dead in one year were carried forward to subsequent years with a '0' for survival and 'NA' for the other variables. In some cases, individuals thought dead in one year but found to be alive in a later year were considered alive throughout.
- **Maturity** – a binary variable (1/0), where any plant that is both alive and indicating reproductive maturity (i.e., having flowering or fruiting stems present, regardless of reproductive output) receives a '1', and if not a '0'. Individuals with a '0' for the 'survival' variable received 'NA' for the "Flowering" variable.

[2] Cohorts represent the chronological timing of distinct planting events at the same site ID. For example, plants that have been translocated at a new site would be considered cohort 1. Additional plantings at the same site in the next year, would be considered cohort 2.

- **Reproduction** – A numeric (count) variable, indicating the number of flowering *or* fruiting stems recorded for each living plant. Any plant with a '0' for the 'Flowering' variable received an 'NA' for the 'Reproduction' variable.
- **Recruitment** – The number of seedlings detected adjacent to each individual being monitored in each year.

Next, the data for each species was summarized by year, site, and cohort. Four summarized values were created for each species:

- **Average survivorship** – the mean of the 'survival' variable, representing in the proportion of individuals surviving.
- **Average flowering** – the mean of the 'flowering' variable, representing the proportion of surviving individuals that were reproductively mature.
- **Average reproduction** – the mean of the number of flowering stems, representing the average reproductive output of surviving individuals.
- **Sum of recruits** – The total number (sum) of recruits found at the cohort level.

With these data summarized into a new dataframe for each species, the summarized values of each trait were plotted over time using the 'ggplot2' package (Wickham 2016) and combined into a single figure using 'ggpubr' (Kassambara 2023). Each trait was plotted with year (2020-2025) on the x-axis and each summarized value on the y-axis, with separate-colored lines for each cohort and faceting by site. This approach was found to be the best way to visualize the data given the variation in transplant year across sites and cohorts. In cases where monitoring did not occur for a Site, Cohort, or plant trait for a given year, those values were left blank in figures and tables.

In the repeat analyses of Sprengel's sedge and slender penstemon, small changes have occurred between 2025 and 2024 results due to data cleaning procedures and the detection of individuals that were previously thought dead.

2.6 Quality Assurance and Control

Quality assurance and quality control measures were used for collecting data within the field program so that methods were consistently replicated across all trials and years, and so that pertinent variables or any variations in methodology were recorded. The data form was designed to accommodate data collection at the transect, plot, or individual plant level across years (Appendix C). The data form included the following fields:

1. Site details (i.e., Site ID, geographical location, slope, aspect, and elevation);
2. Species information (i.e., species name, nursery of origin, seed lot, key metrics for survivorship, maturity, and reproduction);
3. Potential threats (i.e., herbivory, drought, others); and

4. Map outlining the relative location of each individual plant and plant grouping.

Photos were taken using the Solocator App (Civi Corp Pty Limited 2025), which were date- and time-stamped and included the UTM location of the site.

3. RESULTS

3.1 PHASE 1. PROPAGULE COLLECTION

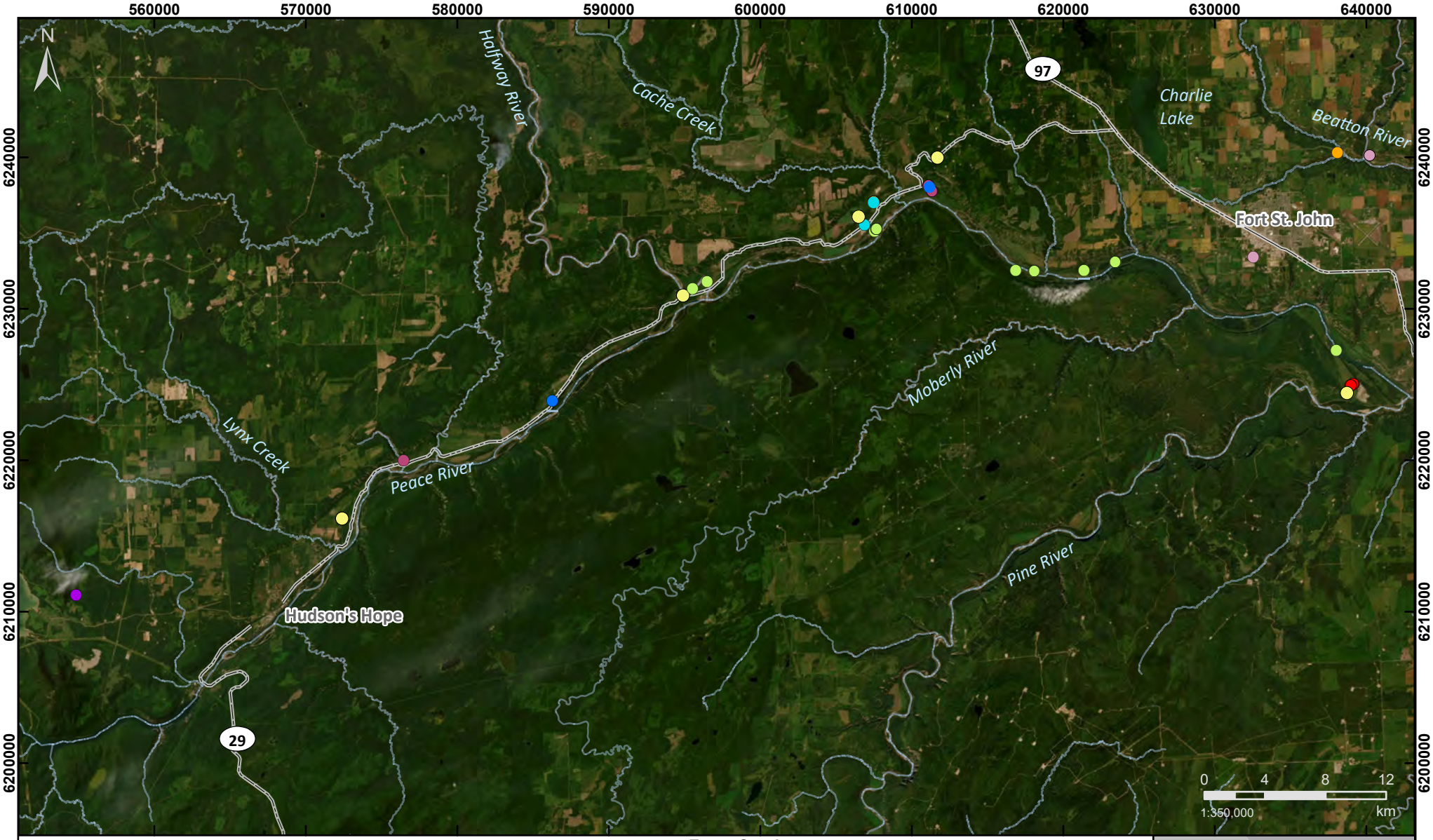
Propagule collection efforts will be minimal in this and future years. Collection efforts, if needed, will focus on harvesting seeds from mature plants cultivated at NATS nursery, with nursery staff conducting the work on-site. Additionally, seeds from other rare target species will be collected opportunistically to support the Site C Reclamation Program. Propagule collection locations to date, are displayed in Figure 3.1-1.

No seeds were collected *in-situ* in 2025; however, 20 grams of Canada mountain-ricegrass seed were collected *ex-situ* at NATS nursery (Table 3.1-1). *Ex-situ* propagule collection did not occur for Torrey's sedge or prairie buttercup (priority species for seed collection) due to low quantities of nursery stock; instead, the translocation of remaining seed-producing individuals was prioritized this year.

Table 3.1-1. Summary of Successful 2025 Propagule Collection Efforts

Common Name	Species Name	Propagule Amount and Type	Collection Timing	Collection Type	Collection Location
Canada mountain-ricegrass	*Piptatheropsis canadensis*	Approximately ~20,600 seeds* (20 g)	July 28, 2025	*ex-situ*	NATS nursery potted plants

**Quantity provided from the nursery is an estimate based on seed weight.*



Site C Project

Experimental Rare Plant Translocation
Propagule Collection Locations
Figure 3.1-1

Date: 2025-11-20
Map Number: BCH-072
Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983

EcoLogic consultants

2017-2024 Target Species

- Sprengel's sedge (*Carex sprengelli*)
- Torrey's sedge (*Carex torreyi*)
- Dryland sedge (*Carex xerantica*)
- Davis' locoweed (*Oxytropis campestris var. davisii*)
- Slender penstemon (*Penstemon gracilis*)
- Canada mountain-ricegrass (*Piptatheropsis canadensis*)
- Prairie buttercup (*Ranunculus rhomboideus*)
- Rock selaginella (*Selaginella rupestris*)
- Tall wood beauty (*Drymocallis arguta*)

3.2 PHASE 2. *EX-SITU* PROPAGATION

Torrey's sedge seed has been undergoing stratification since April 11, 2025, but germination has not yet been observed as of October 2025. Nursery staff continue to refine stratification methods for Torrey's sedge, which has had relatively low germination rates in all previous trials since 2020. Tall wood beauty was successfully propagated this year; however, due to the recent rank change (Blue-listed to Yellow-listed; B.C. CDC 2025), this species is no longer a priority for the Project.

The taxonomy of rock selaginella (*Selaginella rupestris*) and like-species that occur in the region, has been under intensive review by a number of expert botanists over the last two years, including Eagle Cap botanists who have an extensive background with the ERPT program. It was concluded that the *Selaginella* salvaged and propagated was the more common cliff selaginella (*Selaginella scopulorum*), rather than *Selaginella rupestris,* which is still a rare species known from few occurrences in the region.

3.3 PHASE 3. TRANSLOCATION IMPLEMENTATION

Sixty-one individuals in 1-gallon pots representing these three focal species were planted at three locations (Beatton Valley Trails, Leahy Pit Road, and Area E) on June 8th and June 10th, 2025 (Figure 3.3-1 and Figure 3.3-2; Table 3.3-1). Area E is a new recipient site to the program. To date, more than 2,000 plants from eight different rare plant species have been translocated for this Project.

Table 3.3-1. Summary of Individuals Translocated by Species and Site ID in 2025

Species	Site ID	Translocation Date	No. of Adults (1G Pots)
Sprengel's sedge	CARESPR-2023-D-Cohort 2	08-Jun	**3**
	CARESPR-2025-F	10-Jun	**6**
Total			**9**
Torrey's sedge	CARETOR-2025-E-Cohort 1	08-Jun	**2**
Total			**2**
Canada mountain-ricegrass	PIPTCAN-2025-F	08-Jun	**50**
Total			**50**
Grand Total			**61**

570000 580000 590000 600000 610000 620000 630000 640000

6240000 6230000 6220000 6210000

RANURHO-2022-C

CARETOR-2021-A
CAREXER-2019-C
SELARUP-2021-B

CARESPR-2020-1A & 1B
CARESPR-2021-C
CAREXER-2020-D
PENSGRA-2020-B
RANURHO-2021-A
RANURHO-2021-B
PIPTCAN-2020-B

PIPTCAN-2020-A

PENSGRA-2020-A
CAREXER-2020-E

CAREXER-2018-A
CAREXER-2018-B

CARESPR-2025-F

CARESPR-2023-E

CARETOR-2023-C
CARETOR-2024-D
RANURHO-2023-E
RANURHO-2024-F
PIPTCAN-2023-C
PIPTCAN-2024-E

PIPTCAN-2025-F

SELARUP-2021-A
PENSGRA-2021-C

North Cache Creek
Cache Creek
Halfway River
Peace River
Charlie Lake
Wilder Creek
Tea Creek
Fort St. John
Montney Creek
Beatton River
Fish Creek
Alder Creek
Wapoose Creek
Farrell Creek
Moberly River
Pine River
Dry Creek
Brenot Creek
Lynx Creek
Portage Creek
Hudson's Hope
Maurice Creek
Bullrun Creek
Windy Creek
Septimus Creek
Pingel Creek

97
29

N

Earthstar Geographics

Site C Project

Experimental Rare Plant Translocation Recipient Site Locations

Figure 3.3-1

Date: 2025-11-20

Map Number: BCH-070a

Coordinate System: NAD 1983 UTM Zone 10N

Projection: Transverse Mercator

Datum: North American 1983

EcoLogic consultants

Legend

- 2025 Translocation Sites
- 2018-2024 Recipient Sites[1]
- Highway
- Streams

0 2 4 6 km

1:200,000

[1]Site names correspond to the following species:

CAREXER - Dryland sedge (*Carex xerantica*)
CARETOR - Torrey's sedge (*Carex torreyi*)
CARESPR - Sprengel's sedge (*Carex sprengeliii*)
PENSGRA - Slender penstemon (*Penstemon gracilis*)
RANURHO - Prairie buttercup (*Ranunculus rhomboideus*)
SELARUP - Rock selaginella (*Selaginella rupestris*)
PIPTCAN - Canada mountain rice-grass (*Piptatheropsis canadensis*)

Sources: Esri, USGS, NOAA

CARESPR-2023-E

CARETOR-2023-C
CARETOR-2024-D
RANURHO-2023-E
RANURHO-2024-F
PIPTCAN-2023-C
PIPTCAN-2024-E

CARESPR-2025-F

OXYTCAM3-2018-A

PIPTCAN-2025-F

CARESPR-2023-D
CARETOR-2023-B
RANURHO-2023-D

CARETOR-2025-E
CARESPR-2023-D-CO2

OXYTCAM3-2022-E

OXYTCAM3-2020-B

OXYTCAM3-2019-As
OXYTCAM3-2020-C

OXYTCAM3-2022-D

PIPTCAN-2024-D

Site C Project

Experimental Rare Plant Translocation Recipient Site Locations

Figure 3.3-2

Date: 2025-11-26
Map Number: BCH-070b
Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983

EcoLogic consultants

Legend

- 2025 Translocation Sites
- 2018-2024 Recipient Sites[1]
- Highway
- Streams

[1]Site names correspond to the following species:

CAREXER - Dryland sedge (*Carex xerantica*)
CARETOR - Torrey's sedge (*Carex torreyi*)
CARESPR - Sprengel's sedge (*Carex sprengeliii*)
PENSGRA - Slender penstemon (*Penstemon gracilis*)
RANURHO - Prairie buttercup (*Ranunculus rhomboideus*)
SELARUP - Rock selaginella (*Selaginella rupestris*)
PIPTCAN - Canada mountain rice-grass (*Piptatheropsis canadensis*)

0 2 4 6
1:200,000 km

Sources: Esri, USGS, NOAA

3.3.1 Sprengel's Sedge (*Carex sprengelii*)

In 2025, a total of nine individual Sprengel's sedge plants were planted between two locations (Figure 3.3-1 and Figure 3.3-2). On June 9th, three individuals (Plate 3.3-1) were planted at the Leahy Pit Road location (site ID: CARESPR-2023-D-Cohort 2) to augment the six individuals planted in 2023. On June 10th, six individuals (Plate 3.3-2) were planted at a new subsite at the Beatton Valley Trails location (site ID: CARESPR-2025-F; Figure 3.3-3). All plants were watered after planting and fitted with zip tie rings held in place by a numbered tag and ground staple.

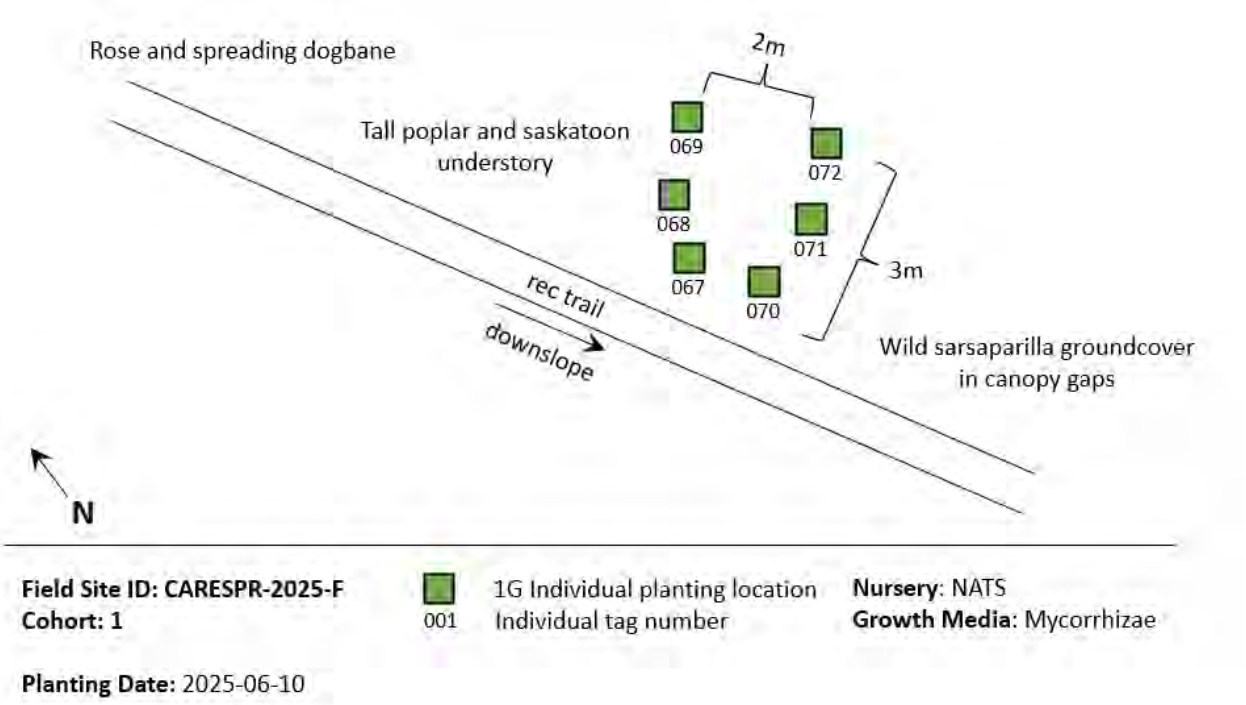


Figure 3.3-3. Sprengel's sedge planting diagram at Beatton Valley Trails site ID: CARESPR-2025-F

Plate 3.3-1. Example of planted Sprengel's sedge (site ID: CARESPR-2023-D-Cohort 2; tag 061; June 9, 2025)

Plate 3.3-2. Example of planted Sprengel's sedge (site ID: CARESPR-2025-F; tag 067; June 10, 2025)

3.3.2 Torrey's Sedge (*Carex torreyi*)

On June 8th, 2025, two individual Torrey's sedge plants were planted at a new subsite at the Leahy Pit Road location (site ID: CARETOR-2025-E; Figure 3.3-2; Figure 3.3-4) downhill from individuals planted in 2023. All plants were watered after planting and fitted with zip tie rings held in place by a numbered tag and ground staple (Plate 3.3-3 and Plate 3.3-4).

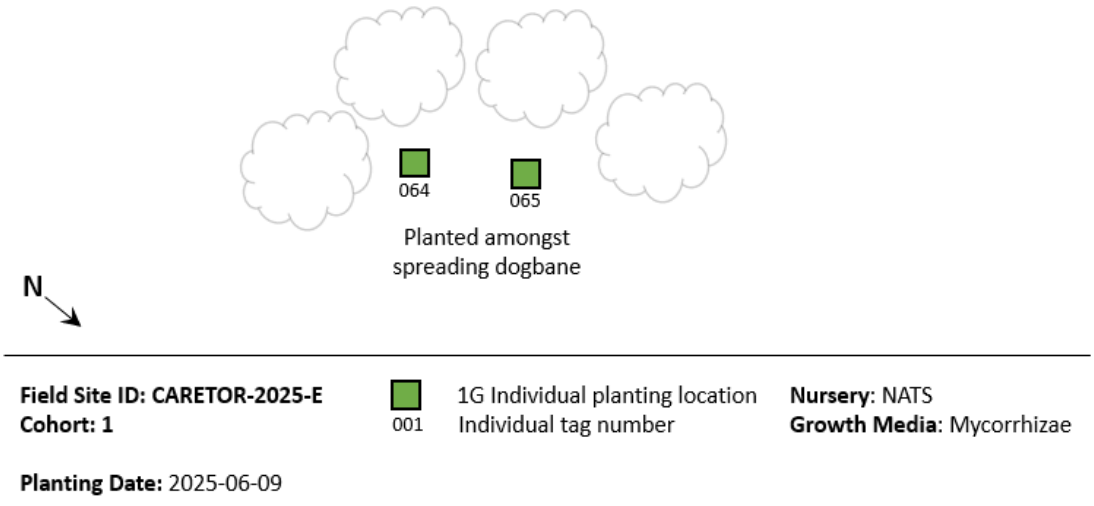


Figure 3.3-4. Torrey's sedge planting diagram at the Leahy Pit Road location site ID: CARETOR-2025-F

Plate 3.3-3. Example of Torrey's sedge planting site at the Leahy Pit Road location (site ID: CARETOR-2025-E; June 9, 2025)

Plate 3.3-4. Example of planted Torrey's sedge tag 064 (site ID: CARETOR-2025-E; June 9, 2025)

3.3.3 Canada mountain-ricegrass (*Piptatheropsis canadensis*)

On June 8th, 2025, a total of 50 Canada mountain-ricegrass plants were planted at the new site (site ID: PIPTCAN-2025-F) at Area E, which is undergoing revegetation with disturbed and undisturbed remnants of native grassland (Eagle Cap 2025). Nine subplots, each with groups of five individuals (Figure 3.3-5), were planted within areas of the remnant native grassland (Plate 3.3-5 and Plate 3.3-6). All individuals were watered after planting, and zip tie rings were applied around each plant to improve detection of these plants during future monitoring (Plate 3.3-7 and Plate 3.3-8). Subplot 10 (group of five individuals) was planted in a reclaimed portion of the aggregate pit, adjacent to the other plantings at Area E (Plate 3.3-9).

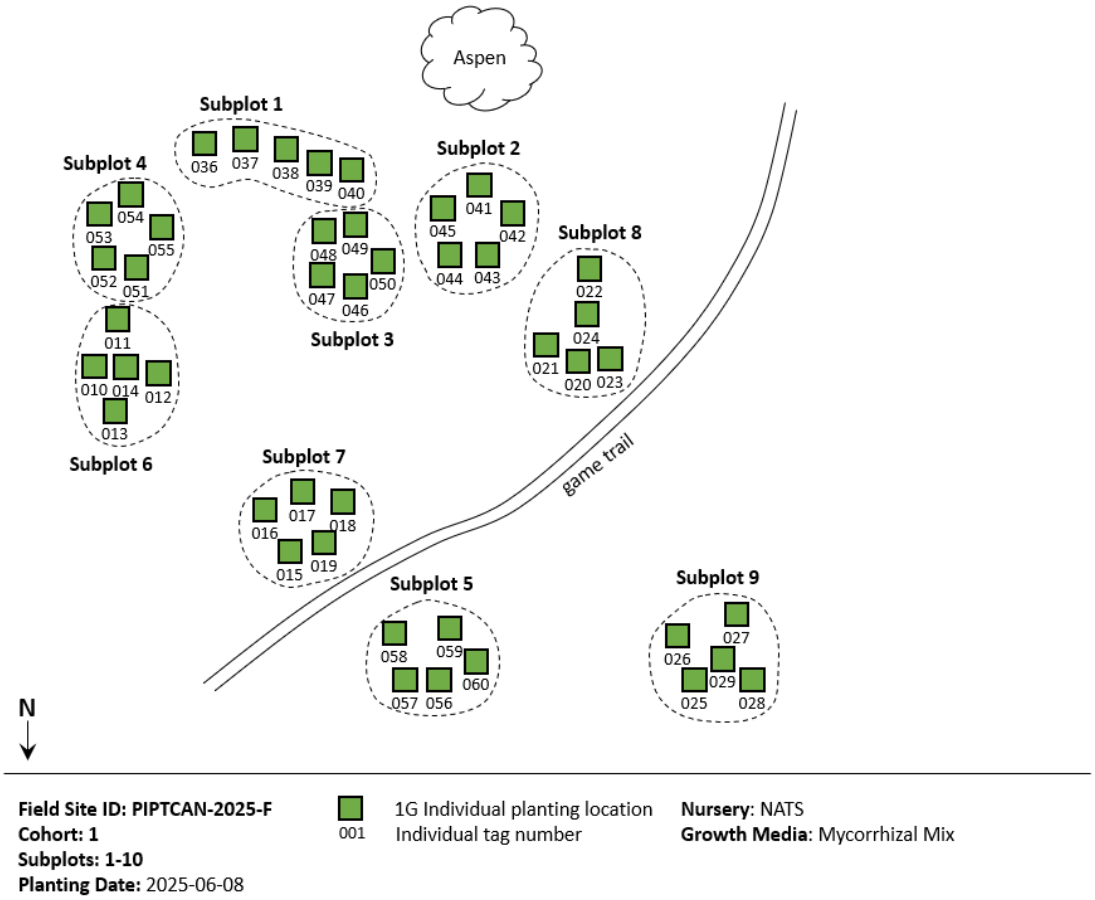


Figure 3.3-5. Canada mountain-ricegrass planting diagram at Area E site ID: PIPTCAN-2024-D (subplots 1-9; subplot 10 was planted in a reclaimed portion of the aggregate pit, adjacent to the other plantings at Area E)

Plate 3.3-5. Example of a Canada mountain-ricegrass subplot (site ID: PIPTCAN-2025-F subplot 1)

Plate 3.3-6. Example of a Canada mountain-ricegrass subplot (site ID: PIPTCAN-2025-F subplot 5)

Plate 3.3-7. Example of planted Canada mountain rice-grass with ziptie ring at the base (site ID: PIPTCAN-2025-F subplot 1; tag 036)

Plate 3.3-8. Example of planted Canada mountain rice-grass with ziptie ring at the base (site ID: PIPTCAN-2025-F subplot 5; tag 057)

Plate 3.3-9. Canada mountain rice-grass planted in the reclaimed area of the aggregate pit at Area E (site ID: PIPTCAN-2025-F subplot 10)

3.4 MONITORING

With an increased focus on long-term success, the program has expanded its monitoring efforts to assess the effectiveness of previous translocations over a longer time frame. These assessments are intended to guide future decision-making and inform adaptive management efforts.

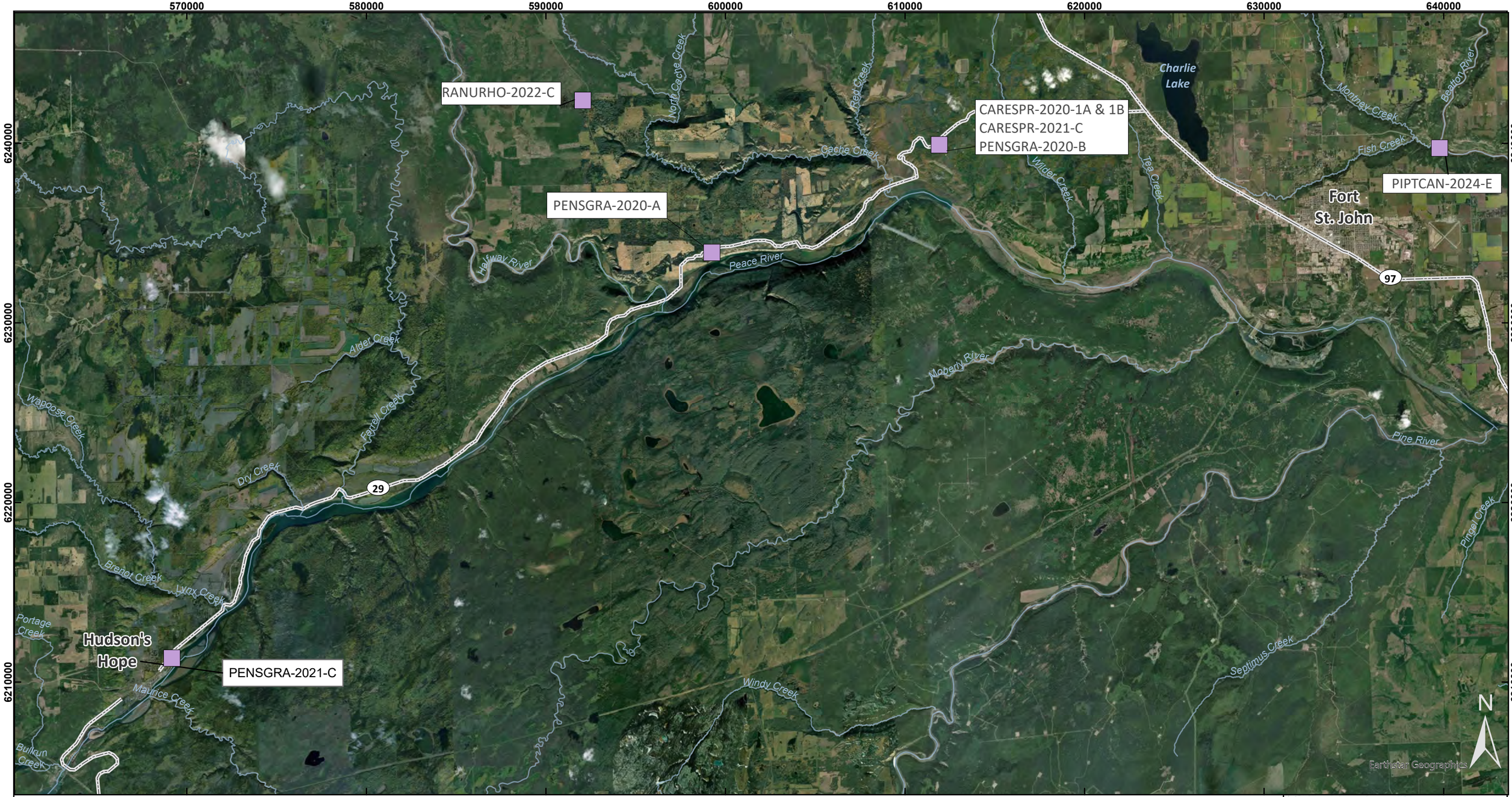
Site monitoring occurred up to two times in 2025 to correspond with seasonal changes in the phenology of each species.

Interim monitoring and/or population monitoring occurred in early spring (June) and early fall (end of August) depending on the plant species and location (Table 3.4-1). Refer to Figure 3.4-1 and Figure 3.4-2) for respective monitoring locations. A summary of follow up measures identified in 2025 during the interim monitoring and the 2025 status of the implementation of the follow up measures are summarized in Table 3.4-2.

Table 3.4-1. 2025 Translocated Rare Plant Species and Monitoring Sites

Species	Site ID	Interim Monitoring Date	Population Monitoring Date
Prairie buttercup (*Ranunculus rhomboideus*)	RANURHO-2021-A	August 18	-
	RANURHO-2022-C	-	June 5
	RANURHO-2023-E	-	June 8 and June 9
	RANURHO-2024-F	-	June 8
Slender penstemon (*Penstemon gracilis*)	PENSGRA-2020-A	-	August 17
	PENSGRA-2020-B	-	August 18
	PENSGRA-2021-C	-	August 17
Canada mountain-ricegrass (*Piptatheropsis canadensis*)	PIPTCAN-2023-C	-	August 17
	PIPTCAN-2024-D	June 7	August 18
	PIPTCAN-2024-E	June 7	August 17
	PIPTCAN-2024-F	July 9 (including watering)	na

Species	Site ID	Interim Monitoring Date	Population Monitoring Date
Dryland sedge (*Carex xerantica*)	CAREXER-2020-D	August 17	-
	CAREXER-2020-E	August 17	-
Torrey's sedge (*Carex torreyi*)	CARETOR-2021-A	August 17	-
	CARETOR-2023-C	-	June 9
	CARETOR-2024-D	-	June 8
Sprengel's sedge (*Carex sprengelii*)	CARESPR-2020-B	-	June 10
	CARESPR-2021-C	-	June 10
	CARESPR-2023-D	-	June 9
	CARESPR-2023-E	-	June 9
	CARESPR-2025-F	July 9	na



Site C Project

Experimental Rare Plant Monitoring Site Locations
Figure 3.4-1

Date: 2025-11-20
Map Number: BCH-071a
Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983

EcoLogic consultants

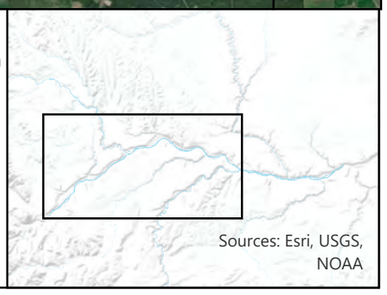
Legend

- 2025 Monitoring Sites[1]
- Highway
- Streams

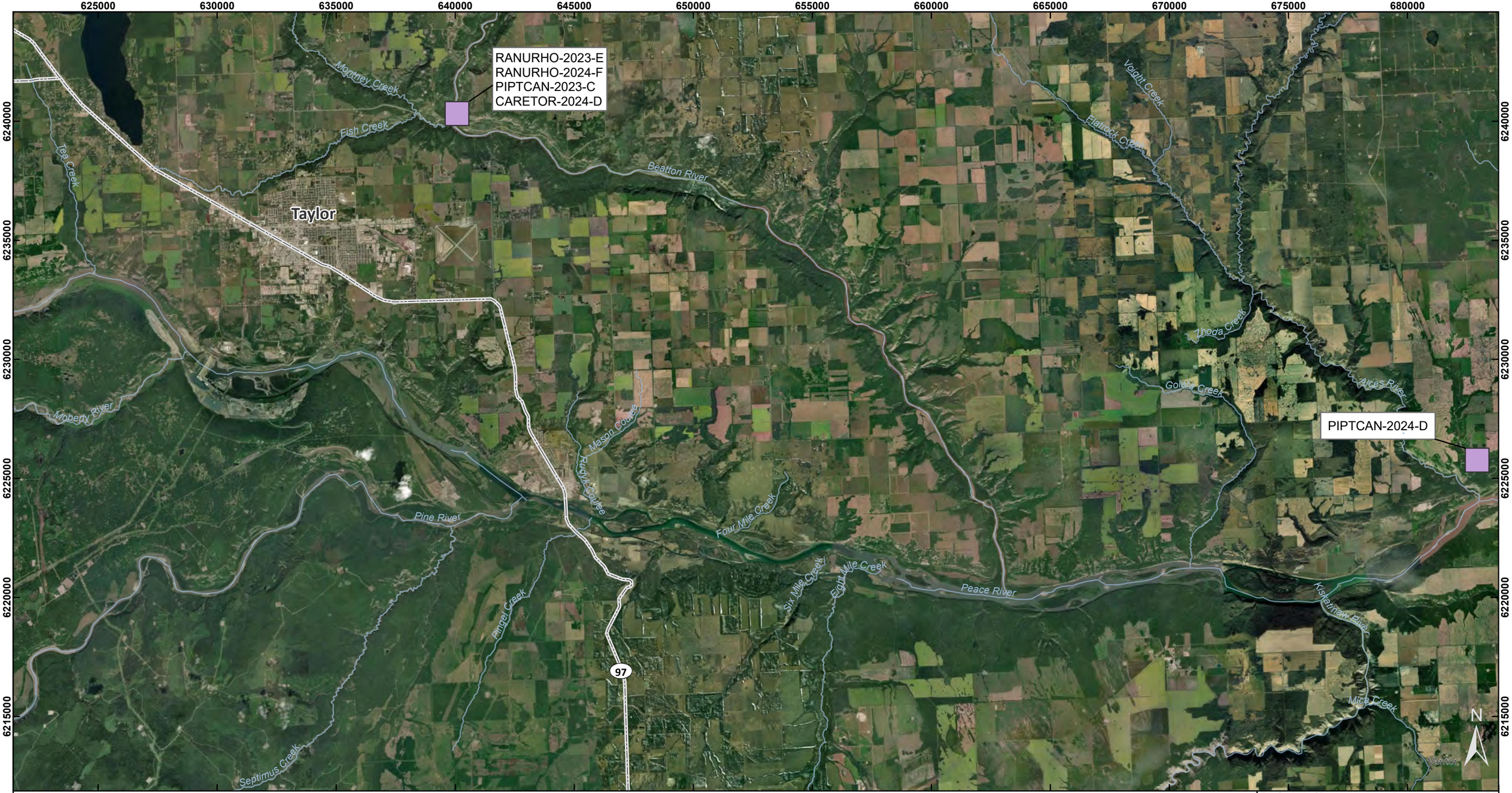
0 2 4 6 km
1:200,000

[1]Site names correspond to the following species:

CAREXER - Dryland sedge (*Carex xerantica*)
CARETOR - Torrey's sedge (*Carex torreyi*)
CARESPR - Sprengel's sedge (*Carex sprengeliii*)
PENSGRA - Slender penstemon (*Penstemon gracilis*)
RANURHO - Prairie buttercup (*Ranunculus rhomboideus*)
SELARUP - Rock selaginella (*Selaginella rupestris*)
PIPTCAN - Canada mountain rice-grass (*Piptatheropsis canadensis*)



Sources: Esri, USGS, NOAA



Site C Project

Experimental Rare Plant Monitoring Site Locations
Figure 3.4-2

Date: 2025-11-20

Map Number: BCH-071b

Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983

EcoLogic consultants

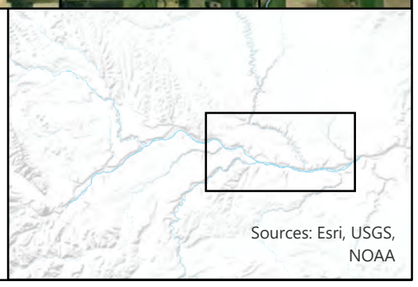
Legend

- 2025 Monitoring Sites[1]
- Streams
- Highway

0 1 2 3 4
1:150,000 km

[1]Site names correspond to the following species:

CAREXER - Dryland sedge (*Carex xerantica*)
CARETOR - Torrey's sedge (*Carex torreyi*)
CARESPR - Sprengel's sedge (*Carex sprengeliii*)
PENSGRA - Slender penstemon (*Penstemon gracilis*)
RANURHO - Prairie buttercup (*Ranunculus rhomboideus*)
SELARUP - Rock selaginella (*Selaginella rupestris*)
PIPTCAN - Canada mountain rice-grass (*Piptatheropsis canadensis*)



Sources: Esri, USGS, NOAA

Table 3.4-2. Summary of Recipient Sites and Current Status

Species	Site Name	Status	Follow-up Measures (2024)	Follow-up Status (2025)
Dryland Sedge (*Carex xerantica*)	CAREXER-2018-A	Inactive	na	na
	CAREXER-2018-B	Inactive	na	na
	CAREXER-2019-C	inactive	na	na
	CAREXER-2020-D	Active	Site visited once for population monitoring.	Site visited in 2025; prioritize replacing existing tags with new ones to improve ease of plant identification.
	CAREXER-2020-E	Active	Site visited once for population monitoring.	Site visited in 2025; prioritize replacing existing tags with new ones to improve ease of plant identification
Canada mountain-ricegrass (*Piptatheropsis canadensis*)	PIPTCAN-2020-A	Inactive	Not monitored due to changes in accessibility (requires crossing a private field for monitoring).	na
	PIPTCAN-2020-B	Inactive	Site visited once for population monitoring. Zip tie rings not installed, however, there is potential for use of this technique to detect plants in the future.	Site not visited in 2025 but continue assessing the need for follow-up measures.
	PIPTCAN-2023-C	Active	A second cohort was planted at this location. Site visited for interim and population monitoring. Zip tie rings were installed around plants at this location. Assess the efficacy of zip tie rings in 2025.	Zip tie rings have been effective for detecting plants. Continue assessing the need for follow-up measures.
	PIPTCAN-2024-D	Active	This site was established near Clayhurst. Assess the efficacy of zip tie rings in 2025.	Zip tie rings have been effective for detecting plants. Continue assessing the need for follow-up measures.
	PIPTCAN-2024-E	Active	This site was established at the Beatton Valley Trail site. Assess the efficacy of zip tie rings in 2025.	Zip tie rings have been effective for detecting plants. Continue assessing the need for follow-up measures.

Species	Site Name	Status	Follow-up Measures (2024)	Follow-up Status (2025)
	PIPTCAN-2025-F	Active	na	This is a new planting site established at Area E (see Section 3.3.3). Assess the efficacy of zip tie rings in 2025.
Davis' locoweed (*Oxytropis campestris* var. *davisii*)	OXYTCAM3-2018-A	Inactive	na	na
	OXYTCAM3-2018-As (i.e. C)	Inactive	na	na
	OXYTCAM3-2020-B	Inactive	na	na
	OXYTCAM3-2020-C	Inactive	na	na
	OXYTCAM3-2022-D	Inactive	na	na
	OXYTCAM-2022-E	Inactive	na	na
Prairie buttercup (*Ranunculus rhomboideus*)	RANURHO-2021-A	Active	Site visited once for population monitoring and watered. Two flattened cages removed. One replaced with rose collars and netting. Assess the efficacy of these changes and possibility of removing herbivory deterrents in 2025. Improve means of tracking recruits as more become detected.	Site was checked in 2025; however full monitoring will be completed in 2026. Herbivory deterrents (i.e., the wire cage) continue to be disturbed at this site and thus has been removed. The rose collars remain intact and thus were not removed.
	RANURHO-2021-B	Inactive	Site visited once for population monitoring and watered. Reinstalled rose collars for both individuals. Assess the possibility of removing rose collars in 2025. Improve means of tracking recruits as more become detected.	Site was checked in 2025; however, this site will no longer be monitored due to no surviving individuals observed. Rose collars were removed.
	RANURHO-2022-C	Active	This crown parcel was observed to be fenced and stocked with cattle (after translocation). It is uncertain how long these disturbances will persist. Evaluate the need for protection from herbivory.	No disturbance by cattle observed in 2025 – site was drier. May be worth using zip tie rings to improve plant detection. Continue to evaluate new site disturbances.

Species	Site Name	Status	Follow-up Measures (2024)	Follow-up Status (2025)
	RANURHO-2023-D	Inactive	Only one individual remaining near the end of the season. Evaluate the need to replant in a different microsite to minimize herbivory (e.g., avoid planting along the edge of a trail). Improve means of tracking recruits as more become detected.	No surviving individuals observed. Evaluate the need to replant in a different microsite to minimize herbivory (e.g., avoid planting along the edge of a trail).
	RANURHO-2023-E	Active	Plants were watered. Evaluate the need for protection from herbivory. Assess the possibility of removing rose collars in 2025. Improve means of tracking recruits as more become detected.	Continue assessing the need for follow-up measures. Rose collars were not removed but will be considered in 2026.
	RANURHO-2024-F	Active	This site was established at the Beatton Valley Trail site.	Continue assessing the need for follow-up measures.
Rock selaginella (*Selaginella rupestris*)	SELARUP-2021-A	Inactive	Site is susceptible to erosion. Limit site visits and opportunistically sample different portions of the slope if more that one site visit is conducted.	Translocated individuals were confirmed to be a similar but non-rare species.
	SELARUP-2021-B	Inactive	Not visited. Continue assessing the need for follow-up measures.	Translocated individuals were confirmed to be a similar but non-rare species.
Slender penstemon *(Penstemon gracilis*)	PENSGRA-2020-A	Active	Continue assessing the need for follow-up measures.	Site may need to be re-marked for ease of monitoring.
	PENSGRA-2020-B	Active	Continue assessing the need for follow-up measures.	Site may need to be re-marked for ease of monitoring.
	PENSGRA-2021-C	Active	Continue assessing the need for follow-up measures.	Continue assessing the need for follow-up measures.
Sprengel's sedge (*Carex sprengelii*)	CARESPR-2020-1A	Active	Continue assessing the need for follow-up measures.	Continue assessing the need for follow-up measures.
	CARESPR-2020-1B	Active	Continue assessing the need for follow-up measures.	Continue assessing the need for follow-up measures.

Species	Site Name	Status	Follow-up Measures (2024)	Follow-up Status (2025)
	CARESPR-2021-C	Active	Clear leaf litter from zip tie rings to improve plant detectability of recruits when monitoring. Consider other ways to improve detection in 2025, as the smooth brome grows taller later in the spring and summer.	Continue to clear leaf litter from zip tie rings to improve plant detectability of recruits when monitoring.
	CARESPR-2023-D	Active	Continue assessing the need for follow-up measures.	New individuals planted in this area in 2025 (see Section 3.3.1). Continue assessing the need for follow-up measures.
	CARESPR-2023-E	Active	Continue assessing the need for follow-up measures.	Continue assessing the need for follow-up measures.
	CARESPR-2025-F	Active	na	This is a new planting site established at the Beatton Valley Trails area (see Section 3.3.1). Assess the efficacy of zip tie rings in 2026.
Torrey's sedge (*Carex torreyi*)	CARETOR-2021-A	Active	Improve means of tracking recruits for this species as more become detected.	No recruits found in 2025. Will implement tracking methods using site maps to denote the location of new recruits and expand zip tie rings to include the location of new recruits, where possible (i.e. located near the mother plant).
	CARETOR-2023-B	Active	Improve means of tracking recruits for this species as more become detected.	No recruits found in 2025. Will implement tracking methods using site maps to denote the location of new recruits and expand zip tie rings to include the location of new recruits, where possible (i.e. located near the mother plant).
	CARETOR-2023-C	Active	Improve means of tracking recruits for this species as more become detected.	One recruit detected close to the parent plant. Will implement tracking methods using site maps to denote the location of new recruits and expand zip tie rings to include the location of new recruits, where possible (i.e. located near the mother plant).
	CARETOR-2024-D	Active	This is a new planting site established at the Beatton Valley Trail site.	No recruits found in 2025. Will implement tracking methods using site maps to denote the location of new recruits and expand zip tie rings

Species	Site Name	Status	Follow-up Measures (2024)	Follow-up Status (2025)
				to include the location of new recruits, where possible (i.e. located near the mother plant).
	CARETOR-2025-E	Active	na	This is a new planting site established at the Leahy Pit Road area (see Section 3.3.2).

3.4.1 Population Monitoring

Population monitoring involved an evaluation of survivorship, maturity, reproduction, and recruitment (Table 3.4-3). These metrics are being used to evaluate population viability at recipient sites and to track establishment of the translocated plants and resulting recruitment. The year-end monitoring is critical to ensure that issues with viability or establishment can be identified and addressed as they arise.

In the table below, note that reproduction also infers maturity. A "-" value in that column simply indicates that individuals were past the flowering stage and entering the seed production stage.

Table 3.4-3. Summary of Population Monitoring Results for 2025

Species	Site Name	Survivorship		Maturity		Reproduction		Recruitment
		Survival in Relation to Total	Percent Survival	Flowering in Relation to Total	Percent Flowering	Seed Production in Relation to Total	Percent Seeding	Number of recruits observed
Prairie buttercup (*Ranunculus rhomboideus*)	RANURHO-2022-C	8/9*	89%	7/9	78%	5/9	56%	0
	RANURHO-2023-E (Cohort 1)	10/10	100%	-	-	9/10	90%	6
	RANURHO-2023-E (Cohort 2)	6/8	75%	-	-	4/8	50%	10
	RANURHO-2024-F	7/7	100%			7/7	100%	4
Slender penstemon (*Penstemon gracilis*)	PENSGRA-2020-A	19/25	76%	-	-	14/25	56%	0
	PENSGRA-2020-B	4/10	4%	-	-	3/10	3%	0
	PENSGRA-2021-C	5/13	38%	-	-	2/13	15%	0
Torrey's sedge (*Carex torreyi*)	CARETOR-2023-C-1A (Cohort 1)	5/5	100%	-	-	5/5	100%	0
	CARETOR-2023-C-1A (Cohort 2)	2/2	100%	-	-	1/2	50%	0
	CARETOR-2023-C -2A (Cohort 1)	5/5	100%	-	-	5/5	100%	1

Species	Site Name	Survivorship		Maturity		Reproduction		Recruitment
		Survival in Relation to Total	Percent Survival	Flowering in Relation to Total	Percent Flowering	Seed Production in Relation to Total	Percent Seeding	Number of recruits observed
	CARETOR-2024-D	4/4	100%	-	-	4/4	100%	0
Sprengel's sedge (*Carex sprengelii*)	CARESPR-2020-B-1A	0/2	0%	-	-	0/2	0%	0
	CARESPR-2020-B-1B	5/5	100%	-	-	1/5	20%	0
	CARESPR-2021-C (Cohort 2)	10/10	100%	-	-	9/10	90%	0
	CARESPR-2023-E	4/4	100%	-	-	3/4	75%	0
Canada mountain-ricegrass (*Piptatheropsis canadensis*)	PIPTCAN-2023-C (Cohort 1)	2/3	67%	-	-	3/3	100%	0
	PIPTCAN-2023-C (Cohort 2)	5/5	100%	-	-	3/5	60%	0
	PIPTCAN-2024-D	45/45	100%	-	-	31/45	69%	0
	PIPTCAN-2024-E	5/5	100%	-	-	3/5	60%	0

**Clumps of individuals*

3.4.2 Sprengel's sedge (*Carex sprengelii*)

Population monitoring of Sprengel's sedge was conducted at three sites: CARESPR-2020-B (June 10), CARESPR-2021-C (June 10), and CARESPR-2023-E (June 9).

At site ID: CARESPR-2020-B-1A (planted in 2020 and 2021), all (two) individuals that were observed in 2024 were not detected in 2025. In the previous year, it was noted that the site was dry and the individuals were in moderate condition, but without seedheads. This site will be visited again in 2026 to confirm survivorship. At site ID: CARESPR-2020-B-1B (Plate 3.4-1), there were a total of five individuals present with one individual having produced seedheads. One individual that was observed in 2024 was not detected in 2025; however, one individual that had not been observed since 2021, was detected in this year, albeit in relatively poor condition. No recruits were observed at either subsite.

At site ID: CARESPR-2021-C (planted in 2021 and 2023), the one individual planted in 2021 was not detected, whereas all ten individuals (cohort 2; Plate 3.4-2) planted in 2023 had survived and were in very

good condition, with nine of the ten individuals (90%) having produced seedheads. No recruits were observed.

At site ID: CARESPR-2023-E, all four planted individuals were present and in very good condition. Three of the four individuals (75%) had produced seedheads, but no recruits were observed.

Plate 3.4-1. Example of adult Sprengel's sedge (tag 003) at site ID: CARESPR-2020-B-1B on June 10, 2025

Plate 3.4-2. Example of adult Sprengel's sedge (tag 429) at site ID: CARESPR-2021-C-Cohort 2 on June 10, 2025

3.4.3 Torrey's sedge (*Carex torreyii*)

Monitoring at the Beatton Valley trail location was conducted at site IDs: CARETOR-2023-C (June 9, 2025) and CARETOR-2024-D (June 8, 2025).

At site ID: CARETOR-2023-C subplot 1A, all seven individuals (100%) survived, and six out of seven (86%) had seedheads (Plate 3.4-3). At subplot 2A, all five individuals (100%) survived and had seedheads. One recruit was observed with seedheads (Plate 3.4-4).

At site ID: CARETOR-2024-D, all four individuals (100%) survived and had seedheads (Plate 3.4-5).

Plate 3.4-3. Example of adult Torrey's sedge (tag 441) at site CARETOR-2023-C subplot 1A on June 9, 2025

Plate 3.4-4. Example of Torrey's sedge recruit with seed head (near tag 449) at site CARETOR-2023-C subplot 2A on June 9, 2025

Plate 3.4-5. Example of adult Torrey's sedge with seed head (tag 080) at site CARETOR-2024-D on August 17, 2025

3.4.4 Canada mountain-ricegrass (*Piptatheropsis canadensis)*

In 2025, population monitoring occurred at three sites: PIPTCAN-2023-C and PIPTCAN-2024-E (both at the Beatton Valley Trails location) and PIPTCAN-2024-D (in the Clayhurst area).

Site IDs: PIPTCAN-2023-C and PIPTCAN-2024-E were monitored on August 17, 2025. At site ID: PIPTCAN-2023-C (cohorts 1 and 2), seven of eight individuals (87%) had survived, and six of eight individuals (75%) had seedheads (Plate 3.4-6 and Plate 3.4-7). At site ID: PIPTCAN-2024-E, all five individuals (100%) had survived, and three of five individuals (60%) had seedheads.

Plate 3.4-6. Sample of Canada mountain-ricegrass (tag 077) monitored at site ID: PIPTCAN-2023-C-Cohort 2 (August 17, 2025)

Plate 3.4-7. Close up of Canada mountain-ricegrass (tag 073) seedhead monitored at site ID: PIPTCAN-2023-C-Cohort 2 (August 17, 2025)

Site ID: PIPTCAN-2024-D had undergone interim monitoring by Eagle Cap on June 7, 2025, to conduct a preliminary check on site condition, document plant presence (i.e., if signs of growth where the zip tie collars were placed?), collect notes on general plant condition and growth stage, and record signs of disturbance. Greening leaves were observed at each subplot (Plate 3.4-8), and seven of 45 translocated plants were starting to show budding inflorescences (Plate 3.4-9). Two subplots showed minimal signs of wildlife disturbance, where a few ground staples (holding down numbered tags) had been pulled from the ground and twist ties (to delineate planting locations) had been removed. These disturbed materials were replaced in the field.

Plate 3.4-8. Example of vegetative greening of Canada mountain-ricegrass (tag 061) monitored at site ID: PIPTCAN-2024-D subplot 6 (June 7, 2025; Eagle Cap photo)

Plate 3.4-9. Example of Canada mountain-ricegrass budding inflorescence monitored at site ID: PIPTCAN-2024-D (June 7, 2025; Eagle Cap photo)

Based on phenology in past years, Canada mountain-ricegrass can be more reliably detected in August when seedheads are usually visible. In 2025, population monitoring at this site occurred on August 18th. All 45 individuals (100%) had survived and 31 of 45 (69%) individuals were observed to have seedheads (Plate 3.4-10 and Plate 3.4-11). It was noted that many of the seeds themselves were not observed on the seedheads. It is recommended that this site is monitored earlier in August to capture more of the reproductive phase.

Plate 3.4-10. Sample of Canada mountain-ricegrass (tag 048) monitored at site ID: PIPTCAN-2024-D subplot 8 (August 18, 2025)

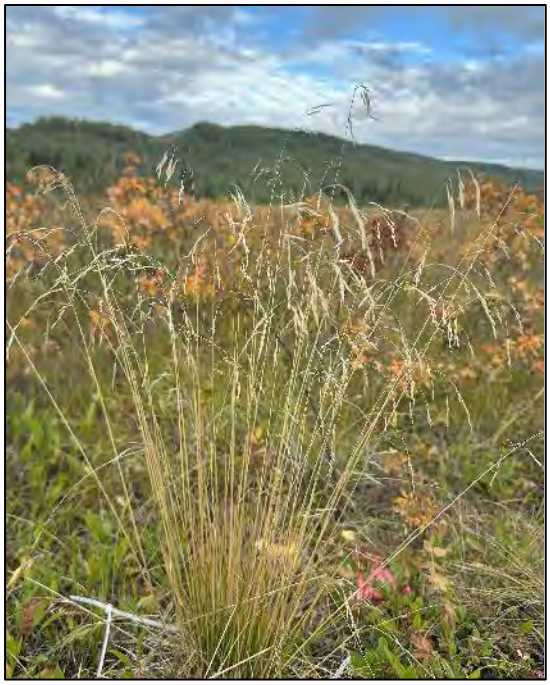


Plate 3.4-11. Sample of Canada mountain-ricegrass (tag 067) monitored at site ID: PIPTCAN-2024-D subplot 9 (August 18, 2025)

3.4.5 Prairie buttercup (*Ranunculus rhomboideus*)

Three prairie buttercup sites were monitored in 2025 - site IDs: RANURHO-2022-C (June 5), RANURHO-2023-E (subplots 1A and 2A; June 8 and 9), and RANURHO-2024-F (June 8).

Site ID: RANURHO-2022-C was monitored by Eagle Cap on June 5, 2025. In 2023, there were natural and anthropogenic disturbances observed on the crown parcel (installation of electric fence, cattle grazing, clearing, and beaver activity). In 2025, Eagle Cap did not notice signs of cattle grazing, and the wire gate installed in 2023 was down and open. Some vehicle tracks, cut trees, drilled holes, and flagging were observed within the fence line, but away from the planting area. Activity observed in the area indicates a possible pipeline or related facility being installed. In addition, new beaver disturbance was observed within the planting area (e.g., felled trees) resulting in some damage to the site. The beaver pond was drawn down and the site appeared quite dry.

Eight of nine clumps (89%) of prairie buttercup that were salvaged and translocated in 2022 had surviving individuals in 2025 (Plate 3.4-12). Seven of nine clumps (78%) showed individuals with inflorescences and five of nine clumps (56%) showed individuals with seedheads (Plate 3.4-13).

Plate 3.4-12. Beaver activity at site ID: RANURHO-2022-C (June 5, 2025; Eagle Cap photo)

Plate 3.4-13. Example of inflorescence and developing seedhead on a monitored adult prairie buttercup at site ID: RANURHO-2022-C (June 5, 2025; Eagle Cap photo)

At site ID: RANURHO-2023-E (Beatton Valley Trail location), all ten individuals from both sites (1A and 2A – Cohort 1) survived and nine of ten individuals were producing multiple seedheads (as many as 26 seedheads). At the same site, cohort 2 which was planted in 2024, had six surviving individuals of eight (75%) in which four of eight individuals (50%) showed seedheads (Plate 3.4-14). A total of 16 recruits were observed from both cohorts 1 and 2 at this site (Plate 3.4-15).

At site ID: RANURHO-2024-F, all seven individuals (100%) survived and produce seedheads (as many as 24) despite having suffered frost damage during transport before being planted in the previous spring. Four recruits were observed at this site. However, during interim monitoring on August 17, 2025, many more recruits were observed (Plate 3.4-16).

Plate 3.4-14. Example of individual prairie buttercup (tag 009) seedheads on June 9, 2025 (site ID: RANURHO-2023-E-1A-Cohort 2)

Plate 3.4-15. Example of prairie buttercup recruit (circled in yellow; parent tag 010) observed on June 9, 2025 (site ID: RANURHO-2023-E-1A-Cohort 2)

Plate 3.4-16. Prairie buttercup recruits observed during interim monitoring (site ID: RANURHO-2024-F; August 17, 2025)

3.4.6 Slender penstemon (*Penstemon gracilis*)

Slender penstemon at PENSGRA-2020-A and PENSGRA-2020-B were monitored on August 17 and 18, 2025. The slender penstemon at PENSGRA-2021-C (near Hudsons' Hope) were monitored on August 17, 2025.

Nineteen of 25 individuals (76%) at PENSGRA-2020-A were assessed and had survived. Fourteen of the individuals (56%) had developed seedheads (Plate 3.4-17 and Plate 3.4-18). Of the ten individuals monitored at PENSGRA-2020-B, four survived (4%); and three of the survivors (3%) had developed seedheads. No recruits were observed.

Plate 3.4-17. Sample of slender penstemon with inflorescences and developing seed pods at site ID: PENSGRA-2020-A (August 17, 2025)

Plate 3.4-18. Sample of slender penstemon developing seedheads at site ID: PENSGRA-2020-A (August 17, 2025)

At site ID: PENSGRA-2021-C-Cohort 2 (individuals planted on the aeolian cap), five of thirteen plants monitored (38%) were present when monitored on August 17, 2025, in which two out of 13 plants (15%) were developing seedheads. One recruit was detected at this site.

3.5 Preliminary Data Analysis

Five species across nine sites were selected for analysis in 2025: Sprengel's sedge, slender penstemon, Torrey's sedge, Canadian mountain-ricegrass, and prairie buttercup. These species and sites were chosen because multiple years of monitoring data are available, making them well suited for exploratory analysis of emerging patterns. Sites with four years of data or more were prioritized for preliminary analysis. Analysis of different species, sites, and cohorts will expand each year as more monitoring data is collected.

3.5.1 Sprengel's sedge (*Carex sprengelii*)

Sprengel's sedge varied in survival between cohorts within the analyzed site (CARESPR-2020-B-1B [Site B]; Figure 3.5-1). Survival was higher in Cohort 1 than Cohort 2, though mortality between 2024 and 2025 reduced Cohort 1 survival considerably (Table 3.5-1). Cohort 2 individuals were monitored the same year

as transplantation, which indicated that the majority of mortality occurred that year, with the survival remaining relatively stable in subsequent monitoring years. This may suggest that transplant shock has led to the initial mortality in this cohort. It should be noted that sample size was low for this species (ranging from 5-11 individuals per cohort; Table 3.5-1), which should be taken into consideration when interpreting the results.

Reproductive characteristics varied between cohorts as well. Cohort 1 individuals flowered in alternating years, while Cohort 2 individuals only appeared to have flowered in 2024. Reproductive output varied between cohorts but was generally 1-3 flowering stems per individual with a peak of 2.8 average flowering stems (Cohort 1, 2021).

Recruitment was low in both sites, with only a single new seedling detected in 2022 in Cohort 1. The low recruitment may be due to small number of individuals transplanted or may indicate that soil or microsite conditions are not suitable for germination of Sprengel's sedge seeds. For example, this site has been observed to be drier compared to other Sprengel's sedge planting sites.

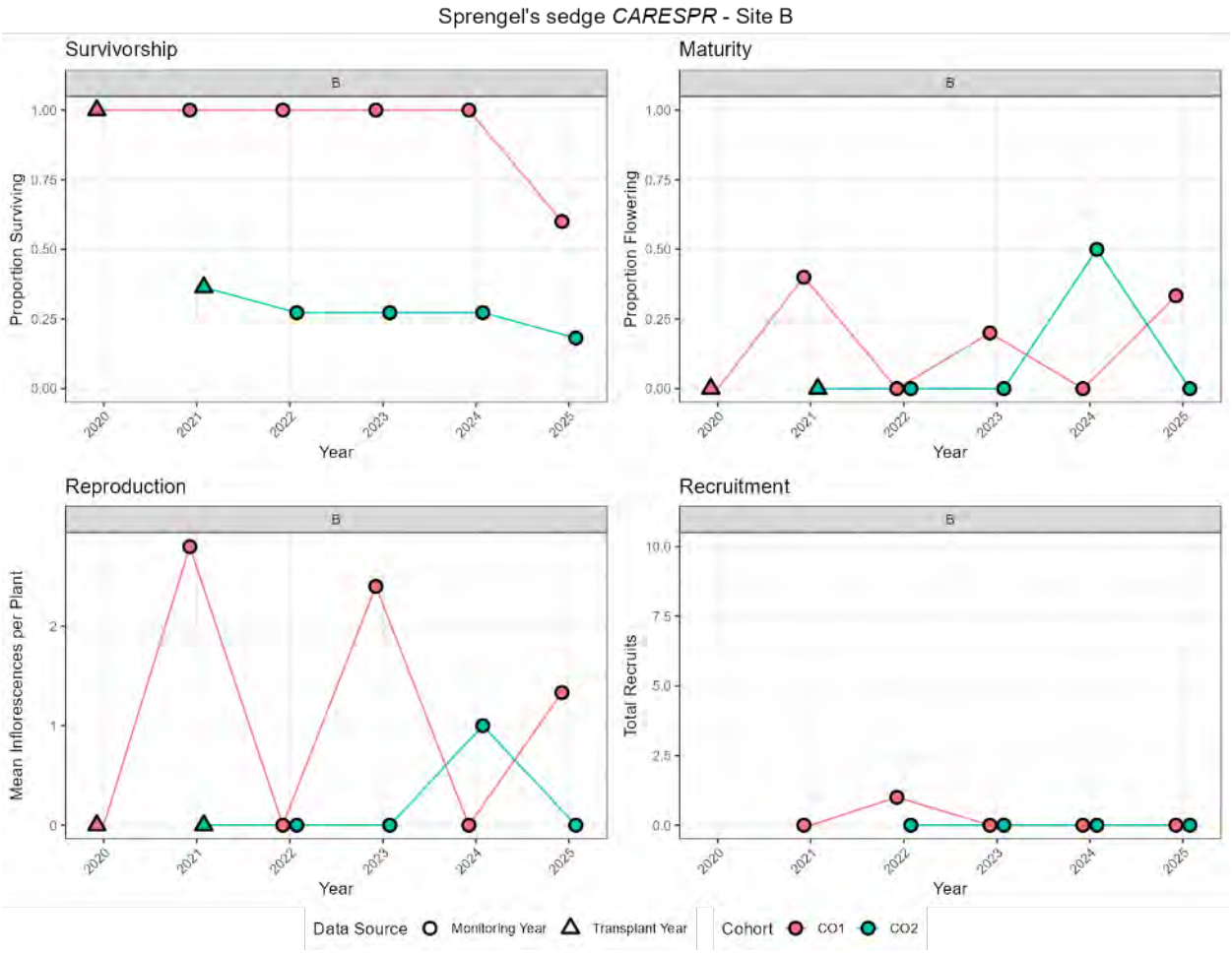


Figure 3.5-1. Patterns of survival, flowering, reproduction, and recruitment over time for Sprengel's sedge at Site B (CARESPR-2020-B-1B). Site data are faceted into separate paired plots for each trait, with cohorts represented with different colored lines within sites.

Table 3.5-1. Summary statistics of transplant traits for Sprengel's sedge

Site ID	Cohort	Year	Average Survivorship	Average Maturity	Average Reproduction	Total Recruits	Sample Size
B	CO1	2020	1	0	0	0	5
	CO1	2021	1	0.4	2.8	0	5
	CO1	2022	1	0	0	1	5
	CO1	2023	1	0.2	2.4	0	5
	CO1	2024	1	0	0	0	5
	CO1	2025	0.6	0.33	1.33	0	5
	CO2	2021	0.36	0	0	0	11
	CO2	2022	0.27	0	0	0	11
	CO2	2023	0.27	0	0	0	11
	CO2	2024	0.27	0.5	1	0	11
	CO2	2025	0.18	0	0	0	11

3.5.2 Torrey's sedge (*Carex torreyi*)

Torrey's sedge exhibited 100% survivorship in all monitoring years at site CARETOR-2021-A (Site A; Cohort 1; Figure 3.5-2). While the sample size was small (nine individuals total; Table 3.5-2), this indicates strong transplant success.

While Torrey's sedge transplants took two years to reproduce, reproductive maturity began proportionally high (75% in 2023) and increased in the following year, with reproductive output increasing as well from 2.25 to 6.5 inflorescences on average.

On the other hand, no recruits were detected in any of the monitoring years despite the reproductive output seen in 2023 and 2024. This is at least partially driven by difficulty with positive seedling detection as is often the case with graminoid species. Monitoring in subsequent years should be able to differentiate between graminoid species recruitment as seedlings mature and display more diagnostic characteristics.

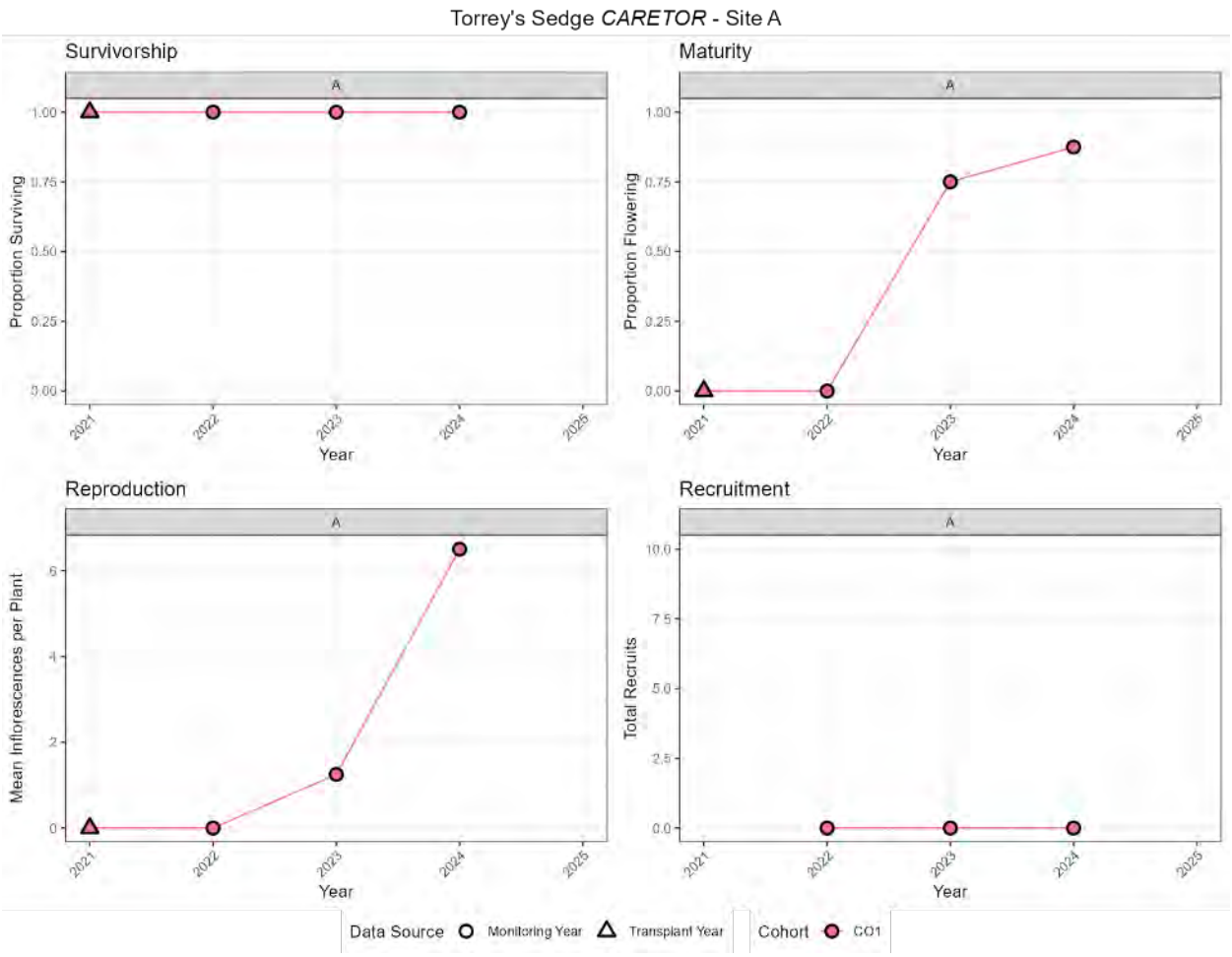


Figure 3.5-2. Patterns of survival, flowering, reproduction, and recruitment for Torrey's sedge at Site A (CARETOR-2021-A).

Table 3.5-2. Summary statistics of transplant traits for Torrey's sedge

Site ID	Cohort	Year	Average Survivorship	Average Maturity	Average Reproduction	Total Recruits	Sample Size
A	CO1	2021	1	0	0	NA	8
	CO1	2022	1	0	0	0	8
	CO1	2023	1	0.75	1.25	0	8
	CO1	2024	1	0.88	6.5	0	8

3.5.3 Canada mountain-ricegrass (*Piptatheropsis canadensis*)

Canada mountain-ricegrass survival stabilized at 60% (3 out of 5 individuals total) in all monitoring years after transplantation (Figure 3.5-3; Table 3.5-3).

Similar to Torrey's sedge, Canada mountain-ricegrass transplants took two years to become reproductive and then maintained a high proportion of flowering individuals. The average number of inflorescences ranged between ~1-3 in years where plants were reproductive.

No Canadian mountain-ricegrass recruits were detected in any of the monitoring years. Like Torrey's sedge, positive identification of Canada mountain-ricegrass seedlings is difficult, which may have contributed to the lack of detection.

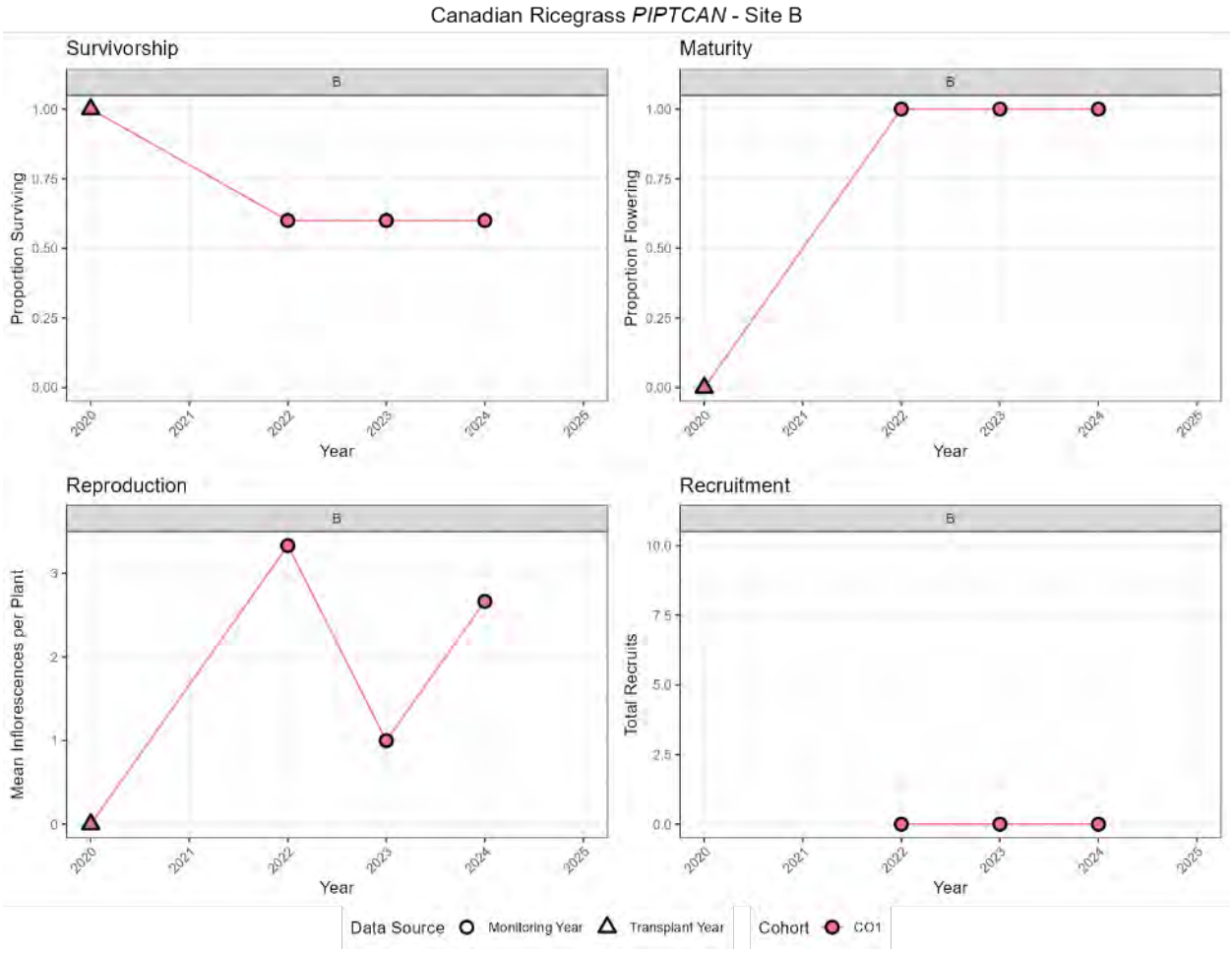


Figure 3.5-3. Patterns of survival, flowering, reproduction, and recruitment for Canada mountain-ricegrass at Site B (PIPTCAN-2020-B).

Table 3.5-3. Summary statistics of transplant traits for Canada mountain-ricegrass

Site ID	Cohort	Year	Average Survivorship	Average Maturity	Average Reproduction	Total Recruits	Sample Size
B	CO1	2020	1	0	0	NA	5
	CO1	2022	0.6	1	3.33	0	5
	CO1	2023	0.6	1	1	0	5

Site ID	Cohort	Year	Average Survivorship	Average Maturity	Average Reproduction	Total Recruits	Sample Size
	CO1	2024	0.6	1	2.67	0	5

3.5.4 Prairie buttercup (*Ranunculus rhomboideus*)

Prairie buttercup survival was generally high across all three sites analyzed (RANURHO-2021-A [Site A], RANURHO-2021-B [Site B], RANURHO-2022-C [Site C]), with the exception of Cohort 1 at Site B in which all had died the year of transplantation (Figure 3.5-4). Site A (Cohort 2) had the lowest survivorship, with 71% of plants surviving in 2024.

Reproductive maturity varied across sites and years, with an alternating pattern at Sites B and C but lower overall at Site A. The average number of inflorescences was relatively low across all sites, ranging between 0 and 3 depending on the year. Site A had low inflorescence production with an average of 0.5 or less in the years that individuals flowered.

Recruitment was low except for at Site A, where 13 recruits were found in 2024. This level of recruitment, coupled with the relatively high proportion of surviving transplants, represents an early indication of successful population establishment for prairie buttercup.

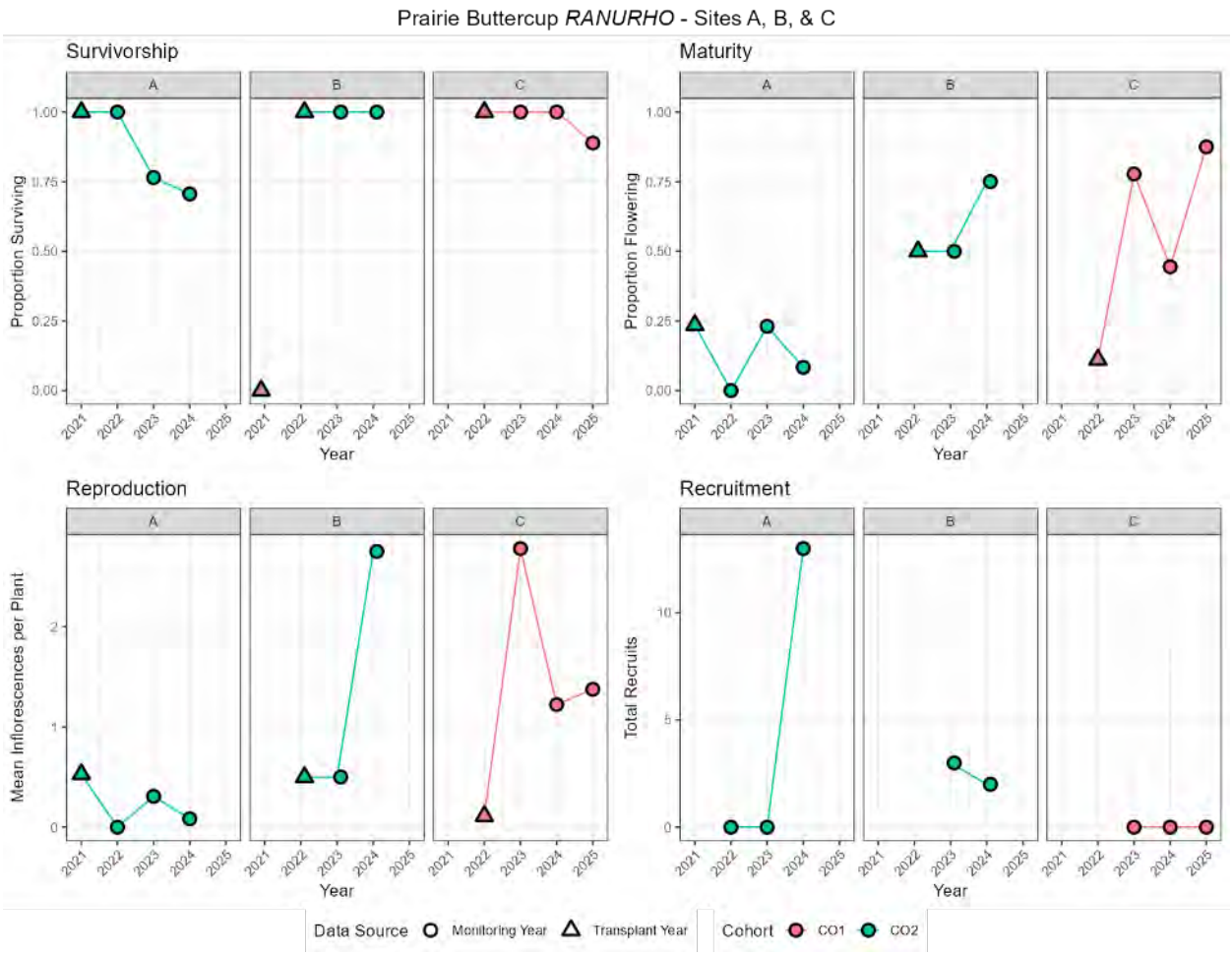


Figure 3.5-4. Patterns of survival, flowering, reproduction, and recruitment for prairie buttercup at Sites A, B, and C (RANURHO-2021-A, RANURHO-2021-B, RANURHO-2022-C). The data for sites are faceted into separate paired plots for each trait, with cohorts represented with different colored lines within sites.

Table 3.5-4. Summary statistics of transplant traits for prairie buttercup

Site ID	Cohort	Year	Average Survivorship	Average Maturity	Average Reproduction	Total Recruits	Sample Size
A	CO2	2021	1	0.24	0.53	-	17
	CO2	2022	1	0	0	0	17
	CO2	2023	0.77	0.23	0.31	0	17
	CO2	2024	0.71	0.08	0.08	13	17
B	CO1	2021	0	-	-	-	15
	CO2	2022	1	0.5	0.5	-	4
	CO2	2023	1	0.5	0.5	0	4
	CO2	2024	1	0.75	2.75	2	4
C	CO1	2022	1	0.11	0.11	-	9

Site ID	Cohort	Year	Average Survivorship	Average Maturity	Average Reproduction	Total Recruits	Sample Size
	CO1	2023	1	0.78	2.78	0	9
	CO1	2024	1	0.44	1.22	0	9
	CO1	2025	0.89	0.88	1.38	0	9

3.5.5 Slender penstemon (*Penstemon gracilis*)

Slender penstemon survival remained high over time at Sites A and C (PENSGRA-2020-A and PENSGRA 2021-C respectively), but showed a marked decline at Site B (PENSGRA-2020-B), where survival dropped to 0% in Cohort 1, and 10% in Cohort 2 by 2025 (Figure 3.5-5; Table 3.5-5). This sharp decline may reflect unfavorable site conditions at Site B, such as soil composition, microclimate, or other environmental factors that were less suitable for slender penstemon survival. For example, the record-breaking heat wave in 2021 and subsequently drier seasons in 2022 and 2023 may have impacted survival, reproduction, as well as recruitment.

All cohorts showed a pattern of maximum proportion flowering the first year that flowering was detected, with a subsequent decline in later monitoring years. This could be explained by a shift in condition from growing in a plant nursery to adapting to natural conditions. Average inflorescences per plant was typically ~4 or fewer (Table 3.5-5).

Recruitment was minimal across all three sites. No recruits were observed at Site A, while Site B recorded two recruits in 2021, and Site C had one recruit in 2023. Given the substantial proportion of individuals that reached reproductive maturity, it is unlikely that low recruitment was caused by insufficient reproductive output. Instead, the limited recruitment is more plausibly attributed to unfavorable conditions for seed germination and establishment, such as inadequate soil moisture, competition, or other site-specific environmental constraints.

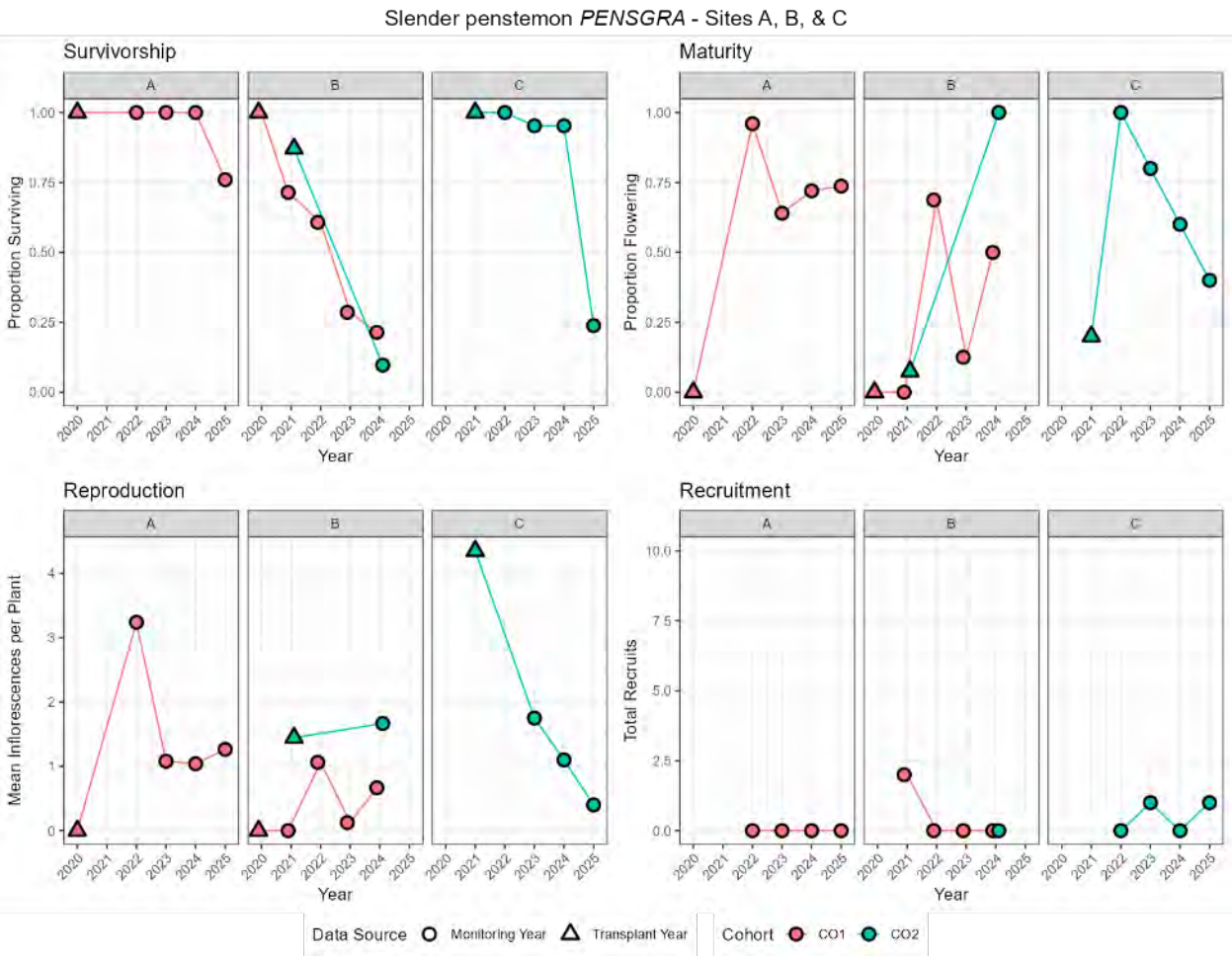


Figure 3.5-5. Patterns of survival, flowering, reproduction, and recruitment for slender penstemon at Sites A, B, and C (PENSGRA-2020-A, PENSGRA-2020-B, PENSGRA-2021-C). The data for sites are faceted into separate paired plots for each trait, with cohorts represented with different colored lines within sites.

Table 3.5-5. Summary statistics of transplant traits for slender penstemon

Site ID	Cohort	Year	Average Survivorship	Average Maturity	Average Reproduction	Total Recruits	Sample Size
A	CO1	2020	1	0	0	-	25
	CO1	2022	1	0.96	3.24	0	25
	CO1	2023	1	0.64	1.08	0	25
	CO1	2024	1	0.72	1.04	0	25
	CO1	2025	0.76	0.74	1.26	0	25
B	CO1	2020	1	0	0	-	28
	CO1	2021	0.71	0	0	2	28
	CO1	2022	0.61	0.69	1.06	0	28

Site ID	Cohort	Year	Average Survivorship	Average Maturity	Average Reproduction	Total Recruits	Sample Size
	CO1	2023	0.29	0.13	0.13	0	28
	CO1	2024	0.21	0.5	0.67	0	28
	CO1	2025	-	-	-	-	-
	CO2	2021	0.87	0.07	1.44	-	31
	CO2	2024	0.10	1	1.67	0	31
C	CO2	2021	1	0.2	4.35	-	21
	CO2	2022	1	1	-	0	21
	CO2	2023	0.95	0.8	1.75	1	21
	CO2	2024	0.95	0.6	1.1	0	21
	CO2	2025	0.24	0.4	0.4	1	21

3.5.6 Data Analysis Summary

The same analytical approach developed for the 2024 Annual Report (EcoLogic 2024) was implemented in 2025, adding three new species to the analysis and re-analyzing two species from 2024 that had additional cohort data available. The types of analyses and results structure remained the same from last year, but the script logic was revised to be more robust to the complexities of the transplant data (e.g., backfilling survival and missing data / denominator handling when necessary). The script has also been fully automated which will facilitate efficient repeat analyses in the coming years of the program.

Similar to 2024 results, species performance varied considerably among species, sites, cohorts, and years. Sprengel's sedge exhibited mixed survival among cohorts at Site B (CARESPR-2020-B-1B), with a sharp decline in 2025 in the more successful of the two cohorts. Reproductive maturity and output remain inconsistent between the two cohorts but was generally low and only one recruit has been detected in the five years Site B has been monitored.

Slender penstemon has shown considerable declines in survival, with two out of three sites having <25% survival in 2025 (PENSGRA-2020-B [Site B] and PENSGRA 2021-C [Site C]). One of the sites (PENSGRA-2020-A [Site A]) still has 75% surviving, however, and has shown a high proportion of flowering individuals – though recruitment has yet to be detected at that site. The declining trend in survival over time and low detection of recruits may also suggest lower probability of establishment for this species at the analyzed Sites.

Torrey's sedge and Canada mountain-ricegrass both had small sample sizes which makes it difficult to extrapolate their establishment success at this stage, but survival remains at 100% for Torrey's sedge and 60% for Canada mountain-ricegrass which indicates that both species are amenable to transplantation. While recruits have not been detected for either species so far at the sites analyzed, species identification at the seedling stage for graminoids is exceedingly difficult, and both species have reached a high

proportion of flowering individuals by 2025. The detection rate of recruits for graminoid species in this program may increase as plants mature and exhibit the diagnostic morphological features required for positive identification.

Prairie buttercup has exhibited high survival at all three Sites analyzed and favorable levels of reproductive maturity at two out of three. Interestingly, the site showing the lowest reproductive potential also produced the most recruits, which highlights the unpredictable nature of transplant experiments and the trajectory of plant population establishment. If survival rates continue to remain high and recruitment continues into the future, prairie buttercup could have a higher probability of establishment than those exhibiting population crashes and a dearth of recruitment.

At all sites analyzed thus far, many of the declines in survival, reproduction, and recruitment could be attributed to the effects of unseasonably dry conditions within the last four years (since the record-breaking heat wave in 2021). Plants translocated at sites and microsites that are able to retain more moisture and recuperate from harsher conditions may increase the likelihood of establishing successful populations if drier conditions continue to persist.

3.6 YEAR IN REVIEW SUMMARY

This section summarizes what was achieved in 2025 from goals established at the end of year 2024. The goals and efforts taken for 2025 are summarized in Table 3.6-1.

Table 3.6-1. Summary of goals achieved in 2025

2024 Goals	Achievement Status (2025)	Details
Focus propagule collection efforts on Torrey's sedge. Forty-two seeds were collected *in-situ* and sent to the native plant nursery for propagation in 2024.	Ongoing	No seeds have been collected in 2025; however, the forty-two seeds collected in 2024 are currently in stratification to be germinated for 2026. *In-situ* collection from translocated individuals will be prioritized in 2026.
Generate new plants from the Canada mountain-ricegrass seeds at native plant nurseries.	✓	50 1-Gallon pots were planted out in 2025 with 32 pots remaining and 20 grams of seed collected. Seventy-seven grams remain in the seedbank.
Generate a seed bank and new stock for species with lower germination rates (i.e., Torrey's sedge).	Ongoing	The 42 seeds collected in 2024 will help produce new stock for future translocation.
Translocation efforts will continue to focus on distributing plants across a larger number of recipient sites to build resilience into the	Ongoing	Canada mountain-ricegrass was planted at a new location (Area E) in 2025 and two existing sites were

2024 Goals	Achievement Status (2025)	Details
program and help alleviate the impacts of stochastic events (e.g., floods, fires, landslides) on the overall program objectives.		enhanced with more plantings of Sprengel's sedge and Torrey's sedge (see Section 3.3: Translocation Implementation for further details). Expanding recipient sites or microsites for prairie buttercup will be considered in 2026.
Translocation will occur in the spring for those species that naturally occur in dryland habitats to facilitate establishment and survivability when moist conditions are more readily available.	✓	All translocation efforts in 2025 occurred in the spring.
Understand facets of population dynamics of select target species through statistical analysis.	In Progress	Preliminary data analysis has commenced in 2024 for four species, and three more species were analyzed in 2025 (Torrey's sedge, Canada mountain-ricegrass, and prairie buttercup). The analysis of different species, sites, and cohorts will expand each year as more monitoring data is collected.
Improve the detectability of species using alternate markings that are more visible throughout the entire growing season.	✓	Zip tie rings were placed around all translocated Torrey's sedge and Canada mountain-ricegrass in 2025. The ziptie rings have improved the detection of these species for monitoring. Rose collars may be removed for more established prairie buttercup sites and ziptie rings may assist with detecting this species for future monitoring.
Identify opportunities for improvement within an adaptive management framework.	✓	Ongoing maintenance to previously installed cages and collars, weed removal, and watering are some of the opportunities identified in 2025.

3.7 DISCUSSION

The program is transitioning to a stronger focus on monitoring, with a heightened emphasis on ensuring the detectability of both existing plants and new recruits. In this shift, substantial efforts will be invested in refining detection methods to accurately track plant populations over time. Additionally, the program

will place greater attention on analyzing key ecological patterns- survivability, maturation, reproduction, and recruitment of new plants, to better understand longer-term patterns and inform future management strategies.

As all phases of the program work concurrently, an adaptive management framework is being used to identify and implement improvements throughout the program's duration.

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APPENDIX A. REGULATORY REQUIREMENTS

Environmental Assessment Certificate (EAC) Conditions

Condition 9 of the EAC requires:

The EAC Holder will engage the services of a Rare Plant Botanist during construction to design and implement an experimental rare plant translocation program in consultation with British Columbia Ministry of Environment (BC MOE) using the MOE's Guidelines for Translocation of Plant Species at Risk in British Columbia (Maslovat 2009).

Condition 14 of the EAC requires:

The EAC Holder must develop a Vegetation and Ecological Communities Monitoring and Follow-up Program for the construction phase and first 10 years of the operations phase. The Vegetation and Ecological Communities Monitoring and Follow-up Program must be developed by a QEP.

The Vegetation and Ecological Communities Monitoring and Follow-up Program must include at least the following:

- *Definition of the study design for the rare plant translocation program (see Condition 9).*
- *Plan for following-up monitoring of any translocation sites to assess the survival and health of translocated rare plant species, under the supervision of a Rare Plant Botanist.*
- *Measurement criteria, including vegetation growth, persistence of rare plants and establishment / spread of invasive plant species, and associated monitoring to document the effectiveness of habitat enhancement and possible compensation programs.*

The Vegetation and Ecological Communities Monitoring and Follow-up Program reporting must occur annually during construction and the first 10 years of operations, beginning 180 days following commencement of construction.

Decision Statement Conditions

The Federal Decision Statement (FDS) Condition 16 subsections that are relevant to the ERPT program are listed below:

> *16.1. The Proponent shall ensure that potential effects of the Designated Project on species at risk, at-risk and sensitive ecological communities, and rare plants are addressed and monitored.*
>
> *16.2. The Proponent shall develop, in consultation with Environment Canada, a plan setting out measures to address potential effects of the Designated Project on species at risk, at-risk and sensitive ecological communities and rare plants.*
>
> *16.3. The plan shall include:*
>
> *16.3.3 Measures to mitigate environmental effects on species at risk and at-risk and sensitive ecological communities, and rare plants.*
>
> *16.3.4 Conservation measures to ensure the viability of rare plants, such as seed recovery and plant relocation.*

APPENDIX B. POTENTIAL RECIPIENT SITE SELECTION METHODS & RESULTS MEMO

EAGLE CAP CONSULTING
environmental consulting services

MEMO

Date: November 13, 2025

To: Natasha Bush (EcoLogic)

From: Randy Krichbaum (Eagle Cap), Margaret Krichbaum (Eagle Cap)

Subject: Site C ERPT Program: Potential Recipient Site Selection Methods & Results

INTRODUCTION

An important component of the Site C Experimental Rare Plant Translocation (ERPT) program is the selection of suitable recipient sites for planting of propagules collected from the project activity zone. Program planning in the spring of 2025 identified a need for additional recipient sites to accommodate the propagules available for outplanting. This memo outlines the methods and results of the recipient site selection work performed in 2025.

The goal of this work was to locate and document suitable recipient sites for planting of rare plant propagules (seeds, achenes, spores, and started plants). The sites needed to meet a number of criteria regarding habitat (both biotic and abiotic components), accessibility, and geographic location.

METHODS

Prefield Review

A prefield review was conducted to identify and delineate possible recipient areas for later verification in the field. The review followed a structured workflow designed to locate the optimal planting locations based on the desired site characteristics.

A team of two qualified botanists completed all of the prefield and field portions of this work, in consultation with the ERPT program manager. The botanists have performed extensive rare plant work in the BC Peace River area, and as such are familiar with both the habitat requirements of rare species and the logistics of working in the Peace Region.

Two of the nine taxa currently in the ERPT program as of the spring of 2025 were selected by the program manager as being in need of additional recipient sites for translocation: Canada ricegrass (*Piptatheropsis canadensis*) and tall wood beauty (*Drymocallis arguta*). Specifically, the program manager requested an evaluation of the habitats present at the decommissioned Area E aggregate pit (disturbed and undisturbed native remnant grasslands as well as revegetated pit areas) to determine if any could serve as translocation recipient sites for Canada ricegrass. Additionally, because it was unknown in the spring of 2025 if tall wood beauty would retain its rare-list status in BC once the 2025 British Columbia Conservation Data Centre (BCCDC) status review was complete, the program manager requested one or more recipient sites for the species be made available in case the need arose.

The project botanical team met in May of 2025 to review the target species list and define desired recipient site characteristics for Canada ricegrass and tall wood beauty. Each desired site characteristic was also assigned a weighting to reflect its relative importance to successful propagule establishment. This allowed for the potential recipient sites to be ranked for suitability following the field visits.

The prefield review identified 13 desirable characteristics of the potential recipient sites. While no potential recipient site can meet all of the listed criteria, the intent of the work was to locate the best possible sites given the limitations present. An ideal site would have the following characteristics:

1. contain suitable high-quality habitat for the specific rare plant taxon
2. be located in the Peace River region of BC
3. be located on land owned by BC Hydro or on Crown land
4. not be located on lands requiring access through a locked gate or other owner permission
5. not be located in the Site C Project Activity Zone (PAZ)
6. not be located below the reservoir preliminary Erosion Impact Line (EIL - a precautionary estimate of the amount of erosion that could occur over a 100 year period)
7. be accessible by road or boat during the entire growing season
8. have a low likelihood of future disturbance (grazing, agricultural, industrial, etc.)
9. have a low percentage of non-native plants
10. have good cell service
11. be more than one kilometre from known occurrences of the same taxon
12. not contain known occurrences of other rare plant taxa
13. be close to a source of water

A literature review was conducted for each of the nine species in the 2025 ERPT program to evaluate any new information relevant to the translocation work. This included checks of recent BCCDC information to uncover any new element occurrences or changes to rare status, and a Google Scholar search for literature on the nine species published since 2024. The review supplemented literature searches conducted in previous years for the translocation project. Queries were also run on the project rare plant database to uncover apparent habitat associations for Canada ricegrass and tall wood beauty based on updated field data.

The habitat needs for Canada ricegrass and tall wood beauty were then reviewed in order to aid in the visual evaluation of aerial imagery. These habitat affinities were: moist to dry, shrubby to open, level to sloped, aspect variable, good condition native low- to mid-height shrub grassland or edges of deciduous or mixed woodlands.

Using the list of desired site characteristics, the habitat types, and other collected information, Geographic Information System (GIS) layers were visually examined and potential recipient sites were selected. Primary GIS layers used for this phase of the prefield review were:

- aerial imagery of the BC Peace River region;
- property ownership provided by BC Hydro;
- known element occurrences of the target taxa;
- potential recipient sites documented in previous years;
- the Site C Project Activity Zone; and
- the preliminary Erosion Impact Line.

Field Verification

Once recipient areas had been marked in the GIS, selected sites were inventoried in the field to determine suitability. Suitable Potential Recipient Sites (PRS) were evaluated and documented, with the data entered into a digital form for later analysis. Data elements collected included all those typically required by the BCCDC to document rare vascular plant element occurrences, as well as ratings for each of the 13 desired site characteristics.

Potential recipient sites were selected partially based on distance to other planting sites, with the aim of distributing them over a wide geographical extent. In some instances, a potential site was found to contain suitable habitat for several ERPT program species in close proximity, and this was noted in the site evaluation. While this does provide the option to plant other ERPT program species at the same site, with the consequent increased risk of a single disturbance event impacting multiple species, the limited number of suitable sites available necessitated using one site for several species in some cases. In addition, Canada ricegrass and tall wood beauty can occur together with several of the program species in wild populations.

RESULTS

Prefield Review

The literature search uncovered four recent references containing information potentially relevant to the translocation of the ERPT program species:

- *Identifying predictors of translocation success in rare plant species* (Bellis, Osazuwa-Peters, et al. 2024);
- *Disentangling the effects of population mixing and propagule amount in rare plant translocations* (Bürli et al. 2025);
- *The relative influence of geographic and environmental factors on rare plant translocation outcomes* (Bellis et al. 2025); and
- *Advancing the science and practice of rare plant conservation with the Center for Plant Conservation Reintroduction Database* (Bellis, Albrecht, et al. 2024).

The queries run on the Site C rare plant database to identify habitat associations for Canada ricegrass and tall wood-beauty did not suggest any new correlations that had not been uncovered in previous years.

One new planting area that appeared to have a high likelihood of meeting the requirements for a tall wood beauty recipient site was selected from the examination of the GIS layers. The most weight was given to the *appropriate habitat types* and *ease of legal access* criteria. The area was thought to contain habitat for multiple rare taxa. Not all potential planting areas in the BC Peace Region were considered; rather the review focussed on areas that appeared to be easily accessible by road from Fort St. John. Therefore, if additional potential recipient sites are required in the future, the as-yet unreviewed portions of the BC Peace region remain for consideration.

The remainder of the PRS points used for the 2025 tall wood beauty recipient site evaluation work had been generated previously, during the prefield reviews completed in 2024 for the project.

Field Verification

The team of two botanists performed the field verification work between June 5 and 7, 2025.

A review of the habitats present at the decommissioned Area E aggregate pit was performed. The surveyors determined that the undisturbed native remnant grassland areas were the most suitable for translocation of Canada ricegrass, but that if desired, the Program Manager could also install several Canada ricegrass plants in the disturbed native grassland and revegetated portions of the decommissioned pit. Several microsites were marked on the ground.

Secondly, a review of previously generated PRS sites for tall wood beauty was conducted in the field, to verify that all sites were outside of the filled Site C reservoir and still available for use. This review was accomplished by driving the extent of the new reservoir along Highway 29; in most cases, the surveyors were able to verify the general PRS site availability without making field checks on the ground.

One additional new recipient site for tall wood beauty was documented, downstream of the Site C reservoir near the Alberta border along Clayhurst Road. The location, approximately 90 km from Fort St. John, met most of the criteria for a desirable recipient site.

It should be noted that during the course of the field verification surveys, one new patch of Canada ricegrass and one new occurrence of fennel-leaved desert-parsley *(Lomatium foeniculaceum* ssp*. foeniculaceum)* were discovered.

Discussion

The primary goals of the 2025 work were to evaluate the decommissioned Area E aggregate pit as a possible Canada ricegrass recipient site, and to locate an additional suitable recipient site for tall wood beauty, based on the 13 criteria listed in the Methods section above. During the course of the field verification, it became clear that the first 11 criteria were relatively easy to meet (that is, accessible planting areas outside of the Site C PAZ and EIL, on Crown or BC Hydro land near the Peace River, which contain appropriate rare plant habitat, low levels of both non-native plants and disturbance, have good cellular coverage, and are close to a source of water).

However, the final two criteria proved much more challenging (planting areas greater than one kilometre from known sites of the same taxon and not already occupied by other rare plant species). While the prefield review specifically avoided known rare plant sites in choosing potential planting areas to evaluate, it was anticipated that new rare plant occurrences would be discovered since the goal was to target high-quality rare plant habitats. Thus, two new rare plant sites were documented by the survey team during the field verification process in 2025. The surveyors attempted to avoid the new and previously known rare plant sites when placing PRS plots and marking supplemental planting locations, but this was not always possible: at both of the recommended planting sites, PRS plots had to be placed in the vicinity of other naturally-occurring rare plant

populations. However, this compromise was considered acceptable considering that naturally-occurring multi-species rare plant sites are frequently found in the BC Peace region.

Therefore, given the above caveats, the decommissioned Area E aggregate pit and the new recipient site recommended for tall wood beauty in 2025 met the majority of the requirements of an ideal recipient site. The sites are on Crown parcels and contain habitat suitable for Canada ricegrass and tall wood beauty (as well as other species in the ERPT program).

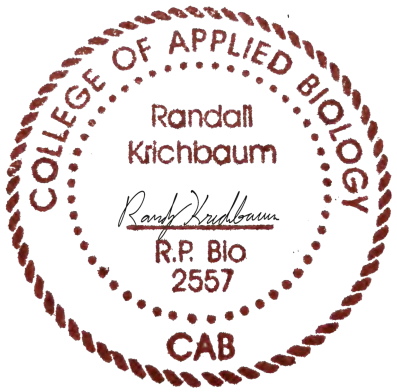
It should be noted however that in September, the BCCDC published the rare status updates for 2025: tall wood beauty was removed from the Blue list and moved to the Yellow list, therefore it no longer qualifies as a rare plant for the ERPT program. The status of Canada ricegrass was left unchanged (BCCDC 2025).

Closure

Reviewed and approved:

Randy Krichbaum M.Sc., R.P. Bio., P. Biol.
Senior Ecologist
Eagle Cap Consulting Ltd.

<Original signed and sealed November 13, 2025 at Calgary, Alberta>



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APPENDIX C. DATA CAPTURE FORM – TRANSLOCATION

Experimental Rare Plant Translocation Program

ECOLOGIC	**TRANSECT / PLOT / INDIVIDUAL** **Data Capture Form**	SITE + T/P	[S-_____] +
		Data Sheet Tracking Number	

Data Recorder:		*Team:*	

TRANSECT / PLOT Level Information		**TRANSECT or PLOT**	*specify*	**ID:**	

Species Name	**Recipient Site Name**	**UTMZone**	**Easting**	**Northing**	**Elev. (m)**	**Plot Solocator Photos**
dd	dd					

Outplanting Conditions			**Nursery**	dd	
Date(yymmdd)	**Weather Cond**	**Ambient Temp (*C)**	**Date Removed**	**Plug Size (mm)**	**Growth Media**

TRANSECT or PLOT		**MAP**	Y/ N	**subPLOT Information**		
Dimensions (m x m)	**Shape & Orientation**	**Loc. of Map**		**subPlot ID**	**Dimensions (m x m)**	**subPL Photos**
		dd		dd		

General Comments	

PLANT OBVS	*Example*																									
TAG NUMBER	94																									
Plant Presence	psent																									
Plant Condition	dead																									
Inflorescences (#)	4																									
Seeds (#heads /pods)	1																									
Implem / Monitor	mon																									
Photos	meth																									
Height (cm)	3																									
Surf.Area cm2	200																									
%CV of Surf. Area	40																									
Soil Mositure	ories																									
Soil Temperature	deg C																									
Mulch Type	osses																									
Mulch Depth	2																									
MicroCatch Created	s / no																									
Damage1 Type	down																									
Damage1 Extent	down																									
Damage2 Type	down																									
Damage2 Extent	down																									
Damage3Type	down																									
Damage3 Extent	down																									
Planter (name)	Bush																									

Species	**Recip. Site**	**Nursery**	**Loc. of Map**	**subPlotID**	**Plant Presence**	**Plant Cond.**	**Inflorescences (#)**	**Seeds (#heads /pods)**
list	list	list	list	instructions	list	list	instructions	instructions

Experimental Rare Plant Translocation Program

Surf.Area cm2	%CV of Surf. Area	Mulch Type	Damage Type	Damage Extent
instructions	instructions	list	list	list

ECOLOGIC

MAP / SITE DIAGRAM

SITE + T/P [S-_____] +

Data Sheet Tracking Number

Map Recorder: | *Team:*

TRANSECT / PLOT Level Information | **TRANSECT or PLOT** | *specify T or P* | **ID:**

Species Name	Recipient Site Name	Slope (deg)	Aspect (T)	Draw Slope Direct.	North Arrow
dd	dd				

General Comments

Draw site diagram here. Clearly illustrate locations of specific tag numbers.