

Vegetation and Wildlife Mitigation and Monitoring Plan 2017 Annual Report

*Site C Clean Energy Project
March 29, 2018*

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1.0 Background

1.1 The Site C Clean Energy Project

The Site C Clean Energy Project (the Project) will be the third dam and generating station on the Peace River in northeast B.C. The Project will provide 1,100 megawatts of capacity and about 5,100 gigawatt hours of energy each year to the province's integrated electricity system. The Project will be a source of clean, reliable and cost-effective electricity for BC Hydro's customers for more than 100 years.

The key components of the Project are:

- an earthfill dam, approximately 1,050 metres long and 60 metres high above the riverbed;
- an 83 kilometre long reservoir that will be, on average, two to three times the width of the current river;
- a generating station with six 183 MW generating units;
- two new 500 kilovolt AC transmission lines that will connect the Project facilities to the Peace Canyon Substation, along an existing right-of-way;
- realignment of six segments of Highway 29 over a total distance of approximately 30 kilometers; and
- construction of a berm at Hudson's Hope.

The Project will also include the construction of temporary access roads, a temporary bridge across the Peace River, and worker accommodation at the dam site.

The environmental assessment of the Project was carried out in accordance with the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), the *BC Environmental Assessment Act* (BCEAA), and the *Federal-Provincial Agreement to Conduct a Cooperative Environmental Assessment, Including the Establishment of a Joint Review Panel of the Site C Clean Energy Project*. The assessment considered the environmental, economic, social, heritage and health effects and benefits of the Project, and included the engagement of Aboriginal groups, the public, all levels of government, and other stakeholders in the assessment process.

Detailed findings of the environmental assessment are documented in the Site C Clean Energy Project Environmental Impact Statement (EIS), which was completed in accordance with the Environmental Impact Statement Guidelines (EIS Guidelines) issued by the Minister of Environment of Canada and the Executive Director of the Environmental Assessment Office of British Columbia. The EIS was submitted to regulatory agencies in January 2013, and amended in August 2013 following a 60 day public comment period on the assessment, including open house sessions in Fort St. John, Hudson's Hope, Dawson Creek, Chetwynd, town of Peace River (Alberta) and Prince George.

In August 2013, an independent Joint Review Panel (JRP) commenced its evaluation of the EIS, and in December 2013 and January 2014 undertook five weeks of public hearings on the Project in 11 communities in the Peace region, including six Aboriginal communities. In May 2014, the JRP provided the provincial and federal governments with a report summarizing the Panel's rationale, conclusions and recommendations relating to the environmental assessment of the Project. On completion of the JRP stage of the environmental assessment, the Canadian Environmental Assessment Agency (CEA Agency) and British Columbia Environmental Assessment Office (BCEAO) consulted with Aboriginal groups on the JRP report, and finalized

key documents of the environmental assessment for inclusion in a Referral Package for the Provincial Ministers of Environment and Forests, Lands and Natural Resource Operations.

Construction of the Project is also subject to regulatory permits and authorizations, and other approvals. In addition, the Crown has a duty to consult and, where appropriate, accommodate Aboriginal groups.

1.2 Environmental Assessment Findings

The environmental assessment of the Project focused on 22 valued components (VCs), or aspects of the biophysical and human setting that are considered important by Aboriginal groups, the public, the scientific community, and government agencies. In the EIS, valued components were categorized under five pillars: environmental, economic, social, heritage and health. For each VC, the assessment of the potential effects of the Project components and activities during construction and operations was based on a comparison of the biophysical and human environments between the predicted future conditions with the Project, and the predicted future conditions without the Project.

Potential adverse effects on each VC are described in the EIS along with technically and economically feasible mitigation measures, their potential effectiveness, as well as specific follow-up and related commitments for implementation. If a residual effect was found on a VC, the effect was evaluated for significance. Residual effects were categorized using criteria related to direction, magnitude, geographic extent, context, level of confidence and probability, in accordance with the EIS Guidelines.

The assessment found that the effects of the Project will largely be mitigated through careful, comprehensive mitigation programs and ongoing monitoring during construction and operations. The EIS indicates that the Project is unlikely to result in a significant adverse effect for most of the valued components. However, a determination of a significant effect of the Project was found on four VCs: Fish and Fish Habitat, Wildlife Resources, Vegetation and Ecological Communities, and Current Use of Lands and Resources for Traditional Purposes.

1.3 Environmental Assessment Conclusion

On October 14, 2014, the Provincial Ministers of Environment and of Forests, Lands and Natural Resource Operation decided that the Project is in the public interest and that the benefits provided by the Project outweigh the likely risks of significant adverse environmental, social and heritage effects (<http://www.newsroom.gov.bc.ca/2014/10/site-c-project-granted-environmental-assessment-approval.html>). The Ministers have issued an Environmental Assessment Certificate setting conditions under which the Project can proceed.

Further, on November 25, 2014, The Minister of Environment of Canada issued a Decision Statement confirming that, while the Project has the potential to result in some significant adverse effects, the Federal Cabinet has concluded that those effects are justified in the circumstances. The Decision Statement sets out the conditions under which the Project can proceed.

1.4 Development of Mitigation, Management and Monitoring Plans

Mitigation, management and monitoring plans for the Project have been developed taking into account the measures proposed in the EIS, information received during the Joint Review Panel hearing process, the Report of the Joint Review Panel on the Project and consultation with Environment Canada, Canadian Wildlife Services, Ministry of Environment and Ministry of Forests Lands and Natural Resources. Those plans are consistent with, and meet requirements

set out in, the conditions of the Environmental Assessment Certificate and of the Federal Decision Statement (FDS) issued on October 14, 2014 and November 25, 2014 respectively.

In addition, in accordance with environmental best practices (FDS Condition 3.1), these plans were informed by the best available information and knowledge, based on validated methods and models, undertaken by qualified individuals and apply the best available economically and technologically feasible mitigation strategies. These plans contain provisions for review and update as new information on the effects of the Project and on the efficacy of the mitigation measures become available.

The mitigation measures proposed by BC Hydro, and their likely success, were taken into account in the environmental assessment to determine the residual adverse effects of the Project on Vegetation and Ecological Communities and Wildlife Resources (see EIS Sections 13 and 14 on Vegetation and Ecological Communities and Wildlife Resources, respectively). As described in the EIS, the Project's adverse effect on these valued components will be significant, and mitigation cannot fully address these effects. In cases where the proposed mitigation measures are considered to be uncertain, the predicted effects of the Project on the target species will not exceed the effects predicted in the EIS.

2.0 Objective and Scope

The objective of the Vegetation and Wildlife Mitigation and Monitoring Plan Annual Report (the Report) is to describe the mitigation and monitoring measures implemented in 2017 to meet the requirements of FDS conditions 9, 10, 11, 16 and 18 and Environmental Assessment Certificate conditions 9 to 12, 14 to 16, 19, 21, 23, and 24. These conditions, and where they are addressed in the Vegetation and Wildlife Mitigation and Monitoring Plan (VWMMP), past annual reports, or the current Report, are listed in Tables 1 and 2 below.

Note that the requirements of Environmental Assessment Certificate (EAC) conditions 8 and 13 (for Vegetation and Ecological Communities), and conditions 17, 18, 20, and 22 (for Wildlife Resources) are fully addressed in the CEMP and/or the Vegetation Clearing and Debris Management Plan. Therefore, those conditions are not addressed in this report.

Requirements of FDS condition 16.3.1 and parts of EAC conditions 9 and 15 were fulfilled in 2015 and results reported in the 2015 Annual Report and are not addressed in this report:

- FDS Condition 16.3.1 - Field work to verify the modeled results for surveyed species at risk and determine habitat effects for those species (Section 6.4.1 of the 2015 Annual Report).
- EAC Condition 9 - Surveys of existing invasive species populations prior to construction. (Section 7.1.1 of the 2015 Annual Report).
- EAC Condition 9 - Rare and Sensitive community identification (Section 7.1.3 of the 2015 Annual Report)
- EAC Condition 15 - Verification of modelled results (Section 7.3.1 of the 2015 Annual Report).

FDS condition 9.9.1 was fulfilled in 2016 with results reported in the 2016 Annual Report, therefore is not addressed in this report:

- FDS Condition 9.9.1 – Conducting a risk assessment for bird collisions under the current transmission line design (Section 6.1.3 of 2016 Annual Report).

Table 1. Federal Decision Statement Conditions and Relevant Annual Report Sections

FDS Condition	Condition	Annual Report Section
9.	Disturbance and destruction of migratory birds	Section 6.1 Federal Decision Statement Condition 9
9.1	The Proponent shall ensure that the Designated Project is carried out in a manner that avoids mortality and disturbance of migratory birds and their nests.	Section 6.1.1 Condition 9.1
9.2	The Proponent shall prepare and submit to the Agency an annual schedule, describing the location and timing for construction and reservoir filling activities, 90 days prior to initiating any of these activities.	Section 6.1.2 Condition 9.2
9.3	The Proponent shall develop, in consultation with	Section 6.1.3 Condition 9.3

FDS Condition	Condition	Annual Report Section
	Environment Canada, a plan to monitor and mitigate potential 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.	
9.9	The Proponent shall address potential risks of bird collisions with the transmission line, in consultation with Environment Canada, by:	
9.9.1	conducting a risk assessment for bird collisions under the current transmission line design;	2016 Annual Report (Section 6.1.3)
9.9.2	determining if additional mitigation measures could be implemented to reduce the risk of bird collisions;	Section 6.1.4 Condition 9.9.2
10	Non-wetland migratory bird habitat	Section 6.2 Federal Decision Statement Condition 10
10.3	The plan shall include:	
10.3.1	non-wetland migratory bird habitat baseline conditions for habitat that would be permanently lost, habitat that would be fragmented and habitat that would remain intact;	Section 6.2.1 Condition 10.3.1
10.3.2	migratory bird abundance, distribution and use of non-wetland habitat;	Section 6.2.2 Condition 10.3.2
10.3.4	compensation measures to address the unavoidable loss of non-wetland migratory bird habitat, including habitat associated with the Canada Warbler, the Cape May Warbler and the Bay-Breasted Warbler;	Section 6.2.3 Condition 10.3.4
10.3.5	an analysis of the effects of any compensation measures identified in condition 10.3.4 on the current use of lands and resources for traditional purposes by Aboriginal peoples; and	Section 6.2.4 Condition 10.3.5
10.3.6	an approach to monitor and evaluate the effectiveness of the mitigation or compensation measures to be implemented and to verify the accuracy of the predictions made during the environmental assessment on non-wetland migratory bird habitat, including migratory bird use of that habitat.	Section 6.2.5 Condition 10.3.6
11	Wetlands used by migratory birds and for current use of lands and resources for traditional purposes	Section 6.3 Federal Decision Statement Condition 11
11.1	The Proponent shall mitigate the potential effects of the Designated Project on wetland habitat used by	Section 6.3.1 Condition 11.1

FDS Condition	Condition	Annual Report Section
	migratory birds, species at risk and for current use of lands and resources for traditional purposes by Aboriginal people.	
11.2	The Proponent shall develop, in consultation with Environment Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups, a plan that addresses potential effects of the Designated Project on wetland habitat used by migratory birds, species at risk and for current use of lands and resources for traditional purposes.	Section 6.3.2 Condition 11.2
11.4	The plan shall include:	
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	Section 6.3.3 Condition 11.4.1
11.4.2	mitigation measures to maintain baseline wetland functions for those wetlands that will not be permanently lost;	Section 6.3.4 Condition 11.4.2
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;	Section 6.3.5 Condition 11.4.3
11.4.4	compensation measures to address the unavoidable loss of wetland areas and functions supporting migratory birds, species at risk, and the current use of lands and resources by Aboriginal people in support of the objective of full replacement of wetlands in terms of area and function	Section 6.3.6 Condition 11.4.4
11.8	The Proponent shall commence the implementation of the compensation measures specified in condition 11.4.4 no later than five years from the initiation of construction.	Section 6.3.7 Condition 11.8
11.9	The Proponent shall implement each component of the plan and provide to the Agency an analysis and summary of the implementation of the plan, as well as any amendments made to the plan in response to the results, on an annual basis during construction and at the end of year 1, 2, 3, 5, 10, 15, 20 and 30 of	Section 6.3.8 Condition 11.9

FDS Condition	Condition	Annual Report Section
	operation.	
16	Species at risk, at-risk and sensitive ecological communities and rare plants	Section 6.4 Federal Decision Statement Condition 16
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:	
16.3.1	field work to verify the modeled results for surveyed species at risk and determine the habitat that would be permanently lost, habitat that would be fragmented and habitat that would remain intact for those species, including the Short-eared Owl, the Western Toad and the Myotis Bat species	2015 Annual Report (Section 6.4.1)
16.3.2	surveys to determine whether the rare plant species potentially facing extirpation in the Project Activity Zone are found elsewhere in the region	Section 6.4.1 Condition 16.3.2
16.3.3	measures to mitigate environmental effects on species at risk and at-risk and sensitive ecological communities and rare plants;	Section 6.4.2 Condition 16.3.3
16.3.4	conservation measures to ensure the viability of rare plants, such as seed recovery and plant relocation;	Section 6.4.3 Condition 16.3.4
16.3.5	an approach to avoiding or minimizing the use of herbicides and pesticides in areas that could impact species at risk, at-risk and sensitive ecological communities and rare plants;	Section 6.4.4 Condition 16.3.5
16.3.6	an approach to monitor and evaluate the effectiveness of mitigation measures and to verify the accuracy of the predictions made during the environmental assessment on species at risk, at-risk and sensitive ecological communities and rare plants; and	Section 6.4.5 Condition 16.3.6
16.3.7	an approach for tracking updates to the status of listed species identified by the Government of British Columbia, Committee on the Status of Endangered Wildlife in Canada, and the Species at Risk Act, and implementation of additional	Section 6.4.6 Condition 16.3.7

FDS Condition	Condition	Annual Report Section
	measures, in accordance with species recovery plans, to mitigate effects of the Designated Project on the affected species should the status of a listed species change during the life of the Designated Project.	

Table 2. Environmental Assessment Certificate Conditions and Relevant Annual Report Sections

EAC Condition	Condition	Plan Reference ^(a)
VEGETATION AND ECOLOGICAL COMMUNITIES		
9	The EAC Holder must develop a Vegetation and Invasive Plant Management Plan to protect ecosystems, plant habitats, plant communities, and vegetation with components applicable to the construction phase.	Section 7.1 EAC Condition 9:
	The Vegetation and Invasive Plant Management Plan must include at least the following:	
	Invasive Species	
	<ul style="list-style-type: none"> • Surveys of existing invasive species populations prior to construction. 	2015 Annual Report (Section 7.1.1)
	<ul style="list-style-type: none"> • Invasive plant control measures to manage established invasive species populations and to prevent invasive species establishment. 	Section 7.1.1 Invasive Plant Control
	Rare Plants and Sensitive Ecosystems	
	<ul style="list-style-type: none"> • The EAC Holder must expand its modelling, including completing field work, to improve identification of rare and sensitive plant communities and aid in delineation of habitats that may require extra care, 90 days prior to any Project activities that may affect these rare or sensitive plant communities 	2015 Annual Report (Section 7.1.3)
	<ul style="list-style-type: none"> • The EAC Holder must, with the use of a QEP, complete an inventory in areas not already surveyed and use rare plant location information as inputs to final design of access roads and transmission lines. These pre- construction surveys must target rare plants as defined in Section 13.2.2 of the EIS—including vascular plants, mosses, and lichens. 	Section 7.1.2 Inventory Areas Not Already Surveyed
	<ul style="list-style-type: none"> • The EAC Holder must create and maintain a spatial database of known rare plant occurrences in the vicinity of Project components that must 	Section 7.1.3 Spatial Database of Known Rare Plant Occurrences

EAC Condition	Condition	Plan Reference ^(a)
	<p>be searched to avoid effects to rare plants during construction activities. The database must be updated as new information becomes available and any findings of new rare plant species occurrences must be submitted to Environment Canada and MOE using provincial data collection standards.</p>	
	<ul style="list-style-type: none"> The EAC Holder must implement construction methods to reduce the impact to rare plants, maximize use of existing access corridors, and construct transmission towers and temporary roads away from wetlands and known rare plant occurrences. 	Section 7.1.4 Rare plant avoidance
	<ul style="list-style-type: none"> Protect known occurrences of Tufa seeps, wetlands and rare plants located adjacent to construction areas. Install signage and flagging where necessary, as determined by the QEP, to indicate the boundaries of the exclusion area. 	Section 7.1.5 Protect tufa seeps, wetlands and rare plants located adjacent to construction areas
	<ul style="list-style-type: none"> 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 MOE using the BC MOE's Guidelines for Translocation of Plant Species at Risk in BC (Maslovat, 2009). 	Section 7.1.6 Experimental rare plant translocation program
10	<p>The EAC Holder must fund or undertake directly with the use of a Rare Plant Botanist the following, during construction:</p>	Section 7.2 EAC Condition 10
	<ul style="list-style-type: none"> Targeted surveys in the RAA (as defined in the amended EIS) to identify occurrences of the 18 directly affected rare plant species (as defined in the amended EIS), and rare plant species identified by the MOEs Conservation Framework requiring additional inventories 	Section 7.2.1 Targeted rare plant surveys in the RAA
	<ul style="list-style-type: none"> A study focused on clarifying the taxonomy of Ochroleucus bladderwort (<i>Utricularia ochroleuca</i>), including field, herbaria, and genetic work in consultation with FLNR and the MOE (BC Conservation Data Centre). 	Section 7.2.2 Taxonomy of Ochroleucus bladderwort
12	<p>The EAC Holder must develop a Wetland Mitigation and Compensation Plan.</p>	Section 7.3 EAC Condition 12
	<p>The Wetland Mitigation and Compensation Plan must include an assessment of wetland function lost as a result of the Project that is important to migratory birds and species at risk (wildlife and plants). The Wetland Mitigation and Compensation Plan must be developed by a QEP with experience in</p>	Section 7.3.1 Wetland Mitigation and Compensation

EAC Condition	Condition	Plan Reference ^(a)
	wetland enhancement, maintenance and development.	
	The Wetland Mitigation and Compensation Plan must include at least the following:	
	<ul style="list-style-type: none"> Information on location, size and type of wetlands affected by the Project 	Section 7.3.1.1 Information on location, size and type of wetlands affected by the Project
	<ul style="list-style-type: none"> If roads cannot avoid wetlands, culverts will be installed under access roads to maintain hydrological balance, and sedimentation barriers will be installed; 	Section 7.3.1.2 Installation of culverts to maintain hydrological balance at wetlands affected by roads, with sedimentation barriers
	<ul style="list-style-type: none"> Stormwater management will be designed to control runoff and direct it away from work areas where excavation, spoil placement, and staging activities occur. 	Section 7.3.1.3 Stormwater management
	<ul style="list-style-type: none"> Develop, with the assistance of a hydrologist, site-specific measures prior to construction to reduce changes to the existing hydrologic balance and wetland function during construction of the Jackfish Lake Road and Project access roads and transmission line. 	7.3.1.4 Site-specific measures to maintain hydrologic balance and wetland function
	<ul style="list-style-type: none"> All activities that involve potentially harmful or toxic substances, such as oil, fuel, antifreeze, and concrete, must follow approved work practices and consider the provincial BMP guidebook Develop with Care (BC Ministry of Environment 2012 or as amended from time to time). 	Section 7.3.1.5 Implementation of Approved work practices and Develop with Care
14	<p>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.</p> <p>The Vegetation and Ecological Communities Monitoring and Follow-up Program must include at least the following:</p>	Section 7.4 Condition 14
	<ul style="list-style-type: none"> Definition of the study design for the rare plant translocation program (see condition 9). 	7.4.1 Definition of the study design for the Experimental Rare Plant Translocation Program
	<ul style="list-style-type: none"> Plan for following-up monitoring of any translocation sites to assess the survival and health of translocated rare plant species, under 	7.4.2 Plan for monitoring translocations

EAC Condition	Condition	Plan Reference ^(a)
	<p>the supervision of a Rare Plant Botanist.</p> <ul style="list-style-type: none"> 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. 	7.4.3 Measurement criteria for effectiveness monitoring of habitat enhancement and compensation programs
WILDLIFE RESOURCES		
15	The Wildlife Management Plan must be developed by a QEP.	Section 4.0 Qualified Professionals
	The Wildlife Management Plan must include at least the following:	
	<ul style="list-style-type: none"> Field work, conducted by a QEP, to verify the modelled results for surveyed species at risk and determine, with specificity and by ecosystem, the habitat lost or fragmented for those species. The EAC Holder must use these resulting data to inform final Project design and to develop additional mitigation measures, as needed, as part of the Wildlife Management Plan, in consultation with Environment Canada and FLNR. 	2015 Annual Report (Section 7.3.1)
	<ul style="list-style-type: none"> Measures to avoid, if feasible, constructing in sensitive wildlife habitats. If avoiding sensitive wildlife habitats is not feasible, condition 16 applies. 	Section 7.5.1 Measures to avoid, if feasible constructing in sensitive wildlife habitats
	<ul style="list-style-type: none"> If sensitive habitats, such as wetlands, are located immediately adjacent to any work site, buffer zones must be established by a QEP to avoid direct disturbance to these sites. 	Section 7.5.2 Setback buffers to avoid direct impacts to sensitive habitats
	<ul style="list-style-type: none"> Protocol for the application of construction methods, equipment, material and timing of activities to mitigate adverse effects to wildlife and wildlife habitat. 	Section 7.5.3 Mitigation of adverse effects to wildlife and wildlife habitat
	<ul style="list-style-type: none"> Protocol to ensure that lighting is focused on work sites and away from surrounding areas to manage light pollution and disturbance to wildlife. If lighting cannot be directed away from surrounding areas, the EAC Holder must ensure additional mitigation measures are implemented to reduce light pollution, including light shielding. 	Section 7.5.4 Protocol to ensure that lighting is focused on work sites
	<ul style="list-style-type: none"> A mandatory environmental training program for all workers so that they are informed that hunting 	Section 7.5.5 Environmental training of workers

EAC Condition	Condition	Plan Reference ^(a)
	<p>in the vicinity of any work site/Project housing site is strictly prohibited for all workers.</p> <p>The EAC Holder must ensure that all workers are familiar with the Wildlife Management Plan.</p>	
16	<p>If loss of sensitive wildlife habitat or important wildlife areas cannot be avoided through Project design or otherwise mitigated, the EAC Holder must implement the following measures, which must be described in the Vegetation and Wildlife Mitigation and Monitoring Plan.</p>	Section 7.6 EAC Condition 16
	<p>The Vegetation and Wildlife Mitigation and Monitoring Plan must include the following compensation measures:</p>	
	<ul style="list-style-type: none"> • Management of EAC Holder-owned lands adjacent to the Peace River suitable as breeding habitat for Northern Harrier and Short-eared Owl. 	Section 7.6.1 Management of lands suitable as breeding habitat for northern harrier and short-eared owl
	<ul style="list-style-type: none"> • Establishment of nest boxes for cavity-nesting waterfowl developed as part of wetland mitigation and compensation plan, and established within riparian vegetation zones established along the reservoir on BC Hydro-owned properties. 	Section 7.6.2 Nest boxes for cavity-nesting waterfowl
	<ul style="list-style-type: none"> • A design for bat roosting habitat in HWY 29 bridges to BC Ministry of Transportation and Infrastructure (MOTI) for consideration into new bridge designs located within the Peace River valley. 	Section 7.6.3 A design for bat roosting habitat in HWY 29 bridges
	<ul style="list-style-type: none"> • Following rock extraction at Portage Mountain, creation of hibernating and roosting sites for bats. 	Section 7.6.4 Creation of hibernating and roosting sites for bats VWMMP Section 8.7.6
	<ul style="list-style-type: none"> • Creation of natural or artificial piles of coarse woody debris dispersed throughout the disturbed landscape to maintain foraging areas and cold-weather rest sites, and arboreal resting sites, for the fisher population south of the Peace River. 	Section 7.6.5 Cold weather rest sites for fisher
19	<p>The EAC Holder must use reasonable efforts to avoid and reduce injury and mortality to amphibians and snakes on roads adjacent to wetlands and other areas where amphibians or snakes are known to migrate across roads including locations with structures designed for wildlife passage</p>	Section 7.7 EAC Condition 19
21	<p>The EAC Holder must ensure that measures implemented to manage harmful Project effects on</p>	Section 7.8 EAC Condition 21

EAC Condition	Condition	Plan Reference ^(a)
	wildlife resources are effective by implementing monitoring measures detailed in a Vegetation and Wildlife Mitigation and Monitoring Plan.	
	The Vegetation and Wildlife Mitigation and Monitoring Plan must be developed by a QEP.	Section 4.0 Qualified Professionals
	The Vegetation and Wildlife Mitigation and Monitoring Plan must include at least the following:	
	<ul style="list-style-type: none"> • Monitor Bald Eagle nesting populations adjacent to the reservoir, including their use of artificial nest structures. 	Section 7.8.1 Monitoring of Bald Eagle nesting populations
	<ul style="list-style-type: none"> • Monitor waterfowl and shorebird populations and their use of natural wetlands, created wetlands, and artificial wetland features. 	Section 7.8.2 Monitoring waterfowl and shorebird populations
	<ul style="list-style-type: none"> • Survey songbird and ground-nesting raptor populations during construction and operations 	Section 7.8.3 Survey songbird and ground-nesting raptor populations
	<ul style="list-style-type: none"> • Require annual reporting during the construction phase and during the first 10 years of operations to EAO, beginning 180 days following commencement of construction. 	Section 7.8.4 Annual reporting beginning 180 days following commencement of construction
23	The EAC Holder must maintain current knowledge of Project effects on the status of listed species by tracking updates for species identified by the Province, the Committee on the Status of Endangered Wildlife in Canada, and the <i>Species at Risk Act</i> .	Section 7.9 Status of listed species

(a) VWMMP: Vegetation and Wildlife Mitigation and Monitoring Plan. Submitted to FLNRO, MOE and the Environmental Assessment Office on June 5, 2015.

3.0 Consultation

Consultation regarding the development and implementation of individual programs conducted in 2017 is provided below.

3.1 Canadian Wildlife Services

In 2017 BC Hydro continued to consult with the Canadian Wildlife Service during plan development and implementation. The majority of the consultation occurred as part of the Vegetation and Wildlife Technical Committee (VWTC) established by the Comptroller of Water Rights under Conditional Water Licences 132990 and 132991 (see Section 3.2).

Consultation with Canadian Wildlife Services with regard to the Wetland Function Assessment (WFA) continued in 2017.

Wetland Function Assessment: On 16 June, 18 September, 5 October, and 20 October 2017, BC Hydro met with representatives of Environment Canada (EC) and the Canadian Wildlife Services (CWS), the Ministry of Forests Lands and Resource Management (FLNRO) and the Ministry of Environment (MOE) to discuss revisions to the draft WFA. A revised version of the WFA was distributed to the VWTC on 13 October 2017 (Appendix 1).

3.2 Consultation with the Province

To meet the request of the BC Comptroller of Water Rights for a process to provide ongoing provincial engagement with respect to the implementation of vegetation and wildlife mitigation and monitoring programs, BC Hydro, MOE and FLNRO established a Vegetation and Wildlife Mitigation and Monitoring Technical Committee (VWTC). The province requested that this Technical Committee be formed, to facilitate overall governance between BC and BC Hydro over the Technical Committee, as a sub-committee of the existing BC and BC Hydro joint Fish / Hydro Management Committee. Environment Canada joined the committee in July of 2016.

In 2017 the VWTC met in person or via conference call fifteen (15) times between January and December 2017 to address Program Areas as laid out in Schedule A of Conditional Water Licenses 132990 and 132991. Table 3 summarizes the status of each Program Area discussed as of December 31, 2017.

Table 3. Status of Schedule A Program Areas as of December 31, 2017.

Program Area	Status as of December 1, 2017
Completed	
1. Ungulates	Complete
4. Bats	Complete
6.2 Amphibians – Migration Mitigation	Complete
7. Eagles	Complete
8.3 Breeding and Migratory Birds – Common Nighthawk	Complete

Program Area	Status as of December 1, 2017
9. Ground Nesting Raptors	Complete
10. Cavity Nesting Species	Complete
11.2. Rare Plants – Regional Surveys	Complete
12. Sharp-tailed Grouse	Complete
13. Lighting Effects	Complete
14. Carnivore Den Sites	Complete
15. Other Raptors	Complete
16. Other Species at Risk	Complete
In Progress	
2.1. Wetlands and Riparian Habitat: Wetland Function Assessment	In progress
2.2. Wetlands and Riparian Habitat: Downstream Vegetation Monitoring	In progress
3. Fisher	In progress
5.1. Snakes – Downstream Monitoring	In progress
5.2. Snakes – Hibernacula Mitigation and Monitoring	In progress
6.1. Amphibians – Downstream Monitoring	In progress
8.1. Breeding and Migratory Birds - Songbirds	In progress
8.2. Breeding and Migratory Birds – Waterbirds	In progress
8.4. Breeding and Migratory Birds – Woodpeckers	In progress
8.5. Breeding and Migratory Birds – Nest Monitoring	In progress
11.1. Rare Plants - Translocation	In progress

4.0 Qualified professionals

The Qualified Professionals involved in the development and implementation of vegetation and wildlife mitigation and monitoring programs in 2017 are listed in Table 4.

Table 4. Qualified Professionals involved in development and implementation of programs in 2017

Qualified Professional	Area of Work
Brock Simons, M.Sc., R.P.Bio. BC Hydro	Vegetation and Wildlife
Lisette Ross, M.Sc., Native Plant Solutions	Wetland Function Assessment
Lynn Dupuis, M.Sc., Native Plant Solutions	Wetland Function Assessment
Llwellyn Armstrong Native Plant Solutions	Statistician
Natasha Bush, B.Sc. P.Ag., Ecologic Consulting Ltd.	Experimental Rare Plant Translocation, Regional Rare Plant Surveys
Dan McAllister, M.Sc., P.Ag., Ecologic	Experimental Rare Plant Translocation, Regional Rare Plant Surveys.
Jamie Fenneman, Ph.D. candidate, R.P.Bio., Ecologic	Experimental Rare Plant Translocation, Regional Rare Plant Surveys
Terry McIntosh, Ph.D., Ecologic	Experimental Rare Plant Translocation, Regional Rare Plant Surveys.
Ryan Durrand, B.Sc. R.P.Bio., Ecologic	Experimental Rare Plant Translocation, Regional Rare Plant Survey
Jason Jones, Ph.D. R. P. Bio., P. Biol., EcoLogic	Experimental Rare Plant Translocation, Regional Rare Plant Surveys, Songbird and Raptor Monitoring, Woodpecker Monitoring
Holly Bueller, M.Sc., EcoLogic	Experimental Rare Plant Translocation, Regional Rare Plant Surveys
Randy Krichbaum, M.Sc., P.Biol., R.P.Bio.- Eagle Cap Consulting Ltd.	Pre-construction Rare Plant Surveys, Experimental Rare Plant Translocation
Margaret Krichbaum, B.Sc.- Eagle Cap	Pre-construction Rare Plant Surveys, Experimental Rare Plant Translocation
Jeff Matheson M.Sc., R.P.Bio., P.Biol.	Experimental Rare Plant Translocation, Regional Rare Plant Surveys.
Claudio Bianchini, R.P. Bio., Bianchini Biological Services	Breeding bird and raptor monitoring
Jeff Matheson, M.Sc., R.P.Bio., Tetra Tech Canada Inc.	Breeding bird and raptor monitoring
Kayla Hatzel, M.Sc., B.I.T., Tetra Tech Canada Inc.	Breeding bird and raptor monitoring
Charlie Palmer, M.Sc., P.Biol., R.P.Bio, Hemmera Envirochem Inc.	Cavity nesting birds work-plan, waterbird work-plan and waterbird monitoring surveys, bat monitoring plan for Portage Mountain, bald eagle monitoring plan,

Qualified Professional	Area of Work
	nest monitoring plan
Ashleigh Ballevena, B.Sc., R.P.Bio, Hemmera	Portage Mountain bat surveys
Brian Paterson, B.Sc., R.P.Bio, Hemmera	Bald eagle survey field lead, Portage Mountain surveys, waterbird aerial surveys
Kyle Routledge, B.Sc., R.P.Bio, Hemmera	Waterbird field lead, cavity nest mitigation field lead, aerial waterbird surveys
Toby St. Clair, M.Sc., Hemmera	Waterbird field lead
Felix Martinez-Nunez, M.Sc., R.P.Bio, Hemmera	Waterbirds field lead Portage Mountain bat surveys field lead
Jay Rourke, M.Sc., R.P.Bio, Hemmera	Waterbird advisor
Jared Hobbs, M.Sc., R.P.Bio, Hemmera	Portage Mountain bat surveys acoustics review
Dan Webster, B.Sc., P.Ag., R.P.Bio., P.Biol., Eco-Web Ecological Consulting Ltd.	Portage Mountain bat surveys
Jay Brogan M.Sc., R.P.Bio., Eco-Web Ecological Consulting Ltd.	Waterbird surveys field lead, aerial waterbird surveys
Sigrid Moe, R.B. Tech., Eco-Web Ecological Consulting Ltd.	Waterbird surveys field lead
Jodi Fleming, B.Sc., P.Ag., BIT, Eco-Web Ecological Consulting Ltd.	Portage Mountain bat surveys

5.0 Structure and Content

The mitigation and monitoring measures discussed in this report are organized into two parts: Section 6.0 describes those mitigation and monitoring measures that were implemented to meet the requirements of the Federal Decision Statement (FDS) conditions; Section 7.0 describes those measures that were implemented to meet the requirements of the Environmental Assessment Certificate (EAC) conditions. Cross-references are provided in Section 7.0 where information provided to meet the EAC conditions is the same as that provided for the FDS conditions.

Several of the programs outlined in the Vegetation and Wildlife Mitigation Plan were not implemented in 2017. Table 5 below outlines which programs were not implemented, and when they will be implemented and reported in annual reports.

Table 5. Summary of programs not implemented in 2017

Condition Number	Program to be Implemented	Implementation Year	Inclusion in Annual Report
FDS 9.3	Nest Monitoring	2021	2021
	Breeding and Migratory Birds – Common Nighthawk	2018	2018
	Breeding and Migratory Birds – Woodpeckers	2018	2018
FDS 10.3.3	Littoral zone enhancements	2019	2019
	Riparian plantings	TBD	TBD
FDS 16.3.6	Wetlands and Riparian Habitat: Downstream Vegetation Monitoring	2019	2019
EAC 16	Construction of artificial snake hibernacula	2018	2018
EAC 21	Monitor amphibian use of migration crossing structures	TBD	TBD
	Downstream surveys for western toad and garter snake	2018	2018

6.0 Implementation of Mitigation and Monitoring Measures – Federal Decision Statement Conditions

Conditions 9, 10, 11, and 16 of the FDS, respectively, set out the mitigation and monitoring requirements for the disturbance and destruction of migratory birds, non-wetland migratory bird habitat, wetlands used by migratory birds and for current use of lands and resources for traditional purposes, and species at risk, at-risk and sensitive ecological communities and rare plants.

The following programs implemented or continued in 2017 are described in the subsequent sections of this report:

- Section 6.1 Federal Decision Statement Condition 9: Migratory Bird Mitigation and Monitoring
 - *Section 6.1.1 Condition 9.1* - Avoidance of disturbance to migratory birds and their nests

- *Section 6.1.2 Condition 9.2* – Schedule for construction and reservoir filling activities
- *Section 6.1.3 Condition 9.3* - Migratory bird monitoring
- *Section 6.1.4 Condition 9.9.2* – Additional mitigation measures to reduce the risk of bird collisions with the transmission line.
- Section 6.2 Federal Decision Statement Condition 10
 - *Section 6.2.1 Condition 10.3.1* - Non-wetland migratory bird habitat baseline conditions
 - *Section 6.2.2 Condition 10.3.2* - Migratory bird abundance, distribution and use of non-wetland habitat
 - *Section 6.2.3 Condition 10.3.4* - Compensation measures to address the unavoidable loss of non-wetland migratory bird habitat, including habitat associated with Canada Warbler, the Cape May Warbler and the Bay-breasted Warbler
 - *Section 6.2.4 Condition 10.3.5* - An analysis of the effects of any compensation measures identified in condition 10.3.4 on the current use of lands and resources for traditional purposes by Aboriginal peoples
 - *Section 6.2.5 Condition 10.3.6* - An approach to monitor and evaluate the effectiveness of mitigation or compensation and verify the accuracy of the environmental assessment on non-wetland migratory birds
- Section 6.3 Federal Decision Statement Condition 11
 - *Section 6.3.1 Condition 11.1* - Mitigate the potential effects of the Designated Project on wetland habitat used by migratory birds, species at risk and for current use of lands and resources for traditional purposes by Aboriginal people
 - *Section 6.3.2 Condition 11.2* - The Proponent shall develop, in consultation with Environment Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups, a plan that addresses potential effects of the Designated Project on wetland habitat used by migratory birds, species at risk and for current use of lands and resources for traditional purposes
 - *Section 6.3.3 Condition 11.4.2* - Mitigation measures to maintain baseline wetland functions for those wetlands that will not be permanently lost
 - *Section 6.3.4 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.
 - *Section 6.3.5 Condition 11.4.4* - Compensation measures to address the unavoidable loss of wetland areas and functions supporting migratory birds, species at risk, and the current use of lands and resources by Aboriginal people in support of the objective of full replacement of wetlands in terms of area and function.
 - *Section 6.3.6 Condition 11.8* - The Proponent shall commence the implementation of the compensation measures specified in condition 11.4.4 no later than five years from the initiation of construction
 - *Section 6.3.7 Condition 11.9* - The Proponent shall implement each component of the plan and provide to the Agency an analysis and summary of the implementation of the plan, as well as any amendments made to the plan in response to the results, on an annual basis during construction and at the end of year 1, 2, 3, 5, 10, 15, 20 and 30 of operation
- Section 6.4 Decision Statement Condition 16
 - *Section 6.4.1 Condition 16.3.2* - Surveys to determine whether the rare plant species potentially facing extirpation in the Project Activity Zone are found elsewhere in the region

- *Section 6.4.2 Condition 16.3.3* - Measures to mitigate environmental effects on species at risk and at-risk and sensitive ecological communities and rare plants
- *Section 6.4.3 Condition 16.3.4* - Conservation measures to ensure the viability of rare plants, such as seed recovery and plant relocation
- *Section 6.4.4 Condition 16.3.5* - An approach to avoiding or minimizing the use of herbicides and pesticides in areas that could impact species at risk, at-risk and sensitive ecological communities and rare plants
- *Section 6.4.5 Condition 16.3.6* - An approach to monitor and evaluate the effectiveness of mitigation measures and to verify the accuracy of the predictions made during the environmental assessment on species at risk, at-risk and sensitive ecological communities and rare plants
- *Section 6.4.6 Condition 16.3.7* - An approach for tracking updates to the status of listed species identified by the Government of British Columbia, Committee on the Status of Endangered Wildlife in Canada, and the Species at Risk Act, and implementation of additional measures, in accordance with species recovery plans, to mitigate effects of the Designated Project on the affected species should the status of a listed species change during the life of the Designated Project

6.1 Federal Decision Statement Condition 9: Migratory Bird Mitigation and Monitoring

This section of the annual report summarizes the programs conducted in 2017 in accordance with the requirements of FDS condition 9, shown below.

9. Disturbance and destruction of migratory birds

- 9.1. The Proponent shall ensure that the Designated Project is carried out in a manner that avoids mortality and disturbance of migratory birds and their nests.
- 9.2. The Proponent shall prepare and submit to the Agency an annual schedule, describing the location and timing for construction and reservoir filling activities, 90 days prior to initiating any of these activities.
- 9.3. The Proponent shall develop, in consultation with Environment Canada, a plan to monitor and mitigate potential 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.
- 9.4. The plan shall include measures to undertake construction, reservoir filling and operation in a manner that avoids or minimizes the risk of disturbance and mortality to migratory birds and their nests.
- 9.5. The Proponent shall, in preparing the plan, consult:
 - 9.5.1. Environment Canada's policy on Incidental Take of Migratory Birds in Canada; and
 - 9.5.2. Environment Canada's avoidance guidelines on General Nesting Periods of Migratory Birds in Canada.
- 9.6. The Proponent shall submit to the Agency and Environment Canada a draft copy of the plan for review 90 days prior to initiating construction.
- 9.7. The Proponent shall submit to the Agency the final plan a minimum of 30 days prior to initiating construction. When submitting the final plan, the Proponent shall provide to the Agency an analysis that demonstrates how it has appropriately considered the input, views or information received from Environment Canada.
- 9.8. The Proponent shall implement the plan and provide to the Agency an analysis and summary of the implementation of the plan, as well as any amendments made to the plan in response to the results, on an annual basis during construction and for the first five years of operation.

- 9.9. The Proponent shall address potential risks of bird collisions with the transmission line, in consultation with Environment Canada, by:
- 9.9.1. conducting a risk assessment for bird collisions under the current transmission line design;
 - 9.9.2. determining if additional mitigation measures could be implemented to reduce the risk of bird collisions; and
 - 9.9.3. implementing any additional mitigation measures (e.g. line marking and diversions), to minimize impacts.

6.1.1 Condition 9.1

This section summarizes actions taken in accordance with the following requirement of Condition 9.1: *The Proponent shall ensure that the Designated Project is carried out in a manner that avoids mortality and disturbance of migratory birds and their nests.*

In accordance with Condition 9.1 and EAC Condition 17, BC Hydro has, where feasible given Project requirements and constraints, scheduled vegetation clearing outside of the migratory bird nesting period. The Project occurs within Zone B5, for which ECCC describes a general nesting period for migratory birds of April 22 to August 24¹. BC Hydro developed section 4.17 of the CEMP to address the requirements of Condition 9.1 and EAC Condition 17, and provided an outline of the nest survey protocol in Section 3.5.1 of the Vegetation Clearing and Debris Management Plan.

BC Hydro developed a pre-clearing nesting activity survey methodology, which outlines specific field procedures to be followed to determine the likelihood that migratory bird nests are present in areas scheduled to be cleared. The protocol also describes the approach for determining appropriate situation and species-specific disturbance setback buffers to be applied around locations where nests are likely to be present. This protocol was updated in 2016 to incorporate site-specific learnings, and was included as Appendix 2 in the 2016 Annual Report.

In 2017 pre-clearing nesting activity surveys were completed between May and July on the left and right banks at the dam site, as well as between May and August along the planned Highway 29 realignment in advance of archeological work. If active or suspected nest areas were identified, then protective buffers were established around the nest area.

After each area was surveyed a free-to-work survey report was produced. The report maps the area surveyed and indicates which areas were free-to-work, any conditions placed on work activities, location of buffered nests and the expiry date of the free-to-work period.

6.1.2 Condition 9.2

This section summarizes actions taken in accordance with the following requirement of Condition 9.2: *The Proponent shall prepare and submit to the Agency an annual schedule, describing the location and timing for construction and reservoir filling activities, 90 days prior to initiating any of these activities.*

¹ https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html#_04

An initial construction schedule was submitted to CEEA on October 17, 2014, revised April 14, 2015, and also January 17, 2018. The most recent revised construction schedule can be found in Appendix 2, updated January 17, 2018.

6.1.3 Condition 9.3

This section summarizes actions taken in accordance with the following requirement of Condition 9.3: *The Proponent shall develop, in consultation with Environment Canada, a plan to monitor and mitigate potential 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.*

6.1.3.1 Songbird surveys

The songbird monitoring program is focussed on passerines (songbird perching birds), hummingbirds, swifts, doves, kingfisher, and pigeons (all members of the orders Passeriformes, Apodiformes, Columbiformes, and Coraciiformes), which are collectively referred to as songbirds. Songbird baseline surveys were conducted in 2006, 2008, 2011 and 2012. Surveys were again conducted in 2016 and 2017 as part of the monitoring program. The Breeding Bird Follow-up Monitoring 2017 Annual Report can be found in Appendix 3.

Songbird surveys were conducted May 28 to July 10, 2017 at 179 stations within the project footprint, in habitats adjacent to the footprint and in the BC Hydro mitigation properties. Each survey station was surveyed two times within the peak migratory bird nesting period to maximize the detection of early and late breeders. Birds were surveyed using unlimited radius point counts. The geographic focus of surveys in 2017 was on the east half of the Peace River valley footprint (from the Halfway River to the dam site) and the Transmission Line.

A total of 2,403 songbirds of 71 songbird species were recorded during the point count surveys in 2017. Eight species listed under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the Species at Risk Act (SARA) and/or British Columbia's Red and Blue lists were observed during the surveys (Table 6). Songbird surveys in Marl Fen, Rutledge and Wilder Creek mitigation properties recorded 18, 36 and 26 songbird species, respectively (Table 7).

Table 6. Songbird species observed during the 2017 point count surveys

Common Name	BC List	COSEWIC	SARA	Total Count ¹			
				Footprint	Mitigation Properties	Adjacent Areas	Total
Belted Kingfisher	Yellow	-	-	4	-	-	4
Olive-sided Flycatcher	Blue	Threatened	Schedule 1 Threatened	8	-	4	12
Western Wood-Pewee	Yellow	-	-	17	1	6	24
Alder Flycatcher	Yellow	-	-	14	6	8	28
Pacific-slope Flycatcher	Yellow	-	-	2	1	-	3
Least Flycatcher	Yellow	-	-	51	7	20	78
Eastern Kingbird	Yellow	-	-	2	-	-	2

Common Name	BC List	COSEWIC	SARA	Total Count ¹			
				Footprint	Mitigation Properties	Adjacent Areas	Total
Warbling Vireo	Yellow	-	-	19	2	17	38
Red-eyed Vireo	Yellow	-	-	101	28	34	163
Philadelphia Vireo	Yellow	-	-	3	-	1	4
Blue-headed Vireo	Yellow	-	-	3	3	3	9
American Crow	Yellow	-	-	17	3	1	21
Common Raven	Yellow	-	-	66	25	16	107
Blue Jay	Yellow	-	-	13	2	3	18
Gray Jay	Yellow	-	-	6	4	8	18
Black-billed Magpie	Yellow	-	-	20	13	2	35
Cedar Waxwing	Yellow	-	-	21	7	6	34
Black-capped Chickadee	Yellow	-	-	11	-	1	12
Boreal Chickadee	Yellow	-	-	2	-	1	3
Bank Swallow	Yellow	Threatened	Schedule 1 Threatened	26	-	-	26
Northern Rough-winged Swallow	Yellow	-	-	2	-	-	2
Tree Swallow	Yellow	-	-	7	-	-	7
Ruby-crowned Kinglet	Yellow	-	-	13	3	4	20
Marsh Wren	Yellow	-	-	3	-	-	3
Red-breasted Nuthatch	Yellow	-	-	14	1	7	22
House Wren	Yellow	-	-	5	7	1	13
Gray Catbird	Yellow	-	-	2	7	1	10
Hermit Thrush	Yellow	-	-	57	13	15	85
Swainson's Thrush	Yellow	-	-	78	14	45	137
Townsend's Solitaire	Yellow	-	-	-	2	-	2
American Robin	Yellow	-	-	81	18	37	136
Purple Finch	Yellow	-	-	6	2	1	9
White-winged Crossbill	Yellow	-	-	-	-	0	0
Pine Siskin	Yellow	-	-	3	0	5	8
Canada Warbler	Blue	Threatened	Schedule 1 Threatened	2	-	-	2
Wilson's Warbler	Yellow	-	-	12	3	7	22
MacGillivray's Warbler	Yellow	-	-	6	-	-	6
Common Yellowthroat	Yellow	-	-	45	2	17	64
Black-and-white Warbler	Yellow	-	-	25	1	7	33
Connecticut Warbler	Blue	-	-	-	-	1	1
Orange-crowned Warbler	Yellow	-	-	19	4	4	27

Common Name	BC List	COSEWIC	SARA	Total Count ¹			
				Footprint	Mitigation Properties	Adjacent Areas	Total
Tennessee Warbler	Yellow	-	-	18	1	14	33
Nashville Warbler	Yellow	-	-	-	-	1	1
Northern Waterthrush	Yellow	-	-	25	5	21	51
Ovenbird	Yellow	-	-	34	6	39	79
Bay-breasted Warbler	Red	-	-	2	-	-	2
Yellow-rumped Warbler	Yellow	-	-	47	7	12	66
Magnolia Warbler	Yellow	-	-	13	-	3	16
Black-throated Gray Warbler	Yellow	-	-	-	-	1	1
Yellow Warbler	Yellow	-	-	92	21	20	133
American Redstart	Yellow	-	-	40	12	29	81
Cape May Warbler	Blue	-	-	6	1	-	7
Townsend's Warbler	Yellow	-	-	3	-	-	3
Black-throated Green Warbler	Blue	-	-	3	-	4	7
Red-winged Blackbird	Yellow	-	-	62	-	2	64
Brewer's Blackbird	Yellow	-	-	10	6	-	16
Baltimore Oriole	Blue	-	-	2	1	3	6
Brown-headed Cowbird	Yellow	-	-	11	2	9	22
Western Meadowlark	Yellow	-	-	1	1	-	2
Dark-eyed Junco	Yellow	-	-	29	5	6	40
Swamp Sparrow	Yellow	-	-	19	2	12	33
Lincoln's Sparrow	Yellow	-	-	46	12	23	81
Song Sparrow	Yellow	-	-	52	2	2	56
Savannah Sparrow	Yellow	-	-	-	3	1	4
Vesper Sparrow	Yellow	-	-	1	11	2	14
Clay-colored Sparrow	Yellow	-	-	21	16	3	40
Chipping Sparrow	Yellow	-	-	12	3	3	18
White-throated Sparrow	Yellow	-	-	102	28	37	167
White-crowned Sparrow	Yellow	-	-	2	-	-	2
Rose-breasted Grosbeak	Yellow	-	-	24	6	11	41
Western Tanager	Yellow	-	-	49	4	11	64

¹ Total count is the sum of the maximum count at all stations. Maximum count is the largest number of each species found over both surveys at the survey station.

Table 7. Songbirds observed at the BC Hydro mitigation properties during the 2017 point count surveys

Common Name	BC List	COSEWIC	SARA	Total Count ¹
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				Marl Fen	Rutledge	Wilder	Total
Western Wood-Pewee	Yellow	-	-	-	1	-	1
Alder Flycatcher	Yellow	-	-	-	2	4	6
Pacific-slope Flycatcher	Yellow	-	-	-	1	-	1
Least Flycatcher	Yellow	-	-	-	3	4	7
Warbling Vireo	Yellow	-	-	-	1	1	2
Red-eyed Vireo	Yellow	-	-	2	12	14	28
Blue-headed Vireo	Yellow	-	-	2	-	1	3
American Crow	Yellow	-	-	1	-	2	3
Common Raven	Yellow	-	-	4	6	15	25
Blue Jay	Yellow	-	-	-	2	-	2
Gray Jay	Yellow	-	-	4	-	-	4
Black-billed Magpie	Yellow	-	-	3	9	1	13
Cedar Waxwing	Yellow	-	-	-	4	3	7
Ruby-crowned Kinglet	Yellow	-	-	3	-	-	3
Red-breasted Nuthatch	Yellow	-	-	1	-	-	1
House Wren	Yellow	-	-	-	4	3	7
Gray Catbird	Yellow	-	-	-	-	7	7
Hermit Thrush	Yellow	-	-	5	5	3	13
Swainson's Thrush	Yellow	-	-	3	7	4	14
Townsend's Solitaire	Yellow	-	-	-	2	-	2
American Robin	Yellow	-	-	7	7	4	18
Purple Finch	Yellow	-	-	-	-	2	2
Wilson's Warbler	Yellow	-	-	1	1	1	3
Common Yellowthroat	Yellow	-	-	2	-	-	2
Black-and-white Warbler	Yellow	-	-	1	-	-	1
Orange-crowned Warbler	Yellow	-	-	-	1	3	4
Tennessee Warbler	Yellow	-	-	-	1	-	1
Northern Waterthrush	Yellow	-	-	5	-	-	5
Ovenbird	Yellow	-	-	1	5	-	6
Yellow-rumped Warbler	Yellow	-	-	5	2	-	7
Yellow Warbler	Yellow	-	-	-	9	12	21
American Redstart	Yellow	-	-	1	11	-	12
Cape May Warbler	Blue	-	-	1	-	-	1
Brewer's Blackbird	Yellow	-	-	-	6	0	6
Baltimore Oriole	Blue	-	-	-	1	-	1
Brown-headed Cowbird	Yellow	-	-	-	1	1	2
Western Meadowlark	Yellow	-	-	-	1	-	1
Dark-eyed Junco	Yellow	-	-	-	5	-	5

Common Name	BC List	COSEWIC	SARA	Total Count ¹			
				Marl Fen	Rutledge	Wilder	Total
Swamp Sparrow	Yellow	-	-	2	-	-	2
Lincoln's Sparrow	Yellow	-	-	5	5	2	12
Song Sparrow	Yellow	-	-	1	-	1	2
Savannah Sparrow	Yellow	-	-	1	2	-	3
Vesper Sparrow	Yellow	-	-	-	3	8	11
Clay-colored Sparrow	Yellow	-	-	1	7	8	16
Chipping Sparrow	Yellow	-	-	2	1	-	3
White-throated Sparrow	Yellow	-	-	2	15	11	28
Rose-breasted Grosbeak	Yellow	-	-	-	5	1	6
Western Tanager	Yellow	-	-	-	3	1	4

¹ Total Count is the sum of the maximum count at all stations. Maximum count is the largest number of each species found over both surveys at the survey station.

6.1.3.2 Waterbird surveys

The waterbirds survey program is focussed on shorebirds, marsh birds, waterfowl, and other birds associated with aquatic and wetland habitats (collectively known as 'waterbirds'). Waterbirds surveys were conducted in the Peace River and adjacent wetlands in 2006 and 2008 and 2012 through 2014. Those waterbird surveys were conducted using fixed-wing aircraft and twin-engine helicopter surveys and, to a lesser extent, ground and boat surveys. No shorebirds were documented during helicopter and fixed-wing aircraft surveys between 2012 and 2014 because of the difficulty detecting small birds using aerial surveys. As a result, methods were adapted in 2017 to continue the use of fixed-wing aircraft for aerial surveys, and to add ground, river boat, unmanned aerial vehicle and autonomous recording unit survey methods. As aerial surveys have been shown to make identifying most waterbirds to the species level, it is expected that the aerial component of waterbird surveys will be discontinued and not applied in 2018. The Waterbirds Follow-up Monitoring 2017 Annual Report can be found in Appendix 4.

The results of 2017 waterbird surveys describe the timing of peak waterbird abundances in spring and fall, diversity metrics and habitat associations. Peak abundance was in the early spring, when mostly dabbling ducks and large dabblers (geese) utilize the Peace River. Diversity was relatively low at this time, reflecting large numbers of a few species. Later in the spring, abundance decreased as waterbirds began to occupy the newly-thawed wetlands on the transmission line. In the fall, waterbird abundance on the Peace River and in transmission line wetlands decreased as the migration progresses. On the Peace River in the fall, gulls were the most abundant waterbirds, while dabbling ducks were the most abundant on wetlands on the transmission line. All habitats on the Peace River were used by waterbirds, but the strongest apparent selection was for vegetated back-channel and island reaches. A substantial number of gulls used gravel substrates in confluence reaches on the Peace River in the fall; accounting for approximately half of all fall waterbird observations. On the transmission line wetlands, the strongest apparent selection by waterbirds was for open water, sedge and willow-sedge wetlands.

Ground and boat-based surveys in 2017 achieved better detectability than previous surveys using aerial methods; 30 species were observed on the transmission line and 38 species on the Peace River. In 2015 and 2016 aerial surveys, eight to ten species were observed. Species richness detected during ground and boat-based surveys in 2017 was similar to that observed during 2006 and 2008 boat and ground-based surveys. Five waterbird species at risk were recorded in 2017, none of which were reported since the 2006 and 2008 ground and boat surveys. Shorebird detectability was also much improved in 2017, which provides better baseline knowledge of this waterbird group for effects monitoring.

Waterbird species observed during 2017 surveys are shown in Table 8. The following designated species at risk were observed during the surveys, as per provincial, *Species at Risk Act* (SARA), or Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listings:

- California gull (*Larus californicus*), Blue-listed in BC
- Surf scoter (*Melanitta perspicillata*), Blue-listed in BC
- Horned grebe (*Podiceps auritus*), listed as Special Concern by COSEWIC and on Schedule 1 of SARA
- Western grebe (*Aechmophorus occidentalis*), Red-listed in BC, listed as Special Concern by COSEWIC and on Schedule 1 of SARA
- Eared grebe (*Podiceps nigricollis*), Blue-listed in BC
- Red-necked phalarope (*Phalaropus lobatus*), Blue-listed in BC

Table 8. Species Observed During Spring 2017 Waterbird Surveys

English Name	Scientific Name	BC Status	COSEWIC Status ^(a)	SARA Status ^(b)	Peace River Survey Abundance ^(c)	Transmission Line Wetland Survey Abundance ^(d)
Benthic Feeding Divers						
Common Goldeneye	<i>Bucephala clangula</i>	Yellow	-	-	264	10
Unidentified Goldeneye	<i>n/a</i>	-	-	-	87	1
Bufflehead	<i>Bucephala albeola</i>	Yellow	-	-	18	106
Surf Scoter	<i>Melanitta perspicillata</i>	Blue	-	-	15	0
White-winged Scoter	<i>Melanitta fusca</i>	Yellow	-	-	6	0
Dabbling Ducks						
Mallard	<i>Anas platyrhynchos</i>	Yellow	-	-	2,743	219
Northern Pintail	<i>Anas acuta</i>	Yellow	-	-	603	4
American Wigeon	<i>Anas americana</i>	Yellow	-	-	346	35
Green-winged Teal	<i>Anas crecca</i>	Yellow	-	-	273	104

English Name	Scientific Name	BC Status	COSEWIC Status ^(a)	SARA Status ^(b)	Peace River Survey Abundance ^(c)	Transmission Line Wetland Survey Abundance ^(d)
Blue-winged Teal	<i>Anas discors</i>	Yellow	-	-	240	198
Unidentified Teal	n/a	-	-	-	101	18
Northern Shoveler	<i>Anas clypeata</i>	Yellow	-	-	94	74
Unidentified Scaup	n/a	-	-	-	53	89
Lesser Scaup	<i>Aythya affinis</i>	Yellow	-	-	32	4
Gadwall	<i>Anas strepera</i>	Yellow	-	-	24	8
Canvasback	<i>Aythya valisineria</i>	Yellow	-	-	15	4
Redhead	<i>Aythya americana</i>	Yellow	-	-	7	3
Ring-necked Duck	<i>Aythya collaris</i>	Yellow	-	-	4	52
Cinnamon Teal	<i>Anas cyanoptera</i>	Yellow	-	-	2	0
American Coot	<i>Fulica americana</i>	Yellow	NAR (1991)	-	1	36
Gulls						
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	Yellow	-	-	2,431	0
Unidentified Gull	n/a	-	-	-	396	0
Ring-billed Gull	<i>Larus delawarensis</i>	Yellow	-	-	154	0
Mew Gull	<i>Larus canus</i>	Yellow	-	-	94	0
California Gull	<i>Larus californicus</i>	Blue	-	-	22	0
Franklin's Gull	<i>Leucophaeus pipixcan</i>	Unknown	-	-	8	1
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Accidental	-	-	2	0
Large Dabblers						
Canada Goose	<i>Branta canadensis</i>	Yellow	-	-	5,580	14
Trumpeter Swan ^(e)	<i>Cygnus buccinator</i>	Yellow	NAR (1996)	-	61	41
Marsh Birds						
Wilson's	<i>Gallinago delicata</i>	Yellow	-	-	0	36

English Name	Scientific Name	BC Status	COSEWIC Status ^(a)	SARA Status ^(b)	Peace River Survey Abundance ^(c)	Transmission Line Wetland Survey Abundance ^(d)
Snipe						
Sora	<i>Porzana carolina</i>	Yellow	-	-	0	80
Piscivorous Divers						
Common Merganser	<i>Mergus merganser</i>	Yellow	-	-	836	9
Barrow's Goldeneye	<i>Bucephala islandica</i>	Yellow	-	-	37	0
Belted Kingfisher	<i>Megaceryle alcyon</i>	Yellow	-	-	20	0
Red-necked Grebe	<i>Podiceps grisegena</i>	Yellow	NAR (1982)	-	17	4
Common Loon	<i>Gavia immer</i>	Yellow	NAR (1997)	-	6	17
Unidentified Tern	n/a	-	-	-	1	0
Western Grebe	<i>Aechmophorus occidentalis</i>	Red	SC (2014)	1-SC (2017)	1	0
Horned Grebe	<i>Podiceps auritus</i>	Yellow	SC (2009)	1-SC	1	3
Unidentified Grebe	n/a	-	-	-	0	2
Eared Grebe	<i>Podiceps nigricollis</i>	Blue	-	-	0	14
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Yellow	-	-	0	5
Shorebirds						
Spotted Sandpiper	<i>Actitis macularius</i>	Yellow	-	-	423	6
Unidentified Shorebird	n/a	-	-	-	48	6
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Blue	SC (2014)	-	11	0
Killdeer	<i>Charadrius vociferus</i>	Yellow	-	-	6	2
Solitary Sandpiper	<i>Tringa solitaria</i>	Yellow	-	-	3	20
Greater Yellowlegs	<i>Tringa melanoleuca</i>	Yellow	-	-	2	16
Lesser Yellowlegs	<i>Tringa flavipes</i>	Yellow	-	-	0	5
Unknown Waterbirds						
Unidentified	n/a	-	-	-	1,122	178

English Name	Scientific Name	BC Status	COSEWIC Status ^(a)	SARA Status ^(b)	Peace River Survey Abundance ^(c)	Transmission Line Wetland Survey Abundance ^(d)
Duck						
Unidentified Waterbird	<i>n/a</i>	-	-	-	114	12

(a) SC = Special Concern; NAR = Not At Risk.

(b) 1-SC = Schedule 1 Special Concern.

(c) Includes flying records as birds were often flushed to flight in front of boat.

(d) Excludes flying records and those from stations where access was not permitted.

(e) All swans were assumed trumpeter swans, but some proportion of tundra is likely based on documented presence of the species (eBird).

6.1.4 Condition 9.9.2

This section summarizes actions taken in accordance with the following requirement of Condition 9.9.2: *The Proponent shall address potential risks of bird collisions with the transmission line, in consultation with Environment Canada, by determining if additional mitigation measures could be implemented to reduce the risk of bird collisions.*

A risk assessment for bird collisions with the transmission line was included in Section 6.1.3 of the 2016 VWMMP Annual Report. Since that time, changes have been incorporated in the transmission line design that further reduce the risk of bird collisions:

- Phase to phase spacing is more than 12 meters, preventing any electrocution hazard that exists on distribution lines;
- Conductor size is approximately 1.25" diameter, therefore easier for birds to see. Each phase of the conductor will be configured in a square-shaped bundle of four, with spacing of 0.5 meters between each conductor, thus further increasing visibility for birds.
- There are no shield wires on most of the line. Shield wires are smaller in diameter and harder for birds to see, and will only be installed in the last kilometer of each end of the line.
- Water crossings of the Peace and Moberly rivers will have marker spheres on them, which will increase visibility for birds.
- Guy wires on the structures are relatively low to the ground, as they connect to the tower at 2/3 the height of the tower. The lower height of the guy wires will reduce risk to birds. The bottom of the guy wires are marked with bright yellow plastic guards, which will increase their visibility, and further reduce risk to birds.

The transmission line has not yet been constructed, but once constructed the mitigations implemented will be documented in the appropriate VWMMP Annual Report.

6.2 Federal Decision Statement Condition 10: Non-Wetland Migratory Bird Habitat Mitigation and Monitoring

This section of the annual report summarizes the applicable components of the VWMMP implemented to fulfill FDS condition 10 in 2017 in accordance with the requirements of FDS condition 10.8. For context, the complete requirements of FDS condition 10 are shown below.

10. Non-wetland migratory bird habitat

- 10.1. The Proponent shall mitigate the potential effects of the Designated Project on non-wetland migratory bird habitat.
- 10.2. The Proponent shall develop, in consultation with Environment Canada, a plan that addresses potential effects of the Designated Project on non-wetland migratory bird habitat.
- 10.3. The plan shall include:
 - 10.3.1. non-wetland migratory bird habitat baseline conditions for habitat that would be permanently lost, habitat that would be fragmented and habitat that would remain intact;
 - 10.3.2. migratory bird abundance, distribution and use of non-wetland habitat;
 - 10.3.3. measures to mitigate the changes in aquatic and riparian-related food resources and other habitat features associated with a change from a fluvial to a reservoir system;
 - 10.3.4. compensation measures to address the unavoidable loss of non-wetland migratory bird habitat, including habitat associated with the Canada Warbler, the Cape May Warbler and the Bay-Breasted Warbler;
 - 10.3.5. an analysis of the effects of any compensation measures identified in condition 10.3.4 on the current use of lands and resources for traditional purposes by Aboriginal peoples; and
 - 10.3.6. an approach to monitor and evaluate the effectiveness of the mitigation or compensation measures to be implemented and to verify the accuracy of the predictions made during the environmental assessment on non-wetland migratory bird habitat, including migratory bird use of that habitat.
- 10.4. The Proponent shall submit to the Agency and Environment Canada a draft copy of the plan for review:
 - 10.4.1. for conditions 10.3.1, 10.3.2, 10.3.3 and 10.3.6, 90 days prior to initiating construction; and
 - 10.4.2. for conditions 10.3.4 and 10.3.5, 90 days prior to implementing any component of the compensation plan.
- 10.5. The Proponent shall submit to the Agency the final plan:
 - 10.5.1. for conditions 10.3.1, 10.3.2, 10.3.3 and 10.3.6, a minimum of 30 days prior to initiating construction; and
 - 10.5.2. for conditions 10.3.4 and 10.3.5, a minimum of 30 days prior to implementing any component of the compensation plan.
- 10.6. When submitting each component of the final plan, the Proponent shall provide to the Agency an analysis that demonstrates how it has appropriately considered the input, views or information received from Environment Canada.
- 10.7. The Proponent shall commence the implementation of the compensation measures specified in condition 10.3.4 no later than five years from the initiation of construction.
- 10.8. The Proponent shall implement each component of the plan and provide to the Agency an analysis and summary of the implementation of the applicable component of the plan, as well as any amendments made to the plan in response to the results, on an annual basis during construction and at the end of year 1, 2, 3, 5, 10, 15, 20 and 30 of operation.

6.2.1 Condition 10.3.1

This section summarizes actions taken in accordance with the following requirement of Condition 10.3.1: *The plan shall include non-wetland migratory bird habitat baseline conditions for habitat that would be permanently lost, habitat that would be fragmented and habitat that would remain intact.*

The collection of data on non-wetland migratory bird habitat baseline conditions is done through implementation of the migratory bird monitoring plans, for which the results of 2017 surveys are summarized in Section 6.1.3 in relation to FDS Condition 9.3 (monitor and mitigate potential disturbance of breeding migratory birds).

6.2.2 Condition 10.3.2

This section summarizes actions taken in accordance with the following requirement of Condition 10.3.2: *The plan shall include migratory bird abundance, distribution and use of non-wetland habitat.*

The collection of data on non-wetland migratory bird abundance, distribution and use of non-wetland habitat is done through implementation of the migratory bird monitoring plans, for which the results of 2017 surveys are summarized in Section 6.1.3 in relation to FDS Condition 9.3 (monitor and mitigate potential disturbance of breeding migratory birds).

6.2.3 Condition 10.3.4

This section summarizes actions taken in accordance with the following requirement of Condition 10.3.4: *The plan shall include compensation measures to address the unavoidable loss of non-wetland migratory bird habitat, including habitat associated with the Canada Warbler, the Cape May Warbler and the Bay-Breasted Warbler.*

BC Hydro continues to manage three properties (Marl Fen, Rutledge and Wilder Creek) that were retained (in part) to provide habitat for non-wetland migratory birds. Management plans for those properties were included in the 2015 annual report. No new properties were added to the program in 2017.

6.2.4 Condition 10.3.5

This section summarizes actions taken in accordance with the following requirement of Condition 10.3.4: *The plan shall include an analysis of the effects of any compensation measures identified in condition 10.3.4 on the current use of lands and resources for traditional purposes by Aboriginal peoples.*

BC Hydro has not been made aware of any current use of its fee simple lands for traditional purposes by Aboriginal peoples. The purchase and retention, by BC Hydro, of fee simple lands is not expected to affect current use of lands and resources for traditional purposes by Aboriginal people. Access to

fee simple lands is controlled by the owner, or, in the case of BC Hydro, the leaseholder of lands leased by BC Hydro.

6.2.5 Condition 10.3.6

This section summarizes actions taken in accordance with the following requirement of Condition 10.3.6: *The plan shall include an approach to monitor and evaluate the effectiveness of the mitigation or compensation measures to be implemented and to verify the accuracy of the predictions made during the environmental assessment on non-wetland migratory bird habitat, including migratory bird use.*

An approach to monitor the effectiveness of mitigation and compensation measures and to verify the accuracy of the predictions made during the environmental assessment on non-wetland migratory birds is done within the migratory bird monitoring plans. The 2017 results of the implementation of those plans are summarized in Section 6.1.3 in relation to FDS Condition 9.3 (monitor and mitigate potential disturbance of breeding migratory birds).

6.3 Federal Decision Statement Condition 11

This section of the annual report summarizes the components of the VWMMP implemented to fulfill FDS condition 11 in 2017 in accordance with the requirements of FDS condition 11.9. For context, the complete requirements of FDS condition 11 are shown below.

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| <p>11. Wetlands used by migratory birds and for current use of lands and resources for traditional purposes</p> <p>11.1 The Proponent shall mitigate the potential effects of the Designated Project on wetland habitat used by migratory birds, species at risk and for current use of lands and resources for traditional purposes by Aboriginal people.</p> <p>11.2. The Proponent shall develop, in consultation with Environment Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups, a plan that addresses potential effects of the Designated Project on wetland habitat used by migratory birds, species at risk and for current use of lands and resources for traditional purposes.</p> <p>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.</p> <p>11.4. The plan shall include:</p> <p>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;</p> <p>11.4.2. mitigation measures to maintain baseline wetland functions for those wetlands that will not be permanently lost;</p> <p>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;</p> <p>11.4.4. compensation measures to address the unavoidable loss of wetland areas and functions</p> |
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supporting migratory birds, species at risk, and the current use of lands and resources by Aboriginal people in support of the objective of full replacement of wetlands in terms of area and function; and

11.4.5. an analysis of the effects of any compensation measures identified in condition 11.4.4 on the current use of lands and resources for traditional purposes by Aboriginal peoples.

- 11.5. The Proponent shall submit to the Agency, Environment Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups a draft copy of the plan for review:
- 11.5.1. for conditions 11.4.1, 11.4.2 and 11.4.3, 90 days prior to initiating construction; and
- 11.5.2. for conditions 11.4.4 and 11.4.5, 90 days prior to implementing any component of the compensation plan.
- 11.6. The Proponent shall submit to the Agency the final plan:
- 11.6.1. for conditions 11.4.1, 11.4.2 and 11.4.3, a minimum of 30 days prior to initiating construction; and
- 11.6.2. for conditions 11.4.4 and 11.4.5, a minimum of 30 days prior to implementing any component of the compensation plan.
- 11.7. When submitting each component of the final plan, the Proponent shall provide to the Agency an analysis that demonstrates how it has appropriately considered the input, views or information received from Environment Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups.
- 11.8. The Proponent shall commence the implementation of the compensation measures specified in condition 11.4.4 no later than five years from the initiation of construction.
- 11.9. The Proponent shall implement each component of the plan and provide to the Agency an analysis and summary of the implementation of the plan, as well as any amendments made to the plan in response to the results, on an annual basis during construction and at the end of year 1, 2, 3, 5, 10, 15, 20 and 30 of operation.

6.3.1 Condition 11.1

This section summarizes actions taken in accordance with the following requirement of Condition 11.1: *The Proponent shall mitigate the potential effects of the Designated Project on wetland habitat used by migratory birds, species at risk and for current use of lands and resources for traditional purposes by Aboriginal people.*

The CEMP (Section 4.17) states that, "except within the dam site area, area, on designated access roads and during clearing, construction activities shall be prohibited within 15 m of the Ordinary High Water Mark of streams or wetland, unless the activity was described in the EIS and is accepted by BC Hydro".

The location and boundaries of wetland habitats along the transmission line right-of-way were field truthed; their boundaries flagged and coordinates recorded using GPS. Riparian Vegetation Management Areas (RVMA) / Machine Free Zones have been established as a 15 m buffer from the ordinary high water mark around wetlands. Within this zone clearing will be carried out by either hand-falling or having machines reach in from the edge of the RVMA (machines are not allowed to enter the RVMA). No burning, mulching or chipping is allowed within the RVMA. Vegetation with a normal mature height less than 3 m and conifers less than 2m will not be removed from the RVMA.

This information was also used when determining the location of access roads that will be used to construct the transmission line. Mitigation for loss of wetland habitat is discussed in Section 6.3.2.

6.3.2 Condition 11.2

This section summarizes actions taken in accordance with the following requirement of Condition 11.2: *The Proponent shall develop, in consultation with Environment Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups, a plan that addresses potential effects of the Designated Project on wetland habitat used by migratory birds, species at risk and for current use of lands and resources for traditional purposes.*

Please refer to Section 3.0 for information on consultation undertaken in 2017 for development of the Wetland Function Assessment component of the wetland mitigation plan. In 2017 BC Hydro revised the Wetland Function Assessment in response to comments from CWS, FLNRO and MOE. A revised version of the WFA was distributed to the VWTC on 13 October 2017 (Appendix 1).

BC Hydro continues to manage the Marl Fen property, which was retained (in part) to protect the marl fen that makes up part of the property. The management plans for that property was included in the 2015 annual report. In 2017, with support by Ducks Unlimited, BC Hydro identified a good candidate wetland for restoration on private land and has been working with the landowner to secure an appropriate covenant to the title and commence restoration activities. In 2018, at the suggestion of Indigenous Groups, BC Hydro will be focussing efforts on finding opportunities for wetland protection and enhancement on BC Crown lands, so that benefits can be realized for use of those lands and resources for traditional purposes.

A wetland monitoring program is being developed for implementation in 2018 through consultation with and review by MoE, FLNRORD, and CWS by way of the VWTC. Based on the requirements for wetland monitoring listed above, a monitoring program must be informative enough to allow for:

- Collection of baseline data on the biogeochemical, hydrological and ecological functioning of the wetlands and associated riparian habitat in the area affected by the Designated Project;
- An evaluation of change to baseline wetland conditions due to the Project;
- Selection of compensation measures for loss of wetland areas and functions, including reclamation, improvement, creation and protection; and,
- Flexibility in the monitoring program to allow for further refinement in the characterization of baseline and affected wetlands, as data become available.

The monitoring program will include direct measures of groundwater quality and quantity, surface water quality and quantity, vegetation cover, structure and diversity, and rare plant occurrence. Further data on biotic structure and diversity, and migratory bird and species at risk abundance, density, diversity and use will be gathered through focussed monitoring plans (e.g., see Section 6.1.3 for details on spring and fall waterfowl and shorebird surveys conducted in 2017). Baseline data regarding current use of wetlands for traditional purposes by Aboriginal people have been gathered by the BC Hydro Indigenous relations team through groundtruthing with FN groups, who will also gather and compile data regarding changes to use of wetlands for traditional purposes. The monitoring program will be revised, as appropriate, as additional data are gathered and opportunities for program improvement are identified.

The priority for the wetland monitoring program in 2018 will be to sample wetland habitats for which baseline data may be insufficient, and which are likely to soon be impacted by clearing or construction activities.

6.3.3 Condition 11.4.1

This section summarizes actions taken in accordance with the following requirement of Condition 11.4.1: *The plan shall include 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.*

Considerable baseline data on the biogeochemical, hydrological and ecological functioning of wetlands and associated riparian habitat were collected during baseline surveys for the EIS. In October 2017 Maple Leaf Forestry Ltd. conducted an assessment and classification of wetlands impacted by the transmission line RoW. This consisted of field visits to identify all the wetlands in the right-of-way, categorize them into a wetland type, and delineate the boundaries of the wetland. Wetlands were categorized into the same wetland types as in the TEM (habitat classification data pending, as of February 9, 2018) while also classified into a Wetland Riparian Class of the Forest Practices and Planning Regulation (FPPR) under the Forest and Range Practices Act (FRPA). In conjunction with the Maple Leaf Forestry dataset, Ecofish consultants conducted a self-assessment of wetlands along the transmission line in 2017 to confirm their hydrologic surface connectivity and therefore likely fish-bearing status. Also in 2017, Hemmera visited select wetlands along the transmission line RoW for wetland classification and water quality sampling.

See Section 6.3.2 for a description of the wetland monitoring program being developed for implementation in 2018.

6.3.4 Condition 11.4.2

This section summarizes actions taken in accordance with the following requirement of Condition 11.4.2: *The plan shall include mitigation measures to maintain baseline wetland functions for those wetlands that will not be permanently lost.*

Wetland function will be maintained for wetlands that will not be permanently lost through timing of works (e.g. winter to minimize ground disturbance), maintenance of hydrology through the installation of culverts during road construction (see Section 7.3.1.2), and installation of special management/ no disturbance buffers around wetlands (see Section 6.3.1).

6.3.5 Condition 11.4.3

This section summarizes actions taken in accordance with the following requirement of Condition 11.4.3: *The plan shall include 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.*

See section 6.3.3 for discussion the plan for monitoring and evaluating changes to baseline conditions, as defined in condition 11.4.1, and for identifying improvements based on monitoring data.

6.3.6 Condition 11.4.4

This section summarizes actions taken in accordance with the following requirement of Condition 11.4.4: *The plan shall include compensation measures to address the unavoidable loss of wetland areas and functions supporting migratory birds, species at risk, and the current use of lands and resources by Aboriginal people in support of the objective of full replacement of wetlands in terms of area and function.*

Please see Section 6.3.2 for details on the wetland mitigation program and the Wetland Function Assessment.

6.3.7 Condition 11.8

This section summarizes actions taken in accordance with the following requirement of Condition 11.8: *The Proponent shall commence the implementation of the compensation measures specified in condition 11.4.4 no later than five years from the initiation of construction.*

Please refer to Section 10.3.4 for details on implementation of the compensation measures in 2015, the first year of construction.

6.3.8 Condition 11.9

This section summarizes actions taken in accordance with the following requirement of Condition 11.9: *The Proponent shall implement each component of the plan and provide to the Agency an analysis and summary of the implementation of the plan, as well as any amendments made to the plan in response to the results, on an annual basis during construction and at the end of year 1, 2, 3, 5, 10, 15, 20 and 30 of operation.*

This annual report represents an analysis and summary of the implementation of the plan. The following amendments were made to the 2015 plan based on survey results and consultation with CWS, FLNRO and MOE:

- Implementation of the songbird survey program, which investigates the relative abundance, density, diversity, and use by songbirds (including species at risk) of wetland habitats, is described in Section 6.1.3.1 for 2017.
- Based on results of 2016 surveys and in consultation with FLNRO, MOE and CWS, BC Hydro amended the waterbirds survey program to incorporate a ground based survey program to document the relative abundance, diversity, and use of habitat by shorebirds, and to gather more accurate data for other waterbird species than was feasible through aerial surveys (see Section 6.1.3.2). The need to develop this program was identified upon review of the data collected, the paucity of shorebird observations, and the overall quality of data collected under the previous survey program. Implementation of the waterbirds monitoring plan in 2017 is described in Section 6.1.3.2.
- The Wetland Function Assessment tool continues to be developed. In 2017 BC Hydro revised the Wetland Function Assessment in response to comments from CWS, FLNRO

and MOE. A revised version of the WFA was distributed to the VWTC on 13 October 2017 (Appendix 1).

- A wetland monitoring program is being developed for implementation in 2018 (Section 6.3.2).

6.4 Federal Decision Statement Condition 16

This section of the annual report summarizes the programs implemented in 2015 in accordance with the requirements of FDS condition 16.6.

For context, the complete requirements of FDS condition 16 are shown below.

16. Species at risk, at-risk and sensitive ecological communities and rare plants

- 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:
 - 16.3.1. field work to verify the modeled results for surveyed species at risk and determine the habitat that would be permanently lost, habitat that would be fragmented and habitat that would remain intact for those species, including the Short-eared Owl, the Western Toad and the Myotis Bat species;
 - 16.3.2. surveys to determine whether the rare plant species potentially facing extirpation in the Project Activity Zone are found elsewhere in the region;
 - 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;
 - 16.3.5. an approach to avoiding or minimizing the use of herbicides and pesticides in areas that could impact species at risk, at-risk and sensitive ecological communities and rare plants;
 - 16.3.6. an approach to monitor and evaluate the effectiveness of mitigation measures and to verify the accuracy of the predictions made during the environmental assessment on species at risk, at-risk and sensitive ecological communities and rare plants; and
 - 16.3.7. an approach for tracking updates to the status of listed species identified by the Government of British Columbia, Committee on the Status of Endangered Wildlife in Canada, and the Species at Risk Act, and implementation of additional measures, in accordance with species recovery plans, to mitigate effects of the Designated Project on the affected species should the status of a listed species change during the life of the Designated Project.
- 16.4. The Proponent shall submit to the Agency and Environment Canada a draft copy of the plan for review 90 days prior to initiating construction.
- 16.5. The Proponent shall submit to the Agency the final plan a minimum of 30 days prior to initiating construction. When submitting the final plan, the Proponent shall provide to the Agency, an analysis that demonstrates how it has appropriately considered the input, views or information received from Environment Canada.

6.4.1 Condition 16.3.2

This section summarizes actions taken in accordance with the following requirement of Condition 16.3.2: *The plan shall include surveys to determine whether the rare plant species potentially facing extirpation in the Project Activity Zone are found elsewhere in the region.*

Project-specific rare plant surveys conducted in 2008 reported occurrences of persistent-sepal yellowcress (*Rorippa calycina*) and peace daisy (*Erigeron pacalis*). A technical memorandum summarizing the results and associated conclusions of intensive surveys searching for occurrences of these two plant species can be found in Appendix 5. A summary of regional rare plant surveys, for which identifying occurrences of persistent-sepal yellowcress and peace daisy were an objective, is presented in Section 7.2.1.

In 2008, three occurrences of persistent-sepal yellowcress were documented in the Site C Local Assessment Area (LAA). Subsequent surveys at the three sites in 2011, 2014, 2016 and 2017 resulted in only marsh yellowcress (*Rorippa palustris*) being found. Despite repeated intensive searches over several years by different surveyors in and around the three documented occurrence sites, no persistent-sepal yellowcress occurrences could be found. Numerous rare plant surveys in 2011, 2012, 2014 and 2017 were conducted along the Peace River from Hudson's Hope to the Alberta border resulting in the identification of numerous occurrences of marsh yellowcress but none of persistent-sepal yellowcress. The available evidence strongly suggests that the three persistent-sepal yellowcress occurrences reported in 2008 on the Peace River are not present. This may have occurred due to extirpation by an extreme flood event, the original identification was made in error, or occurrences were present but not identified despite repeated intensive surveys under appropriate conditions by qualified botanists; the latter possibility was determined to be particularly unlikely (Appendix 5).

In 2008, one occurrence of Peace daisy was documented above the left bank of the Peace River upstream from Wilder Creek. Subsequent surveys at the occurrence site in 2014, 2016 and 2017 did not result in any identification of Peace daisy. In addition, numerous rare plant surveys in 2011, 2012, 2014, 2015, 2016, and 2017 were conducted in habitat thought to be suitable for Peace daisy but no occurrences were found. No occurrence of Peace has been identified since the original 2008 observation despite repeated intensive surveys under appropriate conditions by qualified botanists. This lack of success may be because the population has been extirpated, the locational information may be incorrect and the surveyors were searching in the wrong place, or the plants described as Peace daisy in 2008 may have been misidentified at the time. It has been determined that continuing to return to the reported location of the 2008 occurrence observation would be unlikely to be successful at identifying Peace daisy (Appendix 5).

6.4.2 Condition 16.3.3

This section summarizes actions taken in accordance with the following requirement of Condition 16.3.3: *The plan shall include measures to mitigate environmental effects on species at risk and at-risk and sensitive ecological communities and rare plants.*

In 2017 the following measures were implemented to mitigate effects on species at risk and at-risk and sensitive ecological communities and rare plants:

- Completion of pre-construction rare plant surveys on roads and portions of the transmission line corridor not surveyed during baseline surveys (Section 6.4.2.1)
- Completion of amphibian dispersal mitigation and salvages (Section 6.4.2.2)
- Implementation of a 20 m machine-free buffer zone, within which no mulch would be spread, has been established around a rare plant occurrence (white adder's mouth orchid [*Malaxis brachypoda*]) within the transmission line RoW. This mitigation resulted in the movement of a planned access road so that it did not overlap with the setback buffer.
- Implementation of protection measures for wetland and riparian areas, in which rare plant occurrences are generally concentrated, in the CEMP (See Section 6.3.1).
- The Environmental Features Map was updated with the 2017 rare plant data on 19 January, 2018 and posted in the data room for contractors to access in their planning.
- Further development and implementation of the Experimental Rare Plant Translocation program in consultation with MOE, FLNRO and CWS (Section 7.1.6).
- Avoidance of hibernacula and suspected maternity roosts at Portage Mountain. The 2016 Annual Report described how impacts to hibernacula at Portage Mountain will be avoided. Monitoring of bat activity at Portage Mountain began in 2017 for evaluating the effectiveness of mitigation (Section 6.4.5).

6.4.2.1 Pre-construction rare plant surveys

Pre-construction rare plant surveys were conducted in 2017 in areas of the planned Project footprint not previously surveyed. The resultant data served as inputs to the final design of access roads and the transmission line, as well as to provide information for potential propagule sources for the Experimental Rare Plant Translocation Program (see Section 7.1.6). The first season of pre-construction surveys was completed in the summer and fall of 2015, with the second season finished in the fall of 2016. This was followed by a third season of pre-construction surveys in the summer and fall of 2017, in which pre-construction surveys focussed on the Highway 29 realignment corridor, the transmission line corridor and proposed access roads. In 2017 the surveys were conducted between June 23 and August 12, with a total of 51.7 km of survey transect covered.

The 2017 pre-construction rare plant survey report, which includes methods and results from surveys conducted in 2015-2017, is Appendix 6.

6.4.2.2 Amphibian dispersal mitigation and salvage

Mitigation for minimizing the impacts of the Project on amphibians and amphibian habitat is required of contractors and specified in part in Section 4.17 of Revision 4 of the CEMP. Those mitigations include the following:

- Limit vegetation clearing and avoid road construction in identified amphibian breeding and migration areas, where feasible;
- If construction is required adjacent to any identified amphibian breeding and migration areas, implement appropriate barriers and set-back buffers around the sites in accordance with management of Important Wildlife Areas protection measures (i.e., construction activities shall be prohibited within 15 m of the Ordinary High Water Mark of streams or wetland, unless the activity was described in the EIS and is accepted by BC Hydro; avoid where feasible, including through the use of disturbance setback buffers);

- Install crossing structures for amphibians and snakes to avoid and reduce injury and mortality to amphibians on roads that cross or are immediately beside wetland or other areas where amphibians or snakes are known to migrate across roads in accordance with Section 8.8 of the Vegetation and Wildlife Mitigation and Monitoring Plan. Notify BC Hydro of such installations within 5 days of installation;
- Implement amphibian salvage and relocation procedures as required. Amphibian salvages could be required when avoidance of areas containing metamorphosing tadpoles cannot be avoided, when mass migration events cross access roads, or prior to the destruction of wetlands supporting amphibians (Wildlife Act Permit FJ16-226024, expires December 31, 2023).

It is an implicit requirement of Revision 4 of the CEMP that each Contractor's QEP must conduct amphibian breeding and migration area surveys in advance of ground disturbing activities and alongside active construction roads, where and when appropriate. This is required for knowing when and where mitigation required by the CEMP would be appropriate to implement; for that reason pre-construction surveys for amphibians are a required component of EPPs for works that may impact amphibians.

While this requirement is not in Revision 4 of the CEMP, transmission, clearing and Highway construction contracts issued in 2017 included an explicit requirement for each Contractor and its QEP to follow the Western Toad Management Procedure wherever western toads may exist. The Western Toad Management Procedure was developed through extensive consultation with FLNRORD, MoE and CWS within the VWTC, and can be found in Appendix 7 of this annual report. This procedure was finalized June 26, 2017, and since that time has been required for inclusion in all contractors' EPPs for works that could impact amphibians. Appropriate amphibian mitigation is monitored by BC Hydro site Environmental Monitors and the Independent Environmental Monitor against commitments within EPPs to determine and enforce compliance.

The Western Toad Management Procedure is applicable during construction on access roads, the transmission line, and areas within 250 m of wetlands (Appendix 7). It requires daily surveys of all access roads and work sites during the 'core dispersal period' of June 1 to August 15. During the 'caution dispersal periods' of April 1 to May 31 and August 16 to September 30, the protocol requires a minimum of weekly surveys, as well as surveys before travelling to site and before any work commences. The protocol includes a stop work procedure at access roads or construction sites if dispersing toads are confirmed within 20 m of those areas, as well as a requirement for installing temporary barrier fences to prevent toads from being exposed to an increased mortality risk. Trapped toads are then to be translocated safely across work areas in the direction of their dispersal.

6.4.3 Condition 16.3.4

This section summarizes actions taken in accordance with the following requirement of Condition 16.3.4: *The plan shall include conservation measures to ensure the viability of rare plants, such as seed recovery and plant relocation.*

The propagule collection phase of an Experimental Rare Plant Translocation program was developed in 2017 in consultation with MOE, FLNRO and CWS. Collection of seeds began in 2017 (see Section 7.1.6).

6.4.4 Condition 16.3.5

This section summarizes actions taken in accordance with the following requirement of Condition 16.3.5: *The plan shall include an approach to avoiding or minimizing the use of herbicides and pesticides in areas that could impact species at risk, at-risk and sensitive ecological communities and rare plants.*

The Site C Invasive Weed Mitigation and Adaptive Management Plan (IWMAMP) describes required considerations for contractors when developing an invasive weed management plan. Those include determining treatment boundaries by establishing a buffer zone around rare plant occurrences, as determined in the CEMP and to the satisfaction of an invasive plant QEP. Section 4.15 of the CEMP requires the avoidance / minimization of the use of herbicides or pesticides in areas that could impact species at risk, at-risk and sensitive ecological communities and rare plants. An invasive weed management plan is a required component of contractors' EPPs. Performance by contractors against relevant EPPs is monitored by site Environmental Monitors and the Independent Environmental Monitor to determine and enforce compliance.

6.4.5 Condition 16.3.6

This section summarizes actions taken in accordance with the following requirement of Condition 16.3.6: *The plan shall include an approach to monitor and evaluate the effectiveness of mitigation measures and to verify the accuracy of the predictions made during the environmental assessment on species at risk, at-risk and sensitive ecological communities and rare plants.*

6.4.5.1 Migratory Bird Monitoring

Please see Section 6.1.3.1 and 6.1.3.2 for a summary of the songbird surveys and waterbird surveys conducted in 2017, respectively. These monitoring programs are designed to meet a number of objectives, including to monitor and evaluate the effectiveness of mitigation measures and to verify the accuracy of predictions made during the environmental assessment regarding migratory bird species at risk. Numerous songbird and waterbird species that have been observed in those surveys are provincially and / or federally listed (Sections 6.1.3.1 and 6.1.3.2).

6.4.5.2 Ground Nesting Raptor Surveys

Ground nesting raptor surveys were conducted in 2017 to monitor and evaluate the effectiveness of mitigation measures and to verify the accuracy of predictions made during the environmental assessment on ground nesting raptors, such as short-eared owl (see Section 7.8.3.2). Short-eared owl is provincially Blue-listed and federally listed as Special Concern on Schedule 1 of SARA.

6.4.5.3 Bat Mitigation Monitoring at Portage Mountain

To avoid destroying the hibernacula at Portage Mountain that are being used by little brown myotis and northern myotis, BC Hydro moved the quarry to the eastern edge of the License of Occupation area. This relocation achieved a 300 m no activity / no access buffer around the 16 documented hibernacula. To avoid disturbance to hibernating bats, BC Hydro has also prohibited blasting at Portage Mountain between September 15 and May 15 (see Section 4.2 of the CEMP); this window was established based on data collected at the hibernacula in 2013

and in consultation with bat biologists. This mitigation is summarized in Section 7.6.4 of this annual report and is described in detail in Appendix 9 of the 2016 Annual Report.

To prevent damaging rock structures associated with the hibernacula, the BC MoE² recommends noise levels during blasting be kept below certain thresholds at the hibernacula (see Section 7.6.4). BC Hydro conducted noise modelling for blasting at Portage Mountain, which predicted that noise levels at the hibernacula would be below those thresholds.

BC Hydro is planning on evaluating the accuracy of noise predictions at the hibernacula by monitoring noise during test blasting at Portage Mountain Quarry after May 15, 2018. In addition, BC Hydro is conducting year-round monitoring of bat use at Portage Mountain, with the following objectives:

- confirm that the bat species previously recorded at Portage Mountain remain present during quarry operations;
- evaluate any changes in the use of hibernacula at Portage Mountain through bat activity recorded during the winter and spring-emergence periods;
- evaluate and changes in the use of Portage Mountain by bats by comparing bat activity to previously recorded spring to fall bat activity; and
- emergence counts with bioacoustic surveys to help determine whether maternity roosts are present, and to evaluate the efficacy of spatial setback mitigation from suspected maternity roosts.

An emergence count and bioacoustic survey was conducted at Portage Mountain in 2017 (Appendix 8). During the survey, there was no evidence collected that suggested the presence of maternity roosts within the quarry. However, physical conditions and bat observations suggested the presence of maternity or summer roosts within the cliff located south of the quarry location at Portage Mountain. The suspected maternity roosts appear to be small (approximately ten bats each) and are about 500 m from the location of the quarry boundary. It is expected that quarry operation will not impact these suspected maternity roosts, but this will be evaluated by ongoing monitoring during quarry operations.

6.4.5.4. Wetland Function Assessment and Wetland Monitoring

The Wetland Function Assessment has been developed to characterize the impacts of the Project on wetlands in general, and specifically the ecological functions that wetlands provide (Appendix 1). A wetland monitoring program is being developed for implementation in 2018 to monitor and evaluate the effectiveness of wetland mitigation measures and to verify the accuracy of the predictions made during the environmental assessment (see Section 6.3.2).

6.4.6 Condition 16.3.7

This section summarizes actions taken in accordance with the following requirement of Condition 16.3.7: *The plan shall include an approach for tracking updates to the status of listed species identified by the Government of British Columbia, Committee on the Status of Endangered Wildlife in Canada, and the Species at Risk Act, and implementation of additional*

² BC MoE. 2016. Best Management Practices Guidelines for Bats in British Columbia. Chapter 2: Mine Developments and Inactive Mine Habitats. 68 pp.

measures, in accordance with species recovery plans, to mitigate effects of the Designated Project on the affected species should the status of a listed species change during the life of the Designated Project.

The Conservation Data Center revised its ranking of species at risk in 2017. The following documents were reviewed to identify changes to rankings of species documented in the LAA during baseline surveys³:

- 2017 BC Conservation Status Rank Review and Changes: Invertebrate and Vertebrate Animals
- 2017 BC Conservation Status Rank Review and Changes: Vascular and Non-Vascular Plants

Species listed on Schedules 1, 2 and 3 of the federal Species at Risk Act (SARA) were reviewed to determine if any species occurring in the Project area had been added or had their rankings changed.

Provincially species are assigned to lists based on their Provincial conservation status. Species on the red and blue-lists are considered species at risk. Species on the yellow and unknown lists are not considered species at risk. A summary of the lists are provided below and can be accessed at: <http://www.env.gov.bc.ca/atrisk/help/list.htm>

- **Red-list:** Includes any indigenous species or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.
- **Blue-list:** Includes any indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.
- **Yellow-list:** Includes species that are apparently secure and not at risk of extinction. Yellow-listed species may have red- or blue-listed subspecies.
- **Unknown:** Includes species or subspecies for which the Provincial Conservation Status is unknown due to extreme uncertainty (e.g., S1S4). It will also be 'Unknown' if it is uncertain whether the entity is native (Red, Blue or Yellow), introduced (Exotic) or accidental in B.C. This designation highlights species where more inventory and/or data gathering is needed

6.4.6.1 Rare Plants

In 2017 the status of one species, *Carex torreyi* (Torrey's sedge) changed from Blue listed to

³ Ministry of Environmental Protection and Sustainability. 2017. Recent Data Changes. <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/conservation-data-centre-updates>. Accessed: 6 March 2018.

Red listed in BC. The ranks for other listed plant species have remained the same, and no new rare plants with potential to occur within the Site C Project footprint were added to the lists.

6.4.6.2 Wildlife

On Nov. 2, 2017, barn swallows and bank swallows were listed as “Threatened” on Schedule 1 of SARA. No other wildlife species added to the *Species at Risk Act* in 2017 are likely to occur within the Site C Project area.

No recovery strategies for federally listed species likely to occur within the Site C Project Area were released in 2017.

The BC Conservation Data Centre (CDC) listing changed in 2017 for two species that occur in the LAA:

- Western toad (*Anaxyrus boreas*) changed from Blue to Yellow-listed; and
- Northern Goshawk, *atricapillus* subspecies (*Accipiter gentilis atricapillus*) changed from Yellow to Blue-listed.

7.0 Mitigation and Monitoring Measures-Environmental Assessment Certificate Conditions

Conditions 9 to 12, 14 to 16, 19, 21, 23, and 24 of the Environmental Assessment Certificate, respectively, set out the mitigation and monitoring requirements for the Project's effects on vegetation and ecological communities and wildlife resources.

The following programs were implemented in 2015 are described in the subsequent sections of this report:

- Section 7.1: Vegetation and Invasive Plant Management (Condition 9)
- Section 7.2: Rare Plant Surveys (Condition 10)
- Section 7.3: Wetland Mitigation and Compensation (Condition 12)
- Section 7.4: Rare Plant Translocation (Condition 14)
- Section 7.5 Wildlife Management (Condition 15)
- Section 7.6 Compensation for Loss of Wetland Habitat (Condition 16)
- Section 7.7: Monitoring Wildlife Mitigation Measures (Condition 19)
- Section 7.8: Manage harmful effects on Wildlife Resources (Condition 21)
- Section 7.9: Tracking Changes in the Status of Listed Species (Condition 23)

7.1 EAC Condition 9

This section of the annual report summarizes the programs implemented in 2015 in accordance with the requirements of Condition 9.

For context, the complete requirements of Condition 9 are shown below.

EAC Condition 9

The EAC Holder must develop a Vegetation and Invasive Plant Management Plan to protect ecosystems, plant habitats, plant communities, and vegetation with components applicable to the construction phase.

The Vegetation and Invasive Plant Management Plan must be developed by a QEP.

The Vegetation and Invasive Plant Management Plan must include at least the following:

Invasive Species

- Surveys of existing invasive species populations prior to construction.
- Invasive plant control measures to manage established invasive species populations and to prevent invasive species establishment.

Rare Plants and Sensitive Ecosystems

- The EAC Holder must expand its modelling, including completing field work, to improve identification of rare and sensitive plant communities and aid in delineation of habitats that may require extra care, 90 days prior to any Project activities that may affect these rare or sensitive plant communities
- The EAC Holder must, with the use of a QEP, complete an inventory in areas not already surveyed

and use rare plant location information as inputs to final design of access roads and transmission lines. These pre- construction surveys must target rare plants as defined in Section 13.2.2 of the EIS—including vascular plants, mosses, and lichens.

- The EAC Holder must create and maintain a spatial database of known rare plant occurrences in the vicinity of Project components that must be searched to avoid effects to rare plants during construction activities. The database must be updated as new information becomes available and any findings of new rare plant species occurrences must be submitted to Environment Canada and MOE using provincial data collection standards.
- The EAC Holder must implement construction methods to reduce the impact to rare plants, maximize use of existing access corridors, and construct transmission towers and temporary roads away from wetlands and known rare plant occurrences.
- The EAC Holder must implement construction methods to reduce the impact to rare plants, maximize use of existing access corridors, and construct transmission towers and temporary roads away from wetlands and known rare plant occurrences.
- Protect known occurrences of Tufa seeps, wetlands and rare plants located adjacent to construction areas. Install signage and flagging where necessary, as determined by the QEP, to indicate the boundaries of the exclusion area.
- 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 MOE using the BC MOE's Guidelines for Translocation of Plant Species at Risk in BC (Maslovat, 2009).

The EAC Holder must provide this draft Vegetation and Invasive Plant Management Plan to Environment Canada, FLNR, MOE, and Aboriginal Groups for review a minimum of 90 days prior to construction and operation phases.

The EAC Holder must file the final Vegetation and Invasive Plant Management Plan with EAO, Environment Canada, FLNR, MOE, and Aboriginal Groups, a minimum of 30 days prior to construction and operation phases.

The EAC Holder must develop, implement and adhere to the final Vegetation and Invasive Plant Management Plan, and any amendments, to the satisfaction of EAO.

7.1.1 Invasive Plant Control

On March 22, 2017, EAO issued a Section 34 Order regarding compliance with Conditions 9 and 69 of the EAC and implementation measures to prevent the introduction and spread of invasive weeds on the Project. That Order requires that BC Hydro submit and implement an Invasive Weed Mitigation and Adaptive Management Plan (IWMAMP) to the EAO by April 21, 2017. This IWMAMP was prepared and implemented by a qualified professional as required by the Order. The plan includes herbicide based invasive plant management in the dam site area, and the expansion of the vehicle cleanliness program, including the use of vehicle inspection forms.

The following invasive plant control measures for the Project were implemented in 2017:

- invasive plant removal through hand pulling;
- on-going inventories of invasive plant locations;
- extensive hydroseeding of exposed slopes across the Project area;
- regular vehicle inspections and cleaning through various methods so that vehicles are clean and free of dirt and invasive plants when transitioning between sites and into the Project area;
- BC Hydro implemented an Invasive Species Management Contractor that completed a control program across the dam site in September and October 2017;

- The Main Civil Works contractor has retained an invasive plant species specialist to advise on invasive plant species management;
- BC Hydro installed two temporary wash stations at Gate A and Gate B in July 2017. These were removed at the onset of winter conditions in 2017 and procurement is ongoing for a permanent wash station to be installed for spring 2018.
- A procurement process is ongoing for an Invasive Species Management Contractor to be sourced by BC Hydro and utilized on the dam site, transmission line, reservoir, Hwy 29 realignment and other off-site locations to continue invasive species management for the remainder of the project lifespan.

7.1.2 Inventory areas not already surveyed

This section summarizes actions taken in accordance with the following requirement of Condition 9: *The EAC Holder must, with the use of a QEP, complete an inventory in areas not already surveyed and use rare plant location information as inputs to final design of access roads and transmission lines. These pre- construction surveys must target rare plants as defined in Section 13.2.2 of the EIS—including vascular plants, mosses, and lichens.*

Please see Section 6.4.2.1 for the results of the pre-construction rare plant surveys conducted in areas not already surveyed. Rare plant location data collected in 2017 was used to update the Environmental Features Map for contractors to access in their planning so that impacts to rare plants could be mitigated.

7.1.3 Spatial database of known rare plant occurrences

This section summarizes actions taken in accordance with the following requirement of Condition 9: *The EAC Holder must create and maintain a spatial database of known rare plant occurrences in the vicinity of Project components that must be searched to avoid effects to rare plants during construction activities. The database must be updated as new information becomes available and any findings of new rare plant species occurrences must be submitted to Environment Canada and MOE using provincial data collection standards.*

The Site C Environmental Features Database and Environmental Features Map was updated with the 2017 rare plant data on 19 January, 2018 and posted in the data room for contractors to access in their planning.

The 2017 rare plant data were confirmed to be received by Jennifer Penny, Program Botanist at the BC Conservation Data Center, MOE, on 2 November 2017 and 13 February 2018.

Voucher specimens were submitted to the Herbarium at the University of British Columbia in the fall of 2017.

7.1.4 Rare plant avoidance

This section summarizes actions taken in accordance with the following requirement of Condition 9: *The EAC Holder must implement construction methods to reduce the impact to rare plants, maximize use of existing access corridors, and construct transmission towers and temporary roads away from wetlands and known rare plant occurrences.*

General mitigation to minimize impacts to wetlands is described in Section 6.3.1.

Rare plant location data collected in 2017 were used to update the Environmental Features Map for BC Hydro and contractors to access in their planning so that impacts to known occurrences of rare plants could be mitigated.

The way in which BC Hydro fulfilled this part of Condition 9 during the transmission line design phase was described in the 2015 annual report. Tower types selected are capable of supporting longer spans of conductor than those originally planned, which will reduce the overall number of towers required. Tower pad placement has been adjusted to minimize impacts to wetlands within engineering constraints. As a result, the total number of towers has been reduced from 433 in the conceptual design down to 409 in the current design. The number of wetlands impacted was 102 in the conceptual design, and is 64 in the current design. Occurrences of rare plants have been avoided through transmission line design and tower placement to the degree feasible.

Further practices for avoidance of rare plant occurrences are described in Section 4.15 of the CEMP. All known rare plant occurrences are stored in the Site C Environmental Features Database and displayed on the Environmental Features Map (see Section 7.1.3). Contractors are required to avoid impacting rare plant occurrences, where feasible. Where complete avoidance is not feasible, contractors are required to employ measures to reduce adverse effects, such as by timing construction activities in winter months and frozen ground conditions, placing ramps or mats over occurrences to reduce soil compaction, use rubber-tired equipment, and implement designated travel routes to and from work sites. Additional mitigation for rare plant occurrences that cannot be avoided is through the Experimental Rare Plant Translocation program, through which rare plant propagules are being collected, propagated, out-planted and monitored (see Sections 7.1.6, 7.4.1 and 7.4.2).

7.1.5 Protect tufa seeps, wetlands and rare plants located adjacent to construction areas

This section summarizes actions taken in accordance with the following requirement of Condition 9: *Protect known occurrences of Tufa seeps, wetlands and rare plants located adjacent to construction areas. Install signage and flagging where necessary, as determined by the QEP, to indicate the boundaries of the exclusion area.*

In accordance with the CEMP, Wetland 1 on the north bank of the dam construction site was established as a work avoidance zone, within which no construction activity will be permitted. This zone will be maintained throughout construction.

Within the transmission right of way Riparian Vegetation Management Areas/Machine Free Zones have been established around wetlands. Within this zone clearing will be carried out by either hand-felling or having machines reach in from the edge of the RVMA (machines are not allowed to enter the RVMA). No burning, mulching or chipping is allowed within an RVMA. Vegetation with a normal mature height less than 3 m and conifers less than 2m will not be removed from the RVMA.

7.1.6 Experimental rare plant translocation program

This section summarizes actions taken in accordance with the following requirement of Condition 9: *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 MOE using the BC MOE's Guidelines for Translocation of Plant Species at Risk in BC (Maslovat, 2009).*

A field program was conducted in 2017, as part of Site C Project's Experimental Rare Plant Translocation Program, to identify source populations of target rare plant species, characterize the site and plant community characteristics of the source populations, identify potential recipient locations, and collect seeds (or other propagules) to facilitate ex-situ propagation and eventual planting of propagated material. A technical memorandum summarizing the results and recommendations arising from the 2017 field program can be found in Appendix 9.

In 2017, 23 locations were searched for previously identified and located target species within spatial areas slated for clearing in the near term (e.g., Winter 2017-2018). Seeds (or whole plants in the case of *Polypodium sibiricum*) for seven of the target species; *Carex sprengei* (Sprengel's sedge), *Cirsium drummondii* (Drummond's thistle), *Geum triflorum* var. *triflorum* (old man's whiskers) *Oxytropis campestris* var. *davisii* (Davis' locoweed) *Polypodium sibiricum* (Siberian polypody), *Silene drummondii* var. *drummondii* (Drummond's campion), and *Carex xerantica* (dry-land sedge). Seed collected was delivered to Twin Sisters Native Plant Nursery and NATS Nursery, Twin Sisters is the primary seed storage facility. However, seeds were also stored at NATS nursery in case of catastrophic failure at Twin Sisters, and also because Twin Sisters has limited capacity for storing and propagating whole plants.

Site selection for rare plant translocation will include selection of sites in the regional area that contain the target species (and thus being representative of the habitat associated with the target species), and identification of sites within the regional area that have the same site characteristics as those within the salvage area that contain the target rare plants.

In 2017, regional rare plant surveys (Section 7.2.1; Appendix 10) identified multiple sites outside of prescribed clearing and inundated areas that contain target species, and were therefore identified as eligible sites for future translocation activities. Data from these sites will be collected in 2018 surveys to identify any microsite characteristics important for target rare plant translocation.

In 2017, site data such as slope, aspect, moisture and nutrient regimes, slope position, slope shape, microtopography, and ecosystem classification, were recorded from all seed collection sites, including Bear Flats, Area E, Halfway River, and Watson Slough. In 2018, existing mapping information regarding ecosystems and soils will be used to identify soils and ecosystems that are representative of those donor sites surveyed in 2017. Field surveys will be undertaken to determine site eligibility for rare plant translocation.

7.2 EAC Condition 10

This section of the annual report summarizes the programs implemented in 2017 in accordance with the requirements of Condition 10.

For context, the complete requirements of Condition 10 are shown below.

EAC Condition 10
<p>The EAC Holder must fund or undertake directly with the use of a Rare Plant Botanist the following, during construction:</p> <ul style="list-style-type: none"> • Targeted surveys in the RAA (as defined in the amended EIS) to identify occurrences of the 18 directly affected rare plant species (as defined in the amended EIS), and rare plant species identified by the MOEs Conservation Framework requiring additional inventories. • A study focused on clarifying the taxonomy of Ochroleucus bladderwort (<i>Utricularia ochroleuca</i>), including field, herbaria, and genetic work in consultation with FLNR and the MOE (BC Conservation Data Centre). <p>The EAC Holder must provide FLNR and MOE (BC Conservation Data Centre) with the findings and analysis of results from the surveys and taxonomic study.</p>

7.2.1 Targeted rare plant surveys in the RAA

Targeted surveys in the RAA for 18 directly affected provincially Blue or Red-listed rare plant species were initiated in 2016 and completed in 2017. Of the 18 species identified in the EIS, the status of six species has changed from Blue (5) or Red (1) to Yellow (**Error! Reference source not found.**). Yellow listed species are not considered rare plants and as such these species were not targeted for rare plant surveys.

Regional rare plant surveys were conducted during one period in 2016: late-flowering period (August 11th to 18th) and during three time periods in 2017: early-flowering (June 1st to June 7th), mid-flowering (July 17th to July 21st), and late-flowering (August 23rd to 28th). During those surveys, botanists detected 217 occurrences (56 in 2016 and 161 in 2017) of 21 rare plant species that are listed with the BC Conservation Data Centre (CDC) (Table 9).

Table 9 Element occurrences documented during the 2016 and 2017 Regional Rare Plant Surveys

Scientific Name	English Name	No. of Occurrences (2016)	No. of Occurrences (2017)	No. of Occurrences Total
<i>Artemisia herriotii</i>	Herriot's sage	5	23	28
<i>Antennaria neglecta</i>	field pussytoes	5	12	17
<i>Avenula hookeri</i>	spike-oat	5	12	17
<i>Calamagrostis montanensis</i>	Plains reedgrass	7	13	20
<i>Carex backii</i>	Back's sedge	0	1	1
<i>Carex sprengeii</i>	Sprengel's sedge	0	1	1
<i>Carex torreyi</i>	Torrey's sedge	1	3	4
<i>Carex xerantica</i>	dry-land sedge	2	22	24
<i>Cirsium drummondii</i>	Drummond's thistle	0	12	12

Scientific Name	English Name	No. of Occurrences (2016)	No. of Occurrences (2017)	No. of Occurrences Total
<i>Elymus albicans</i>	Montana wildrye	1	0	1
<i>Elymus lanceolatus</i> ssp. <i>psammophilus</i>	sand-dune wheatgrass	1	0	1
<i>Geum triflorum</i> var. <i>triflorum</i>	old man's whiskers	11	6	17
<i>Lomatium foeniculaceum</i> var. <i>foeniculaceum</i>	fennel-leaved desert-parsley	0	9	9
<i>Oxytropis campestris</i> var. <i>davisii</i>	Davis' locoweed	0	19	19
<i>Penstemon gracilis</i>	slender penstemon	9	3	12
<i>Polypodium sibiricum</i>	Siberian polypody	0	2	2
<i>Potentilla pulcherrima</i>	pretty cinquefoil	1	11	12
<i>Ranunculus cardiophyllus</i>	heart-leaved buttercup	0	1	1
<i>Ranunculus rhomboideus</i>	prairie buttercup	0	8	8
<i>Silene drummondii</i> var. <i>drummondii</i>	Drummond's campion	3	3	6
<i>Symphotrichum lanceolatum</i> var. <i>lanceolatum</i>	panicled aster	5	0	5
Total No. of Occurrences		56	161	217

Some of the rare plant species identified in the amended EIS were removed from the regional rare plant survey target species list because they were downlisted and are no longer listed as species of concern with the BC CDC (Table 10).

Table 10. At Risk Plant Species Downlisted to Yellow between 2013 and 2017

Scientific Name	Common Name	BC CDC and NatureServe Conservation Status Rank (2013) ^(a)	BC CDC and NatureServe Conservation Status Rank (2017)	Rank Status Designation Year
<i>Anemone virginiana</i> var. <i>cylindroidea</i>	riverbank anemone	Blue (S3)	Yellow (S4)	2015
<i>Galium labradoricum</i>	northern bog bedstraw	Blue (S3)	Yellow (S3S4)	2015
<i>Salix serissima</i>	autumn willow	Blue (S2S3)	Yellow (S3S4)	2015
<i>Juncus confusus</i>	Colorado rush	Red (S1)	Yellow (S4)	2016

Scientific Name	Common Name	BC CDC and NatureServe Conservation Status Rank (2013) ^(a)	BC CDC and NatureServe Conservation Status Rank (2017)	Rank Status Designation Year
<i>Muhlenbergia glomerata</i>	marsh muhly	Blue (S3)	Yellow (S4)	2015
<i>Symphotrichum puniceum</i> var. <i>puniceum</i>	purple-stemmed aster var. gardneri	Blue (S3)	Yellow (S3S4)	2016

(a) EIS, Volume 2, Appendix R, Part 1, Table 3.1.1

7.2.2 Taxonomy of Ochroleucus bladderwort

The program for completing the taxonomic classification of Ochroleucus bladderwort (*Utricularia ochroleuca*) is described in Section 8.2.3 of the Vegetation and Wildlife Mitigation and Monitoring Plan, submitted to FLNRO, MOE and the Environmental Assessment Office on June 5, 2015. On 21 March 2016, BC Hydro sent a letter to the BC Environmental Assessment Office stating that information received from Jennifer Penny, Program Botanist at the BC Conservation Data Center, between November 2014 and January 2016, indicated that taxonomic classification of the identified species was no longer required (Appendix 11).

The Conservation Data Center has indicated that Ochroleucus bladderwort is an accepted name for this species on the Flora of North America Update⁴ and Annotated Checklist of the Panarctic Flora Vascular Plants⁵ (2018). Jennifer Penny noted that the species “has consistent morphological characteristics allowing it to be distinguished from other taxa” (Appendix 11).

7.3 EAC Condition 12

This section of the annual report summarizes the programs implemented in 2015 in accordance with the requirements of Condition 12.

For context, the complete requirements of Condition 12 are shown below.

EAC Condition 12

The EAC Holder must develop a Wetland Mitigation and Compensation Plan. The Wetland Mitigation and Compensation Plan must include an assessment of wetland function lost as a result of the Project that is important to migratory birds and species at risk (wildlife and plants). The Wetland Mitigation and Compensation Plan must be developed by a QEP with experience in wetland enhancement, maintenance and development.

The Wetland Mitigation and Compensation Plan must include at least the following:

⁴ ITIS (Integrated Taxonomic Information System). 2011. *Utricularia ochroleuca*. Available online: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=34459#null. Accessed 26 February 2018.

⁵ Annotated Checklist of the Panarctic Flora Vascular Plants. 2018. 820203 *Utricularia ochroleuca*. Available online: <http://nhm2.uio.no/paf/820203>. Accessed 26 February 2018.

- Information on location, size and type of wetlands affected by the Project;
- If roads cannot avoid wetlands, culverts will be installed under access roads to maintain hydrological balance, and sedimentation barriers will be installed;
- Stormwater management will be designed to control runoff and direct it away from work areas where excavation, spoil placement, and staging activities occur.

Develop, with the assistance of a hydrologist, site-specific measures prior to construction to reduce changes to the existing hydrologic balance and wetland function during construction of the Jackfish Lake Road and Project access roads and transmission line.

- All activities that involve potentially harmful or toxic substances, such as oil, fuel, antifreeze, and concrete, must follow approved work practices and consider the provincial BMP guidebook Develop with Care (BC Ministry of Environment 2012 or as amended from time to time).
- 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

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

The EAC Holder must provide this draft Wetland Mitigation and Compensation Plan to Environment Canada, FLNR, MOE, Aboriginal Groups, Peace River Regional District and District of Hudson's Hope for review a minimum of 90 days prior to any activity affecting the wetlands.

The EAC Holder must file the final Wetland Mitigation and Compensation Plan with EAO, Environment Canada, FLNR, MOE, Peace River Regional District, District of Hudson's Hope and Aboriginal Groups, a minimum of 30 days prior to any activity affecting the wetlands.

The EAC Holder must develop, implement and adhere to the final Wetland Mitigation and Compensation Plan, and any amendments, to the satisfaction of EAO.

7.3.1 Wetland Mitigation and Compensation Plan

Condition 12 requires: *The EAC Holder must develop a Wetland Mitigation and Compensation Plan. The Wetland Mitigation and Compensation Plan must include an assessment of wetland function lost as a result of the Project that is important to migratory birds and species at risk (wildlife and plants). The Wetland Mitigation and Compensation Plan must be developed by a QEP with experience in wetland enhancement, maintenance and development.*

Please see Section 6.3.2 for a summary of wetland mitigation plan development for 2017.

7.3.1.1 Information on location, size and type of wetlands affected by the Project

This section summarizes actions taken in accordance with the following requirement of Condition 12: *Information on location, size and type of wetlands affected by the Project.*

Three spatial datasets are available that describe the location, size and type of wetlands that may be affected by the Project: TEM habitat mapping; detailed wetland mapping; and the Maple Leaf Forestry dataset. The TEM was generated in and around the Project Activity Zone (PAZ), including the Peace River, the transmission line, and other sites within the PAZ. Polygons in the TEM were produced at a 1:20,000 scale, delineated using aerial photography, characterized with aerial photography combined with Vegetation Resources Inventory (VRI) forest cover mapping, and ground-truthed using field sampling. The TEM was used to generate estimates of wetland area to be affected by construction in the PAZ in the EIS; however, because up to three wetland types (and potentially more than three wetlands) can be found within a TEM polygon, the TEM habitat mapping's usefulness for characterizing wetlands that may be affected is limited.

Detailed wetland mapping was created by BC Hydro to be a finer scale wetland mapping inventory than the TEM data. Within a TEM polygon, wetland boundaries were delineated using aerial photos that were either at a 1:5,000 or 1:15,000 scale. This allowed for greater detail to delineate the wetland edge. The detailed wetland mapping was completed along the transmission line corridor and the Peace River. It was delineated by first identifying all TEM polygons classified as wetland habitat. Using large scale aerial photographs, the boundaries of any wetland that fell within a TEM wetland polygon were then delineated and the habitat type of the TEM wetland polygon was assigned to the newly delineated wetland(s). In some cases the TEM wetland was divided up into several smaller wetlands while in others the edge of the TEM wetland was only modified based on the higher detail aerial photographs used. Also, in some cases, wetlands have been delineated outside of TEM wetland polygons. A Field Truthing Required (FTR) label was assigned to any wetland where wetland classification needed refining. Because the detailed wetland mapping polygons follow wetland edge, this GIS dataset is useful for characterizing wetlands that may be affected.

In October 2017 Maple Leaf Forestry Ltd. conducted an assessment and classification of wetlands impacted by the transmission line RoW. This consisted of field visits to identify all the wetlands in the RoW, categorize them into a wetland type, and delineate the boundaries of the wetland. Wetlands were categorized into the same wetland types as in the TEM while also classified into a Wetland Riparian Class of the Forest Practices and Planning Regulation (FPPR) under the Forest and Range Practices Act (FRPA). All wetlands in the transmission line were classified as W1, W3, W5, or a non-classified wetland. The Wetland Riparian Class was used to identify the minimum riparian management area width, riparian reserve zone width and riparian management zone width for the wetland. Because the Maple Leaf Forestry dataset has field-verified wetland edges and type, there is a greater level of accuracy associated with this dataset; however, wetland mapping and characterization was only conducted along the transmission line RoW, and therefore its usefulness for characterizing wetlands that may be affected by the Project is limited.

Although each dataset has its limitations, the TEM, detailed and Maple Leaf wetland habitat mapping can be used in association with each other. Since the detailed wetland mapping was mapped at the finest scale and covers the entire PAZ, this dataset is best suited overall for identifying the location, size and type of wetlands that may be affected by the Project, once all FTR wetlands have been verified. As the Maple Leaf data set has been field-verified, it will be

used to help characterize the error in the detailed wetland mapping, as well as to help refine the detailed wetland mapping, as appropriate. Wetlands identified as FTR will also be field verified through the wetland monitoring program (Section 6.3.2).

7.3.1.2 Installation of culverts to maintain hydrological balance at wetlands affected by roads, and sedimentation barriers

This section summarizes actions taken in accordance with the following requirement of Condition 12: *If roads cannot avoid wetlands, culverts will be installed under access roads to maintain hydrological balance, and sedimentation barriers will be installed;*

Section 4.4 of Revision 4 of the CEMP specifies that BC Hydro and/or contractors must, prior to construction of access roads, develop site-specific measures with the assistance of a hydrologist to reduce changes to the existing hydraulic balance and wetland function during construction, including installation of culverts installed under access roads to maintain hydrological balance and sedimentation barriers. The Jackfish Lake Road proposed in the EIS is no longer planned for construction. New project access roads for the transmission line have not yet been constructed, but have been designed with the assistance of hydrologists to maintain hydrologic balance. Road construction is planned to occur in 2018. Pre-existing access roads have been improved, including through the installation of upgraded culverts to address drainage, as per the MFLNRO engineering manual and erosion and sediment control requirements as determined by a QEP.

7.3.1.3 Stormwater management

This section summarizes actions taken in accordance with the following requirement of Condition 12: *Stormwater management will be designed to control runoff and direct it away from work areas where excavation, spoil placement, and staging activities occur.*

Stormwater management is addressed a number of times in Revision 4 of the CEMP:

- Section 4.4 - BC Hydro and/or contractors must “control runoff and manage stormwater (for example rainfall or snow melt) and direct it away from construction areas where excavation, spoil placement, and staging activities occur”.
- Section 4.5 - BC Hydro and/or contractors must “design and construct bridges so that stormwater runoff from bridge decks, side slopes, and approaches is directed into a retention pond or vegetated area to remove suspended solids, dissipate velocity and prevent sediment and other deleterious substances from entering watercourses”.
- Section 4.14 - BC Hydro and/or contractors must “completely isolate all concrete work from any water within or entering into any watercourse or stormwater system.” “Prevent any water that contacts uncured or partly cured concrete during activities like exposed aggregate wash-off, wet curing, or equipment washing from directly or indirectly entering any watercourse or stormwater system.”

Stormwater across the site is managed by contractors under the Sediment Control Program. Management includes installation of sedimentation ponds and interception ditches. Interception ditches capture and divert stormwater away from construction areas into the sedimentation ponds. Water from the sedimentation ponds is discharged into the surrounding environment.

7.3.1.4 Site-specific measures to maintain hydrologic balance and wetland function

This section summarizes actions taken in accordance with the following requirement of Condition 12: *Develop, with the assistance of a hydrologist, site-specific measures prior to construction to reduce changes to the existing hydrologic balance and wetland function during construction of the Jackfish Lake Road and Project access roads and transmission line.*

Mitigation to maintain hydrologic balance and wetland function during construction of roads is described in Section 7.3.1.2.

7.3.1.5 Implementation of Approved work practices and Develop with Care

This section summarizes actions taken in accordance with the following requirement of Condition 12: *All activities that involve potentially harmful or toxic substances, such as oil, fuel, antifreeze, and concrete, must follow approved work practices and consider the provincial BMP guidebook Develop with Care (BC Ministry of Environment 2012 or as amended from time to time).*

Section 4.13 of Revision 4 of the CEMP outlines requirements for site and activity-specific EPPs to include procedures to address spill response related to identified environmental hazards. These procedures include the following general steps:

1) MAKE THE AREA SAFE

- Evaluate risk to personal/public, electrical and environmental safety;
- Wear appropriate Personal Protective Equipment (PPE);
- Never rush in, always determine the product spilled before taking action;
- Warn people in the immediate vicinity; and
- Verify that no ignition sources are present if the spill is a flammable material.

2) STOP THE FLOW (when possible and safe to do so)

- Act quickly to reduce the risk of environmental impacts;
- Close valves, shut off pumps or plug holes/leaks; and
- Stop the flow or the spill at its source.

3) SECURE THE AREA

- Limit access to the spill area; and
- Prevent unauthorized entry onto the site.

4) CONTAIN THE SPILL

- Block off and protect drains and culverts
- Prevent spilled material from entering drainage structures (ditches, culverts, drains)

- Use spill containment and sorbent material to contain the spill appropriate to site location and spilled materials

5) Notification/ Reporting – as per Table 10 below

- Determine appropriate Contractor, BC Hydro and regulatory notification obligations and notify appropriate personnel
- When necessary, the first external call shall be made to **Emergency Management BC (EMBC)**, formerly known as the Provincial Emergency Program (PEP), **at 1-800-663-3456 (24 Hour)**. Spills would then be reported to the appropriate ministries/agencies according to Table 11 to allow for immediate response (as required) by appropriate staff. For spills to aquatic habitat, collection of water samples shall be undertaken to characterize the nature and extent of the release.
- Provide the required information for input into BC Hydro’s EIR system

Table 11. Spill Reporting Matrix from Spill Reporting Regulation Schedule of Reportable Levels for Certain Substances

Item	Substance	Quantity	External Reporting Requirements	Internal Reporting Requirements
-	Any Spill	Any amount in aquatic habitat	EMBC, DFO and MFLNRO	Environmental Incident Report (EIR)
-	Oil and Waste Oil	Any amount $\geq 1L$	N/A	EIR
1	Class 1, Explosives as defined in section 2.9 of the Federal Regulations	Any quantity that could pose a danger to public safety or 50 kg	EMBC	EIR
2	Class 2.1, Flammable Gases, other than natural gas, as defined in section 2.14 (a) of the Federal Regulations	≥ 10 kg	EMBC	EIR
3	Class 2.2 Non-Flammable and Non-Toxic Gases as defined in section 2.14 (b) of the Federal Regulations	≥ 10 kg	EMBC	EIR
4	Class 2.3, Toxic Gases as defined in section 2.14 (c) of the Federal Regulations	≥ 5 kg	EMBC	EIR
5	Class 3, Flammable Liquids as defined in section 2.18 of the Federal Regulations	≥ 100 L	EMBC	EIR
6	Class 4, Flammable Solids as defined in section 2.20 of the Federal Regulations	≥ 25 kg	EMBC	EIR
7	Class 5.1, Oxidizing	≥ 50 kg or 50 L	EMBC	EIR

Item	Substance	Quantity	External Reporting Requirements	Internal Reporting Requirements
	Substances as defined in section 2.24 (a) of the Federal Regulations			
8	Class 5.2, Organic Peroxides as defined in section 2.24 (b) of the Federal Regulations	≥1 kg or 1 L	EMBC	EIR
9	Class 6.1, Toxic Substances as defined in section 2.27 (a) of the Federal Regulations	≥5 kg or 5 L	EMBC	EIR
10	Class 6.2, Infectious Substances as defined in section 2.27 (b) of the Federal Regulations	≥1 kg or 1 L, or less if the waste poses a danger to public safety or the environment	EMBC	EIR
11	Class 7, Radioactive Materials as defined in section 2.37 of the Federal Regulations	Any quantity that could pose a danger to public safety and an emission level greater than the emission level established in section 20 of the "Packaging and Transport of Nuclear Substances Regulations"	EMBC	EIR
12	Class 8, Corrosives as defined in section 2.40 of the Federal Regulations	≥5 kg or 5 L	EMBC	EIR
13	Class 9, Miscellaneous Products, Substances or Organisms as defined in section 2.43 of the Federal Regulations	≥25 kg or 25 L	EMBC	EIR
14	Waste containing dioxin as defined in section 1 of the Hazardous Waste Regulation	≥1 kg or 1 L, or less if the waste poses a danger to public safety or the environment	EMBC	EIR
15	Leachable toxic waste as defined in section 1 of the Hazardous Waste Regulation	≥25 kg or 25 L	EMBC	EIR
16	Waste containing polycyclic aromatic hydrocarbons as defined in section 1 of the hazardous Waste Regulation	≥5 kg or 5 L	EMBC	EIR
17	Waste asbestos as defined in section 1 of the Hazardous Waste Regulation	≥50 kg	EMBC	EIR
18	Waste oil as defined in	≥100 L	EMBC	EIR

Item	Substance	Quantity	External Reporting Requirements	Internal Reporting Requirements
	section 1 of the Hazardous Waste Regulation			
19	Waste containing a pest control product as defined in section 1 of the Hazardous Waste Regulation	≥5 kg or 5 L	EMBC	EIR
20	PCB Wastes as defined in section 1 of the Hazardous Waste Regulation	≥25 kg or 25 L	EMBC	EIR
21	Waste containing tetrachloroethylene as defined in section 1 of the Hazardous Waste Regulation	≥50 kg or 50 L	EMBC	EIR
22	Biomedical waste as defined in section 1 of the Hazardous Waste Regulation	≥1 kg or 1 L, or less if the waste poses a danger to public safety or the environment	EMBC	EIR
23	A hazardous waste as defined in section 1 of the Hazardous Waste Regulation and not covered under items 1 – 22	≥25 kg or 25 L	EMBC	EIR
24	A substance, not covered by items 1 to 23, that can cause pollution	≥200 kg or 200 L	EMBC	EIR
25	Natural gas	≥10 kg, if there is a breakage in a pipeline or fitting operated above 100 psi that results in a sudden and uncontrolled release of natural gas	EMBC	EIR

Note: Federal Regulations means the Transportation of Dangerous Goods Regulations made under the *Transportation of Dangerous Goods Act*; Hazardous Waste Regulation" means B.C. Reg. 63/88.

6) CLEAN-UP

- Determine cleanup options and requirements with appropriately qualified professionals
- Mobilize recovery equipment and cleanup crew and conduct cleanup activities
- Dispose of all equipment and/or material used in clean up (e.g., used sorbent, oil containment materials, etc.) in accordance with MFLNRO requirements. Disposal of special wastes (e.g., material with > 3% oil by mass) and contaminated soil must comply with the Environmental Management Act and Regulations
- Replenish spill response kits and equipment.

7.4 EAC Condition 14

This section of the annual report summarizes the programs implemented in 2017 in accordance with the requirements of Condition 14.

For context, the complete requirements of Condition 14 are shown below.

EAC Condition 14

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.

7.4.1 Definition of the study design for the Experimental Rare Plant Translocation Program

As outlined in the VWMPP, the study design for the Experimental Rare Plant Translocation Program will follow a five step approach, as outlined in Maslovat (2009)⁶. The information gained from the experimental approach will be used to identify which approaches are effective and to isolate inadequacies in specific methods or management. Monitoring the success or failure of the methods will assist in identifying opportunities for improvement within an adaptive management framework. Importantly, this information can also help to inform other translocation projects, thereby improving the overall success of translocation efforts. here are four objectives of the program:

- 1) Translocate rare plant species through plant salvage, collection of vegetative propagules and/ or seeds from populations that will or may be lost (e.g., lost due to the creation of the reservoir);
- 2) Document the survival of the translocated rare plants through population monitoring at re-location sites;
- 3) Manage translocated populations for seven years after translocation to maximize plant survival and fitness; and

⁶ Maslovat, C. 2009. Guidelines for translocation of plant species at risk in British Columbia. British Columbia Ministry of Environment, Victoria, BC.

- 4) Improve the theory and practice of rare plant translocation, and increase knowledge of the biology and ecology of targeted rare plant species.

The program at its current state of development consists of four main phases over seven years of study (2016 to 2022):

- 1. Research, development, and program development (2016-2017).** The literature review and program development is underway and will continue throughout the duration of the ERPT program. A review of existing guidance, methodologies, and results of previous rare plant translocation projects worldwide is ongoing. The lessons learned through these studies and analyses are being used to inform the structure and methods of the ERPT program.
- 2. Propagule collection (2017).** The standards for collecting and storing propagules for ex-situ conservation (e.g., timing, sampling, labelling, cleaning, processing, stratification, sowing, provenance) are being refined for this program and incorporate guidance outlined in Maslovat (2009) and by the European Native Seed Conservation Network (2009)⁷. The level of risk to each plant population is being used to prioritize sites for the collection program and will be used for future collection activities, as appropriate. The level of risk is determined based on the expected clearing date, rarity of the plant, and predicted propagule collection timing. Propagule collection is occurring throughout the growing season and takes into consideration local plant phenology and propagation. Field teams are conducting multiple site visits to collect seeds on a number of occasions as appropriate based on seed availability and readiness.
- 3. Ex-situ propagation (2017 and 2021).** The second phase of the ERPT Program involves the evaluation of methods and implementation of seed cleaning, drying, storage, stratification, and ex-situ propagation for each individual taxon. Depending on the species and seed type, seeds are either being dried or cleaned following collection to ensure maximum viability. Cleaning includes the removal of waste material from the seed itself and includes the use of sieves, hand separation, and water baths and drying, as appropriate. Through the stratification process, seeds are being pretreated to simulate the relevant natural conditions to break the seed coat and germinate. Seeds that do not require stratification are being stored until spring. Propagation methods for asexual and sexual propagation for each species are being investigated in the context of the ecological conditions observed at the source populations.
- 4. Translocation implementation (2018 and 2021).** The detailed methods for translocation implementation are being developed and refined based on data collected during field activities. The translocation implementation includes preparation at pre-translocation sites and seeding and/or planting at recipient sites. Efforts will be made to determine if any site preparation (for intact habitats) or site engineering (for restoration sites) is required before translocation and to identify if habitat manipulation after the translocation will be required. Recipient sites will be prepared as necessary prior to the translocation, including invasive plant species removal (and implementation of steps to minimize introduction during the translocation process), soil amendment, and sculpting microcatchments. The specific timing windows for planting will be determined based on the plant phenology, the development stage of the propagated plants, and the local

⁷ ENSCONET. 2009a. Seed Collecting Manual for Wild Species. Main editors: Royal Botanic Gardens (UK) & Universidad Politécnica de Madrid (Spain). Edition 1: 17 March 2009.

weather and soil moisture conditions. The majority of the planting is expected to occur in optimal microhabitats in spring 2019 to provide sufficient time for the plants, which are mostly perennials, to develop ex-situ.

- 5. Post-translocation care, maintenance and monitoring (2018-2022).** Post-translocation care, maintenance, and monitoring will commence immediately after each translocation event is completed. Post-translocation plant care and site management will include follow-up site visits for seven years after translocation to assess the health and establishment of the translocated populations and to identify and address any factors affecting the survival or health of the translocated plants. The frequency and level of effort of post-translocation care and additional monitoring in subsequent years will be determined based on data collected during the first four years of follow-up site visits (i.e., short-term monitoring). Translocated populations that are achieving identified targets will still require long-term monitoring (i.e., the full seven years) but may require less frequent follow-up visits than populations that are not achieving key metrics and thus require more active management. All actions associated with the translocation will be fully documented to retain as much information as possible on the pathway of a given plant (e.g., from seed collection to planting) to facilitate post-hoc assessments of success.

The information gained from the experimental approach will be used to identify which approaches are effective and to isolate inadequacies in specific methods or management. Monitoring the success or failure of the methods will assist in identifying opportunities for improvement within an adaptive management framework. Importantly, this information can also help to inform other translocation projects, thereby improving the overall success of translocation efforts.

7.4.2 Plan for monitoring translocations

Experimental Rare Plant Translocation Program monitoring will document a suite of parameters designed to evaluate the efficacy of translocation methods in relation to the stated objectives of the program. All actions associated with the translocation (see Section 7.4.1) will be fully documented to retain as much information as possible on the pathway of a given plant (e.g., from seed collection to planting) to facilitate post-hoc assessments of success. Specifically, the monitoring program will measure, document, and evaluate the following:

1. the efficacy of the methods used to 1) characterize donor and recipient sites, 2) collect and store plant propagules, 2) conduct ex-situ propagation; and 3) translocate the rare plant species from the host site to the recipient sites;
2. the efficacy of the techniques used for managing the translocated plant propagules (e.g. site preparation, watering, weeding, fertilizing);
3. the survival of the translocated rare plant species through monitoring of population size, extent, threats, resilience, and persistence; and
4. the success of follow up procedures applied to address any declines in survival or fitness of the translocated plants.

7.4.3 Measurement criteria for effectiveness monitoring of habitat enhancement and compensation programs

Please see Section 7.4.2 for how the effectiveness of the rare plant translocation program will be measured.

7.5 EAC Condition 15

This section of the annual report summarizes the programs implemented in 2017 in accordance with the requirements of Condition 15.

For context, the complete requirements of Condition 15 are shown below.

EAC Condition 15

The EAC Holder must develop a Wildlife Management Plan. The Wildlife Management Plan must be developed by a QEP.

The Wildlife Management Plan must include at least the following:

- Field work, conducted by a QEP, to verify the modelled results for surveyed species at risk and determine, with specificity and by ecosystem, the habitat lost or fragmented for those species. The EAC Holder must use these resulting data to inform final Project design and to develop additional mitigation measures, as needed, as part of the Wildlife Management Plan, in consultation with Environment Canada and FLNR.
- Measures to avoid, if feasible, constructing in sensitive wildlife habitats. If avoiding sensitive wildlife habitats is not feasible, condition 16 applies.
- If sensitive habitats, such as wetlands, are located immediately adjacent to any work site, buffer zones must be established by a QEP to avoid direct disturbance to these sites.
- Protocol for the application of construction methods, equipment, material and timing of activities to mitigate adverse effects to wildlife and wildlife habitat.
- Protocol to ensure that lighting is focused on work sites and away from surrounding areas to manage light pollution and disturbance to wildlife. If lighting cannot be directed away from surrounding areas, the EAC Holder must ensure additional mitigation measures are implemented to reduce light pollution, including light shielding.
- A mandatory environmental training program for all workers so that they are informed that hunting in the vicinity of any work site/Project housing site is strictly prohibited for all workers.

The EAC Holder must ensure that all workers are familiar with the Wildlife Management Plan.

The EAC Holder must submit this draft Wildlife Management Plan to Environment Canada, FLNR, MOE and Aboriginal Groups for review a minimum of 90 days prior to the commencement of construction.

The EAC Holder must file the final Wildlife Management Plan with EAO, Environment Canada, FLN, MOE and Aboriginal Groups, a minimum of 30 days prior to commencement of construction.

The EAC Holder must develop, implement and adhere to the final Wildlife Management Plan, and any amendments, to the satisfaction of EAO.

7.5.1 Measures to avoid, if feasible constructing in sensitive wildlife habitats

This section summarizes actions taken in accordance with the following requirement of Condition 15: *Measures to avoid, if feasible, constructing in sensitive wildlife habitats. If avoiding sensitive wildlife habitats is not feasible, condition 16 applies.*

Measures to avoid impacts to sensitive wildlife habitats are described in Section 4.17 of Revision 4 of the CEMP:

- Avoid construction activity within Important Wildlife Areas, including designated setback buffers determined by a QEP, where feasible:
 - wetlands;
 - snake hibernacula;
 - bat hibernacula;
 - sharp-tailed grouse leks;
 - beaver lodges, dams and food caches;
 - active furbearer and large carnivore den sites;
 - active bird nests (see Section 6.1.1);
 - mineral licks;
 - habitat used by ungulates for winter range; and
 - amphibian breeding sites and migration routes.
- Except within the dam site area, on designated access roads and during clearing, construction activities are prohibited within 15 m of the Ordinary High Water Mark of streams or wetlands, unless the activity was described in the EIS and is accepted by BC Hydro;
- Guidance to minimize impacts to raptor nests;
- Protocol for conducting sharp-tailed grouse lek monitoring and a decision tree for various lek activity scenarios to minimize impacts to sharp-tailed grouse leks (see also Appendix 8 of the 2016 Annual Report); and
- Measures for minimizing impacts to amphibian breeding and migration areas (see also Section 6.4.2.2 and Appendix 7).

7.5.2 Setback buffers to avoid direct impacts to sensitive habitats

This section summarizes actions taken in accordance with the following requirement of Condition 15: *If sensitive habitats, such as wetlands, are located immediately adjacent to any work site, buffer zones must be established by a QEP to avoid direct disturbance to these sites*

As described in Section 7.4.1, Revision 4 of the CEMP (Section 4.17) specifies that construction activity is to be avoided within Important Wildlife Areas, including designated setback buffers determined by a QEP, where feasible.

Procedures for determining appropriate situation and species-specific disturbance setback buffers to be applied around locations where bird nests are likely to be present are discussed in Section 6.1.1 (migratory birds) and described in Appendix 2 (migratory birds, sharp-tailed grouse, bald eagle and other raptors).

7.5.3 Mitigation of adverse effects to wildlife and wildlife habitat

This section summarizes actions taken in accordance with the following requirement of Condition 15: *Protocol for the application of construction methods, equipment, material and timing of activities to mitigate adverse effects to wildlife and wildlife habitat.*

Much mitigation of adverse effects to wildlife is discussed in Sections 7.5.1 and 7.5.2. Section 6.4.2 provides a summary of mitigation applied in 2017 to minimize adverse impacts to amphibians. Revision 4 of the CEMP (Section 4.17) specifies that, where feasible, vegetation clearing will take place during Peace Region terrestrial wildlife least-risk windows. Least risk timing windows for wildlife are described in Table 5 of the CEMP, and also in Appendix 2 of this annual report for birds.

Where clearing outside of least-risk timing windows cannot be avoided, pre-clearing surveys are conducted for Important Wildlife Areas, with disturbance setback buffers determined by a QEP. The protocol for pre-clearing bird nesting activity surveys is described in Appendix 2, in which situation and species-specific setback buffers are again determined by a QEP.

7.5.4 Protocol to ensure that lighting is focused on work sites

This section summarizes actions taken in accordance with the following requirement of Condition 15: *Protocol to ensure that lighting is focused on work sites and away from surrounding areas to manage light pollution and disturbance to wildlife. If lighting cannot be directed away from surrounding areas, the EAC Holder must ensure additional mitigation measures are implemented to reduce light pollution, including light shielding.*

Section 4.17 of Revision 4 of the CEMP requires contractors to focus lighting on work sites and away from surrounding areas to minimize light. CEMP requirements are audited by site Environmental Monitors and the Independent Environmental Monitor to determine and enforce compliance.

7.5.5 Environmental training of workers

This section summarizes actions taken in accordance with the following requirement of Condition 15: *A mandatory environmental training program for all workers so that they are informed that hunting in the vicinity of any work site/Project housing site is strictly prohibited for all workers. The EAC Holder must ensure that all workers are familiar with the Wildlife Management Plan.*

All workers are required to attend both a BCH orientation and a contractor specific orientation(s) prior to starting work on-site. A component of these training sessions is environmental training for workers. Completion of these sessions required prior to the issuance of site access cards.

7.6 EAC Condition 16

This section of the annual report summarizes the programs implemented in 2017 in accordance with the requirements of Condition 16.

For context, the complete requirements of Condition 16 are shown below.

EAC Condition 16

If loss of sensitive wildlife habitat or important wildlife areas cannot be avoided through Project design or otherwise mitigated, the EAC Holder must implement the following measures, which must be described in the Vegetation and Wildlife Mitigation and Monitoring Plan.

The Vegetation and Wildlife Mitigation and Monitoring Plan must include the following compensation measures:

- Compensation options for wetlands must include fish-free areas to manage the effects of fish predation on invertebrate and amphibian eggs and larvae and young birds.
- Mitigation for the loss of snake hibernacula, artificial dens must be included during habitat compensation.
- Management of EAC Holder-owned lands adjacent to the Peace River suitable as breeding habitat for Northern Harrier and Short-eared Owl.
- Establishment of nest boxes for cavity-nesting waterfowl developed as part of wetland mitigation and compensation plan, and established within riparian vegetation zones established along the reservoir on BC Hydro-owned properties.
- A design for bat roosting habitat in HWY 29 bridges to BC Ministry of Transportation and Infrastructure (MOTI) for consideration into new bridge designs located within the Peace River valley.
- Following rock extraction at Portage Mountain, creation of hibernating and roosting sites for bats.
- Creation of natural or artificial piles of coarse woody debris dispersed throughout the disturbed landscape to maintain foraging areas and cold-weather rest sites, and arboreal resting sites, for the fisher population south of the Peace River.

The EAC Holder must provide this draft Vegetation and Wildlife Mitigation and Monitoring Plan to Environment Canada, FLNR, MOE, and Aboriginal Groups for review a minimum of 90 days prior to the commencement of construction.

The EAC Holder must file the final Vegetation and Wildlife Mitigation and Monitoring Plan with EAO, Environment Canada, FLNR MOE, and Aboriginal Groups, a minimum of 30 days prior to commencement of construction.

The EAC Holder must develop, implement and adhere to the final Vegetation and Wildlife Mitigation and Monitoring Plan, and any amendments, to the satisfaction of EAO.

7.6.1 Management of lands suitable as breeding habitat for northern harrier and short-eared owl

This section summarizes actions taken in accordance with the following requirement of Condition 16: *Management of EAC Holder-owned lands adjacent to the Peace River suitable as breeding habitat for Northern Harrier and Short-eared Owl.*

BC Hydro continues to manage three BCH owned properties (Marl Fen, Rutledge and Wilder Creek) that have been identified for retention and management. All three properties provide suitable habitat for non-wetland birds, including northern harrier and short-eared owl. Surveys for ground nesting raptors on these properties in 2017 documented no Short-eared Owl but four Northern Harriers at Marl Fen and one at Wilder Creek (Section 7.8.3).

7.6.2 Nest boxes for cavity-nesting waterfowl

In 2017, 269 nest boxes were constructed for cavity nesting bird species. Of these, 76 nest boxes were constructed for waterfowl; 9 for bufflehead, 49 for Barrow's goldeneye, common goldeneye or hooded merganser; and 18 for common merganser (Table 12).

Table 12. Nest boxes constructed by species group

Species group	Box type	Species supported	Number of nest boxes built
Passerines	A / BC B1	black-capped chickadee boreal chickadee red-breasted nuthatch white-breasted nuthatch house wren brown creeper	41
	A2 B2	mountain bluebird tree swallow violet-green swallow	61
Woodpeckers (secondary excavators)	C	northern flicker / northern pygmy owl	*
Waterfowl	E1	bufflehead	9
	F	Barrow's goldeneye common goldeneye hooded merganser	49
	D / G	common merganser	18
Raptors and Owls	B3	northern hawk-owl	20
	C	northern pygmy-owl / northern flicker	23
	E2	boreal owl northern saw-whet owl	26
	E3	American kestrel	19
	H	barred owl	3
Total			269*

* Box type C supports both northern flicker and northern pygmy-owl. To avoid double counting, the total number constructed of box type C is included in the raptor and owl species group.

± Nine nest boxes were constructed as extras.

In late-June and early-July 2017, 96 nest boxes were installed on the north side of the Peace River on trees and structures on BC Hydro owned and managed lands, and private lands where permission was granted (Table 13). Of those, 16 nest boxes were designed to be suitable for waterfowl; two for bufflehead, 10 for Barrow's goldeneye, common goldeneye or hooded merganser; and four for common merganser.

Table 13. Nest boxes installed in 2017

Species group	Box type	Number of boxes installed
Passerine	A / BC B1	16
	A2 B2	18
Woodpeckers (secondary excavators)	C	*
Waterfowl	E1	2
	F	10
	G	4
Raptors and Owls	E2	10
	E3	14
	C	9
	B3	13
Total		96

Nest box installation will continue in 2018. The full Cavity Nesting Mitigation and Monitoring Program 2017 Annual Report can be found in Appendix 12.

7.6.3 A design for bat roosting habitat in HWY 29 bridges

This section summarizes actions taken in accordance with the following requirement of Condition 16: *A design for bat roosting habitat in HWY 29 bridges to BC Ministry of Transportation and Infrastructure (MOTI) for consideration into new bridge designs located within the Peace River valley.*

During baseline surveys bats were documented using the Farrell Creek, Halfway River and Cache Creek bridges as night roosts. These three (3) bridges and the bridge at Lynx Creek will be inundated by the reservoir. New bridges will be constructed at these locations. BC Hydro has reached an agreement with the Ministry of Transportation and Infrastructure to install bat roost structures on newly constructed bridges along re-aligned sections of Highway 29 to offset the losses of night roosts on existing bridges.

The type(s) and number of bat boxes installed on each bridge will be determined in consultation with bridge engineers. Roost boxes designed by Bat Conservation International⁸ will be installed. BC Hydro and MOTI will share the installation plans with the VWTC prior to finalization of each bridge design.

The following criteria will be used to determine placement of the bat roosts on each bridge structure:

- no effect on the structural integrity of the bridge;
- no interference with routine bridge maintenance;

⁸ Keeley, B.W and M.D. Tuttle. 1999. Bats in American Bridges. Bat Conservation International Inc. Resource Publication No. 4.

- minimizes opportunities for interaction with the public;
- safety of bats using the boxes; and
- southern exposure.

Due to the restrictions regarding placement of boxes on bridges, the size of bridges and associated access restrictions there are no plans to move or replace boxes with alternate designs if the boxes are not used by bats. If boxes located on bridges are not used and there is no evidence of bats roosting in other parts of the bridge structure BC Hydro, in consultation with the VWTC will explore the feasibility of re-locating unused bat roost boxes to areas adjacent to the bridge site(s).

7.6.4 Creation of hibernating and roosting sites for bats

This section summarizes actions taken in accordance with the following requirement of Condition 16: *Following rock extraction at Portage Mountain, creation of hibernating and roosting sites for bats.*

To avoid destroying the hibernacula at Portage Mountain that are being used by little brown myotis and northern myotis, BC Hydro moved the quarry to the eastern edge of the License of Occupation area. This relocation achieved a 300 m no activity/no access buffer around the 16 documented hibernacula. This mitigation is described in detail in Appendix 9 of the 2016 Annual Report.

In February of 2016 the BC Ministry of Environment released Best Management Practices Guidelines for Bats in British Columbia “Bat BMPs”⁹. These guidelines recommend a 100 m buffer be established around the core area of bat habitat, which for Portage Mountain is defined as all the hibernacula entrances documented. Within this 100 m no activities that modify the above or below ground habitat are allowed. The guidelines also recommend a 1 km special management zone, within which blasting activities are permitted if the following can be achieved:

- No blasting to occur between October and May;
- Blasting must be conducted within the following parameters (to avoid damage to the rock structures associated with the hibernacula):
 - the sound concussion is less than 150 dB;
 - the shock wave is less than 15 p.s.i; and
 - the peak particle velocity is less than 15 mm/s.

To avoid disturbance to hibernating bats, BC Hydro has also prohibited blasting at Portage Mountain between September 15 and May 15 (see Section 4.2 of the CEMP); this window was established based on data collected at the hibernacula in 2013 and in consultation with bat biologists (see the 2016 Annual Report).

For planned activities at Portage Mountain Quarry, noise modelling was conducted, from which it was determined that at 300m:

- the sound concussion would be 120 dB (below BMP limit of 150 dB);
- the shock wave would be 0.002 p.s.i (1 kPa) and (below BMP limit of 15 p.s.i (104 kPa); and

⁹ BC MoE. 2016. Best Management Practices Guidelines for Bats in British Columbia. Chapter 2: Mine Developments and Inactive Mine Habitats. 68 pp.

- the peak particle velocity would be 2.84 mm/s (below BMP limit of 15 mm/s).

As described in Section 6.4.5.3, BC Hydro is planning on evaluating the accuracy of noise predictions at the hibernacula by monitoring noise during test blasting at Portage Mountain Quarry after May 15, 2018. In addition, BC Hydro is conducting year round monitoring of bat use at Portage Mountain, with the following objectives:

- confirm that the bat species previously recorded at Portage Mountain remain present during quarry operations;
- evaluate any changes in the use of hibernacula at Portage Mountain through bat activity recorded during the winter and spring-emergence periods;
- evaluate and changes in the use of Portage Mountain by bats by comparing bat activity to previously recorded spring to fall bat activity; and
- emergence surveys with bioacoustic surveys to help evaluate the efficacy of spatial setback mitigation from suspected maternity roosts (Section 6.4.5; Appendix 8).

As a result of this mitigation, impacts to bat hibernacula at Portage Mountain due to the Project are no longer expected to occur. Monitoring during test blasting and quarry operations in 2018 will help to evaluate this revised impact prediction, and the results of 2018 monitoring will be summarized in the 2018 VWMMP Annual Report.

7.6.5 Cold weather rest sites for fisher

This section summarizes actions taken in accordance with the following requirement of Condition 16: *Creation of natural or artificial piles of coarse woody debris dispersed throughout the disturbed landscape to maintain foraging areas and cold-weather rest sites, and arboreal resting sites, for the fisher population south of the Peace River.*

Twenty-five (25) coarse woody debris (CWD) piles for fisher were created within the dam site area in 2016. No additional CWD piles were created for fisher in 2017; however, signs were installed at existing CWD piles indicating that they were designated fisher habitat to prevent their inadvertent disturbance by construction activities.

7.7 EAC Condition 19

This section of the annual report summarizes the programs implemented in 2017 in accordance with the requirements of Condition 19.

For context, the complete requirements of Condition 19 are shown below.

EAC Condition 19

The EAC Holder must use reasonable efforts to avoid and reduce injury and mortality to amphibians and snakes on roads adjacent to wetlands and other areas where amphibians or snakes are known to migrate across roads including locations with structures designed for wildlife passage

The EAC Holder must consult with Environment Canada, FLNR and MOE with regard to the size and number of the proposed structures prior to construction.

On December 22, 2016, the BC EAO issued an Order to BC Hydro, which stated that BC Hydro was not compliant with the requirement of EAC Condition #19 to mitigate impacts to amphibians

on roads, or the requirement of VWMMP (in relation to EAC Condition #16) to conduct additional amphibian surveys at Portage Mountain to identify appropriate amphibian road crossing mitigation structures. The Order required that BC Hydro:

- have a QEP develop a survey plan for conducting amphibian surveys on the newly constructed Project access road and any unsurveyed sections of the 400 road between Canyon Drive and Portage Mountain Quarry;
- have a QEP implement the amphibian survey plan;
- have a QEP determine what, if any, amphibian mitigation measures are appropriate for addressing potential effects to amphibians on the road between Canyon Drive and Portage Mountain Quarry;
- consult with Environment Canada, FLNR and MOE in the development of mitigation for addressing potential effects to amphibians on the road, as described in EAC Condition 19;
- implement appropriate mitigation for addressing potential effects to amphibians on the road; and
- monitor the use and effectiveness of mitigation measures, and implement any recommendations made by the QEP so that effects to amphibians are addressed to the satisfaction of the QEP.

In response to the order, BC Hydro developed the Site C Western Toad Management Procedure (Appendix 7), a protocol for conducting amphibian assessments within and adjacent to work sites and defined steps to take depending on the results of those assessments. This Procedure was developed to clarify contractor requirements regarding amphibian mitigation, was finalized June 26, 2017. Since that time the Procedure has been required for inclusion in all contractors' EPPs for works that could impact amphibians. Appropriate amphibian mitigation is monitored by BC Hydro site Environmental Monitors and the Independent Environmental Monitor against commitments within EPPs to determine and enforce compliance. Amphibian mitigation activities in 2017 are summarized in Section 6.4.2.2.

Also in response to the Order, BC Hydro engaged a QEP to develop and guide the implementation of a mitigation and monitoring plan related to amphibians at Portage Mountain Quarry. No work occurred at Portage Mountain in 2017 prior to July 24. From July 24 onwards, the work conducted by the QEP is described in Appendix 13, and is summarized as follows:

- Pre-construction amphibian habitat surveys were developed and implemented by a Qualified Professional from July 24-29, 2017 prior to site mobilization by the contractor;
- Two areas were identified as relevant habitat features (a wetland at the top of the quarry and a water crossing);
- At the water crossing, amphibian exclusion fencing was installed on both sides of the access road to allow for travel through the location to get to the quarry site, as per the Site C Western Toad Management Procedure (Appendix 7);
- The QEP evaluated the conceptual design of 1,000 mm diameter culverts as amphibian crossing mitigation near the two relevant habitat features. The QEP found that the structures satisfied the management practices recommended in the Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia Guidebook¹⁰ and recommended their installation;
- Daily dawn road surveys were completed prior to the crew arriving onsite between August 1, 2017 and Sept 3, 2017.
- Appropriate mitigation when encountering migrating toads (i.e., translocation in the direction of toad travel) was implemented as per the Site C Western Toad Management Procedure (Appendix 13).
- Weekly surveys for amphibian activity occurred in all active work areas from Sept 3,

¹⁰ Ovaska, K., L. Sopuck, C. Englestoft, L. Matthias, E. Wind and J. MacGarvie. 2004. Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia. Prepared for BC Ministry of Water, Land and Air Protection. Nanaimo, BC. 159 pp.

2017 until September 12, 2017, when work on the site was suspended due to extreme fire risk.

7.8 EAC Condition 21

This section of the annual report summarizes the programs implemented in 2015 in accordance with the requirements of Condition 21.

For context, the complete requirements of Condition 21 are shown below.

EAC Condition 21

The EAC Holder must ensure that measures implemented to manage harmful Project effects on wildlife resources are effective by implementing monitoring measures detailed in a Vegetation and Wildlife Mitigation and Monitoring Plan. The Vegetation and Wildlife Mitigation and Monitoring Plan must be developed by a QEP.

The Vegetation and Wildlife Mitigation and Monitoring Plan must include at least the following:

- Monitor Bald Eagle nesting populations adjacent to the reservoir, including their use of artificial nest structures.
- Monitor waterfowl and shorebird populations and their use of natural wetlands, created wetlands, and artificial wetland features.
- Monitor amphibian use of migration crossing structures installed along Project roads.
- Survey songbird and ground-nesting raptor populations during construction and operations.
- Survey the distribution of western toad and garter snake populations downstream of the Site C dam to the Pine River.
- Require annual reporting during the construction phase and during the first 10 years of operations to EAO, beginning 180 days following commencement of construction.

The EAC Holder must provide this draft Vegetation and Wildlife Mitigation and Monitoring Plan to FLNR, MOE, Environment Canada and Aboriginal Groups for review a minimum of 90 days prior to the commencement of construction.

The EAC Holder must file the final Vegetation and Wildlife Mitigation and Monitoring Plan with EAO, FLNR, MOE, Environment Canada and Aboriginal Groups a minimum 30 days prior to the commencement of construction.

The EAC Holder must develop, implement and adhere to the final Vegetation and Wildlife Mitigation and Monitoring Plan, and any amendments, to the satisfaction of EAO.

7.8.1 Monitoring of Bald Eagle nesting populations

Known bald eagle nest locations along the Peace River and at natural wetlands adjacent to the Site C transmission line right-of-way were surveyed by helicopter over three days in May and June 2017. Sixty-six (66) previously recorded stick nests were re-visited during the 2017 surveys and 13 new nests were recorded, of which nine were identified as bald eagle nests. Of the bald eagle nests observed, 34 were observed to be active at least once during the 2017 surveys, and 24 of those active nests were observed to have chicks in the nest (Table 12; Appendix 14). Nest productivity was estimated to be the last number of chicks observed in the

nest, unless it was three, in which case two chicks were assumed to fledge due to low expected survivability of chicks from third-laid eggs.

Table 14. Active bald eagle nests and productivity estimates, May and June 2017

Nest ID	May 1, 2017	May 16, 2017	June 17, 2017	Assumed Productivity (~no. fledged)
6	Adult	Adult, Chicks (2)	Adult, Chick (1)	1
8	Adult	Adult, Chicks (2)	Chicks (2)	2
13	Adult, Chicks (1-2)	Chicks (2)	Chicks (2)	2
22	Adult	Adult	-	0
29	Adult, Chicks (2)	Adult, Chick (1)	*	1
38	Adult	Adult, Chicks (2)	Chicks (3)	2
62c	Adult	Adult, Chick (1)	Chicks (2)	2
101	Adult	-	n/a	0
104	Adult	Adult	Chicks (2)	2
121	Adult	Adult, Chicks (2)	Chicks (2)	2
122	Chicks (3)	Adult, Chicks (2)	Chicks (2)	2
127	Adult	Adult, Chicks (2)	Adult, Chicks (2)	2
132	Adult	Adult, Chicks (2)	Adult, Chick (1)	1
133	Adult	Adult	*	0
137	Adult	Adult, Chick (1)	Chicks (2)	2
138	Adult	Adult, Chick (1)	Chick (1)	1
144	Chicks (2-3)	Chicks (2)	Chicks (3)	2
146	Adult	Adult, Chicks (2)	Chick (1)	1
155	Adult	Chick (1)	Chicks (2)	2
203	Adult	Adult	-	0
218	-	-	Adult	0
219	Adult	Adult	-	0
222	Adult	Adult	Chicks (2)	2
224	Adults (2)	-	-	0
303	Adult	Adult	-	0
400	Adult	Adult, Chicks (2)	Chicks (3)	2
500	Adult	Chicks (2)	Chick (1)	1
600	Adult	Chicks (2)	Adult, Chick (1)	1
602	Adult	Chick (1), Eggs (2)	Chick (1)	1
603	Adult, Chicks (2-3)	Adult, Chicks (2)	*	2
604	-	-	Adult	0
607	n/a	Adult, Chick (1)	Chick (1)	1
611	n/a	Chicks (3)	*	2
612	n/a	Adult	*	0

Notes: n/a – nest not surveyed; '**' - nest not found due to foliage; '-' inactive nest (i.e., no birds observed).

7.8.2 Monitoring waterfowl and shorebird populations

This section summarizes actions taken in accordance with the following requirement of Condition 21: *Monitor waterfowl and shorebird populations and their use of natural wetlands, created wetlands, and artificial wetland features.*

A summary of the waterbird survey program for 2017 is presented in Section 6.1.3.2.

7.8.3 Survey songbird and ground-nesting raptor populations during construction and operations

This section summarizes actions taken in accordance with the following requirement of Condition 21: *Survey songbird and ground-nesting raptor populations during construction and operations.*

7.8.3.1 Songbirds

A summary of the songbird monitoring program for 2017 is presented in Section 6.1.3.1.

7.8.3.2 Ground nesting raptors

Ground nesting raptor surveys in 2017 were conducted in three BC Hydro mitigation properties (Marl Fen, Rutledge Property and Wilder Creek), as well as in cleared portions of the Site C reservoir. Ground nesting raptor surveys were completed three times between May and July 2017. The surveys were conducted using a combination of encounter transects walked on foot and by boat and stationary standwatches.

Ground nesting raptors were observed at two of the three mitigation properties and in an area north of Highway 29. All observations were Northern Harriers: four at Marl Fen, one at Wilder Creek, and one near the Highway 29 cleared area. The Highway 29 observation was within the reservoir footprint but hunting over a fallow field and not in a recently cleared area. No ground nesting raptors were observed within the cleared portions of the footprint along the Peace River in 2017. No nests or possible nests were observed at any of the areas surveyed. At the present time, there is no evidence of ground nesting raptors nesting within cleared portions of the reservoir. Surveys in 2018 will continue in all cleared areas within the reservoir and in the mitigation properties. The Ground Nesting Raptor Monitoring 2017 Annual Report can be found in Appendix 15.

7.8.4 Annual reporting beginning 180 days following commencement of construction

This section summarizes actions taken in accordance with the following requirement of Condition 21: *Require annual reporting during the construction phase and during the first 10 years of operations to EAO, beginning 180 days following commencement of*

construction.

Submission of this report satisfies the requirement this portion of Condition 21 for 2017 during the construction phase of the Site C Clean Energy Project.

7.9 Status of listed species

This section of the annual report summarizes the programs implemented in 2017 in accordance with the requirements of Condition 23. For context, the complete requirements of Condition 23 are shown below.

EAC Condition 23

The EAC Holder must maintain current knowledge of Project effects on the status of listed species by tracking updates for species identified by the Province, the Committee on the Status of Endangered Wildlife in Canada, and the Species at Risk Act.

Should the status of a listed species change for the worse during the course of the construction of the Project due to Project activities, the EAC Holder, must work with Environment Canada FLNR and MOE to determine if any changes to the associated management plans or monitoring programs are required to mitigate effects of the Project on affected listed species.

7.9.1 Rare Plants

Please see Section 6.4.6.1 for a summary of ranking changes to rare plants

7.9.2 Wildlife

Please see Section 6.4.6.2 for a summary of ranking changes to wildlife.