Vegetation and Wildlife Mitigation and Monitoring Plan 2015 Annual Report

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Site C Clean Energy Project

January, 2016

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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 CEA Agency and 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 Decision Statement issued on October 14, 2014 and November 25, 2014 respectively.

In addition, in accordance with environmental best practices (Decision Statement 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 2015 to meet the requirements of Decision Statement 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, are listed in Tables 1 and 2 below. Note that the requirements of Environmental Assessment Certificate 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. They are, therefore, not addressed in this report.

Table 1. Federal Decision Statement Conditions and Relevant Plan Section

Decision Statement Condition	Condition	Plan Reference
9.	Disturbance and destruction of migratory birds	Section 6.1 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
9.3.	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.	Section 6.1.2 Condition 9.3
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;	Section 6.1.3 Condition 9.9
10.	Non-wetland migratory bird habitat	Section 6.2 Decision Statement Condition 10
10.3	The plan shall include:	
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	Section 6.2.1 Condition 10.3.4

Decision Statement Condition	Condition	Plan Reference
	May Warbler and the Bay-Breasted Warbler;	
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.	Section 6.2.3 Condition 10.7
11.	Wetlands used by migratory birds and for current use of lands and resources for traditional purposes	Section 6.3 Decision Statement Condition 11
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.	Section 6.3.1 Condition 11.1
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:	
11.4.2.	mitigation measures to maintain baseline wetland functions for those wetlands that will not be permanently lost;	Section 6.3.3 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 6.3.4 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; and	Section 6.3.5 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	Section 6.3.6 Condition 11.8

Decision Statement Condition	Condition	Plan Reference
	construction.	
11.9	The Proponent shall implement each component of the plan and provide to the Agency a n 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 6.3.7 Condition 11.9
16	Species at risk, at-risk and sensitive ecological communities and rare plants	Section 6.4 Decision Statement Condition 16
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;	Section 6.4.1 Condition 16.3.1
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
16.3.5.	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 6.4.3 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 6.4.4 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 measures, in accordance with species recovery plans, to mitigate effects of the Designated Project on the affected species should the status of a	Section 6.4.5 Condition 16.3.7

Decision Statement Condition	Condition	Plan Reference
	listed species change during the life of the Designated Project.	

Table 2. Environmental Assessment Certificate Conditions and Relevant Plan Sections.

EAC Condition	Condition	Plan Reference
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	
	• Surveys of existing invasive species populations prior to construction.	Section 7.1.1 Surveys and treatment of invasive species
	• Invasive plant control measures to manage established invasive species populations and to prevent invasive species establishment.	Section 7.1.2 Invasive plant control measures
	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	Section 7.1.3 Rare and Sensitive Ecosystem Community Identification
	• 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 7.1.4 Inventory Areas Not Already Surveyed

EAC Condition	Condition	Plan Reference
	• 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.	Section 7.1.5 Spatial Database of 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.	Section 7.1.6 Rare plant avoidance
	• 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 7.1.7 Protect tufa seeps, wetlands and rare plants located adjacent to construction areas
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.	Section EAC Condition 12
	The Wetland Mitigation and Compensation Plan must include at least the following:	
	• Information on location, size and type of wetlands affected by the Project;	Section 7.2.1 Wetland Mitigation and Compensation Plan
	• If roads cannot avoid wetlands, culverts will be installed under access roads to maintain hydrological balance, and sedimentation barriers will be installed;	Section 7.2.1.1 Installation of culverts to maintain hydrological balance at wetlands affected by roads
	• Stormwater management will be designed to control runoff and direct it away from work areas where excavation, spoil placement, and staging activities occur.	Section 7.2.1.2 Stormwater management

EAC Condition	Condition	Plan Reference
	• 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.	Section 7.2.1.3 Site-specific mitigation measures for 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).	Section 7.2.1.4 Implementation of Approved work practices and Develop with Care
WILDLIFE RESOURCES		
	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:	
	• 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.	Section 7.3.1 Verification of modelled results for surveyed species at risk
	• Measures to avoid, if feasible, constructing in sensitive wildlife habitats. If avoiding sensitive wildlife habitats is not feasible, condition 16 applies.	Section 7.3.2 Measures to avoid, if feasible constructing in sensitive wildlife habitats
	• 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 7.3.3 Protocol for the application of construction methods, equipment, material and timing of activities to mitigate adverse effects to wildlife and wildlife habitat.
	• Protocol for the application of construction methods, equipment, material and timing of activities to mitigate adverse effects to wildlife	Section 7.3.4 Mitigation of adverse effects to wildlife

EAC Condition	Condition	Plan Reference
	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.	Section 7.3.5 Protocol to ensure that lighting is focused on work sites
	• 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.	Section 7.3.6 Environmental training of workers
	The EAC Holder must ensure that all workers are familiar with the Wildlife Management Plan.	Section 7.3.6 Environmental training of workers
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.	Section 7.4 EAC Condition 16
	The Vegetation and Wildlife Mitigation and Monitoring Plan must include the following compensation measures:	
	• Management of EAC Holder-owned lands adjacent to the Peace River suitable as breeding habitat for Northern Harrier and Short-eared Owl.	Section 7.4.1 Management of EAC Holder-owned lands
	• 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 7.4.2 A design for bat roosting habitat in HWY 29 bridges
	• 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 7.4.3 Cold weather rest sites for fisher

EAC Condition	Condition	Plan Reference
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.	Section 7.5 EAC Condition 21
	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:	
	• Monitor waterfowl and shorebird populations and their use of natural wetlands, created wetlands, and artificial wetland features.	Section 7.5.1 Monitoring waterfowl and shorebird populations
	• 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 7.5.2 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 *Species at Risk Act.*	Section 7.6.1 EAC Condition 23

3.0 Consultation

Consultation regarding the development and implementation of individual programs conducted between the submission of the final plan on June 5, 2015 and December 31, 2015 is provided below.

3.1 Wetland Function Assessment

On March 6, 2015 BC Hydro consulted 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) on the draft wetland function assessment. The discussion focused on the function assessment methodology and selection of species for use in the assessment. Participants provided recommendations for inclusion of additional species, suggestions for linking baseline data to the assessment and alternate means of analysing local area field data for potential use in the function assessment.

A revised function assessment, addressing comments received during the March 6, 2015 meeting was provided to participants on November 20, 2015. On January 8, 2016 BC Hydro met again 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 the revised draft Wetland Function Assessment (Appendix G).

BC Hydro will consult on the revised draft function assessment with Aboriginal groups to seek their comment on the overall methodology and on the approach to the inclusion of the current use of wetlands for traditional purposes by Aboriginal people in the wetland function assessment. Additional species may be added to the function assessment following consultation with Aboriginal groups.

3.2 Bird Transmission Line Collision Risk Assessment

BC Hydro shared, via conference call, its proposed approach to undertaking the bird transmission line collision risk assessment with representatives of EC and CWS on September 30, 2015.

A meeting, to review the draft assessment was held on November 5, 2015. BC Hydro revised its assessment incorporating comments received from EC and CWS during the November 5, 2015 meeting, and provided the revised risk assessment to CWS on November 23, 2015 (Appendix E). To date BC Hydro has not received any further comments on the revised assessment.

3.3 Non-wetland migratory birds

On September 21, 2015 representatives of EC and the CWS and FLNRO visited three properties in the Peace that BC Hydro proposes to use to mitigate for non-wetland migratory birds. BC Hydro's proposed management of each property were discussed with participants.

Prior to the meeting participants were provided with draft management plans for two of the properties. The third plan was being drafted and not available for distribution at that time but is now attached as a component of Appendix F.

BC Hydro received comments from FLNRO and made revisions in consideration of these comments into the two plans.

3.4 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 have established a Vegetation and Wildlife Mitigation and Monitoring Technical Committee (the Technical Committee). 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.

Through pre-work and an inaugural Technical Committee meeting on December 18, 2015 BC Hydro and BC have agreed that the purpose of the technical committee is to:

a) Review the content and approach of the plan developed by BC Hydro to achieve compliance with the relevant conditions in the EAC and the DS issued in respect of the Project, as well as Water License conditions and other applicable permits.

b) Provide a forum for agency representatives to provide technical advice and recommendations to BC Hydro during the development, review and refinement of the Plan and any resulting terms of reference for project work, including advice related to adaptive management and provincial management objectives, to support BC Hydro in achieving the desired environmental outcomes through monitoring, mitigation and offsetting projects to effectively meet regulatory requirements for the Site C Project.

c) Where a new study not already defined in a Plan is identified, the Technical Committee will establish a process for determining the need for, and documentation of any studies, mitigation, monitoring or follow-up programs related to the new study.

d) Provide a forum for the review of study results and relevant data as they are available and to provide technical advice to BC Hydro and regulatory agencies related to continuing studies and study modifications.

e) Facilitate agency representatives in their review process including communicating back to their respective agencies the sufficiency of the Plan in achieving compliance with the applicable permits and authorizations (e.g., Water Licence conditions, Wildlife Act permits) and the EAC and DS.

f) Develop a suitable approach to document any commitments beyond the EAC and the DS made by BC Hydro as a result of discussions at this Technical Committee.

The first meeting of the committee occurred on December 18, 2015 during which the structure of the committee was discussed.

The second meeting occurred on January 11, 2015 during which specific vegetation and wildlife programs were grouped by MOE/FLNRO to provide a structure for their further comments on the June 5, 2015 Vegetation and Wildlife Mitigation and Monitoring Plan.

4.0 Qualified professionals

The following Qualified Professionals were involved in development and implantation of programs in 2015:

Qualified Individual	Area of work
K. Anré McIntosh, R.P.Bio. P.Ag, PMP BC Hydro	Vegetation and Wildlife
Lisette Ross, M.Sc., Native Plant Solutions	Wetland Function assessment, Waterfowl and shorebird fall migration surreys
Melissa Mushanski, B.Sc. M.Sc., Native Plant Solutions	Waterfowl and shorebird fall migration surreys
Llwellyn Armstrong Native Plant Solutions	Statistician
Darryl Kroeker, M.Sc., Ducks Unlimited Canada	Wetlands, wetland birds
Claudio Bianchini, R.P. Bio., Bianchini Biological Services	Species Model verification, spring waterfowl and shorebird surveys
Rick Matthe, Ba Hon. Pathfinder Endeavours	Noxious Weeds
Lauren Simpson, R.P.Bio, Keystone Wildlife Research	Data analysis rare and sensitive ecosystems, Bald Eagle and beaver surveys
Derek Cheng, GIS analysis, Keystone Wildlife Research	Rare and Sensitive Ecosystem survey data analysis
Kyle Routledge, BIT. Keystone Wildlife Research	Bald Eagle and beaver surveys within dam site, rare ecosystem surveys
Todd Kohler, B.Sc., Keystone Wildlife Research	Rare and Sensitive Ecosystem surveys
Shane White, R.P. Bio., Keystone Wildlife Research	Rare and Sensitive Ecosystem surveys
Randy Krickbaum, M.Sc., P.Biol., R.P.Bio, Eagle Cap Consulting	Pre-construction rare plant 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 Decision Statement conditions; Section 7.0 describes those measures that were implemented to meet the requirements of the Environmental Assessment Certificate conditions. Cross-references are provided in Section 7.0 where information provided to meet the Environmental Certificate conditions is the same as that provided for the Decision Statement conditions.

Several of the programs outlined in the Vegetation and Wildlife Mitigation Plan were not implemented in 2015. Table 3 below outlines which programs were not implemented, when they will be implemented and reported in subsequent annual reports.

Table 3. Summary of programs not implemented in 2015

Condition Number	Program to be implemented	Implementation Year	Inclusion in Annual Report
FDR 9.3	Breeding Bird Follow-Up Monitoring Program Bird Nesting Monitoring Program	2016	2016
FDR 9.9.2-9.9.3	Identification and implementation of additional mitigation measures to reduce risk of bird collisions	2016	2016
FDR 10.3.3	Littoral zone enhancements Riparian plantings	2016 TBD	2016 TBD
FDR 10.3.6	Monitoring effectiveness of mitigation and compensation measures	2016	2016
FDR 11.4.3	Monitoring changes in baseline wetland conditions	2016	2016
FDR 16.3.4	Rare plant seed collection and translocation	2016	2016
EAO 9	Rare plant translocation	2016	2016
EAO 10	Surveys for 18 rare plant species Rare plant taxonomic study	2016 2016	2016 2016
EAO 11	Assistance to habitat enhancement projects in the RAA	2016	2016
EAO 14	Rare plant translocation	2016	2016
EAO 16	Construction of artificial snake hibernacula Creation of bat hibernacula at Portage Mountain Creation of rest sites for Fisher	2016 TBD 2016	2016 TBD 2016
EAO 19	Avoidance of injury and mortality to amphibians and snakes	2016	2016
EAO 21	Monitoring nesting Bald Eagle populations Monitor amphibian use of migration crossing structures Songbird and ground nesting raptor surveys Downstream surveys for western toad and garter snake	2016 2016 2016 2019	2016 2016 2016 2019

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

Conditions 9, 10, 11, and 16 of the Decision Statement, 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 in 2015 are described in the subsequent sections of this report:

- Section 6.1 Decision Statement Condition 9
    - *Section 6.1.1* Avoidance of disturbance to migratory birds and their nests (Decision Statement 9.1)
    - Section 6.1.2 Waterfowl and Shorebird monitoring (Decision Statement 9.3)
    - *Section 6.1.3* Transmission Collision Risk assessment (Decision Statement 9.9: 9.9.1
- Section 6.2 Decision Statement Condition 10
    - *Section 6.2.1* 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 (Decision Statement 10.3.4)
    - *Section 6.2.2* Implementation of compensation measures specified in condition 10.3.4 no later than five years from the initiation of construction (Decision Statement 10.7)
- Section 6.3 Decision Statement Condition 11
    - *Section 6.3.1* 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 (Decision Statement 11.1)
    - *Section 6.3.2* 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 (Decision Statement 11.2)
    - *Section 6.3.3* mitigation measures to maintain baseline wetland functions for those wetlands that will not be permanently lost (Decision Statement 11.4.2)
    - *Section 6.3.4* 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. (Decision Statement 11.4.3)
    - *Section 6.3.5* 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 (Decision Statement 11.4.4)
    - *Section 6.3.6* 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 (Decision Statement 11.8)
    - *Section 6.3.7* 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 (Decision Statement 11.9)

- Section 6.4 Decision Statement Condition 16
    - *Section 6.4.1* 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 (Decision Statement 16.3.1)
    - *Section 6.4.2* measures to mitigate environmental effects on species at risk and at-risk and sensitive ecological communities and rare plants (Decision Statement 16.3.3)
    - *Section 6.4.3* 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 (Decision Statement 16.3.5)
    - *Section 6.4.4* 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 (Decision Statement 16.3.6)
    - *Section 6.4.5* 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 (Decision Statement 16.3.7)

6.1 Decision Statement Condition 9: Migratory Bird Mitigation and Monitoring

This section of the annual report summarizes the programs implemented in 2015 in accordance with the requirements of Decision Statement 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 scheduled vegetation clearing during the Peace Region terrestrial wildlife least-risk windows for birds, as identified by BC and Environment Canada (Region 6). 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 the Vegetation Clearing and Debris Management Plan (section 3.5.1). Both documents were provided in draft to Environment Canada and the Ministry of Forest, Lands and Natural Resource Operations. Based on comments received both the CEMP and the nest survey protocol in the final Vegetation Clearing and Debris Management Plan were revised.

Following this a breeding season pre-clearing nest survey methodology was developed which outlines specific field procedures to be followed to identify the presence of active bird nests within areas scheduled to be cleared outside of avian least-risk windows, as well as specific buffers to be applied in the event active bird nests are identified.

The survey methodology was developed in accordance with the protocol outlined in the Vegetation Clearing and Debris Management Plan and in accordance with avoidance guidance from Canadian Wildlife Service (Environment Canada 2014a), provincial Best Management Practices (BC MFLNRO 2013 and 2014), and bird nest survey methodology produced for similar development projects in British Columbia (BC EAO 2014). Nest surveys are to be conducted between 1 March and 30 September in areas where vegetation clearing is scheduled. Pre-clearing surveys are to be conducted by a Qualified Environmental Professional (QEP).

A summary of the nest survey methodology is provided below. The complete methodology is provided in Appendix A.

Aerial surveys

- Aerial surveys will be used to identify large stick nests, Trumpeter Swan and Sandhill Crane nests.
- Initial surveys are to be conducted in early spring prior to leaf-out, nests will be classified as active or inactive[1].
- Follow-up surveys are to be conducted, as required prior to clearing, to determine if nests initially classified as inactive are being used by late nesters

Ground surveys

- Ground surveys will be used to identify nest sites of other species (e.g. songbirds, shorebirds, cavity-nesting owls and woodpeckers).
    - Between May 1-July 31 (the Critical Nesting Period) three complete nest surveys are to be completed within a 5 day period prior to clearing,
    - Between April 1-April 30 and August 1-August 15 (the Caution Nesting Period) two complete nest surveys (a full survey cycle) are to be completed within a 5 day period prior to clearing,

[1] Active nests are those confirmed to be being used for breeding. Inactive nests are those with no current evidence of use for breeding.

    - During the Exceptions Nesting Period (August 16-March 31), one complete nest survey is sufficient for a full survey cycle prior to clearing.
- Surveys are to be conducted within clearing limits and up to 30m beyond the limits. Transects will be used by surveyors to passively survey the area.
- During surveys the QEPs will look for nest structures and bird behaviour which indicate the presence of active nests.
- Active bird nest locations will be flagged using assigned coloured flagging tape. Flagging tape is to be hung approximately 5 m from the nest to show generally where the nest is located. A precise GPS location of the nest will be taken.
- No-clearing buffers are to be clearly flagged, using assigned coloured flagging tape, around all confirmed active nests and suspected nest areas with significant evidence of breeding. The onsite QEP will recommend the size of nest buffer to be established based on the above factors. For most bird nests, a minimum of a 30 m radius buffer is to be established around active nests.
- No clearing activities within the established buffer areas are to occur until after the QEP has determined that nesting and fledging are complete, or if the status of the nest has been changed from active to inactive.
- After the birds are thought to have fledged the nest and buffer area will be re-searched
- Inactive nests will be inconspicuously flagged at dbh on the nest tree to alert bird surveys of the nest location for follow-up surveys (if required).
- The free to clear period is 3 days immediately after completion of surveys.
    - If clearing does not occur within these 3 days, a single follow-up nest survey can be completed within 5 days from the last survey date, which would commence a new 3 day period where clearing is allowed.
    - If no clearing has occurred within the 5 days of the last survey date of a full survey cycle, then a new full survey cycle (three nest survey visits) should be initiated

Active nest reassessments

Once a nest is designated active, additional survey time will be required to document the change in status from active to inactive.

- A minimum of 5 days should elapse prior to initiating a reassessment of the nest (day one begins on the day following the last survey).
- If the nest is obviously active, the surveyor should document such activity and leave the site. Otherwise, two one-hour watches should be conducted on two separate days (e.g., one 1-hr watch per day for 2 days) for a nest to be properly reassessed. If a nest is well-concealed and/or high enough in a tree that an incubating/brooding adult might not be observed, a third one hour nest watch will be conducted; this can be completed later on during the same day as the second survey.
- An active nest status may be changed to inactive if, upon completing the appropriate number of nest watches described above, no adult, nestling or fledgling activity is observed associated with the nest or buffer habitat. This confirmation will be provided in writing prior to commencement of clearing.
- All active nests for which the status has changed to inactive should be reassessed at least 3 days prior to clearing as a matter of due diligence
- If a nest is discovered that remains active beyond either nesting period, an onsite QEP will reassess the nest to verify its inactive status prior to any clearing work.

Summary of 2015 surveys

Surveys to field test the methodology were conducted June 17- 19 and July 6-10, 2015. The methodology was modified to add additional clarifications as follows:

- "Bird Biologist" was replaced with Qualified Environmental Professional (QEP)
- Exceptions Nesting Period methodology was clarified and enhanced, creating the following categories, each with its own specific methodology:
    - o No breeding activity expected
    - o Late breeding activity expected or detected
    - o Early breeding activity expected
    - o Species-specific survey methodology were developed for White-winged Crossbill

In 2015, pre-clearing nest surveys were completed July 21-24, July 28-Aug 5 and Aug 6-20 to identify active nests within areas scheduled for clearing. Additional surveys targeting White-winged Crossbills, which may nest at any time of the year when there are favourable spruce cone crops, were conducted August 28-31, September 17 and October 21-22, 2015. Survey reports are provided in Appendix B.

In total, eight (8) active nests were identified within areas scheduled for clearing. Each nest was buffered and the buffer maintained until a QEP determined the next was no longer active.

6.1.2 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.*

6.1.2.1 Spring waterfowl surveys

Spring waterfowl and shorebird surveys along the Peace River and adjacent large lakes were conducted on March 18, April 2 and 10, 2015. The survey flights were conducted using a single engine Cessna 206 flying at 150 m AGL and a speed of 100 km/h.

The Peace River main stem was the only open body of water observed during all three 2015 surveys. A total of 4867 waterfowl in mixed groups of six species were observed with species diversity increasing for each survey (Table 4). Abundance of waterfowl was relatively even throughout the survey area except for higher abundances in downstream areas during the second survey.

Table 4. Species observed during spring 2015 waterfowl and shorebird surveys

Waterfowl Species	Scientific Name	March 18	April 02	April 10	Total
Canada Goose	*Branta Canadensis*	1008	1363	599	2970
Common Goldeneye	*Bucephala clangula*	408	695	334	1437
Common Merganser	*Mergus merganser*	69	101	187	357
Green-winged Teal	*Anas crecca*	0	28	0	28
Mallard	*Anas platyrhynchos*	5	22	10	37
Trumpeter Swan	*Cygnus buccinators*	0	17	21	38
Grand Total		1490	2226	1151	4867

Trumpeter Swans were recorded along the Peace River during two of the three surveys with all swans observed upstream of the proposed Site C dam site. The largest concentration of Trumpeter Swans were observed during the April 2nd and 10th surveys with both observations located approximately 10 km upstream of the proposed Site C dam site, across from Wilder Creek.

A number of large lakes along the transmission route were also surveyed for waterfowl presence. These lakes were mostly frozen during all three surveys. An unnamed lake situated between Boucher and Rene Lakes was beginning to thaw during the April 2nd survey and two Trumpeter Swans were observed within the narrow strip of open water along the southern shore on both April 2nd and 10th. During the April 10th survey, two additional Trumpeter Swans were observed on a lake situated approximately 7.5 km northeast of Boucher Lake.

The 2015 spring waterfowl and shorebird survey report provided in Appendix C.

6.1.2.2 Summary of fall waterfowl surveys

Fall waterfowl and shorebird surveys along the Peace River and adjacent large lakes were conducted on September 1, 15 and 19, 2015. The survey flights were conducted using a single engine Cessna 180 flying at 150 km/hr and heights of 152.4 m AGL.

Fall surveys were expanded to survey waterfowl and shorebird use of wetland habitats between the Peace River and the Transmission line between Hudson's Hope and the confluence of the Peace and Moberly Rivers and to link observations to mapped wetland habitat types. These data will be used to inform the wetland assessment function and achieve compliance with EAO condition 21 and FDR 11.1.

A total of 4107 individual birds of 12 species were detected across all surveys (Table 5). The number of species observed and the species richness peaked on the September 15 survey. The number of individual birds detected was highest on the September 1 survey and decreased with each subsequent survey. The observations were linked to 15 different habitat types. The widest use of habitats was seen on the September 15 survey.

Table 5. Species observed during fall 2015 waterfowl and shorebird surveys

Species		Species Abundance by Survey			
Common Name	**Scientific Name**	**1**	**2**	**3**	**Total**
Barrow's goldeneye	*Bucephala islandica*	0	1	0	1
Blue-winged teal	*Anas discors*	370	61	0	431
Canada goose	*Branta canadensis*	1174	672	309	2155
Common merganser	*Mergus merganser*	0	21	8	29
Green-winged teal	*Anas crecca*	15	17	0	32
Mallard	*Anas platyrhynchos*	54	75	3	132
Northern pintail	*Anas acuta*	5	24	40	69
Northern shovelor	*Anas clypeata*	0	7	0	7
Trumpeter swan	*Cygnus buccinator*	61	33	14	108

Unidentified duck		11	402	165	578
Unidentified gull		0	90	295	385
Unidentified scaup		26	0	38	64
Unidentified swan		32	29	7	68
Total		1748	1432	879	4059

84% of all observations were on the Peace River or lakes. Use of wetlands by fall migrants included:

- use of Tamarack sedge (TS) wetlands by mallards, blue-winged teals, and other unidentifiable duck species.

- use of sedge wetlands (SE), Labrador tea-sphagnum (BL) and step- moss (AM) habitat by Canada geese, swans and dabbling ducks. Use of these wetland types was low totalling approximately 1% of all birds observed

The 2015 fall waterfowl and shorebird survey report provided in Appendix D.

6.1.3 Condition 9.9

This section summarizes actions taken in accordance with the following requirement of Condition 9.9: *The Proponent shall address potential risks of bird collisions with the transmission line, in consultation with Environment Canada, by:*

9.1.1. conducting a risk assessment for bird collisions under the current transmission line design;

An assessment of the potential risk for bird-transmission line collisions with the two proposed 500-kv transmission lines connecting the Site C substation to the existing Peace Canyon substation along and adjacent to the existing 77-km right-of-way was completed. The assessment included:

- A literature review summarizing known contributors to avian collisions with transmission lines.

- A spatially explicit model of collision risk along the proposed ROW that differentiates ROW segments of varying potential for bird collisions with the proposed transmission line.

- A qualitative risk assessment of the proposed ROW and the proposed tower types and conductor arrangements. To qualitatively assess potential for bird collision risk, a risk score was assigned to each segment based on three features:

    - Segment crosses a topographical depression or runs parallel to a ridge (score = 1.0);

    - Segment is within 100 m of a wetland (score = 1.0); and

    - Segment is within 100 m to 500 m of a wetland (score = 0.5).

Each segment was given an overall score of 0.0 to 2.5 based on the sum of the three criteria. A high score indicates higher potential risk.

Wetlands within 100 m of the corridor were identified by buffering the right-of-way centerline by 140 m and intersecting the buffer with the wetland layer. The additional 40 m was added to account for half the average width of the corridor. Wetlands within 100 m to 500 m of the corridor were identified by buffering the centerline by 540 m, removing the area within 140 m of the centerline, and intersecting the buffer with the wetland layer.

In addition to the generalized avian risk assessment, in response to comments received from Environment Canada in November of 2015 (See Section 3.0 above) species-specific assessments were developed for Trumpeter Swan, Horned Grebe, Common Nighthawk, Olive-sided Flycatcher and Rusty Blackbird to evaluate potential risk to protected species (e.g., *Species at Risk Act* [SARA], *Migratory Birds Convention Act*) and to assess potential risk to birds that do not exclusively use wetland habitats.

Two of the 150 segments received a high risk score of 2.5; this represents approximately 1.3% of the total ROW length. Fifty-three of the 150 segments received a moderate risk score of 1.5; this represents approximately 35% of the total ROW length. The remaining 95 segments (approximately 63% of the total ROW length) received low risk scores of 1.0, 0.5, or 0. In total, only seven of 150 ROW segments (approximately 9% of total ROW length) are predicted to pose potentially high risk of bird collisions.

The risk assessment report is provided in Appendix E. Note that the risk assessment report does not recommend further field work as required to support the results of the risk assessment. No field work is planned to be undertaken as part of the risk assessment.

In 2016 BC Hydro will consider the bird transmission risk assessment to identify any existing or further measures that can be accommodated in the final design for the transmission line to reduce the risk of bird collisions within the seven segments of the right-of-way identified as having a high risk for collisions. Results of the feasibility assessment will be provided in the 2016 annual report.

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

This section of the annual report summarizes the applicable components of the Vegetation and wildlife mitigation and monitoring plan implemented to fulfill Decision Statement Condition 10 in 2015 in accordance with the requirements of Decision Statement condition 10.8. For context, the complete requirements of 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 10.3.4

This section summarizes actions taken in accordance with the following requirement of Condition 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.*

BC Hydro has identified three properties (Marl Fen, Rutledge and Wilder Creek) suitable for retention and management to provide habitat for non-wetland migratory birds (Figures 1-3). Draft management plans (Appendix F) have been prepared for each property outlining how they would be managed over time to provide habitat for non-wetland migratory birds.

Wilder Creek: The Wilder Creek lands are located west of Wilder Creek. They were purchased by BC Hydro in the 1980's. Forested portions of the property will be managed to provide habitat for non-wetland migratory birds.

Marl Fen: The Marl Fen Mitigation property is located outside of Hudson's Hope. It was purchased by BC Hydro in 2014 as part of the Project's wetland mitigation plan. Non wetland portions of the property will be managed to provide habitat for non-wetland migratory birds.

Rutledge: The Rutledge property is located east and west of Dry Creek. It was purchased by BC Hydro in 2014. Forested portions of the property will be managed to provide habitat for non-wetland migratory birds.

BC Hydro is proposing these properties as candidate conservation sites for review by Environment Canada, FLNRO, MOE, and Aboriginal Groups, and will review any comments from these agencies and Aboriginal groups prior to including these as final site selections. In finalising site selection of these properties, BC Hydro shall provide to CEA Agency an analysis that demonstrates how it has considered the input, views or information received from Environment Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups (in accordance with Federal condition 11.4.5, 11.7).

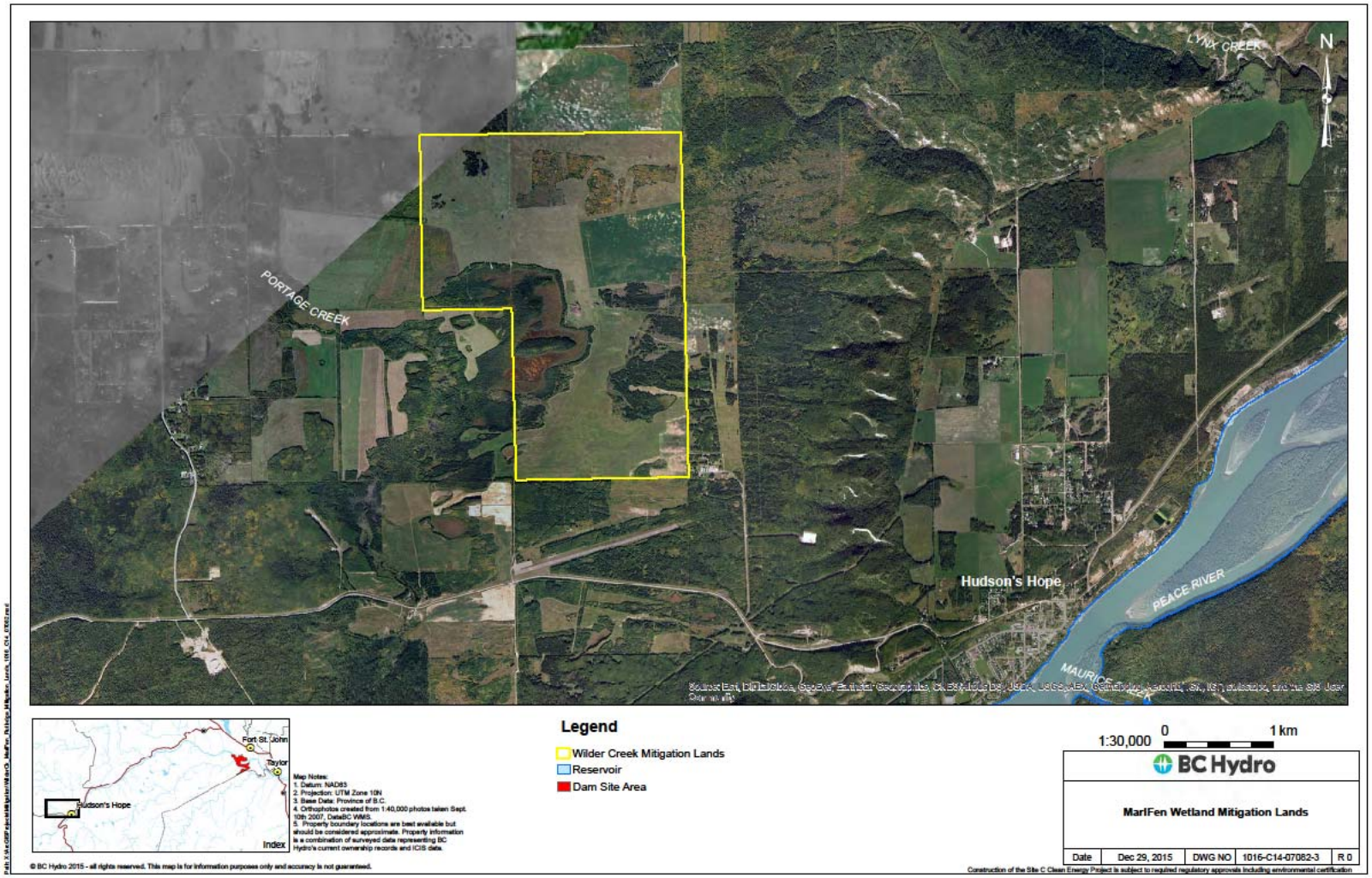

Figure 1. Marl Fen Wetland Mitigation Lands

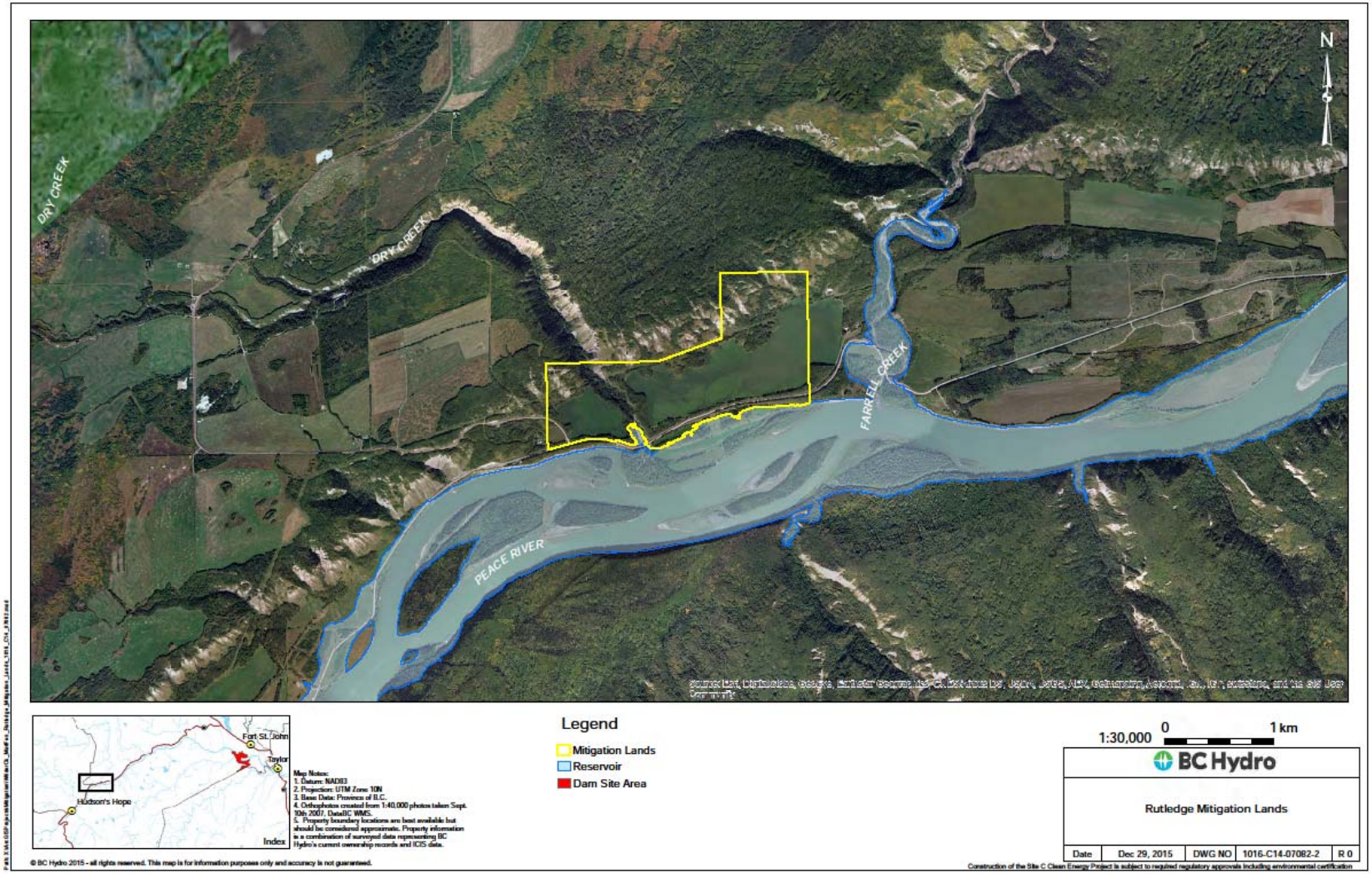

Figure 2. Rutledge Mitigation Lands.

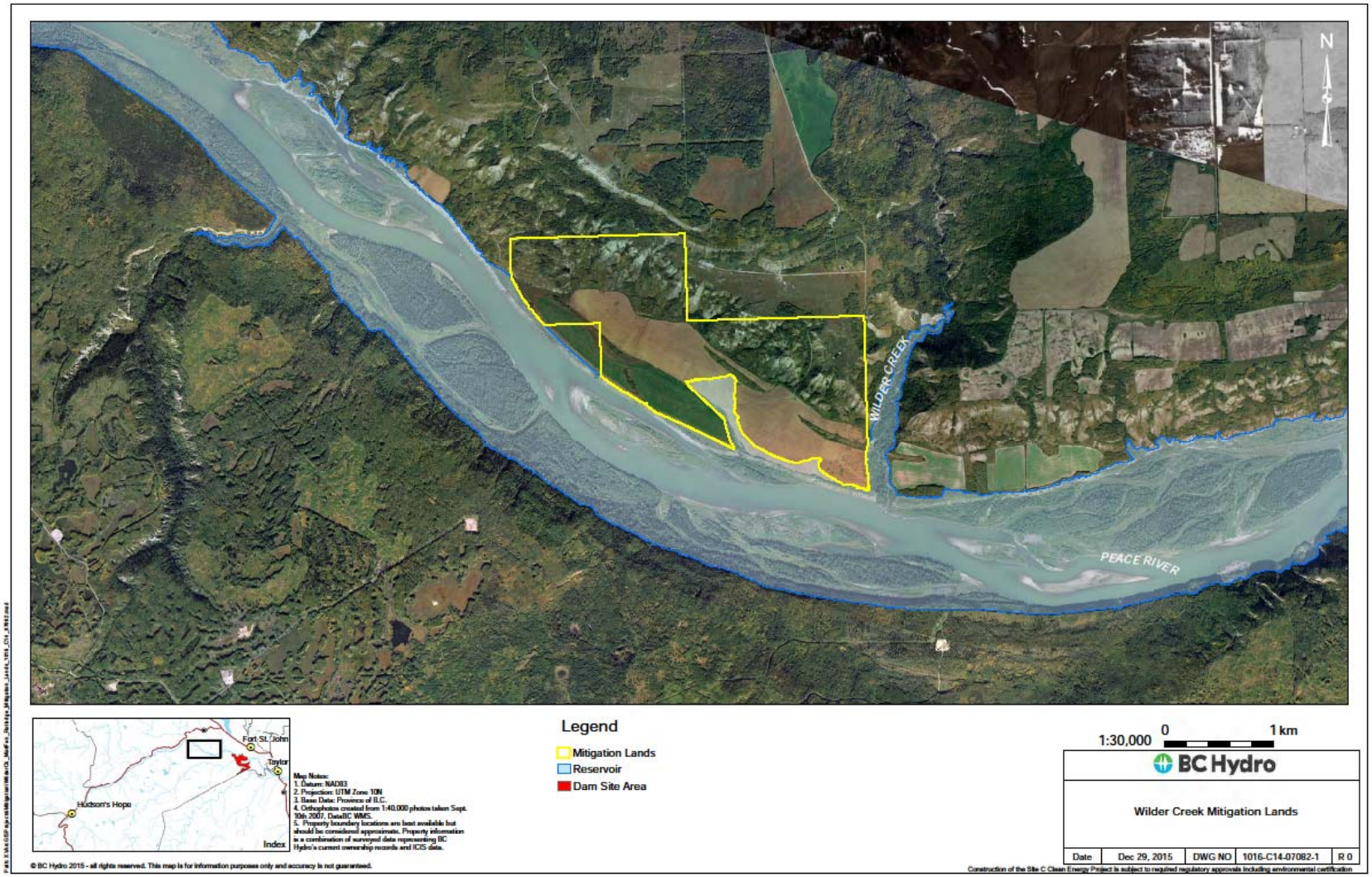

Figure 3. Wilder Creek Mitigation Lands.

Implementation of the plans began in 2015 on the Marl Fen property with:

- Installation of fencing around the wetland to protect the integrity of the wetland by excluding cattle
- Installation of fencing around dugouts within the property to exclude cattle from the dugouts and provide an area of un-disturbed habitat between the dugout and the fencing.
- Selection of leaseholder/land manager who will manage the property in accordance with the property specific management plan.
- September 21, 2015 site tour with agencies. During the tour BC Hydro reviewed the draft management plan with agency participants and asked for comments on the draft plan.

6.2.2 Condition 10.7

This section summarizes actions taken in accordance with the following requirement of Condition 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.*

Implementation of the compensation measures specified in condition 10.3.4 above began in 2015, the first year of construction with the implementation of the Management plan on the Marl Fen mitigation property.

6.3 Decision Statement Condition 11

This section of the annual report summarizes the components of the Vegetation and wildlife mitigation and monitoring plan implemented to fulfill Decision Statement Condition 11 in 2015 in accordance with the requirements of Decision Statement condition 11.9. For context, the complete requirements of Condition 11 are shown below.

11.	**Wetlands used by migratory birds and for current use of lands and resources for traditional purposes**
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.
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.
11.3.	The Proponent shall, in developing the plan, describe how the mitigation hierarchy and the objective of no net loss of wetland functions were considered.
11.4.	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;

11.4.2. mitigation measures to maintain baseline wetland functions for those wetlands that will not be permanently lost;

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;

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; 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.*

In 2015 potential effects of the Designated Project on wetland habitat used by migratory birds and species at risk were mitigated as follows:

- 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.

- Implementation of the management at the Marl Fen wetland (See Section 6.2.1 above)

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 2015 for development of the wetland mitigation plan.

In 2015 BC Hydro continued to identify opportunities for wetland mitigation and revised the wetland function assessment, incorporating comments received from EC, CWS, MOE and FLNRO during the March 6, 2014 meeting. The revised wetland function assessment is provided in Appendix G.

6.3.2.1 Wetland Mitigation Plan

In 2015 BC Hydro and Ducks Unlimited continued the process of identifying wetland mitigation opportunities that could become components of the wetland mitigation plan.

Four approaches to wetland mitigation were identified. These approaches include wetland restoration, wetland enhancement, wetland protection, and wetland creation. Wetland restoration uses dams to restore the hydrology of previously drained areas. Wetland enhancement uses dams to increase the size of existing wetlands or alters the existing land management to improve wetland. Wetland protection is the prevention or control of activities that negatively influence wetlands. Wetland creation is the construction of an artificial wetland where no wetland previously existed.

The construction guidelines for Area A, submitted with the June 5, 2015 plan have been incorporated as requirements in the Main Civil Works contract BC Hydro entered into with the Peace River Hydro Partners. Creation of this wetland will occur over the 8 year construction period.

Additional wetland mitigation opportunities have been identified in three zones:

- within 1km of the Site C reservoir
- within the Peace Region
- within the remainder of the Province

Twenty-two sites with the potential for wetland mitigation opportunities have been identified within about 1km of the Peace River. Eight of these opportunities were identified for further investigation in 2015. In April 2015 aerial photographs of these sites were taken to document peak water levels at each site and determine if there were inlets/outlets. Additional site visits to these eight sites are planned in 2016-2017 to gather additional site-specific data and determine which opportunities are suitable for inclusion in the wetland mitigation plan.

Within the Peace Region 54 sites were identified as having potential for inclusion in the Site C wetland mitigation plan and additional 36 sites were identified in the remainder of the Province. These sites will be investigated after the assessment of opportunities within 1km of the Peace River is completed, beginning with sites in the Peace Region.

6.3.3 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.*

Within the dam site, 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.

6.3.4 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.*

Please refer to Section 6.1.2.1 and 6.1.2.2 above for details on spring and fall waterfowl and shorebird surveys conducted in 2015. Data collected during these surveys builds on the pre-disturbance baseline data against which changes will be monitored against.

BC Hydro conducted ground-truthing activities in summer 2014 and 2015 with Saulteau First Nations registered trapline holders and McLeod Lake Indian Band. During ground-truthing, wetland areas near and around Boucher Lake were identified as areas for harvesting medicinal plants. In particular, medicinal plants such as peppermint, horsetail, fireweed, clover, yarrow, strawberry plant, dandelions, plantain, Labrador tea, trapper's tea, high bush cranberry, bearberry, rosehips, juniper, tamarack, aspen bark, alder buds, spruce tips, spruce gum, and rat root were commonly associated with wetland areas and would be gathered by Aboriginal harvesters. These wetland habitats were seen to be widely used by moose, including beaver, muskrat and waterfowl, and were identified as areas where Aboriginal harvesters may set traps

6.3.5 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*

While the wetland function assessment will guide the overall wetland compensation program, in 2014 BC Hydro purchased, as described in section 6.2.1 above, an available a private land holding (the Marl Fen property) that included a wetland that will contribute toward the replacement of wetlands in terms of area and function, in accordance with Condition 11.4.4.

Thirteen species at risk: seven rare plants, one invertebrate, one amphibian, two birds and two mammal have been documented on the Marl Fen property (Table 6). One of the objectives of management of the Marl Fen property is to maintain this use by these species.

Table 6. Species at risk documented within the Marl Fen Mitigation Property

Species common name	Species Scientific name	Provincial Status	Federal Status
Rare plants			
Tawny Paintbrush	*Castilleja miniata var. fulva*	Red	
Slender-leaf Sundew	*Drosera linearis*	Blue	
Northern Bog Bedstraw	*Galium labradoricum*	Blue	
Bog Rush	*Juncus stygius ssp. americanus*	Blue	
Small-flowered Lousewort	*Pedicularis parviflora ssp. parviflora*	Blue	
Autumn Willow	*Salix serissima*	Blue	
Purple-stemmed Aster	*Symphyotrichum puniceum var. puniceum*	Blue	
Wildlife			
Bronze copper	*Lycaena hyllus*	Blue	
Western toad	*Anaxyrus boreas*	Blue	Special Concern-SARA Schedule 1
Rusty Blackbird	*Euphagus carolinus*	Blue	Special Concern-SARA Schedule 1
Upland Sandpiper	*Bartramia longicauda*	Red	
Northern Myotis	*Myotis septentrionalis*	Blue	Endangered-SARA Schedule 1
Little brown Myotis	*Myotis lucifugus*		Endangered-SARA Schedule 1

BC Hydro is proposing the Marl Fen property as a candidate wetland conservation site for review by Environment Canada, FLNRO, MOE, and Aboriginal Groups, and will review any comments from these agencies and Aboriginal groups prior to including these as final site selections. In finalising wetland site selection of this property for inclusion in the wetland compensation plan, BC Hydro shall provide to CEA Agency an analysis that demonstrates how it has considered the input, views or information received from Environment Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups (in accordance with Federal condition 11.4.5, 11.7).

6.3.6 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 6.2.1 for details on implementation of the compensation measures in 2015, the first year of construction.

6.3.7 Condition 11.9

This section summarizes actions taken in accordance with the following requirement of Condition 11.8: *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*.

Submission of this report satisfies the reporting component of Condition 11.9.
BC Hydro is considering the following amendments to the waterfowl and shorebird survey plan based 2015 results:

- completion of surveys using a helicopter: to improve species identification and maximize the number of individuals detected.
- completion of the first fall migration survey earlier to determine when migration begins and if additional species are observed

6.4 Decision Statement Condition 16

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

For context, the complete requirements of 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 16.3.1

This section summarizes actions taken in accordance with the following requirement of Condition 16.3.1: *the plan shall include: 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.*

Prior to initiating field work to verify modeled results for surveyed species at risk, the species models and the Terrestrial Ecosystem Mapping presented in the Environmental Impact Statement (EIS) were reviewed. Several of the models had an accuracy of greater than 80% and were deemed accurate, that is their predictive ability could not be improved upon with additional field work. Field work to verify modeled results for surveyed species at risk focused on the following thirteen species whose model accuracy was <80% and had observations of individuals in habitats rated low (L) or nil (N) by the model in the EIS: Nelson's sparrow (*Ammodramus nelson)*, Yellow Rail (*Coturnicops noveboracensis)*, Le Conte's Sparrow (*Ammodramus leconteii)*, Broad-winged Hawk (*Buteo platypterus)* , Short-eared owl (*Asio flammeus)*, Sharp-tailed grouse (*Tympanuchus phasianellus)*, bats (little brown Myotis and northern Myotis), great spangled fritillary (*pseudocarpenteri* subspecies), common wood-nymph (*nephele* subspecies), Arctic blue (*lacustris* subspecies), Aphrodite fritillary (*manitoba* subspecies) and western toad (*Anaxyrus boreas*).

A total of 210 TEM polygons with 1037 observations of the 13 target species were identified within N or L rated habitats. A total of 102 polygons and 433 records were field checked in June 2015. The remainder of the polygons and records were verified using aerial photograph interpretation and review of the original wildlife data. Of these, 171 site specific records were adjusted based on field observations and aerial photograph interpretation and 73 were revised through adjusting model buffers.

The accuracy of the revised models improved for all 13 species (see Table 7 below) with six models improving to over 80% accuracy and six improving to 50-80% accuracy.

Table 7. Summary of improved species model accuracy

Species	Original Model Accuracy (obs. H+M/total obs.)	Revised Model Accuracy (obs. H+M/total obs.)
Nelson's Sparrow	77.30%	86.4%
Yellow Rail	34.80%	84.8%
Le Conte's Sparrow	74.50%	81.4%
Broad-Winged Hawk	40.40%	65.2%
Short-Eared Owl	60.90%	91.3%
Sharp-Tailed Grouse (LI W)	1.20%	12.2%
Sharp-Tailed Grouse (LI G)	87.80%	89.0%
Eastern Red Bat	-	-
Little Brown Myotis/Northern Myotis (RB)	74.60%	74.6%
Little Brown Myotis/Northern Myotis (FD)	63.50%	82.5%
Old World Swallowtail	86.00%	86.00%
Great Spangled Fritillary	27.50%	74.5%
Common Wood-Nymph	35.20%	75.2%
Uhler's Arctic	80.50%	80.50%
Tawny Crescent	80.90%	80.90%
Artic Blue	69.80%	93.5%
Aphrodite Fritillary	60.90%	71.1%
Western Toad	23.90%	44.6%

The complete report is provided in Appendix H.

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 2015 the following measures were implemented to mitigate effects on species at risk and at-risk and sensitive ecological communities and rare plants:

- Development of management plans for three mitigation properties (see Appendix F)
- Implementation of protection measures in CEMP (See Section 6.3.1 above)
- Completion of pre-construction rare plant surveys on roads and portions of the transmission line corridor not surveyed during baseline surveys

Pre-construction rare plant surveys

Field surveys for rare plants along roads and portions of the transmission line not surveyed during baseline were conducted between June 30 and September 7, 2015. A total of 42 botanist survey days were spent on the ground and 209.8km surveyed.

Thirty-nine (39) occurrences of 16 different rare plant species-13 vascular plants and 3 lichens were documented. Of the 16 rare species, 6 are on the BC Ministry of Environment's 'Red' list, with the remaining 10 being on the 'Blue' list. None of the taxa are listed on Schedule 1 of the Species at Risk Act, or are considered to be Extinct, Extirpated, Endangered, Threatened, or Special Concern by COSEWIC (Government of Canada 2002; COSEWIC 2015b). Many of these new sites were within one kilometre of other occurrences of the same species found in previous years, and were considered to be extensions of these larger occurrences. The complete 2015 program report is attached in Appendix I.

The Sprengel's sedge and frosted rosette, both lichens, represent new species for the survey area.

Two species, tawny paintbrush sedge and old man's whiskers were documented in the project area during the baseline studies. At the time the EIS was prepared, they were not listed by the BC Conservation Data Centre as species at risk and so were not treated in the impact assessment. After discussions with species experts and the Conservation Data Center the Conservation Data Center confirmed that tawny paintbrush is not to be considered a rare plant and will be de-listed in 2016.

The occurrences of old man's whiskers have been added to the Environmental Features Map.

The Environmental Features Map was updated with the 2015 rare plant data on October 30, 2015 and posted in the data room for contractors to access in their planning.

6.4.3 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.*

Use of herbicides in areas that could impact at-risk and sensitive ecological communities was addressed through the establishment of pesticide free zones and residual free zones. In 2015 these zones were established around wetlands, creeks, ditches and ponds located within areas with documented noxious weed infestations that were to be treated with herbicides (See Section 7.1.2 for a summary of noxious weed control administered prior to construction).

A pesticide free zone (PFZ) is a zone that extends 2 m outside wetted area or high water mark of the feature being protected. Within this zone only mechanical treatment using gas powered trimmers is administered.

A residual free herbicide zone (RFZ) is a 10m zone that begins at the edge of the PFZ. Within this zone only the non-residual herbicide glyphosate is applied.

6.4.4 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.*

Please see Section 6.4.2 above for a summary of the pre-construction rare plant surveys conducted in 2015.

6.4.5 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 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 identification and ranking of species at risk revised rankings were released in June 2015. The following documents were reviewed to identify changes to rankings of species documented in the LAA during baseline surveys:

- 2015AnimalChanges
- 2015Animal_Rank_Reveiw_Changes
- 2015Plant_Changes_VascularPlants

A list of recovery planning documents (http://www.env.gov.bc.ca/wld/recoveryplans/recovery_doc_table.html0) was reviewed to determine which species whose rankings were changed have species recovery plans.

Species listed on Schedules 1, 2 and 3 of the federal Species at Risk Act were reviewed to determine if any species had been added or had their rankings changed. No changes were found.

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

6.4.5.1 Rare Plants

The Conservation Data Center changed the status of eleven rare vascular plants in June 2015 as follows:

- Field pussytoes, pretty cinquefoil and Montana wildrye were moved from the yellow-list to the red-list. These three species are now considered rare plants.

- Small-flowered lousewort was moved from the blue-list to the red-list and is now considered a rare plant.

- Drummond's thistle and dry-land sedge were moved from the red-list to the blue-list.

- Many-headed sedge, tender sedge, fox sedge, riverbank anemone and northern bog bedstraw were moved from the blue-list to the yellow-list. These species are not considered to be rare in BC.

The rankings of field pussytoes and pretty cinquefoil were changed in anticipation of construction of the Site C Clean Energy Project. The rational provided by the CDC for the rank changes is:

- field pussytoes- much of the range is threatened by a hydroelectric development and other threats (CDC 2015a)
- pretty cinquefoil-occurs in BC Only in the Peace Lowlands (CDC 2015a)

Recovery planning documents are not yet available for any of the above rare plants.

6.4.5.2 Wildlife

The status of seven wildlife species was changed in June 2015 as follows:

- Baltimore Oriole, Black Swift and Winter Wren moved from the yellow-list to the blue-list. These species are now considered species at risk.

- Cape May Warbler was moved from the red-list to the blue-list.

- Cackling Goose and Le Conte's Sparrow were moved from the blue-list to the yellow-list. These species are no longer considered species at risk.

- Eastern red bat changed moved from the red-list to unknown.

Recovery planning documents are not yet available for any of the above species.

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: Wetland Mitigation and Compensation (Condition 12)
- Section 7.3: Wildlife Management (Condition 15)
- Section 7.4: Compensation for Loss of Wetland Habitat (Condition 16)
- Section 7.5: Monitoring Wildlife Mitigation Measures (Condition 21)
- Section 7.6: 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 Surveys and treatment of invasive species

This section summarizes actions taken in accordance with the following requirement of Condition 9*: Surveys of existing invasive species populations prior to construction.*

Surveys and treatment of invasive species have been conducted in the Project Activity Zone annually since 2009. In 2015 BC Hydro continued with its noxious weed inventory and control program. Initial weed inventories were conducted in May 2015 at the following locations prior to the start of construction:

- 85th Avenue Industrial Lands
- Howe Pit
- Dam site: north bank

85th Avenue Industrial Lands

Infestations of annual sow thistle (*Sonchus oleraceus),* Canada thistle (*Cirsium arvense),* perennial sow thistle (*Sonchus arvensis)* and scentless chamomile (*Matricaria maritime)* were documented within the 85th Avenue Industrial Lands.

The extent and distribution of invasive plants documented during the May inventory was less than observed during the 2014 season. The plant populations and number of polygons has decreased while the number of small patches and scattered individual plants has increased. These observations indicate 2014 treatment was effective.

Howe Pit

Infestations of Canada thistle, Dalmation toadflax (*Linaria dalmatica),* night-flowering catchfly (*Silene noctiflora),* perennial sow thistle and scentless chamomile were documented within Howe Pit during the May 2015 inventory.

Dam site: north bank

Infestations of Canada thistle (*Cirsium arvense)*, diffuse knapweed (*Centaurea diffusa)* and scentless chamomile (*Matricaria maritima*) were documented on the north bank. The diffuse knapweed infestation, which has been treated annually since 2009, was reduced through treatment to a very minor infestation compared to previous years, with six locations.

7.1.2 Invasive plant control measures

This section summarizes actions taken in accordance with the following requirement of Condition 9*: Invasive plant control measures to manage established invasive species populations and to prevent invasive species establishment.*

Site specific treatments were applied between June and September 2015. Treatments applied at each site are summarized below.

85th Avenue Industrial Lands

A pesticide free zone (PFZ) of 2 m was established around the high water mark of two dugouts within the property, within this zone only mechanical treatment using gas powered trimmers was administered. Beyond this zone a further 10 m residual free herbicide zone was established, within this zone only the non-residual herbicide glyphosate was applied.

Infestations were treated four times in July and three times in September using a combination of chemical and mechanical treatments. In July, Aminopyralid/metsulfuron methyl and adjuvant were initially applied by spot and broadcast applications to various locations of the industrial lands where residual free zones (RFZs) were not of concern. Subsequent retreatments, in September, were carried out using glyphosate. Glyphosate was administered in the RFZ buffer surrounding the two dugouts.

A single mechanical treatment using gas powered trimmers was conducted in September within the 2 m PFZ around the two dugouts. Mechanical treatment was only applied in areas where noxious weeds were present.

Post treatment inspections of the herbicide treated areas showed successful control of the noxious weeds. Areas with scentless chamomile showed control of the adult and actively growing plants, though germinant plants only showed suppression from the herbicide application.

The final weed audit was completed on Oct. 6th, which indicated the vegetation injury threshold achieved was 95%.

Howe Pit

A pesticide free zone of 2 m was established around a wetland located within the property, within this zone only mechanical treatment using gas powered trimmers was administered. Beyond this zone a further 10 m zone of residual free herbicide was established, within this zone only the non-residual herbicide glyphosate was applied.

Infestations were treated four times in June using a combination of Aminopyralid/metsulfuron methyl and adjuvant, and once in July using a combination of 2,4-D amine and glyphosate. Both spot and broadcast treatments were applied. Spot treatments were applied using a back pack sprayer and broadcast treatments were applied using an UTV mounted boomless sprayer.

Post treatment inspection of the herbicide treated areas showed successful control of the noxious weeds. A final weed audit was not completed due to high industrial use of the site associated with the onset of Project construction.

Dam site: north bank

Pesticide free zones of 2 m were established around a seasonal spring and pond located within the areas of noxious weed infestation. A single spot chemical treatment using aminopyralid was applied in mid-July. The site and the responsibility of controlling noxious weeds was taken over by the Site C construction camp contractor in late July. As stated above the knapweed was reduced to very low levels prior to the mobilisation of the camp contractor.

7.1.3 Rare and Sensitive Ecosystem community identification

This section summarizes actions taken in accordance with the following requirement of Condition 9*: 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.*

Three red-listed and fourteen blue-listed communities are defined for the BWBSmw, BWBSwk1 and SBSwk2 subzone variants, in the peace lowland region (Table 8). Thirteen of these communities potentially occur in the BWBSmw subzone, four occur in the SBSwk2 subzone and six occur in the BWBSwk1 subzone (BC Conservation Data Centre 2014).

Table 8. At-risk ecological communities potentially occurring within the Site C LAA.

Scientific Name	English Name	BC List	BWBS mw*	BWBS wk1*	SBS wk2*	TEM Ecosystem Unit
Juncus arcticus - Puccinellia nuttalliana - Suaeda calceoliformis	arctic rush - Nuttall's alkaligrass - seablite	Red	(00)			May occur in 00/SE
Muhlenbergia richardsonis - Juncus arcticus - Poa secunda ssp. *juncifolia*	mat muhly - arctic rush - Nevada bluegrass	Red	(00)			May occur in 00/SE
Picea mariana / Vaccinium vitis-idaea / Sphagnum spp.	black spruce / lingonberry / peat-mosses	Blue	Wb03			08/BT
Larix laricina / Carex aquatilis / Tomentypnum nitens	tamarack / water sedge / golden fuzzy fen moss	Blue	Wb06	(Wb06)	(Wb06)	10/TS
Picea mariana / Equisetum arvense / Sphagnum spp.	black spruce / common horsetail / peat-mosses	Blue	(Wb09)	(Wb09)		May occur in 08/BT
Betula nana / Carex aquatilis	scrub birch / water sedge	Blue	(Wf02)		Wf02	May occur in 00/WS, Wf02
Eriophorum angustifolium - Carex limosa	narrow-leaved cotton-grass - shore sedge	Blue			Wf13	Wf13
Larix laricina / Menyanthes trifoliata - Carex limosa	tamarack / buckbean - shore sedge	Blue	(Wf18)			May occur in 10/TS

Scientific Name	English Name	BC List	BWBS mw*	BWBS wk1*	SBS wk2*	TEM Ecosystem Unit
Typha latifolia Marsh	common cattail Marsh	Blue	(Wm05)			May occur in 00/SE
Picea glauca - Picea mariana / Rhododendron groenlandicum / Aulacomnium palustre	white spruce - black spruce / Labrador-tea / glow moss	Blue	(Ws15)	(Ws15)		May occur in 08/BT
Picea glauca - Abies lasiocarpa / *Vaccinium membranaceum* / *Pleurozium schreberi*	white spruce - subalpine fir / black huckleberry / red-stemmed feathermoss	Blue		101		01/SM, 05/SC
Pinus contorta / Vaccinium membranaceum / Cladina spp.	lodgepole pine / black huckleberry / reindeer lichens	Blue			02	02/LH
Picea glauca - Pinus contorta / Shepherdia canadensis / Eurybia conspicua	white spruce - lodgepole pine / soopolallie / showy aster	Blue		103		04/SW
Picea glauca / *Gymnocarpium dryopteris - Aralia nudicaulis*	white spruce / oak fern - wild sarsaparilla	Blue	110			05/SO
Picea glauca / Ribes triste / Equisetum spp.	white spruce / red swamp currant / horsetails	Blue	111	(110)		07/SH
Populus balsamifera - Picea glauca / *Alnus incana - Cornus stolonifera*	balsam poplar - white spruce / mountain alder - red-osier dogwood	Blue	112			09/Fm02
Salix exigua Shrubland	narrow-leaf willow Shrubland	Red	Fl06			00/WH

Field surveys focused on forested at-risk ecological communities located within Project Activity Zones as defined by the habitat mapping. Non-forested wetlands will be surveyed in 2016 as part of the wetland mitigation program. Sampling occurred on: August 28 to 29, 2014; September 3 to 7, 2014; October 10, 2014; and August 14 to September 1, 2015. Data from previous surveys were also reviewed to determine if information was available to assess the occurrence of at-risk ecological communities at sites previously sampled within the Project Activity Zone.

A total of 142 plots were completed in 2014/15 and 14 plots were identified from TEM surveys conducted in 2006. Data from these 156 plots were compiled to characterize at-risk ecological communities and identify current occurrences within the Project Activity Zone.

A summary of the results of the 2014 and 2015 surveys, by mapped ecosystem unit, is provided below. The complete program report is provided in Appendix J.

Forested Bogs (Mapped ecosystem unit BT and TS)

Five at-risk ecological communities in the BWBSmw are correlated with the 08/BT and 10/TS mapped ecosystem units. Eight-four plots were completed in the BWBSmw in polygons mapped as 08/BT or 10/TS. Fifty-three of these were accurately mapped (field site series matched the mapped ecosystem unit) and 33 current occurrences of the 5 at-risk ecological communities were confirmed. Overall, at-risk ecological communities were confirmed in 39% of sampled sites mapped as TS or BT in the BWBSmw. No map adjustments were identified to improve the identification of forested bogs. Most polygons mapped as 08/BT or 10/TS, that significantly overlap with the Project activity zone, have been sampled.

Forests in the BWBSwk1 (Mapped Ecosystem units SW and SM)

One at-risk ecological community in the BWBSwk1 is correlated with the 01/SM mapped ecosystem unit. Two plots were completed in polygons mapped as 01/SM. Both of these were accurately mapped (field site series matched the mapped ecosystem unit) and represented a current occurrence of the *Picea glauca – Abies lasiocarpa / Vaccinium mambranaceum / Pleurozium schreberi* AREC.

One at-risk ecological community in the BWBSwk1 is correlated with the 03/SW mapped ecosystem unit. Fourteen plots were completed in polygons mapped as 03/SW. Nine of these were accurately mapped (field site series matched the mapped ecosystem unit) and four represented a current occurrence of the *Picea glauca - Pinus contorta / Shepherdia canadensis / Eurybia conspicua* at-risk ecological community. All confirmed occurrences were associated with warm aspect slopes (n=4), while cool aspect sites contained a different plant association not representative of the at-risk ecological community (n=5).

As all sites significantly overlapping with PAZ were sampled, no map adjustments were required.

Forests in the SBSwk2 (Mapped ecosystem unit LH)

One at-risk ecological community in the SBSwk2 is correlated with the 02/LH mapped ecosystem unit. Five plots were completed in polygons mapped as 02/LH but all were found to represent mesic sites. The LH/02 is described as a very dry nutrient poor site restricted to ridge crests and upper slopes. A review of the mapping determined that ridge crests associated with the *Pinus contorta / Vaccinium membranaceum / Cladina* spp at-risk ecological community do not occur in the mapped area. Map adjustments removed this at-risk ecological community from the selection since it is unlikely to occur in the Project area.

Moist Forest in the BWBSmw (Mapped ecosystem units 05/SO)

One at-risk ecological community in the BWBSmw is correlated with the 05/SO mapped ecosystem unit. Five plots were completed in polygons mapped as 05/SO and three of these were accurately mapped (field site series matched the mapped ecosystem unit). No current occurrences of the *Picea glauca / Gymnocarpium dryopteris - Aralia nudicaulis* at-risk ecological community were confirmed due to the absence of key indicator species. Map adjustments removed this at-risk ecological community from the selection since it is unlikely to occur in the Project area.

Very Moist Forests in the BWBSmw (Mapped ecosystem units SH and Fm02)

One at-risk ecological community in the BWBSmw is correlated with the 07/SH mapped ecosystem unit. Fifteen plots were completed in polygons mapped as 07/SH. Seven of these were accurately mapped (field site series matched the mapped ecosystem unit) and all seven of these sites represented a current occurrence of the *Picea glauca / Ribes triste / Equisetum spp*. at-risk ecological community.

One at-risk ecological community in the BWBSmw is correlated with the Fm02 mapped ecosystem unit. Fifteen plots (2014: n=11 and 2015: n=4) were completed in polygons mapped as Fm02. Eight of these were accurately mapped (field site series matched the mapped ecosystem unit) and four represented a current occurrence of the *Populus Balsamifera - Picea glauca / Alnus incana - Cornus stolonifera* at-risk ecological community.

All current occurrences of the *Picea glauca / Ribes triste / Equisetum spp*. and the *Populus Balsamifera - Picea glauca / Alnus incana - Cornus stolonifera* at-risk ecological communities were in mature to old forests, in both seral and non-seral stands. Map adjustments added seral forests as an at-risk ecological community and removed young and non-forested (shrub or herb dominated) stands.

Floodplain Sites in the BWBSmw (Mapped ecosystem units WH)

One at-risk ecological community is correlated with the 00/WH mapped ecosystem unit. Seven plots were completed in polygons mapped as WH. Three of these were accurately mapped (field site series matched the mapped ecosystem unit) and one represented a current occurrence of the *Salix exigua* shrubland AREC. An additional occurrence of this at-risk ecological community was documented in the mapped ecosystem unit Fm02 structural stage 3 (active floodplain and gravel bar modifiers). Nine plots were completed in polygons mapped as Fm02 structural stage 3 and 6 of these were accurately mapped. Map adjustments added Fm02 structural stage 3 (active floodplain, gravel bar modifiers) as an at-risk ecological community.

Project Interaction

The area summary of mapped ecosystems units associated with at-risk ecological communities occurring in the area mapped for the Project has been refined based on field work (Table 9).

The total area for some forested areas has increased based on the inclusion of both seral and non-seral site series (BWBSmw:07/SH; BWBSwk1:04/SW) or decreased due to the exclusion of young stands (BWBSmw:09/Fm02 and 07/SH). Other forested sites have been removed from because local conditions do not support the at-risk plant association (BWBSmw:05/SO; SBSwk2:02/LH). The total area for forested bogs has decreased based on field confirmation (BWBSmw:08/BT and 10/TS). New mapped ecosystem units associated with at-risk ecological community were identified for the *Salix exigua* shrubland and the *Picea glauca - Abies lasiocarpa / Vaccinium membranaceum / Pleurozium schreberi* ecological communities which identified new areas for both these at-risk ecological communities in the area mapped.

Both potential and confirmed current occurrences of all at-risk ecological communities are identified on the environmental features map as polygons, allowing care to be taken during work in these areas.

units in the LAA associated with at-risk ecological communities (adapted from Hilton et al. 2013).

	English Name	BC List	BEC Unit	Associated Mapped Ecosystem Unit	Area (ha) of Ecosystem Unit Mapped Area	Area (ha) of At-risk Ecological Communities Mapped Area (confirmed and potential)
nellia la	arctic rush - Nuttall's alkaligrass - seablite	Red	BWBSmw	00/SE	1168	1168
onis - a lia	mat muhly - arctic rush - Nevada bluegrass	Red				
sh	common cattail Marsh	Blue				
x	scrub birch / water sedge	Blue	BWBSmw	00/WS	363	363
ium -	narrow-leaved cotton-grass - shore sedge	Blue	SBSwk2	Wf13	8.5	8.5
nium n spp.	black spruce / lingonberry / peat-mosses	Blue	BWBSmw	08/BT	2051	1881
etum spp.	black spruce / common horsetail / peat-mosses	Blue				
ariana tre	white spruce - black spruce / Labrador-tea / glow moss	Blue				
ex num	tamarack / water sedge / golden fuzzy fen moss	Blue	BWBSmw	10/TS	1405	1336
nthes osa	tamarack / buckbean - shore sedge	Blue				

Scientific Name	English Name	BC List	BEC Unit	Associated Mapped Ecosystem Unit	Area (ha) of Ecosystem Unit Mapped Area	Area (ha) of At-risk Ecological Communities Mapped Area (confirmed and potential)
Picea glauca - Abies lasiocarpa / Vaccinium membranaceum / Pleurozium schreberi	white spruce - subalpine fir / black huckleberry / red-stemmed feathermoss	Blue	BWBSwk1	01/SM, 05/SC	0	35
Picea glauca - Pinus contorta / Shepherdia canadensis / Eurybia conspicua	white spruce - lodgepole pine / soopolallie / showy aster	Blue	BWBSwk1	04/SW	52	158
Pinus contorta / Vaccinium membranaceum / Cladina spp.	lodgepole pine / black huckleberry / reindeer lichens	Blue	SBSwk2	02/LH	70	0
Picea glauca / Gymnocarpium dryopteris - Aralia nudicaulis	white spruce / oak fern - wild sarsaparilla	Blue	BWBSmw	05/SO	1215	0
Picea glauca / Ribes triste / Equisetum spp.	white spruce / red swamp currant / horsetails	Blue	BWBSmw	07/SH (ST 5-7)	1699	2630
Populus balsamifera - Picea glauca / Alnus incana - Cornus stolonifera	balsam poplar - white spruce / mountain alder - red-osier dogwood	Blue	BWBSmw	09/Fm02 (ST 5-7)	2664	1364
Salix exigua Shrubland	narrow-leaf willow Shrubland	Red	Fl06	09/Fm02 & WH (ST 3)	0	1634

7.1.4 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 above for the results of the rare plant surveys conducted in areas not already surveyed.

7.1.5 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 Environmental features map was updated with 2015 rare plant survey results in October 2015.The revised map was provided to contractors for use in avoidance of rare plants during construction.

The 2015 rare plant data were submitted to Jennifer Penny, Program Botanist at the BC Conservation Data Center, MOE on December 18, 2015 and to Jennifer Tennant, Environment Stewardship Branch, Environment Canada on December 29, 2015. Data were submitted as per provincial data collection standards.

7.1.6 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.*

Avoidance of sensitive wildlife habitats during transmission line design

The Site C project involves the construction of two, 75km long, 500kV transmission lines between the proposed Site C Substation and the existing Peace Canyon Generating Station. The conceptual design of these lines considered the following factors to guide initial placement of towers along the right-of-way:

- the mechanical properties of the conductor (assumed to be “Peace” type conductor);
- the structural and mechanical properties of the towers (assumed to come from the “Peace” family of towers);
- the electrical clearance requirements of the conductor to ground; and
- key geographical features along the route including major road and river crossings, creek crossings and terrain contours.

To refine the conceptual design and achieve avoidance of sensitive areas, additional information was added to the transmission line model including:

- the overlay from the baseline environmental studies which identified wetlands, sensitive ecosystems, rare plant occurrences and sensitive wildlife habitats within and adjacent to the right-of–way;
- geotechnical ground conditions along the right-of-way;
- other 3rd party infrastructure in the area (e.g. gas pipelines, rail lines, road crossings);
- other electrical and mechanical design constraints (e.g. weather loadings);
- archaeological sites;
- ground-truthing information gathered through consultation with trapline holders; and
- data on waterfowl occurrence during spring and fall migration.

Additionally, the tower type family was changed (from “Peace” type to delta) and the conductor type was changed (from “Peace” to SP-926.7-45/7) to optimise the electrical and mechanical design properties. This new tower type family is capable of supporting longer spans of conductor which will reduce the overall number of towers required.

The line layout was then re-examined to determine the optimal number and location of towers based on the revised design criteria. The results of this design optimization exercise in relation to environmentally sensitive areas are as follows:

	Conceptual Design	**Refined Design**
Total number of towers	433	419
Number of towers in wetland areas	102	75
Number of towers in rare ecosystem areas	104	78
Number of towers in rare plant areas	1	0
Number of towers in archaeological areas	1	0
Total number of towers in sensitive areas	113	81

As discussed above, the final design will also consider the results of the bird transmission line risk assessment and any further measures that may be taken to reduce bird collision risks.

7.1.7 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.

7.2 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:

- 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.

7.2.1 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 6.3.2.1 above for a summary of wetland mitigation plan development.

7.2.1.1 Installation of culverts to maintain hydrological balance at wetlands affected by roads

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;*

Installation of culverts to maintain hydrological balance at wetlands affected by roads was guided by Section 4.4 of the CEMP.

In 2015 temporary drainage culverts 12m in length and 150mm in diameter were installed as follows:

- Septimus Access Road: 2 culverts
- Repeater Site Access Road: 2 culverts
- South bank access road: 1 culvert
- Septimus Substation Access Road: 1 culvert

In addition, temporary drainage ditches were installed through the existing rail grade along the Septimus Rail Siding. Both the temporary culverts and ditches will be replaced with permanent culverts in 2016. Figure 4 illustrates the locations of the roads referenced above.

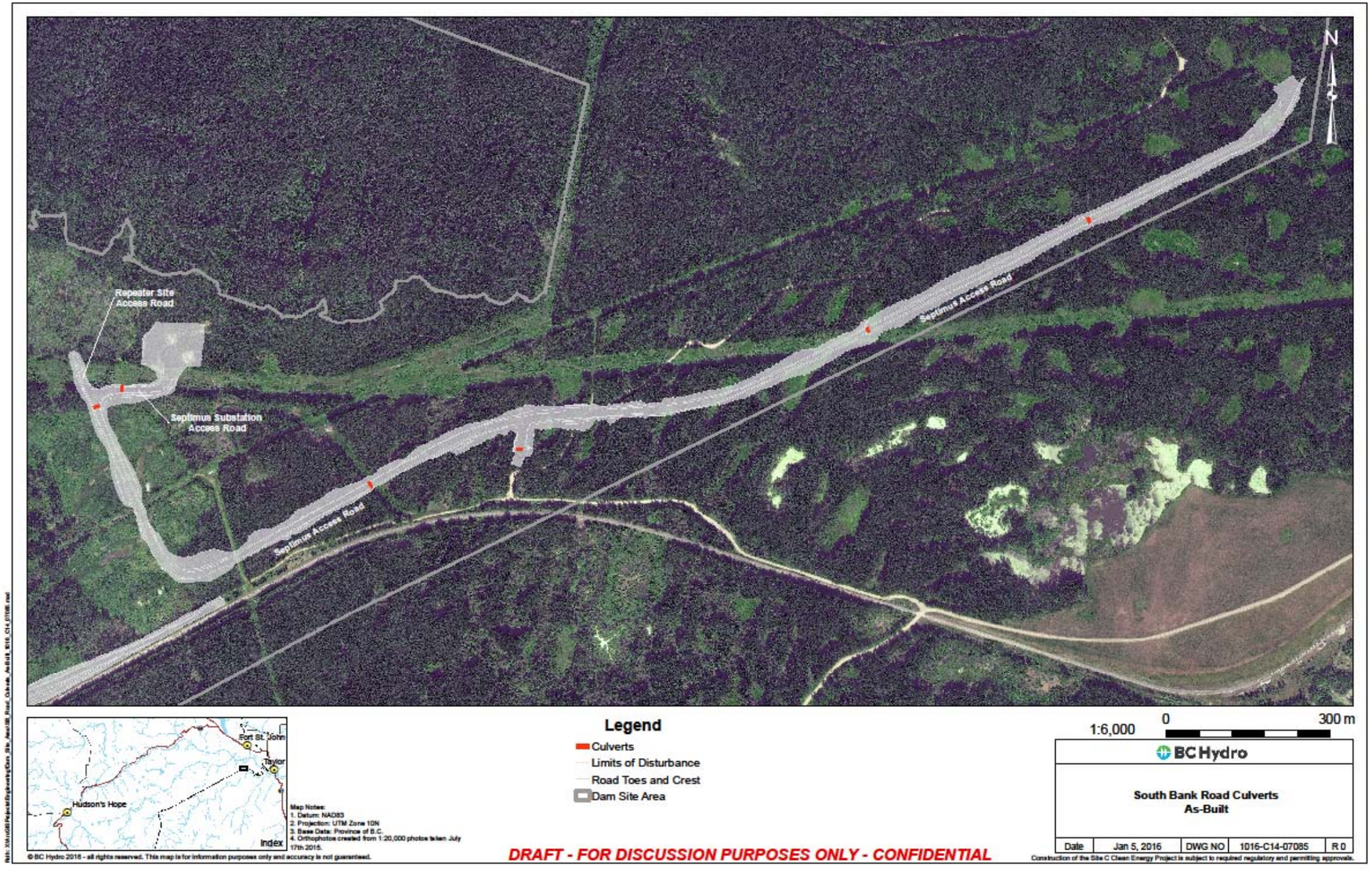

Figure 4. Location of roads along which culverts were installed in 2015.

7.2.1.2 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.

Measures to 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 were developed and implemented as per section 4.4 of the CEMP. In 2015 a settling pond was installed in the L3 ravine at the dam site and surface water diversion ditches were constructed to divert water away from excavations at the worker accommodation camp and north bank excavation.

7.2.1.3 Site-specific mitigation measures for Jackfish Lake Road and Project access roads and transmission line.

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.

No construction on Jackfish Lake Road or the transmission line occurred in 2015. The access road constructed on the south bank followed the route of existing roads. One culvert, 12m in length and 150mm in diameter was installed along the south bank access road.

7.2.1.4 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).*

Approved work practices and Develop with Care were implemented in accordance with Section 4.13 of the CEMP. As per these work practices, equipment is serviced and refuelled at least 30 m from watercourse and wetlands, drip trays are placed under equipment parked for over 24 hours, bulk fuel storage facilities are lined and have containment for at least 110% of the stored volume, equipment is inspected daily, vehicles carry spill kits and workers are trained in spill response procedures.

7.3 EAC Condition 15

This section of the annual report summarizes the programs implemented in 2015 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.

7.3.1 Verification of modelled results for surveyed species at risk

This section summarizes actions taken in accordance with the following requirement of Condition 15: *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.*

Results of field work to verify the modeled results for surveyed species at risk are provided in Section 6.4.1 above.

7.3.2 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.*

Please see Section 7.1.6 above for measures taken to avoid constructing in sensitive wildlife habitats.

Avoidance of wetland habitat at the dam site

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.

7.3.3 Protocol for the application of construction methods, equipment, material and timing of activities to mitigate adverse effects to wildlife and wildlife habitat.

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*

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.

7.3.4 Mitigation of adverse effects to wildlife

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.*

An amphibian salvage was conducted in early September 2015, in three wetlands on the north bank within the dam site, under Wildlife Act Permit FJ15-178764. The salvage was conducted using dip nets and minnow traps. Four adult salamanders and one juvenile salamander were relocated to a wetland south of the Peace River. The salvage report was submitted to Front Counter BC in accordance with the Permit conditions.

7.3.5 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.*

Lighting was focused on the work site at the following construction locations:

- worker accommodation camp
- north bank access roads
- south bank access roads
- Peace River construction bridge

7.3.6 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 and 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.

7.4 EAC Condition 16

This section of the annual report summarizes the programs implemented in 2015 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.

7.4.1 Management of EAC Holder-owned lands

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.*

Please see Section 6.2.1 for a discussion of management of BC Hydro owned lands to provide breeding habitat for Northern Harrier and Short-eared Owl.

7.4.2 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.*

On June 23, 2014 MOTI indicated it was receptive to accommodation of Oregon Bridge Wedge bat roost structures on new bridges crossing Cache Creek, Farrell Creek, Lynx creek and the Halfway River along Highway 29 in the Peace River valley. The Oregon Wedge is illustrated in Figure 5 below.

The structure(s) would remain the property of BC Hydro. They would be installed on the outside of the bridge support/deck, positioned over open water in locations such that they would not interfere with the integrity, maintenance or inspection of the bridge by MOTI.

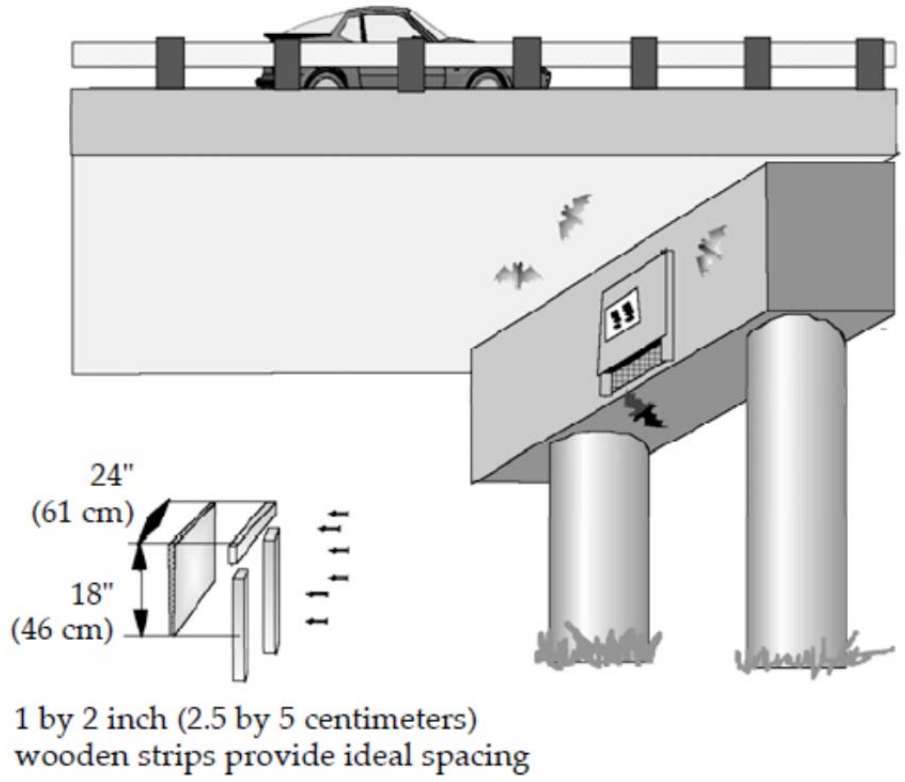

Figure 5 Oregon Wedge bat roost proposed for use on Highway 29 bridges in the Peace River Valley.

Source: Kelly, B.W and M.D. Tuttle. 2009. Bats in American Bridges.

7.4.3 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.*

The provincial fisher specialist, Rich Weir, provided the following specifications for creation of coarse woody debris piles for fisher.

One - two piles/ha of coarse woody debris will be created. Piles will be placed in/adjacent to areas of mixed forests with canopy closure >40%, structural stages 5-7. Piles will have following characteristics:

- Pile dimensions > 3 m wide x 5 m long x 2 m high
  - 30% pieces >30 cm diameter
  - Each piece >3 m long
  - Mixture of Sw, At, Acb, Pl

In March 2016, during processing of slash piles, coarse woody debris piles for fisher will be created as per the specifications above in areas adjacent to un-cleared edges of Area A and at Septimus siding. Additional piles will be created along the transmission line right-of-way in 2016/2017.

7.5 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 must 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.

7.5.1 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.*

Please see Section 6.1.2.1 and 6.1.2.2 for summaries of spring and fall waterfowl and shorebird surveys.

7.5.2 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.

7.6 EAC Condition 23

This section of the annual report summarizes the programs implemented in 2015 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.

The provincial ranking of field pussytoes was changed from yellow to blue and the ranking of pretty cinquefoil was changed from yellow to red in anticipation of construction of the Site C Clean Energy Project. The rational provided by the CDC for the rank changes is:

- field pussytoes- much of the range is threatened by a hydroelectric development and other threats (CDC 2015a)
- pretty cinquefoil-occurs in BC Only in the Peace Lowlands (CDC 2015a)

Neither species is considered at risk federally.

BC Hydro will work with FLNR and MOE, through the wildlife technical sub-committee, to quantify effects of the Project on these species and to determine if any changes to the Projects associated management plans or monitoring programs are required to mitigate effects of the Project on these listed species.