

**Columbia River Project Water Use Plan**

**Arrow Lakes Reservoir Wildlife Management Plan**

**Arrow Lakes Reservoir: Implementation of Wildlife Physical Works**

**Implementation Year 2**

**Reference: CLBWORKS-30**

***Cartier Bay Wildlife Enhancements Review -  
CLBWORKS 30 - Sites 14 & 15A***

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Duncan, BC

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# CARTIER BAY WILDLIFE ENHANCEMENTS REVIEW CLBWORKS 30, SITES 14 & 15A

PREPARED FOR:



**BC Hydro Generation**  
**Water Licence Requirements**  
**6911 Southpoint Drive**  
**Burnaby, BC**



SHALLOW WATER HABITAT AT CARTIER BAY, SEPTEMBER 9, 2014

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## 1.0 INTRODUCTION

Loss of habitat associated with construction and operation of the Keenleyside, Revelstoke and Mica dams has resulted in requirements by the B.C. Water Comptroller to conduct “physical works”. After much consultation with stakeholders, Cartier Bay (Photograph 1) was determined to be a location where wildlife values were high and enhancements could be undertaken to modify the habitat and potentially improve the value for fish and wildlife. Two projects were proposed (by Golder Associates), 14 (Photograph 2) and 15A (Photograph 3). These projects would increase the deep water habitat associated with Cartier Bay by raising and hardening the outlet and prevent the early inundation of the area as reservoir levels rise in the late spring. No scientific ecological evaluation was conducted to back-up these assertions. The Okanagan Nation Alliance (ONA) in conjunction with LGL Ltd. (LGL) was asked to evaluate the proposed works in light of the potentially impacted ecosystems. This brief report provides a review of the report provided by ONA and LGL.

## 2.0 PEER REVIEW

The ONA and LGL team identified five key questions in response to the proposed works:

1. Whether adding water to Cartier Bay will diminish its habitat value to ducks and geese;
2. Whether the utility to wildlife of current shoreline physical and biological attributes would be lost, and whether it would take an extended time, if ever, to develop similar attributes at higher elevation;
3. Whether further flooding of about 26 hectares of dense Reed Canarygrass would lead to its death and decomposition, potentially increasing biochemical oxygen demand in the area to an undesirable extent for a long time;
4. Whether the timing of winter ice formation and thawing might be altered, potentially diminishing the area’s current suitability to support such species as Western Toad; and
5. Whether there would be an overall net loss of area and/or function of habitat types that some wildlife species currently utilize at Cartier Bay.

These questions accurately address much of the uncertainty associated with the physical works at Sites 14 and 15A. The question that was not asked, but is pertinent is whether the proposed works will enhance the existing biodiversity by creation of restored habitats (former riparian forest habitat) or if the works will only increase habitats that already exist. Biodiversity is one of the cornerstones of resilient ecosystems (Holling 1973). There appears to be little consideration of any positive contribution of the proposed works on the biodiversity associated with Cartier

Bay. The large expanses of reed canary grass that were planted in the Arrow Reservoir to address dust problems have become biological deserts. Although some of the grass would be inundated with the proposed works, there is a potential that the degradation of the drowned grass, in combination with increases in non-native milfoil, could create anoxic conditions due to the high biochemical oxygen demand of the decomposing plant material (identified Point 3 above).



**Photographs 1 (left) and 2 (right).** Shallow water habitat (Photograph 1) is very important for wading shorebirds (herons and sandpipers). The breach in the rail grade, Site 14 (Photograph 2), would be rebuilt with a 1 m higher invert.



**Photograph 3.** Site 15A consists of collapsing wooden culvert that has created a gap in the old rail grade north of Site 14. This area would also be rebuilt with a raised invert.

The ONA and LGL team suggest that implementation of the Site 14 works may have a beneficial outcome as there is limited habitat in this area at present. It is not clear if the works at Site 14 would address the issues associated with the dense stands of Reed Canarygrass or if the habitat that might be created would persist over the long term (Photograph 4). Recommendations that work at Site 15A maintain the current water levels (by addressing the collapsing wooden box culvert) appear to be reasonable.



**Photograph 4.** Large stands of invasive Reed Canarygrass have created a depauperate habitat that benefits few species. Raising the water levels may result in the loss of the mud flat and sedge habitats that currently borders the open water of Cartier Bay and provides habitat for a variety of shorebirds and other species.

The substrate in the Cartier Bay area is a fine silty material that has been deposited by the Columbia River over eons since glaciation. This fine textured soil supported a forest of Western Red Cedar and Western Hemlock (with minor White Spruce) with Balsam Poplar and other riparian species along the river channels. Old river channels can be seen in the aerial photographs of the area. With flooding, these forest conditions and the ecological diversity that was supported by these forests were lost. The loss of these forests has resulted in a reduction of the ecological goods and services provided by the forests. Old forests of conifers and Balsam Poplar provide a diversity of habitats for a variety of animals. Photograph 5 shows a Black Bear coming out of hibernation in an old riparian Balsam Poplar tree.



**Photograph 5.** This Black Bear was hibernating in a cavity in this old riparian Balsam Poplar tree. Note also the holes from woodpeckers on the stem of the tree.

Placement of rock in the design of the works for both Site 14 and 15A introduces this un-natural element to the floodplain. This introduction of a foreign element to the Cartier Bay area may have significant ecological consequences just as the introduction many years ago of the Reed Canarygrass has had significant ecological consequences. The railroad introduced un-natural materials many years ago, but this was before the potential consequences of such actions were recognized. The addition of significant volumes of large rock associated with the proposed works was not identified by the ONA and LGL team. Similarly, the implications of the proposed works on biodiversity and resilience were not directly identified, although cautions were expressed. The following section provides some ideas that might provide more benefits to the biota of Cartier Bay.

### 3.0 OTHER OPTIONS

The potential loss of shallow water / mud flat ecosystems associated with the proposed projects suggests that there may be more benefit in creating these habitats than in increasing water depth. Similarly, there is an abundance of Reed Canarygrass covered areas in Cartier Bay. By working

with a low ground pressure, long reach excavator, possibly on rig mat type supports the Reed Canarygrass mat could be stripped to expose the muddy shoreline. The stripped material could be used to build high areas in Cartier Bay that could be revegetated using Balsam Poplar stakes. This would initiate the successional processes that would eventually return the riparian forests that have been lost (Braatne and Rood 1998). This work could be undertaken in the early spring prior to inundation by the Arrow Lakes Reservoir (ALR). This would allow the cuttings to become well established prior to high water.

The re-establishment of high ground floodplain habitat that could support riparian forests would provide a significant biodiversity enhancement in Cartier Bay that is not currently available. In addition, by stripping the Reed Canarygrass to create this upland habitat, more of the shallow water / mud flats habitat would be created. Balsam Poplar riparian forests are differentially lost when valley bottom areas are flooded. Mechanisms to replace this important habitat and the later successional forests that these pioneering species promote could be an important mitigative tool in the development of reservoirs.

#### 4.0 CONCLUSIONS

The ONA and LGL study has reasonably identified the ecological concerns associated with the Site 14 and 15A projects, although several ecological aspects of these projects were missed or poorly treated (lack of biodiversity enhancements and introduction of foreign materials (rip-rap) to the floodplain area). The ONA and LGL report accurately identifies the uncertainty associated with the treatments proposed by Golder. This level of uncertainty suggests that other options with a higher degree of benefit certainty be investigated and that the treatments proposed for Sites 14 and 15A be abandoned.

#### REFERENCES CITED

Braatne, Jeff H. and Stewart B. Rood. 1998. Strategies for promoting natural recruitment and restoration of riparian cottonwoods and willows. Paper presented at Ecosystem Restoration: Turning the Tide. Society for Ecological Restoration Northwest Chapter Conference and Annual Meeting. Tacoma, Washington.

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