FISH AND FISH HABITAT

VOLUME 2, SECTION 12

The Environmental Impact Statement (EIS) details the environmental assessment undertaken for the Site C Clean Energy project. The EIS includes the project rationale, identifies potential effects and proposes measures to avoid or mitigate these effects. The EIS also describes the benefits Site C would provide for customers, Aboriginal groups, northern communities and the province as a whole.

ABOUT THE ASSESSMENT

Fish and fish habitat would potentially be affected by the construction and operation of the project. The fish and fish habitat assessment analyses potential effects of the Site C project on:

- **Changes in Fish Habitat**: Quality and quantity of fish habitats, habitat availability, water depth, velocity, water temperature, sedimentation, water quality, ice regime, aquatic productivity, food resources, and competition for food and habitat
- **Changes in Fish Health and Survival**: Species diversity; fish population distribution, fish population relative abundance, fish population biomass, sedimentation, stranding, fish entrainment, and total dissolved gas
- **Changes in Fish Movement**: Fish species population, movement patterns and general life history parameters (i.e., access to habitats), swim speeds, and fish entrainment

ASSESSMENT AREA

The local assessment area for fish habitat includes:

- The Peace River in the proposed reservoir area
- Tributaries entering the proposed reservoir
- Peace River downstream of the proposed Site C Dam to the Many Islands Area, Alberta
- Watercourses and water bodies within the transmission line and roadway rights-of-way
- Watercourses and water bodies within the Project activity zone
- Riparian areas adjacent to identified watercourses and water bodies

The regional assessment area includes the Peace River from Peace Canyon Dam, B.C. to Vermilion Chutes, Alberta.

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES

POTENTIAL EFFECTS	KEY MITIGATION MEASURES
Changes to Fish Habitat	**Construction:** • Place materials and materials relocation sites away from high water level; contour and cap with gravels and cobble for habitat • Include habitat features in design of roads and watercourse crossings • Design habitat features into the Hudson's Hope shoreline protection berm • Compensate for fish habitat affected by Highway 29 realignment 'like for like' in vicinity of habitat loss • Retain non-merchantable trees and vegetation in riparian areas near the

POTENTIAL EFFECTS	KEY MITIGATION MEASURES
	high water mark of the reservoir, where feasible • Manage the construction footprint to reduce impact • Remove temporary structures from the river as soon as they are no longer required. **Operations:** • Manage reservoir fluctuation (within a 1.8 m maximum normal operating range) to reduce effects to shoreline habitat • Plant a riparian area along the reservoir shoreline adjacent to BC Hydro-owned farmland, where appropriate • Enhance downstream side channel complexes to increase wetted habitat during low flows, create new wetted channels, and restore back channels
Changes to Fish Health and Survival	**Construction:** Sediment Reduction Measures: • Adjust construction activities where feasible • Use clean rock materials for riprap construction • Monitor equipment use (low-sediment operations protocol) • Berm or cap areas with high sediment potential • Leave stumps in place in the reservoir headpond area • Clear in winter, where feasible • Conduct in-stream construction in work areas, where feasible Stranding Avoidance Measures: • Monitor habitat areas to determine potential stranding locations • Implement a fish collection and relocation program for stranded fish • Enhance side channels to increase wetted habitat • Contour mainstem bars, where practical Fish Passage Measures: • Design smooth, gradual transitions at approach channel, penstock and tailrace entrances and exits • Ensure smooth finish on tunnel linings • Select large, slow turbines; reduce obstructions (such as boulders) • Design openings and exits to reduce fish injury Dissolved Gas Mitigation Measures: • Spillway design was modified to reduce dissolved gas generation • Reduce hold points and duration of reservoir filling and turbine commissioning **Operations:** Measures to Reduce Total Dissolved Gas: • Implement procedure to manage the rate of discharge at each gate • Implement procedure to reduce total dissolved gas concentration in tailwater
Changes to Fish Movement	• Provide upstream fish passage during construction and operations by a trap and haul facility • Implement a periodic capture and translocation for small fish species (contingent on study results)

Key Findings

- The transformation of a river ecosystem to a reservoir would create a new and productive aquatic ecosystem. This new aquatic environment is expected to support a community of equal or greater productivity than the existing riverine environment.
- The composition of fish species would change. Species such as kokanee, lake whitefish, lake trout, burbot, peamouth and rainbow trout that can adapt to the new ecosystem would likely benefit.
- Other species that rely on riverine habitats may decline in the reservoir environment. Three distinct groups of the species that may decline in the new ecosystem may be lost:
    - The migratory component of the Moberly River Arctic grayling
    - Migratory bull trout that spawn in the Halfway River
    - Mountain whitefish that rear in the Peace River and spawn in tributaries of the Peace River or the Peace River mainstem upstream of the Site C dam site

  The loss of these distinct groups would result from the loss of river habitat, reduced fish health and survival during construction and reservoir filling, and hindered fish movement. Arctic grayling, bull trout and mountain whitefish would continue to be present in Peace River tributaries and downstream of the reservoir and may persist in the reservoir.
- As a result of the potential loss of these distinct groups of fish, the Project may result in a significant adverse effect on fish and fish habitat.

Monitoring & Follow-Up

An environmental monitoring program will be implemented during construction to evaluate the effectiveness of mitigation measures and monitor physical changes in the environment. Environmental Management Plans will be implemented during construction to limit impacts on fish and fish habitat, including:

- Fish and Aquatic Habitat Management Plan
- Erosion Prevention and Sediment Control Plan
- Surface Water Quality Management Plan

ABOUT THE SITE C CLEAN ENERGY PROJECT

Site C is a proposed third dam and hydroelectric generating station on the Peace River in northeast B.C. Site C would provide 1,100 megawatts (MW) of capacity, and produce about 5,100 gigawatt hours (GWh) of electricity each year – enough energy to power the equivalent of about 450,000 homes per year in B.C.

Site C is undergoing a cooperative environmental assessment by the Canadian Environmental Assessment Agency (CEA Agency) and the British Columbia Environmental Assessment Office (EAO). The environmental assessment process commenced in August 2011 and is anticipated to take approximately three years to complete.

FOR MORE INFORMATION visit bchydro.com/sitec

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