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# Biodiversity & threatened species

## Sechelt Creek Hydropower Project, Canada

From the outset, an objective of the Sechelt Creek Hydropower Project, Canada, was to restore salmon spawning runs that had not occurred for some decades as a result of ecosystem disturbance.

### Overview

The Sechelt Creek Generating Station is a 16MW run-of-river “Greenfield” development on Sechelt Creek, 25km northeast of the town of Sechelt, British Columbia. Sechelt Creek is an alpine watercourse that flows westward to the Pacific Ocean via Salmon Inlet, a steep and rugged fiord. The power plant operates in a remote forest location accessible only by boat or float-plane, with materials for the construction of the plant having been transported to the site by barge.

A unique double intake structure conveys water to the powerhouse from high in the valley on both Jackson and Sechelt Creeks. The control structure at the Sechelt Creek intake consists of a 25m wide concrete gated spillway with an Obermeyer bladder gate of variable height. The gate structure is designed to lay flat, facilitating the passage of gravel and other bedload to the downstream environment. Flows at the Jackson Creek intake structure are controlled by a mechanical crank lift sluice gate. Penstocks from the two intake structures converge into a single penstock that followed existing forest access tracks and is buried for almost its entire length.

The Sechelt Creek Powerhouse is architecturally designed to resemble a traditional Salish long house two pole structure. It houses two 8MW vertical pelton turbines with four jets connected to synchronous generators. These units are particularly useful in that they can be operated to meet varying stream flows from 0.2 to 6 cubic metres per second, maximizing their use in dynamic, rainfall responsive catchments. The units are also resistant to sand and other particulate matter in the feed water.

## **Dam name**

<b>Scheme operator</b> Regional Power	<b>Size of scheme (MW)</b> 16
<b>Country</b> Canada	<b>Catchment area</b> 83km <sup>2</sup>
<b>River</b> Sechelt Creek	<b>Effective reservoir capacity</b> Run of River
<b>Construction years</b> 1993-97	<b>Reservoir size</b> Run of River

## **External Recognition**

The Sechelt Creek Hydropower Project has received significant recognition from external sources, including:

- Featuring in “Global Warming”, a program produced by Federal and Provincial Governments to showcase environmentally friendly development and its role in improving the environment.
- “Ecologo” certification, following independent environmental audits
- 2005 “Blue Planet Prize” awarded for environmental excellence by the International Hydropower Association.

## **Details**

Historically, forestry operations have resulted in side channels of the Sechelt Creek being dyked, with landings for the purpose of sorting logs and other materials having been constructed. Bedload movement, resulting in dewatering of some aquatic habitat areas, further exacerbated the impact of these alterations on salmonid habitat. As a consequence, major salmonid spawning runs in Sechelt Creek ceased to occur some decades prior to the construction of the Sechelt Creek Hydropower Project.

Stakeholder engagement during the planning of the Sechelt Creek Hydropower Scheme identified that restoration of spawning runs was highly desirable. It was determined that this outcome could potentially be facilitated by the creation of spawning habitat in a side channel parallel to the main creek stem.

A side channel was created by the removal of sediment and replacement with native gravel. The channel was designed to be isolated from the main stem of the creek during high flows, protecting salmon eggs during the incubation period. Optimum flow in the channel is maintained by diverting clean water from the tailrace of the power station at a rate of 0.5 cubic metres per second using gravity feed and a backup siphon.

As the hydropower facility is a run-of-river operation, the volumes discharged by the station during low flow months were not expected to meet requirements for maintaining spawning/incubation conditions in the channel. To overcome this challenge, a low flow augmentation scheme was constructed at Sechelt Lake, a natural lake in the upper catchment. The remote nature of the site necessitated the use of helicopters to transport materials for the construction of a control weir, floating intake siphon and ancillary infrastructure. The augmentation scheme is remotely operated and is powered by a 1kw micro-hydro turbine.

The channel became operational shortly after commissioning of the Sechelt Creek Hydropower Station. In 1998, 25 pairs of resident salmon were transplanted into the channel as 'seed stock'. The number of fish returning to spawn in the channel in 2003 was estimated at approximately 2000. It is expected that this step in rehabilitating salmonid populations in the creek will have wide-ranging ecological benefits, as annual salmon spawning runs attract and sustain populations of eagles, seals and bears.

In addition, Regional Power has since initiated a partnership with the BC Ministry of Water, Land and Air Protection to assist with an existing program for the re-establishment of Roosevelt Elk in the region. The Regional Power program involves the planting and cultivation of selected plant species favored as food by the elk, enhancing the capacity of the environment to sustain an expanding herd.

## **Other Aspects**

### Siting and design

Aside from the deliberate creation of salmon spawning habitat, the Sechelt Creek Hydropower Project included a number of siting and design features, including:

- Construction of the powerplant immediately below an impassable waterfall, hence creating no additional barriers to the passage of anadromous and migratory aquatic species.
- Specially designed gates on the Sechelt Creek intake structure that enable passage of gravels and bedload to maintain the natural geomorphic character of the downstream environment
- The use of run-of-river technology minimize the impact of the scheme on downstream riverine environments and negates the need to inundate large areas of terrestrial habitat
- Buildings were designed to blend with the traditional structures of the local aboriginal community.

### Erosion and sedimentation

The design of the gates at the Sechelt Creek intake structure is intended to facilitate the natural downstream movement of bedload. The passage of these materials protects the downstream river channel from scouring, armouring and other geomorphic degradation resulting from lack of passage of larger particles.

### Environmental Flows

The use of run-of-river technology minimizes regulation of the river, preserving hydrological regimes including seasonal variability and floods. By this means, fish

spawning triggers, invertebrate life cycles, channel forming flows and useable aquatic habitat in the downstream environment are preserved.

#### Community engagement and acceptance

Strong commitment to improving the regional environment, along with intensive stakeholder engagement process resulted in widespread acceptance of the project among community, indigenous and regulatory stakeholders.

#### Local Capacity Building

A commitment to using local resources wherever possible, included the use of local contractors for maintenance and repair works, was intended to benefit the local community. The plant provides both seasonal and permanent employment opportunities for local residents.

#### Heritage

The architecture of the powerplant was designed to be sensitive to the cultural heritage of the region and mimics the Salish long house two pole structures traditionally built by the local indigenous people.

#### **Further information**

<http://web.mala.bc.ca/earle/sechelt-creek>