

# Nutrient Restoration

## - An Overview



## Why Do We Need The Nutrient Restoration Program?

In 1962 the Provincial Government created a new Crown corporation – BC Hydro – to develop hydro-electric projects in the Columbia River region and elsewhere in the province.

Construction of BC Hydro's dams and generating stations in the Canadian portion of the Columbia River Basin began in the 1960s with the Columbia River Treaty projects. Three Treaty dams were developed to provide water storage (flood prevention) and power generation for the United States.

Columbia River Treaty Dams built by BC Hydro:

- Duncan Dam (water storage)
- Hugh Keenleyside Dam (water storage)
- Mica Dam (powerhouse and water storage)

In addition to these dams constructed under the treaty, BC Hydro operates other power facilities in the Columbia Basin – on behalf of the Provincial Government – including: Aberfeldie, Elko, Kootenay Canal, Revelstoke, Seven Mile, Spillimacheen, Walter Hardman and Whatshan.

Some impacts from dam construction, including flooding and the creation of reservoirs, were immediately evident, such as the Seven Mile dam development that flooded white-tailed deer habitat in the Pend d'Oreille Valley. Other impacts, such as the decline in productivity that occurred in Kootenay Lake when the Duncan Dam trapped nutrients upstream, took several decades before becoming evident. As well, the Libby Dam (located across the border in Montana) at the south end of the lake also affected the lake's productivity.

In addition to trapping nutrients upstream, dam construction and flooding also impacted river, lake and tributary habitat, eliminated spawning habitat and created greater water level fluctuations. The dams also altered the volume, speed and direction of water that circulates nutrients.

By 1991, Kootenay Lake had become nutrient starved and spawning kokanee returning to the Meadow Creek Spawning Channel had plummeted to 270,000, compared to a pre-dam level of 1 million spawners. By 1998, returning kokanee spawners on the upper Arrow Lakes Reservoir had declined by over 80% compared to the late 1980's, impacting the larger sport fish species that rely on kokanee as their main food source.

## What Is The Nutrient Restoration Program?

In 1992 an experimental Nutrient Restoration Program was started on Kootenay Lake to rebuild the food web that had been impacted by construction of BC Hydro dams. In 1999 the Nutrient Restoration Program was expanded to the upper Arrow Lakes Reservoir.

The Fish and Wildlife Compensation Program is a joint initiative of BC Hydro, the Ministry of Environment, and Fisheries and Oceans Canada to conserve and enhance fish and wildlife populations impacted by the construction of BC Hydro dams in Canada's portion of the Columbia Basin. The Compensation Program delivers and monitors the Nutrient Restoration Program in collaboration with its partners. The Ministry of Environment provides additional technical expertise.

Between spring and fall the Fish & Wildlife Compensation Program adds a seasonally-adjusted mixture of liquid nitrogen and phosphorus to Kootenay Lake and the upper Arrow Lakes Reservoir. The nutrients are added in order to mimic natural, pre-dam cycles including spring freshet conditions. The nutrients are being added to grow a specific size of phytoplankton, which feeds the zooplankton which in turn feeds the kokanee.

On Kootenay Lake, a barge is used to disperse fertilizer in the north arm of the lake. The Galena Bay ferry is used to disperse nutrients on the upper Arrow Lakes Reservoir.

## Is The Nutrient Restoration Program Working?

Fisheries in both Kootenay Lake and the Arrow Lakes Reservoir are healthier since the start of the Nutrient Restoration Programs in 1992 and 1999, respectively. Monitoring confirms that the density and abundance of kokanee in both systems is higher than before nutrient restoration started. A healthy kokanee population is better able to support the other species that rely on kokanee as a food source, including sport fish, grizzlies, bald eagles and other species.

In 2004 the Hill Creek and Meadow Creek spawning channels were full to capacity for the first time in a decade. More than one million spawners returned to the Meadow Creek spawning channel on Kootenay Lake and 200,000 returning spawners filled the Hill Creek spawning channel on the upper Arrow Lakes Reservoir. The Compensation Program funds both of these spawning channels.

The nutrients added through the Nutrient Restoration Program provide food for a specific size of phytoplankton known as nanoplankton. By adding nutrients to Kootenay Lake and the upper Arrow Lakes Reservoir, the Compensation Program and its partners, are helping rebuild the food web and are making a real difference.

Fisheries biologists caution that nutrients are one piece of this biological puzzle and other factors such as changes in weather patterns, precipitation levels and the flow regime will alter how the food web responds to the nutrients that are added.

## What Is The Fish & Wildlife Compensation Program?

The Fish & Wildlife Compensation Program (FWCP) is a joint initiative, separate from but not independent of – BC Hydro, the Government of British Columbia (Ministry of Environment) and the Federal Government (Fisheries and Oceans Canada).

The FWCP's mandate is to deliver projects that conserve and enhance fish and wildlife populations affected by BC Hydro dam "footprint" impacts throughout the Columbia River Basin in Canada. Footprint means the initial construction and impoundment impacts primarily associated with lost habitat.

As part of its water license agreement, BC Hydro provides the Compensation Program with \$3.2 million each year (indexed for inflation) in perpetuity to deliver fish and wildlife projects on its behalf.

## Want To Know More?

Feel free to visit our website at [www.fwcp.ca](http://www.fwcp.ca) or contact us for more information (250) 352-6874 or [info@fwcp.ca](mailto:info@fwcp.ca).