

# COLUMBIA RIVER WATER USE PLAN UPDATE

SUMMER 2009

BC Hydro is pleased to provide highlights from the Columbia River Water Use Plan now in its third year of implementation. The plan calls for a large number of monitoring programs and physical works projects to be implemented on the Columbia River mainstem from Kinbasket Reservoir downstream to the lower Columbia River over the next 12 years. These are expected to provide benefits to recreation, fisheries, wildlife, and archaeology.

## BOAT RAMP IMPROVEMENTS

The Columbia River Water Use Plan recommends improvements to recreational boat access in Kinbasket and Arrow Lakes reservoirs. In 2008, BC Hydro held community meetings in Revelstoke, Golden, Valemount, Burton and Fauquier to discuss boat ramp preliminary designs and incorporate community feedback.

The provincial Comptroller of Water Rights (CWR) has reviewed the preliminary designs and community feedback, and has ordered BC Hydro to proceed with final design and construction at Valemount Marina, Bush Harbour, Burton, Fauquier, and McDonald Creek Park. BC Hydro is working to secure all the necessary permits and authorizations required to start construction as directed by the CWR. Two boat ramp locations, Bush Harbour and Burton, also require land transfers.

BC Hydro plans to construct boat ramps on Kinbasket and Arrow Lakes reservoirs in stages so that higher elevation components of the projects are completed first followed by lower elevation components as water levels permit.

In 2009, BC Hydro will also continue to investigate possible options to improve recreational boat access to the mid Columbia River, and Arrow Lakes Reservoir. This will include determining whether access can be safely provided to the Columbia through improvements of the existing Centennial Park boat ramp (Revelstoke), and working with the communities of Deer Park, Renata and Castlegar to identify potential sites for up to two new boat ramps between Renata and Syringa Park.

## RECREATIONAL USE STUDIES

BC Hydro expects to start a Recreational Demand Study in 2009 to establish a link between Arrow Lakes Reservoir water levels and use of the reservoir for recreational pursuits. BC Hydro will also start a Boat Ramp Use Study to assess levels of use and determine whether planned boat ramp improvements under the Water Use Plan provide the expected benefits.



Woody debris on reservoir shorelines

## WOODY DEBRIS REMOVAL

BC Hydro continues to remove woody debris from Kinbasket and Arrow Lakes reservoirs using local crews. Intensive debris removal work continues on Kinbasket Reservoir in support of both recreational interests and to support the work of other Columbia River Water Use Plan programs. In 2008, BC Hydro piled

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FOR GENERATIONS

roughly 85,000 cubic metres of woody debris from Canoe Reach (Valemount end) and Columbia Reach (Golden end) of Kinbasket Reservoir. Approximately 60% of the piles were burned last year before weather conditions were no longer suitable. In 2009, the remainder of the piles will be burned and debris removal activities will focus on the middle stretch of the reservoir.

## WHITE STURGEON

BC Hydro is working in cooperation with federal and provincial partners to help rebuild Columbia River white sturgeon populations through a long term research program developed under the Water Use Plan.

BC Hydro has conducted several studies to understand white sturgeon spawning, egg incubation, and rearing throughout the Columbia River. Egg mats placed downstream of Revelstoke Dam in 2008 collected a small number of white sturgeon eggs indicating spawning had occurred in that area. BC Hydro also placed egg mats in the Lower Columbia downstream of Waneta Generating Station that collected several thousand white sturgeon eggs and several hundred larvae. Adult white sturgeon with acoustic tags are being tracked downstream of the Hugh Keenleyside dam in an attempt to identify additional spawning locations.

White sturgeon rearing continues at the Wardner fish hatchery to support future white sturgeon releases in the Columbia River. Four female white sturgeon captured in 2008 were spawned at the fish hatchery before being released back into the Lower Columbia River. As in previous years, white sturgeon juveniles and larvae were released downstream of Revelstoke and Hugh Keenleyside dams in the April 2009. Follow-up monitoring will track survival, growth and distribution of the released fish. To date, four released juvenile white sturgeon have been recaptured downstream of Revelstoke.

In 2008, BC Hydro also started a study to investigate whether white sturgeon exist in Kinbasket Reservoir. No white sturgeon have been captured yet to date, efforts will continue in 2009.

## RESERVOIR PRODUCTIVITY

In 2008, BC Hydro started a study to monitor the productivity of Kinbasket and Revelstoke reservoirs. Sampling was conducted on a monthly basis throughout the summer for a range of water quality parameters, as well as phytoplankton and zooplankton communities. This goal of this work is to investigate the link between dam operations and pelagic productivity in these two reservoirs. The results of this work will tie into kokanee population monitoring, which has been ongoing in Kinbasket and Revelstoke reservoirs since 2001.



Observing sculpin behaviour through a viewing tube

## COLUMBIA RIVER FISH STUDIES

BC Hydro continues to conduct annual surveys in the Columbia below Revelstoke Dam and Hugh Keenleyside Dam to provide information on fish abundance, distribution and life history. This information will help to better understand the operational effects of dam operations on fish populations. Rainbow trout populations in the Lower Columbia continue to be at or near biological capacity and are supporting a robust recreational fishery. Stomach analysis was conducted this spring and it is hoped that this will provide more information on fish predation patterns of various river species such as walleye.

BC Hydro also continues to conduct yearly whitefish and rainbow trout spawning assessments in the lower Columbia River to help determine the effectiveness of the whitefish and rainbow trout protection flows implemented by BC Hydro. Major whitefish spawning locations were identified in and around the Castlegar area. The focus of future work will be to gather life history information on juvenile whitefish and analyse physical characteristics of the adult spawning locations. Spring monitoring of rainbow trout has shown that the cold spring has severely delayed spawning activity. The key spawning locations are at Norn's Creek, the lower Kootenay River and the Genelle gravel shoals.

In the early spring of 2009, BC Hydro started a 5-year study to monitor the life history and habitat use of six species of sculpin and dace in the Lower Columbia River. The study will collect information on spawning, determine the importance of suspected nursery areas, and assess the potential risks of operations on federally-listed species of sculpin and dace. The study is designed to monitor sculpin and dace species in unregulated systems in the Okanagan and then compare their activity under the regulated Lower Columbia.

## WILDLIFE PHYSICAL WORKS

BC Hydro is undertaking studies in Arrow Lakes Reservoir to document important wildlife habitat and identify potential sites within the drawdown zone where wildlife habitat could be enhanced through physical works. In 2008, BC Hydro assessed the feasibility of 42 candidate sites in Revelstoke Reach and recommended eight sites for further evaluation.

In 2009, BC Hydro will continue to work with the Wildlife Physical Works Committee to evaluate the Revelstoke Reach sites further and develop a plan for implementation in 2010. BC Hydro will also investigate other potential sites for enhancement in the middle and lower reaches of Arrow Lakes Reservoir.



Planting sedge seedlings on Arrow Lakes Reservoir flats near Burton

## REVEGETATION

Revegetation of the drawdown zones of Kinbasket and Arrow Lakes reservoirs aims to increase plant cover and diversity for the benefit of wildlife, fish, archaeological site protection and shoreline stability. The program focuses on planting sedge, cottonwood and other native plant species in the reservoir drawdown zones and fertilizing to enhance the growth of existing plants. Planting includes a combination of live stakes, seedlings and locally-collected seeds.

To date, a total of 1525 hectares in Kinbasket Reservoir and 393 hectares in Arrow Lakes Reservoir have been identified for planting, seeding and fertilization.

In 2008, BC Hydro planted a total of 43,000 sedge seedlings, 900 willow/cottonwood seedlings, and 14,000 live stakes of willow, cottonwood and red osier dogwood in the Bush Arm area of Kinbasket Reservoir. We also seeded small areas with custom seed mix on an experimental basis. In 2009, BC Hydro will focus on planting within the Canoe Reach of Kinbasket Reservoir and revisiting the planted sites in Bush Arm to track growth.

In Arrow Lakes Reservoir, BC Hydro set up a small fertilization trial near Burton in 2008 to test different fertilizers and

application rates. Larger scale planting of live stakes, seedlings and seeds is planned for the summer of 2009.

## BENEFITS OF REVELSTOKE DAM MINIMUM FLOW

In 2007, BC Hydro initiated a suite of aquatic studies in the mid Columbia River to determine whether a Revelstoke dam minimum flow planned for late 2010 when Unit 5 is expected to become operational will provide fisheries benefits. These studies focus on the area between the Revelstoke Dam and the mouth of the Illecillewaet River where the influence of Revelstoke Dam discharge is greatest. The studies were started prior to implementation of the minimum flow release to provide a “before and after” comparison of water quality parameters, benthic communities and juvenile and adult fish habitat use.

## ARCHAEOLOGY

BC Hydro completed an archaeological overview assessment of Arrow Lakes Reservoir in 2008. A total of 13 archaeological sites were newly identified at several locations in the vicinity of the Narrows. These sites provide evidence of human occupation of the shoreline area and some may date to the early post-glacial period between 7,000 and 10,000 years ago. These sites are in addition to the 13 archaeological sites that were newly identified in Revelstoke Reach during the 2007 archaeological overview assessment. BC Hydro plans to start a study in 2009 at these sites to investigate wind and wave erosion.

## UNDERSTANDING EFFECTS OF RESERVOIR OPERATIONS

A key component of the Columbia River Water Use Plan is to better understand the potential impacts of BC Hydro’s operations on fish, wildlife, vegetation, recreation and archaeology to better inform future decision making at the next Water Use Plan review.

### BURBOT

In fall of 2008, BC Hydro started a five-year study to better understand how Arrow Reservoir and Revelstoke Dam operations affect burbot spawning. Burbot were trapped at four general areas: the free-flowing Columbia River below Revelstoke Dam, Upper Arrow Lake, the Narrows and Lower Arrow Lake. A total of 189 burbot were sampled and radio-acoustic tags were inserted into 40 fish to track their movements. Sampling found a wide range of apparent readiness to spawn, which suggests Arrow Lakes burbot may start spawning earlier than previously

expected. In 2009, sampling will continue and fixed receiver base stations will be installed along the reservoir to continuously track these fish.

#### SPAWNING FISH

BC Hydro has started a five-year study to determine whether low Arrow Lakes reservoir levels restrict kokanee, bull trout and rainbow trout from reaching spawning areas in tributary streams. In 2008, previous scientific work was reviewed and 23 high-priority streams were identified for the spring 2009 field season. These high-priority streams will be surveyed on a regular basis to identify fish populations and determine if spawning fish access is affected by reservoir levels and stream flows.

#### NESTING BIRDS

BC Hydro established permanent monitoring plots in Canoe Reach (Kinbasket Reservoir) and Revelstoke Reach (Arrow Lakes Reservoir). A total of 75 nests in Canoe Reach and 149 nests in Revelstoke Reach were located and monitored in 2008. The study found that the breeding bird communities of Canoe Reach and Revelstoke Reach were remarkably different. Of the 40 species of nests found last year only Alder Flycatcher, Cedar Waxwing, Chipping Sparrow, Killdeer, Song Sparrow, Warbling Vireo, and Swainson's Thrush were found in both reservoirs. Nest failures at Canoe Reach were found to be largely a result of predation whereas nest failures in Revelstoke Reach were due to both predation and rising water levels. Nest surveys will be repeated each summer over the next 9 years.

#### MIGRATORY SONGBIRDS

BC Hydro started a 10-year program to monitor migratory songbirds on Machete Island downstream of Revelstoke Dam in the summer of 2008. A total of 2616 birds were captured (53 species) using mist nets and 1908 individual birds were banded. The most common species was Common Yellowthroat (22% of birds) followed by Yellow-rumped Warbler, Swainson's Thrush, Orange-crowned Warbler, Yellow Warbler, and American Redstart. Migration was heaviest from mid August to mid September with a strong peak movement in early September.

#### SHOREBIRDS AND WATERBIRDS

BC Hydro conducted a number of different types of surveys (airplane, boat and ground) in Revelstoke Reach from late May to the end of December in 2008 to survey waterbirds, shorebirds and raptor nests, and collect information on waterbird and shorebird behaviour. Surveys will be repeated over the next nine years.

#### AMPHIBIANS AND REPTILES

In 2008, BC Hydro completed an amphibian and reptile study in the drawdown zones of Kinbasket and Arrow Lakes reservoirs that documented extensive reptile and amphibian use of both Revelstoke Reach (Arrow Lakes Reservoir) and Bush Arm (Kinbasket Reservoir). Western Toads, Columbia Spotted Frogs, Long-toed Salamanders, Western Terrestrial Garter Snakes and Common Garter snakes were found in the drawdown zone of both reservoirs. Pacific Treefrogs, Painted Turtles and Northern Alligator Lizards were also found in Arrow Lakes Reservoir. Information collected in 2008 will be used to design a long-term monitoring program.



Sampling for productivity studies



Columbia spotted frog



Yellow warbler



Rainbow trout eggs

## HOW TO GET MORE INFORMATION

Copies of the Columbia River Water Use Plan, study terms of reference and consultant reports, report on bird soft constraints performance measures and the Executive Summary of the Columbia Water Use Plan Consultative Committee report are available at [bchydro.com/environment/wateruse/wateruse30859.html](http://bchydro.com/environment/wateruse/wateruse30859.html)

For more information please contact Jennifer Walker-Larsen, Stakeholder Engagement Advisor at the Revelstoke District Office.

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