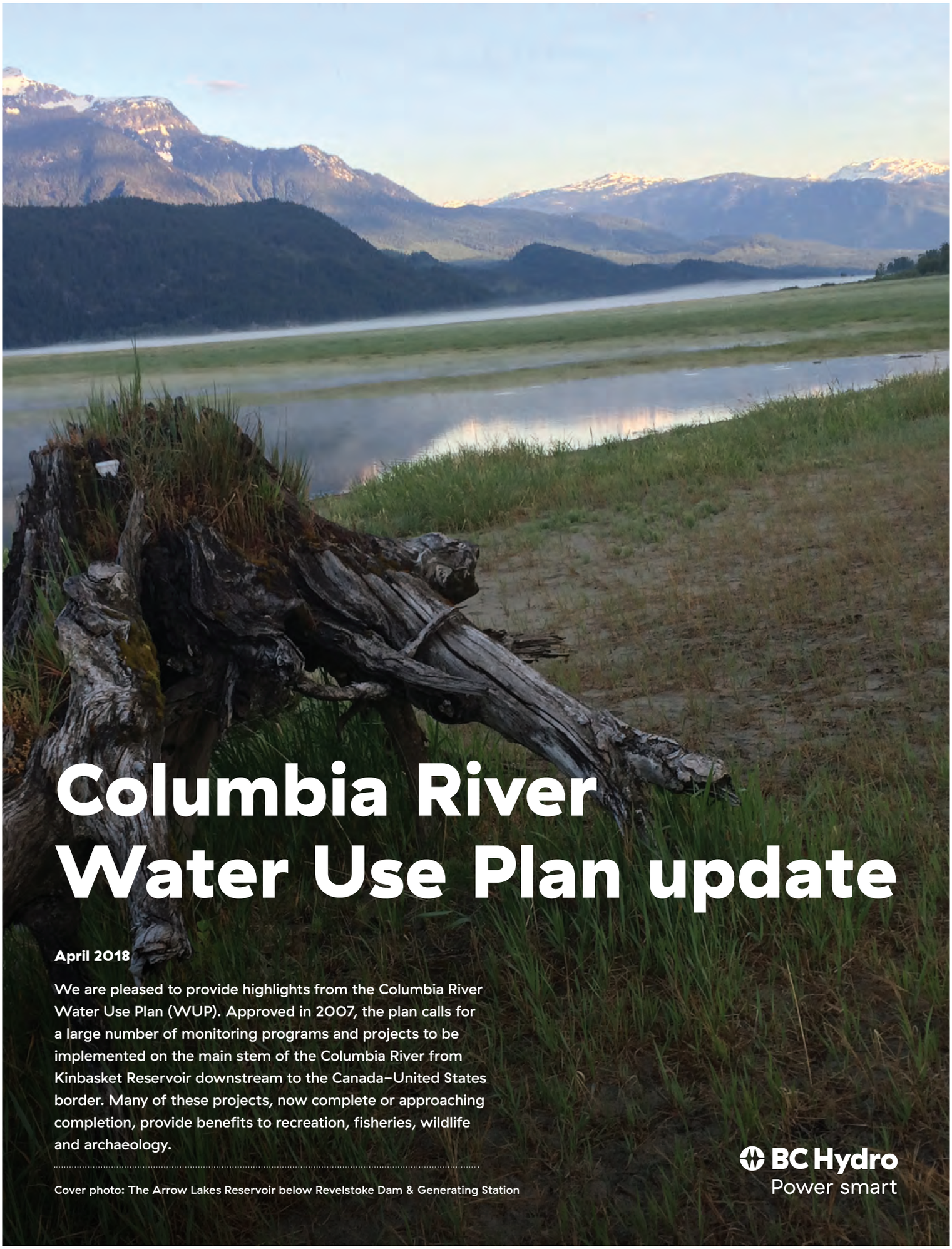

Columbia River Water Use Plan update

April 2018

We are pleased to provide highlights from the Columbia River Water Use Plan (WUP). Approved in 2007, the plan calls for a large number of monitoring programs and projects to be implemented on the main stem of the Columbia River from Kinbasket Reservoir downstream to the Canada–United States border. Many of these projects, now complete or approaching completion, provide benefits to recreation, fisheries, wildlife and archaeology.

Cover photo: The Arrow Lakes Reservoir below Revelstoke Dam & Generating Station

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Boat ramp improvements

Between 2008 and 2016, we built new ramps and made improvements to existing ramps at two sites on Kinbasket Reservoir and eight sites on Arrow Lakes Reservoir. These new and refurbished ramps will provide area boaters with safe and improved access for many years to come.

Boat launching at the improved Shelter Bay Provincial Park boat ramp

Arrow Lakes Reservoir	Kinbasket Reservoir
Shelter Bay Provincial Park	Valemount Marina
Village of Nakusp boat ramp	Bush Harbour
MacDonald Creek Provincial Park	
Burton boat ramp	
Fauquier boat ramp	
Edgewood boat ramp	
Syringa Creek Provincial Park	
Anderson Point boat ramp	

Boat ramp use study

We continue to monitor use of all the upgraded boat ramps on Kinbasket and Arrow Lakes Reservoirs by vehicle counters. We also conduct periodic face-to-face surveys at the ramps to gather information and feedback directly from boaters. Face-to-face surveys conducted from 2009 to 2017 indicated that user satisfaction has increased significantly with almost all boat ramp upgrades.

Woody debris removal

We continue to remove floating woody debris from Kinbasket and Arrow Lakes Reservoirs and meet with Debris Management Committees in Castlegar, Nakusp, Golden and Valemount to plan and prioritize work. Since 2007, we have completed close to $7 million of debris removal work on Kinbasket and Arrow Lakes Reservoirs. We estimate that we have removed over 450,000 cubic metres of woody debris from Kinbasket Reservoir and over 90,000 cubic metres from Arrow Lakes Reservoir.

For Arrow Lakes Reservoir, we focused our efforts last year (2017) around the lower portion of the reservoir between Deer Park and Edgewood. That year, we piled and burned over 4,000 cubic metres of woody debris. This year's work on Arrow Lakes Reservoir will focus on the areas in the upper portion of the reservoir around Shelter Bay and Beaton Arm. Crews plan to start work in late March to limit fire risk and potential impacts to wildlife.

On Kinbasket Reservoir, we removed over 39,000 cubic metres of debris in 2017. This year we will burn any remaining debris stored at Bush Harbour and continue shore based piling and burning in the Canoe Reach area south of Valemount. Crews will also remove debris from high priority areas identified for the entire reservoir by the Golden and Valemount Debris Management Committees. If reservoir water levels reach close to full pool this year, we will conduct a water based collection program that focuses on the northern part of the reservoir where debris accumulations and densities are highest

In 2017, the Kinbasket Reservoir Debris Management Program collaborated for the second year with the Reservoir Archaeology Program (RAP). The RAP is an archaeological inventory program underway in Kinbasket Reservoir and a number of other Columbia reservoirs to identify and record archaeological sites within the active erosion zone. The goal of the cooperation is to ensure that ground disturbance as a result of debris management work is managed in a way that is consistent with our best management practices for heritage and archaeological resources, even though many of the locations have been used repeatedly in the past. The additional work focuses on assessing historical debris management locations for previously unrecorded archaeological material. The additional inventory data collected further supports the RAP to better understand settlement patterns and prehistoric land use in the region. The collaboration is expected to continue in both Arrow Reservoir and Kinbasket Reservoir again in 2018.

Floats anchoring a gill net set in Revelstoke Reservoir

Reservoir productivity

In 2018, we are continuing with programs that investigate links between reservoir biological productivity and the operation of Kinbasket and Revelstoke Reservoirs. These studies started in 2008 and focus on learning how the aquatic food webs work and whether we could make changes to reservoir operations to improve biological production.

The food webs start with nutrients, such as phosphorus and nitrogen. Nutrients are made available to phytoplankton (algae) and then move up the food chain to zooplankton and kokanee. Field sampling for water and plankton is conducted from April to October and kokanee populations are assessed in late summer and fall. Moored temperature monitoring stations were installed in the reservoirs in 2012 and provide more continuous data on how water, and thus nutrients, moves through the system.

While low in productivity, both Kinbasket and Revelstoke Reservoirs have short, efficient food chains that can support relatively good kokanee populations. Total kokanee numbers are dominated by fry (up to 86 per cent) so they vary widely year by year. The number of older fish (one to three years) in Kinbasket Reservoir tends to be relatively consistent, averaging about 1.75 million. In 2016, we saw a significant decline in those older ages and suspect this was caused by a large–scale kokanee die off in the spring. While the cause of the unusual mortality is unknown, a disease is thought to have contributed to the event. Since that time, growing conditions in the reservoir have been good and spawner sizes have increased. This is common for kokanee populations after a decline in numbers. In the smaller Revelstoke Reservoir, kokanee abundance is lower and typically more variable. Since 2012, total numbers of kokanee have been lower than the long term average of about 1 million, and spawner sizes have been larger.

Kinbasket burbot monitoring program

We completed this four–year study in 2017. Biotelemetry was used to determine biological characteristics, movement and depth preferences of Burbot during their spawning period in late winter and early spring in the Kinbasket Reservoir. Burbot were surgically implanted with small tags that transmit location, depth and temperature. These fish were tracked year–round from fixed receivers near suspected spawning areas. Although many fish moved from deep to shallow water (from more than 50 metres to less than 16 metres) during spawning season, no clear movement patterns were observed towards specific spawning sites.

Kinbasket bull trout monitoring program

We are continuing this study to assess whether reservoir level fluctuations affect juvenile Bull Trout movements from their natal streams to the Kinbasket Reservoir, as well as the habitat use of these fish in the drawdown zone. Juvenile fish are tagged and their movements to and from streams are recorded by antennae buried at the entrance of creeks. Fish are also sampled along the shoreline during summer. Preliminary data indicate that juvenile fish tend to migrate out of streams in the fall and do not use the reservoir shoreline areas.

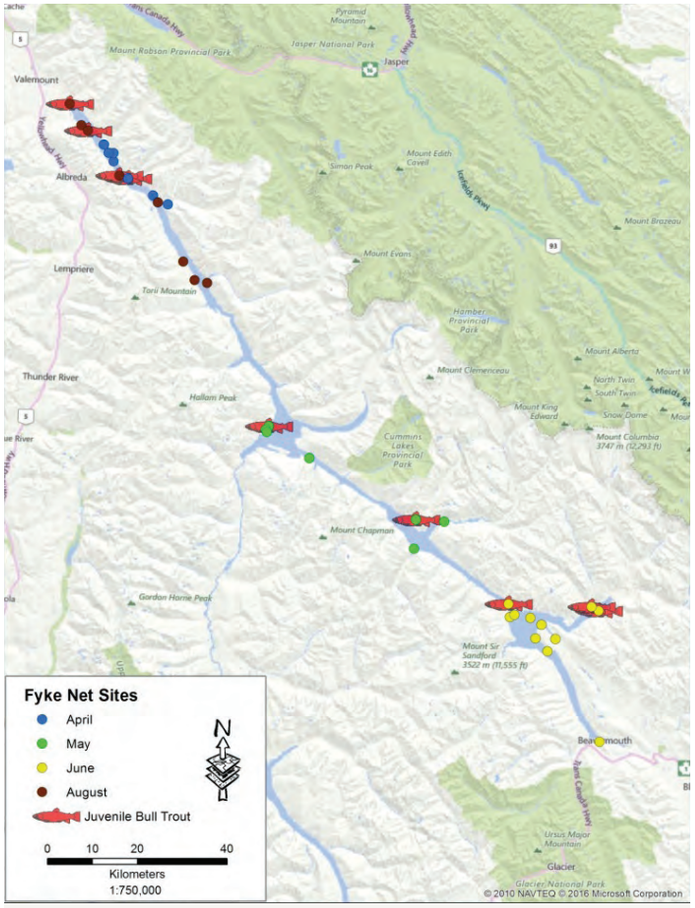
Kinbasket rainbow trout monitoring program

This study primarily aims to assess whether our Kinbasket Reservoir operations affect access to streams for spawning Rainbow Trout in the spring or the quality of their rearing habitat. Fish are tagged and tracked by fixed receivers set throughout the reservoir. Creeks are also surveyed for the presence of juveniles. Results about effects of operations are inconclusive to date, primarily because we have only found a small number of fish. However, several tagged fish did migrate to the southern end of the reservoir (Columbia Reach) during spawning season.

Revelstoke dam minimum flow

We are continuing a suite of aquatic studies in the mid–Columbia River to determine whether minimum flows at Revelstoke Dam provide expected fisheries benefits. The studies, most of which started in 2007, monitor variables ranging from water temperature, water levels, nutrients, benthic productivity, and fish communities.

We began providing a minimum flow from Revelstoke Dam of 142 cubic metres per second (5,000 cubic feet per second) in



Location of sampling sites and juvenile Bull Trout captures in summer 2016

December 2010 when we started operating the newly installed fifth generating unit. Since that time we have always maintained discharge flows above the required minimum flow. Indeed, flows are typically well above that level to prevent damage to the turbines that can be caused by cavitation. So far, the data collected does not show that there has been any change to fish distribution, growth or diversity as a result of the minimum flow.

White sturgeon

The Canadian portion of the Upper Columbia River white sturgeon population was listed as endangered under the Species at Risk Act in 2006. This was due to recruitment failure, where an insufficient number of young survive to become mature adults. We are working in cooperation with First Nations, stakeholders, and federal and provincial government partners to help restore the Upper Columbia River white sturgeon populations through long–term monitoring programs developed under the Water Use Plan.

We are conducting several studies to better understand white sturgeon spawning and how conditions at identified spawning locations influence when spawning occurs and the rate of egg development. Results have shown that sturgeon spawn from

June through August at multiple locations throughout the Columbia River including downstream of Revelstoke Dam, near Kinnaird downstream of the Hugh L. Keenleyside Dam and the Arrow Lakes Generating Station, downstream of Waneta Dam, and in the United States.

A white sturgeon conservation aquaculture program that has released hatchery–raised sturgeon into the Columbia River each year since 2002 has been very successful. Monitoring shows that more of the young fish have survived than originally expected. We estimate that there are now over 30,000 hatchery–origin white sturgeon in the Columbia River between the Hugh L. Keenleyside Dam in Castlegar and Lake Roosevelt in the United States.

Given this success, the approach of the aquaculture program has shifted and now focuses on collecting eggs and larvae from the wild for rearing in a hatchery. After being collected in the river, wild eggs and larvae are initially reared in a streamside trailer near the Waneta spawning location to make sure they incubate in natural river conditions. The larvae are then transferred to the hatchery and reared until nine months of age. This approach is important to maintain as much genetic diversity as possible.

We are continuing stock assessments that estimate the number of wild white sturgeon remaining in the Columbia River between the Hugh L. Keenleyside and Grand Coulee Dams. The current estimate for the Canadian portion of the Columbia River is approximately 1,400 wild adults, with more than 5,000 hatchery–origin sturgeon at large. We are also determining if hatchery–origin sturgeon are becoming reproductive and contributing to natural spawning events occurring in the river. Preliminary results suggest that a small portion of hatchery–origin males are becoming reproductive and likely contributed to spawning that occurred in 2017. This information, along with population abundance estimates and juvenile survival numbers, is being used to help plan white sturgeon recovery efforts. Finally, we are evaluating the suitability of available spawning habitat and the feasibility of spawning habitat restoration to help stimulate recruitment.

Crews release an adult white sturgeon downstream of Hugh L. Keenleyside Dam

For fish species including white sturgeon, water temperature influences both the timing of spawning as well as the rate of egg development. In the Columbia River, water temperatures are cooler downstream of Revelstoke Dam compared to water temperatures below Hugh L. Keenleyside Dam. As a result, the timing of white sturgeon spawning downstream of Revelstoke Dam is delayed almost one month and eggs require an additional week of incubation to hatch.

This extra time means that larval hatch and dispersal happens in late summer instead of early summer and the newly hatched fish have less time to feed and grow before winter, lowering their chance of survival. The influence of temperature is an important component of our understanding of white sturgeon population recruitment processes and natural adaptability in altered systems.

Lower columbia fish studies

We are continuing annual surveys on fish abundance, distribution and life history in the Columbia River below Hugh L. Keenleyside Dam to better understand the effects of dam operations on fish populations. The Lower Columbia River Large River Fish Indexing Program completed its eleventh year of monitoring in 2017. Key species monitored include Rainbow Trout, Mountain Whitefish and Walleye.

We are also continuing field surveys during flow changes from Hugh L. Keenleyside Dam to assess current fish protection flows. Juvenile fish are at risk of being stranded during flow reductions during the summer period when they are typically found in shallow, warm productive inshore areas. In accordance with the Lower Columbia River Fish Stranding Protocol, we assess the risk of stranding fish before we plan to reduce discharge flows from Hugh L. Keenleyside Dam using data collected during previous flow reduction events. For significant reductions in flows, we send out crews to look for stranded fish downstream on the Lower Columbia River. This represents considerable amount of staff effort to understand the impacts of our operations and protect fish. From April 1, 2017 to March 31, 2018, BC Hydro sent crews out 14 separate times.

Rainbow Trout are a key sportfish in the mainstem Columbia River and typically spawn in March, April and May. Key spawning areas below the Hugh L. Keenleyside Dam are Norn's Creek and Norn's Creek Fan. Rainbow Trout eggs are vulnerable to reductions in water flows until the fry hatch about six to eight weeks after the eggs are laid. Since 1999, we have managed Columbia River flows to protect Rainbow Trout spawning locations (redds) from dewatering. Discharge flows from the facility are lowered during the peak spawning period to encourage the trout to spawn in areas of deeper water and reduce the chance that incubating eggs will be exposed during flow changes. We recently completed an 19 year study that proves the Rainbow Trout protection flows are very successful. Spawning surveys conducted from 1999 to 2017 found that over 99% of the trout eggs laid each year were kept safe.

Rainbow trout eggs

Birds

A suite of 10–year studies to monitor bird use of drawdown zone habitats in Arrow Lakes and Kinbasket Reservoirs and determine the effects of reservoir levels completed their final year of field data collection in 2017. The next step is to analyze the entire 10 years of data and summarize the results.

MIGRATORY SONGBIRDS

In 2017, songbird banding continued at two locations within the drawdown zone and one location outside of the drawdown zone in Arrow Lakes Reservoir south of Revelstoke. Tree and shrub habitat at higher elevations continue to host the largest numbers of migrant songbirds compared to other habitats within the drawdown zone. Last fall, the most frequently captured species at all locations was Yellow–rumped Warbler. This year two species, the Virginia Rail and Rusty Blackbird, were captured in the drawdown zone for the first time during the study.

Songbird banding results suggest that the interaction between reservoir levels and the abundance of songbirds and habitat use by songbirds is complex. Although preliminary results after 5 years of study suggested that songbird capture rates were lower when the reservoir level was high, data collected in subsequent years has not always supported that finding.

Savannah Sparrow

NESTING BIRDS

Since 2008, we have been studying bird nesting in Kinbasket and Arrow Lakes Reservoir drawdown zones to understand how our reservoir operations affect bird populations. The drawdown zones of Kinbasket and Arrow Lakes Reservoirs have been confirmed to provide nesting habitat for 65 bird species. Monitoring their nests allows us to examine the significance of nest flooding due to reservoir operations. In Arrow Lakes Reservoir, songbirds mostly nest in shrubs and trees at higher elevations within the drawdown zone. Airport Marsh in Revelstoke Reach provides important nesting habitat for marsh birds, while the tall grass habitat at lower elevations provides nesting habitat for ground–nesting waterfowl. Kinbasket Reservoir has less shrub and tree habitat and most of the nesting birds are ground–nesters, particularly the Savannah Sparrow and Spotted Sandpiper.

Chipping Sparrow nest

While all nesting birds face risk from predators (snakes, mammals, and other birds), birds nesting in reservoir drawdown zones also risk being flooded by rising water levels. Ground–nesting birds are particularly susceptible and can be affected by flooding even after the young leave the nest. Savannah Sparrow juveniles, for example, cannot fly when they first fledge and leave their nests. A five–year radio–telemetry study to examine the impact of Kinbasket Reservoir operations on the juvenile survival of Savannah Sparrow wrapped up in 2017. The tracking results suggest that although a few individual juveniles were found to be impacted by flooding, predators are the greatest danger to newly fledged birds.

The wetlands of Revelstoke Reach of Arrow Lakes Reservoir provide a variety of habitats for waterbirds throughout the year. In 2017, the wetlands retained ice well into April, limiting the ability of waterfowl to use the wetlands during spring migration. Below average numbers of waterfowl were counted this year during both spring and fall migration compared to previous years of the study. Similar to previous years, five waterfowl species nested successfully in Arrow Lakes Reservoir in 2017. These included Canada Goose, Mallard, American Wigeon, Wood Duck, and Common Merganser.

Researchers have also been monitoring the breeding of wetland raptor species. The productivity of tree–nesting Bald Eagle and Osprey was relatively low in 2017, primarily due to a severe mid–summer windstorm that caused widespread damage to nests. Although the study has documented occasional nesting by ground–nesting raptors including the Short–eared Owl and Northern Harrier in the drawdown zone, no nests of these species were found in 2017.

AMPHIBIANS AND REPTILES

BC Hydro completed a four–year study in 2017 that looked at how the recently installed generating units at Mica Dam (Mica Units 5 and 6) affects amphibian and reptile populations in Kinbasket Reservoir. In 2018, BC Hydro will wrap up a 12 year monitoring study of amphibian and reptile life history and habitat use in the drawdown zones of Arrow Lakes and Kinbasket Reservoirs.

In 2017, Kinbasket Reservoir reached close to its normal maximum in early July, three weeks earlier than average, and then continued to rise slowly with water levels peaking in August. The earlier than normal refill was the result of rapid snowmelt. This caused inundation of breeding habitat with water levels one to two metres higher than average in June during the crucial period for successful breeding for Western Toad. However water levels remained below the 2016 level when reservoir levels were even higher. The continued presence of amphibians and reptiles of all life stages (including Western Toad and Columbia Spotted Frog) in the drawdown zone in consecutive years suggests that these species are not adversely affected by reservoir operations. Instead, these species appear to occupy habitats at the leading edge of the reservoir as it fills through the spring and early summer.

In 2016, through a variety of survey methods including egg mass surveys, visual encounter surveys, auditory surveys and radiotelemetry, we documented the presence of four species of amphibian and five species of reptile in the drawdown zones of Kinbasket and Arrow Lakes Reservoirs. In Kinbasket Reservoir, Western Toad and Columbia Spotted Frog were the most commonly encountered species.

Columbia Spotted Frog

Pacific Chorus frog

Mating Western Toads

Valemount peatland

This study's main objectives are to assess whether erosion is increasing or decreasing in the Valemount peatland and the primary causes of any observed erosion. A preliminary study conducted in 2008 concluded that erosion processes were directly related to Kinbasket Reservoir operations, although it would take 2,000 years to erode the entire site at the observed rates. We are evaluating if the current study (using the most recent available aerial surveys) can be used to better understand the erosion mechanisms and determine to what extent these are influenced by reservoir operations.

Revegetation

A six–year study to monitor results of the large scale replanting efforts in Arrow Lakes Reservoir was completed in 2017 and indicates mixed success. Of the eighty hectares of the drawdown zone that were selected for infill planting between 2009 and 2011 to enhance existing vegetation, sixty hectares still support some surviving transplants. The planted Kellogg's sedge, Columbia sedge, and black cottonwood have survived and taken root and in limited areas, these plants are growing vigorously. For the remaining twenty hectares (about one quarter of the treated areas), survival of plantings has been minimal to non–existent.

In some parts of the Arrow Lakes drawdown zone in Revelstoke Reach and Lower Inonoaklin, planted cottonwood stakes have successfully taken root and now form small leafy stands several metres in height. Of the three species used in live staking, black cottonwood was the most widely–planted cutting and showed the best survivorship six to eight years post–planting at several locations. Red–osier dogwood and willow stakes generally failed to establish.

In 2017, a detailed analysis of revegetation data from 16 locations in the Kinbasket Reservoir and 14 locations in Arrow Lakes Reservoir was conducted. The goal was to determine what revegetation techniques and site conditions contributed to success. A catalogue was also created to document the planting efforts and help guide any future work. For each site, a high resolution map of vegetation communities is provided along with a physical site description, treatment summary, list of the species planted, planting density, seeding rate, and a summary of planting success.

Wildlife habitat enhancement projects

ARROW LAKES RESERVOIR

BC Hydro is planning to construct a wildlife enhancement project in the drawdown zone of the mid to lower Arrow Lakes Reservoir. This project is expected to benefit nesting and migratory birds as well as other wildlife affected by reservoir operations. Two sites were considered for the wildlife enhancement project: Burton Flats and Lower Inonoaklin. Burton Creek is located south of Nakusp, on the east side of Arrow Lakes Reservoir, and the Lower Inonoaklin site is located south of the Fauquier ferry on the west side of Arrow Lakes Reservoir. We will not go ahead with the Lower Inonoaklin site. We decided to pursue the Burton Flats site because of a greater potential for benefits to wildlife and gathered feedback on preliminary site designs at a stakeholder meeting on August 31, 2017. We are planning for a phased construction. If conditions are suitable and we receive the necessary permits, we expect to be ready to start construction in the fall of 2018.

KINBASKET RESERVOIR

We are still waiting for full pool reservoir conditions, which did not occur in either 2016 or 2017, to see whether the debris mounds we built in fall 2015 can withstand high water levels and wave action.

To protect wetland habitat in the Valemount Peatland, large amounts of accumulated woody debris was removed from several kilometres of the drawdown zone in January 2018. Removal of this woody debris in other Kinbasket Reservoir and Valemount Peatland locations has been followed by a positive response in vegetation growth and diversity of plants.

Debris mounds built next to the Bush Arm causeway

Arrow Lakes Reservoir soft constraints performance 2017

Soft constraint	Target	2017 performance
Recreation	Reservoir water levels between 1,435 feet and 1,440 feet from May 24 to September 30. Flexibility to achieve lower reservoir levels of 1,424 feet during the recreation season would be acceptable with proposed construction/upgrade of boat ramps for recreation interests served by these formal access points.	The reservoir water level was between 1,435 and 1,440 feet 61.5% of the time during the recreation season (May 24 to September 30) and above 1,424 feet 99.2% of the time.
Wildlife	Ensure inundation of nesting bird habitat by rising reservoir levels and availability of fall migratory bird habitat is no worse than recent average (1984–1999). Target a reservoir level of 1,438 feet or lower by August 7.	Arrow Lakes Reservoir was below 1,424 feet for about 32.1% of the time between April 30 and July 16. This resulted in below average conditions for nesting birds. The reservoir was below 1,438 feet for 89.5% of the time between August 7 and October 31 for fall migratory birds.
Fish	Reservoir levels above 1,424 feet to ensure tributary access during kokanee spawning period from late August to early November.	Reservoir was above 1,424 feet 100% of the time between August 25 and November 15.
Vegetation	Maintain current (2004) level of vegetation in the drawdown zone by maintaining lower reservoir water levels during the growing season.	Reservoir was below 1,424 feet for 13% of the time between May 1 and July 31.
Erosion	Minimize duration of full pool events and avoid sudden drawdown once full pool has been reached to avoid shoreline slumping. Reservoir water level of 1,440 feet is ideal.	The reservoir reached a peak level of about 1,442.2 feet on July 27, about 1.8 feet below full pool. Due to a return of drier summer conditions, the Columbia system was operated in proportional draft for the balance of summer. For this reason, the reservoir drafted to about 1,434 feet on August 31 and 1,426 feet on September 30. This is about 20 feet higher than the levels observed in 2016.
Culture and Heritage	The original target was 'reservoir levels at or below 1,430 feet for as long as possible to limit impacts to archaeological sites'. During the five-year interim review of the Arrow soft constraints, this target was determined not to be effective due to the presence of 102 archaeological sites at elevations below 1,430 feet.	BC Hydro is implementing a multiyear Reservoir Archaeology Program (RAP) in the Upper and Lower Arrow Lakes to inventory heritage sites and identify impacts as a result of normal reservoir operations. Information gathered by the RAP is expected to assist future decision makers and development of an Archaeological Management Plan.

HOW TO GET MORE INFORMATION

Copies of the Columbia River Water Use Plan, study terms of reference, reports, performance measures, Columbia River WUP Consultative Committee report, and other water use planning information are available at: **bchydro.com/about/sustainability/conservation/water_use_planning/southern_interior/columbia_river.html.**

Contact a BC Hydro community relations representative

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Completed projects

Shelter Bay Park boat ramp upgrades (Arrow Lakes Reservoir)
Nakusp boat ramp replacement (Arrow Lakes Reservoir)
MacDonald Creek Park boat ramp upgrades (Arrow Lakes Reservoir)
Burton boat ramp construction (Arrow Lakes Reservoir)
Fauquier boat ramp upgrades (Arrow Lakes Reservoir)
Edgewood boat ramp upgrades (Arrow Lakes Reservoir)
Syringa Park boat ramp upgrades (Arrow Lakes Reservoir)
Anderson Point boat ramp construction (Arrow Lakes Reservoir)
Bush Harbour boat ramp construction (Kinbasket Reservoir)
Valemount Marina boat ramp upgrades (Kinbasket Reservoir)
Cartier Bay wetland protection project (Revelstoke)
Airport Slough wetland protection project (Revelstoke)
Revegetation planting (Arrow Lakes Reservoir)
Sturgeon hatchery upgrade (mid–Columbia River)

Completed studies

Recreation demand study (Arrow Lakes Reservoir)
Woody debris removal environmental review (Kinbasket, Arrow Lakes Reservoir and Lower Columbia River)
Woody debris inventory, management strategy and removal (Kinbasket and Arrow Lakes Reservoir)
Feasibility of boat ramp improvements (Kinbasket, Arrow Lakes, mid–Columbia River and Lower Columbia River)
Indian Eddy dredging engineering and environmental review (Lower Columbia River)
Erosion protection and monitoring (mid–Columbia River)
Erosion long term monitoring (mid–Columbia River)
Inventory of vegetation resources (Kinbasket and Arrow Lakes Reservoir)
Juvenile fish stranding study (mid–Columbia River)
Burbot life history (Kinbasket and Arrow Lakes Reservoir)
Macrophyte study (Revelstoke Reservoir)
Nagle Creek wetland study (Revelstoke Reservoir)
Wetland vegetation study (Kinbasket Reservoir)
Sturgeon spawning habitat assessment (mid–Columbia River)
Sturgeon incubation and rearing study (mid–Columbia River)
Effects of Revelstoke 5 flow changes on incubation of sturgeon (mid–Columbia River)
Sturgeon inventory and habitat use (Kinbasket Reservoir)
Sturgeon recolonization risk assessment (Kinbasket Reservoir)
Spawning fish tributary access study (Arrow Lakes Reservoir)
Sculpin and dace study (Lower Columbia River)
Rainbow trout spawning study (Lower Columbia River)
Whitefish spawning study (Lower Columbia River)
Whitefish egg monitoring study (Lower Columbia River)
Great blue heron study (Lower Columbia River)
Nest mortality of migrating birds (Kinbasket and Arrow Lakes Reservoir)
Neotropical migrant bird use study (Arrow Lakes Reservoir)
Shorebird and waterbird monitoring study (Arrow Lakes Reservoir)
Heritage monitoring wind and wave erosion study (Arrow Lakes Reservoir)
Archaeological overview assessment (Kinbasket, Revelstoke, and Arrow Lakes Reservoir)

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