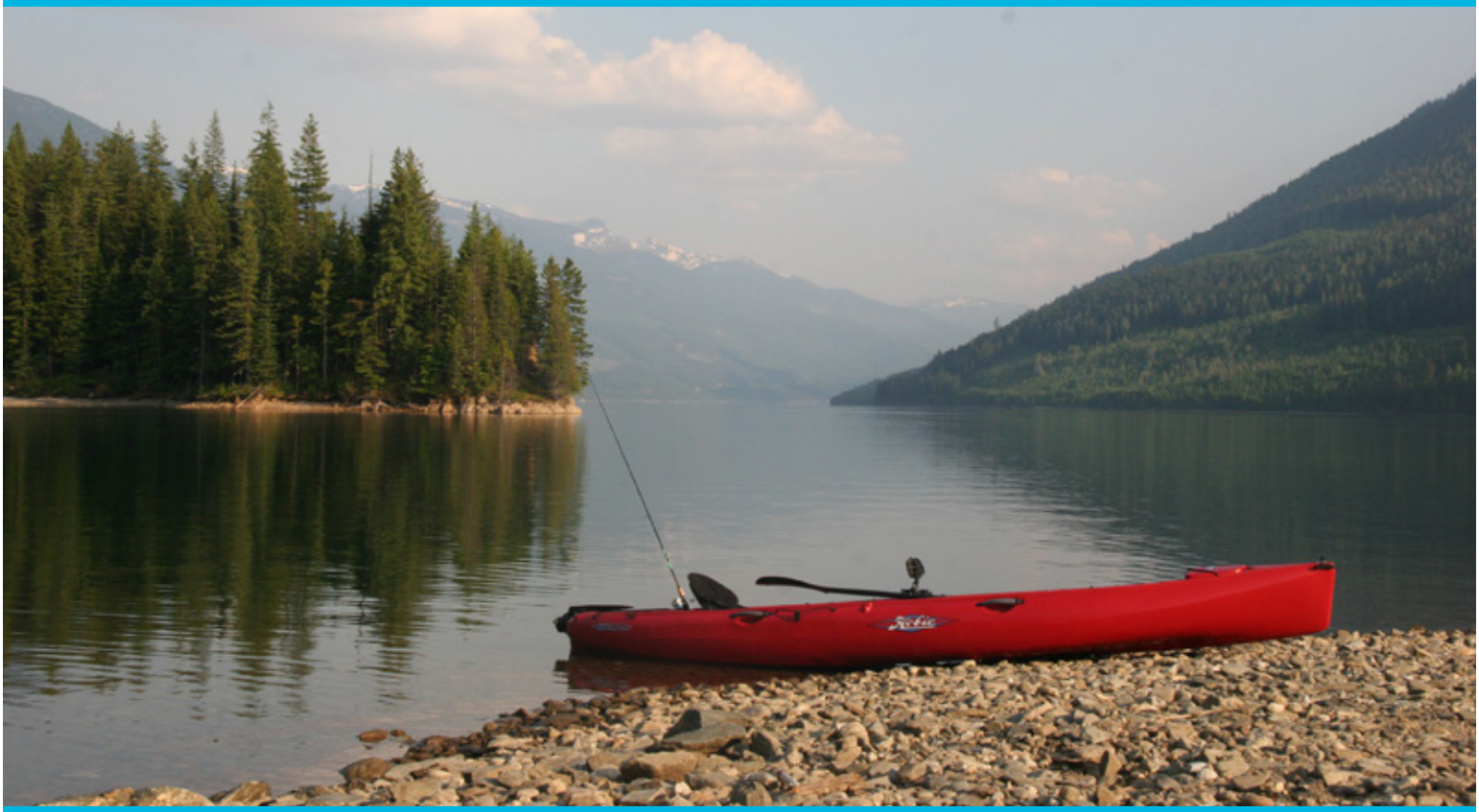
Columbia River Water Use Plan update



May 2022

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. These projects are intended to benefit fisheries, wildlife, recreation, and archaeology.

Cover photo: Revelstoke Reservoir. Photo by Jen Walker-Larsen.

BC Hydro
Power smart

Fisheries

We have been working to support indigenous fish populations in the Columbia River through a number of studies and projects delivered through the Columbia River Water Use Plan.

Fish stranding

Rainbow trout

Reduction in water flow from the Hugh L. Keenleyside Dam has the potential to strand or trap juvenile fish in pools that form along the banks of the Columbia River. We have responded to fish stranding in the Lower Columbia River since the mid–1990's, coordinating water flow changes at the dam with field teams that survey locations where pools form to search for stranded fish. Fish are collected from pools using dip nets, seine nets, and electrofishing. Once captured, the fish are safely moved back into the Columbia River.

Formal studies to find locations with the highest risk of stranding began in 2000, and Water Use Plan studies continued this work from 2007 through to 2022. From April 1, 2020 to March 31, 2021, teams completed a total of 17 fish stranding surveys during Hugh L. Keenleyside flow changes and successfully returned over 9,500 fish back to the mainstem Columbia River. We will soon analyze data from the past 21 years to develop a standardized fish stranding risk. This will be used to update the protocol that guides our fish stranding responses. In addition, this analysis will be combined with a model of river flows based on data collected in 2021 to better predict where fish stranding may occur.

Riverbed recontouring

In March 2021, we recontoured the riverbank at the Genelle Main Bar to reduce fish stranding. This site is located adjacent to the community of Genelle, approximately eight kilometres downstream from Castlegar.

Recontouring is a temporary mitigation measure, and most of the fill has already been eroded by the flow of the river. We also implement specific operational protocols and mitigation techniques to minimize the effects of fish stranding during scheduled flow reductions.

Stranding pools near Genelle

Fish population indexing

We continued the Lower Columbia River fish indexing program again in 2021, marking 14 years of our annual fish population surveys under the Water Use Plan. Key species we monitor include rainbow trout, mountain whitefish, and walleye. The 2021 survey results won't be finalized until August, but the estimates of rainbow trout from 2010 to 2020 varied from being stable around 22,000 (2010–2014) to increasing sharply to close to 60,000 (2015–2018) and have since decreased to approximately 35,000 in 2020. Estimates of mountain whitefish abundance have remained relatively stable since 2010 (52,000–71,000). Walleye are not native to the Columbia River in either the U.S. or Canada. The adults only reproduce in the U.S. and only come in the Lower Columbia in the summer. Their abundance has remained relatively stable since 2012 (10,000–16,000).

This project also allows us to monitor the occurrence of new, introduced species. For example, it recorded the first instance of northern pike in the Columbia in 2009. Other species recorded over the years are brook and brown trout, pumpkinseed, yellow perch, small/largemouth bass, and tench.

Rainbow trout spawning studies

We also continued the rainbow trout spawning assessment studies in 2021, another program that began in 2007. Rainbow trout are a key sportfish in the mainstem Columbia River and typically spawn in the Lower Columbia River from March until June. Key mainstem spawning areas below the Hugh L. Keenleyside Dam are Norns Creek Fan and near Genelle.

We used drone surveys this year to photograph key spawning locations in addition to traditional helicopter–based surveys and on the ground monitoring. When water clarity is excellent, the drone photographs provide clear photos of redds dug by the spawning trout. Based on this success, we're planning to add drone surveys to the regular methods in 2022.

Spawning rainbow trout

Rainbow trout spawning protection flows

Since 1992, we have implemented rainbow trout spawning protection flows downstream of the Hugh L. Keenleyside Dam. We know that these flows have been successful at protecting rainbow trout eggs from dewatering, but we do not yet know if the flows have benefited the adult population. To evaluate the effect of these flows on the adult rainbow trout population, we are alternating between years of rainbow trout spawning protection flows ("on" years) and no rainbow trout spawning protection flows ("off" years) from 2019 to 2023.

Rainbow trout spawning protection flows help prevent eggs laid in the Columbia River from being dewatered by maintaining stable or increasing water levels during the peak spawning period. Rainbow trout are a key sportfish in the mainstem Lower Columbia River and typically spawn from March to July. Rainbow trout eggs are laid in gravel nests (redds) and may be vulnerable to dewatering during reductions in water flows until the juvenile fish (fry) emerge, about six to eight weeks after the eggs are laid. Egg vulnerability is dependent on several factors including the depth of the redd, weather conditions, substrate, and the duration of dewatering.

The objective of rainbow trout spawning protection flows is to provide stable or increasing flows from Arrow Lakes Reservoir from April through June to reduce the number of eggs dewatered in the Lower Columbia River. Rainbow trout spawning protection flows are set at the beginning of April with the intent to hold stable or increasing flows through to the end of June during the peak spawning period. While water flows from the Kootenay River may go up and down during this time, the stable or increasing flows from Arrow Lakes Reservoir reduce the chances that eggs are dewatered by maintaining water levels.

The ability for us to meet rainbow trout spawning protection flow objectives in any given year depends on inflow conditions and Columbia River Treaty (CRT) requirements. The CRT requires Arrow Lakes Reservoir to remain below its flood control limits during the operating year and as such, this operating control may require adjustment to downstream flows under certain water conditions, causing the 'stable or increasing' rainbow trout flows to decrease. Providing spawning protection flows requires a Non-Power Uses agreement (NPU) with the United States under the CRT. This allows us to reshape Arrow flows from April through June for rainbow trout protection subject to meeting flood control requirements on the reservoir. In exchange, we reshape Arrow flows from January through July to aid in the U.S. salmon migration flow objectives.

Please leave sampling equipment—like the invertebrate baskets pictured above—in place.

Monitoring since 2007 has shown that with spawning protection flows in place, 97 to 99% of rainbow trout redds in the Lower Columbia River have been protected, with 1 to 2% of these redds dewatered each year. During that time, the adult rainbow trout population in the Lower Columbia River has nearly doubled. While this may suggest that rainbow trout spawning protection flows are working, rainbow trout protection flows have been in place every year, so without comparison to years without protection flows, it is unclear if the increase in adults is due to the protection flows or to another factor.

To help answer if spawning protection flows are contributing to the increase in rainbow trout, an experimental approach was developed where on alternating years, we would not implement protection flows through a negotiated NPU under the CRT. Instead, Arrow reservoir would be operated as needed to meet regulatory requirements under our water licenses and the CRT. Each year, during this "on" and "off" approach, rainbow trout spawning and the rainbow trout population would be monitored, with additional monitoring carried out during "off" years. This approach was endorsed by the Columbia River Rainbow Trout Flows Technical Forum, which include representatives from regulatory agencies, First Nations, and BC Hydro.

Both "on" and "off" years since the start of the experiment have been similar to past years when protection flows were always in place, with low levels of redd dewatering that are not expected to affect the rainbow trout population.

Year	"On" or "off" year	% of redds dewatered
2019	Off year	0.7%
2020	Hybrid year— started as an on year but switched to an off year	1.1%
2021	On year	0.1%
2022	Off year	TBD
2023	On year	TBD

In 2022, we will again be operating with an "off" year for rainbow trout spawning protection flows in the Lower Columbia River. The Hugh L. Keenleyside Dam will be operated as needed, and although we are expecting to see low levels of redd dewatering, we will closely monitor rainbow trout spawning throughout the Columbia River. As always, we will respond to salvage any fish stranded during flow changes and return them to the Columbia River.

As part of the experiment in 2022, we will also be collecting data on how much fish food is present in the river using sampling equipment installed at Norns Fan and Genelle. To ensure the integrity of the experiment, we ask that you please leave the sampling equipment in place and keep dogs and motorized vehicles away from dewatered redds and the sampling equipment.

A technical forum that includes regulatory agencies, First Nations, and BC Hydro representatives has been convening each year to review results and plan for next year. The study and the technical forum are planned for up to five years, ending in 2023. If study results demonstrate that the protection flows provide significant benefits to the adult rainbow trout population, they will be considered for further implementation.

White sturgeon spawning restoration

We're continuing our work with First Nations, stakeholders, federal and provincial government partners, and other industries through the Upper Columbia White Sturgeon Initiative to help recover Upper Columbia River white sturgeon. The white sturgeon population in the Canadian portion of the Columbia River was listed as endangered in 2006 under the Species at Risk Act due to recruitment failure where an insufficient number of young survive to become mature adults. We've been delivering a wide range of long-term monitoring studies under the Water Use Plan to learn more about sturgeon including their habitat use, movements, spawning and recruitment. We're focusing on two segments of the sturgeon population— those living below the Hugh L. Keenleyside Dam and those living above the dam in Arrow Lakes Reservoir.

A conservation aquaculture program was initiated in 2001 to prevent extirpation (local extinction) and restore a natural age class structure in the population. Hatchery-origin juvenile sturgeon have been released annually into the Columbia River below the Hugh L. Keenleyside Dam since 2002 and into Arrow Reservoir since 2007. The conservation aquaculture program has been continually adapted based on new information and since 2014, wild eggs and larvae have been collected from spawning locations in the Columbia River near Trail, Castlegar, and Revelstoke and raised in a hatchery. This approach helps to maintain the genetic diversity of the wild population by allowing wild adults to reproduce naturally and then their offspring are released back into the river at an age and size where they survive better. Overall, the aquaculture program has been very successful downstream of the Hugh L. Keenleyside Dam where monitoring shows that more of the young fish have survived than originally expected. Accordingly, the number of fish we raise and release each year is only a fraction of what it used to be in the early years of the program. Above the Hugh L. Keenleyside Dam in Arrow Lakes Reservoir, success has been more difficult to determine as there have been fewer recaptures of released fish. We're now releasing larger fish into Arrow Lakes Reservoir in hopes of improving survival. In 2022, we'll be releasing 100 nine-month-old sturgeon below the Hugh L. Keenleyside Dam

and approximately 300 juvenile sturgeon above the dam in Arrow Lakes Reservoir at Shelter Bay. The releases into Arrow Lakes Reservoir include nine-month-old juveniles and some two-year-old juveniles reared to a larger size to determine if this will help improve survival following release.

Through our work we have learned that sturgeon spawn from June through August at multiple spawning locations in the Canadian Columbia. Downstream of Hugh L. Keenleyside Dam known spawning sites are downstream of the Hugh L. Keenleyside Dam and Arrow Lakes Hydro, near Kinnaird, and downstream of Waneta Dam. Upstream of the Hugh L. Keenleyside Dam one spawning location has been identified near Revelstoke Dam. We are continuing to monitor spawning activity at these sites to determine how conditions influence the timing of spawning and the frequency each site is used. We're also using genetic techniques to analyze tissue samples from fish born at different spawning sites to estimate the number of wild adults contributing to spawning events at the different sites. This information will help us continue to refine our conservation aquaculture program.

While the specific cause of white sturgeon recruitment failure is still being investigated, changes to substrate conditions at spawning sites from dam construction and river regulation has been identified as an area where restoration could have a positive effect. We commissioned a study in 2017 to better understand current substrate conditions and to assess the feasibility of restoration options that would likely benefit white sturgeon.

We are working on a project to enhance the spawning substrate for endangered white sturgeon in the spawning area in the tailrace of Arrow Lakes Generating Station. Upper Columbia white sturgeon are experiencing recruitment failure where not enough young survive to sexual maturity. White sturgeon spawn in three known locations in the Columbia River between the Hugh L. Keenleyside Dam and the international border. Habitat at the Arrow Lakes Hydro location is less suitable for sturgeon spawning as it was created as a tailrace and consists of a small area of larger rip-rap material. A working group comprised of BC Hydro, regulators and First Nations have recommended placing a specific mix of rocks and gravel that will improve conditions for incubating eggs and larvae by giving them more complexity for hiding from predators during this critical life stage. An excavator on a barge will carefully place the material onto the spawning bed. This work is planned to occur in October and November 2022. This work builds on the success of a prior experiment at the Revelstoke spawning location in 2011 that demonstrated biological benefit for larval white sturgeon.

Wildlife habitat enhancement

Bush Arm debris mounds

Constructed (2015) mounds at Bush Causeway (north), showing a side-by-side structural comparison in 2020 and 2021.

Full-pool Kinbasket Reservoir water levels in 2020 tested the debris mounds we built in fall 2015 near the Bush Arm Causeway. The structural integrity of the mounds was heavily degraded, due to a combination of wave action and abrasion from floating debris while the log boom was breached, reducing the mounds to interlocking wood "skeletons" with a thin veneer of soil on the mound tops. Several of the mounds are now noticeably narrower and lower than before the 2020 surcharge event.

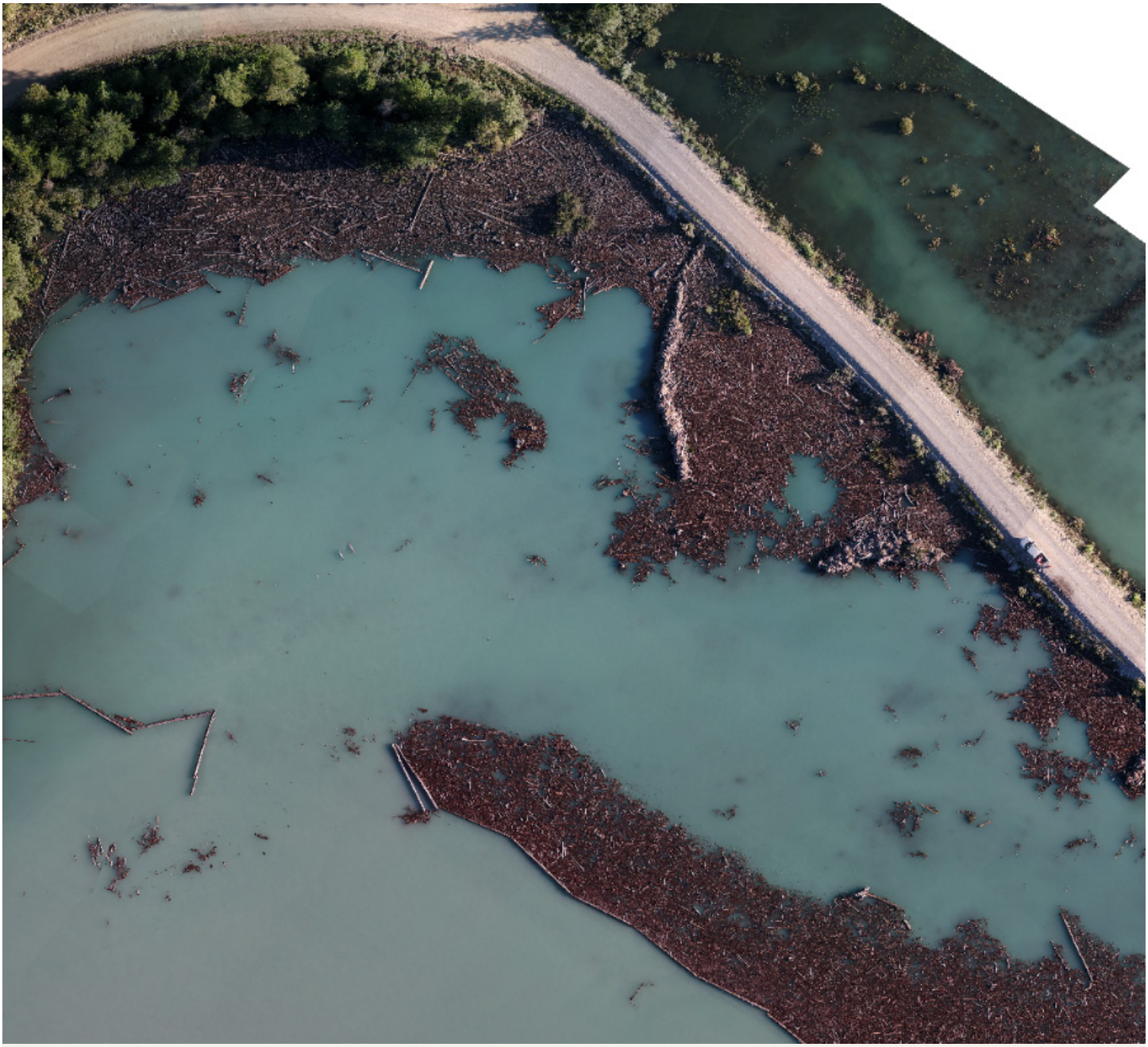
Vegetation monitoring at the site in June 2021 determined that only vegetation on the tops of the mounds closest to the causeway withstood the extended high reservoir water levels, wave action, and associated log abrasion that occurred in 2020. The herbaceous vegetation is now sparser than pre-surcharge on the mound tops. Some naturally established shrubs such as willow and raspberry have persisted. Of the 12 cottonwood stakes alive pre-surcharge, 58% (seven stakes) survived inundation and wave abrasion of the surcharge. The willow stakes had a 36% survival rate (four out of 11).

In contrast, the lower-profile mounds near the gentle shoreline locations away from the causeway (Bush Causeway South) survived the surcharge well, with little erosion of material, and with retention of the diverse shrub species and some trees established there.

Bush Arm and Canoe Reach debris booms

The high Kinbasket Reservoir water levels in 2020 also allowed us to assess whether floating log debris booms we installed at Bush Causeway and near the north end of Canoe Reach were effective in excluding floating wood debris. We installed the log debris booms several years ago after woody debris removal at these sites by our debris contractor was followed by a positive response in vegetation growth and diversity of plants.

The Bush Causeway boom failed due to a rotten log boom stick, and wood debris floated into the enclosure. The debris contractor promptly removed all the accessible floating wood and repaired the boom.

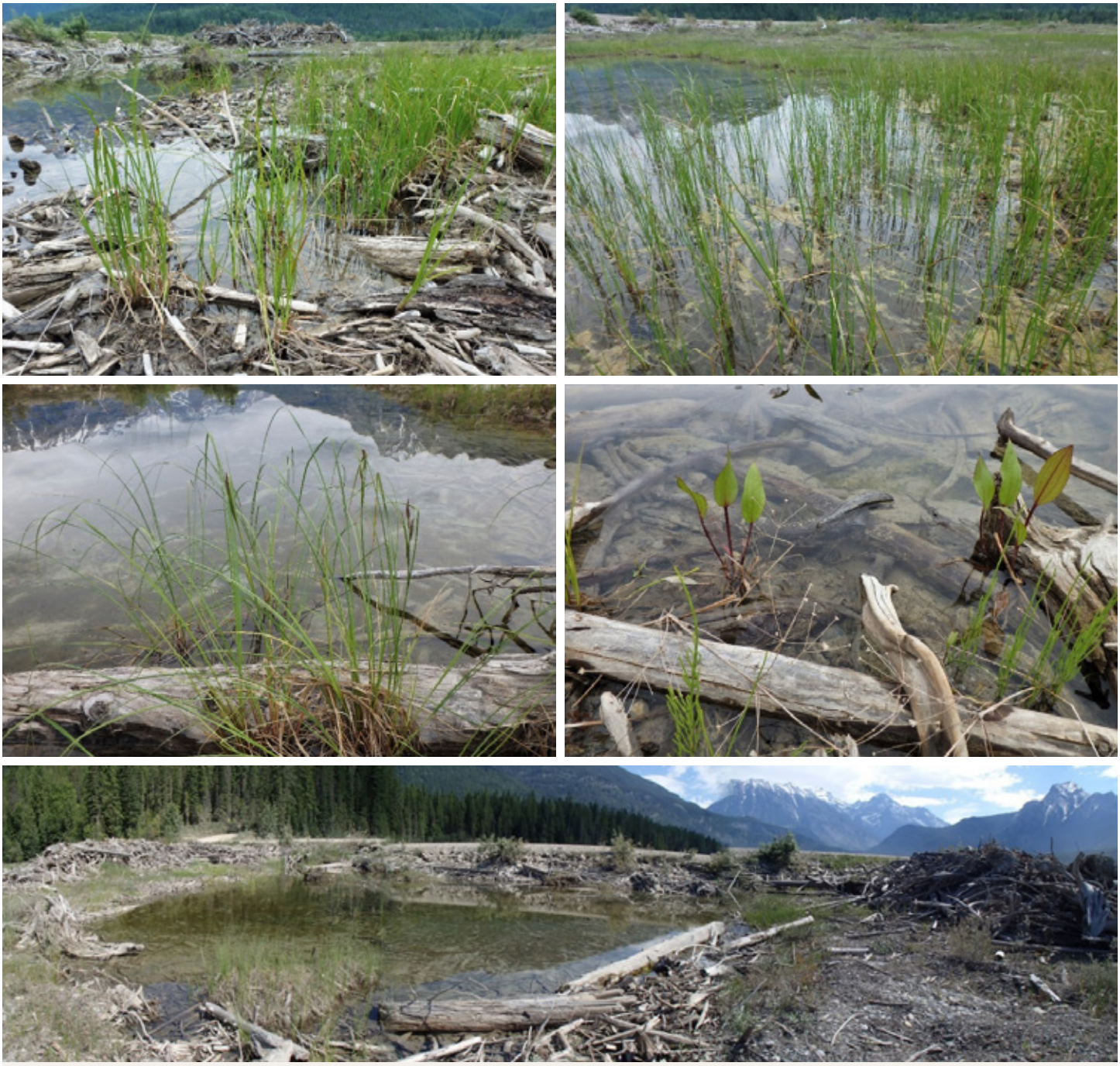


Aerial image of the log-boom breach at Bush Arm following a windstorm in August 2020. Image obtained by Murray Chapple, Sterling Lumber Co Ltd.

The shallow wetlands that provide productive western toad habitat remain largely free of wood debris, as shown in the photos below, due to the quick response by the debris contractor.

To further protect wetland habitat in the Valemount Peatland and meet reservoir recreation objectives, large amounts of accumulated woody debris were removed from several kilometres of the drawdown zone in January and November 2021 in the upper part of Canoe Reach.

The Canoe Reach log boom, although slightly damaged before the high water, did successfully stop floating wood from entering that enclosure. The number of vegetation species is decreasing over time from 60 in 2020 to 36 in 2021, likely as the area of standing water increases as the previous wet meadow becomes a deeper marsh. This process was already underway before the 2020 surcharge inundation event.



Wetland vegetation in cleared ponds at Bush Causeway, June 2021.

Woody debris removal

We're continuing to meet with Debris Management Committee members in Castlegar, Nakusp, Golden, and Valemount to plan and prioritize our floating woody debris removal work for Kinbasket and Arrow Lakes Reservoirs. Removing floating woody debris is an important part of improving recreational opportunities for those reservoirs. Since 2007 we've funded close to $9.7M of debris work that has removed over 356,000 cubic metres of woody debris from Kinbasket Reservoir and over 91,200 cubic metres from Arrow Lakes Reservoir.

The 2021 year was a reminder of how record-breaking temperatures can lead to extreme fire conditions. Arrow Lakes Reservoir experienced at least two fires of note in 2021, including the large Octopus Creek fire on the east shoreline south of Needles ferry. The timing of debris removal and burning for both Arrow and Kinbasket is increasingly focused in the cooler and wetter late fall and early winter to avoid the high fire risk season that occurs from April through September in many years.

A total of 92,000 cubic metres of wood debris was removed from Kinbasket Reservoir during and since the 2020 surcharge event, using some of the additional funds allocated for surcharge debris removal response. Of the 37,000 cubic metres of debris removed in 2021, 18,000 cubic metres of floating debris was removed from the southern part of the reservoir. There was an additional 19,000 cubic metres removed using shore-based methods, focused at Bear Island and other parts of Bush Arm in the south, and in the Canoe Reach on shorelines near the Valemount Marina, Horse Creek recreational area of the east shoreline and areas accessed from West Canoe Forest Service Road.

We've made improvements to our debris inventory methodology. In the early days of the program, we conducted aerial surveys of the reservoirs and staff visually estimated volumes of wood remaining at the main debris accumulations. In 2019 we tested an alternative approach where we captured multi-view aerial photos during flights instead. Using stereo photogrammetry, we can view the photos in three dimensions and more accurately estimate wood volumes. Using this technique, we have updated our debris inventory for Kinbasket Reservoir completed in 2021 with a total volume as of May 2019 being 840,000 cubic metres. Of that, 370,000 cubic metres is the noticeable "bathtub ring", with 450,000 cubic metres found as scattered logs and 20,000 cubic metres being inputs from landslides.

For Arrow Lakes Reservoir, we focused our efforts in 2021 on beaches in the southern and central part of the reservoir, from Hutchinson Creek north to McDonald Boat Launch.

Burning woody debris on Bear Island.

Shore-based debris removal at Van Houten Creek.

We removed approximately 6,500 cubic metres of woody debris in 2021. This year's Arrow Lakes Reservoir work focus will be determined through discussion with the Debris Committee.

We're continuing to coordinate our Kinbasket and Arrow debris removal work with our Reservoir Archaeology Program (RAP) in both reservoirs to protect heritage and archaeological sites. The RAP is an archaeological inventory program underway in Kinbasket Reservoir and Arrow Lakes Reservoir to identify and record archaeological sites within the active erosion zone. Although we have repeatedly used many of our debris management locations in the past, this coordination ensures that any ground disturbance caused by our debris work is managed according to our best management practices for heritage and archaeological resources.

Boat ramps

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

New boat ramp upgrades

In April 2022, we upgraded the boat ramp and floats at Martha Creek on Revelstoke Reservoir. We replaced the existing concrete slabs on the ramp with pre-cast slabs, extending it beyond its current elevation of 571 metres to a new toe elevation of 570 metres, and we also extended the gravel and rip-rap transition to address the depression that has formed at the base of the ramp. We also removed and replaced the existing boarding float and added new anchor blocks as necessary.

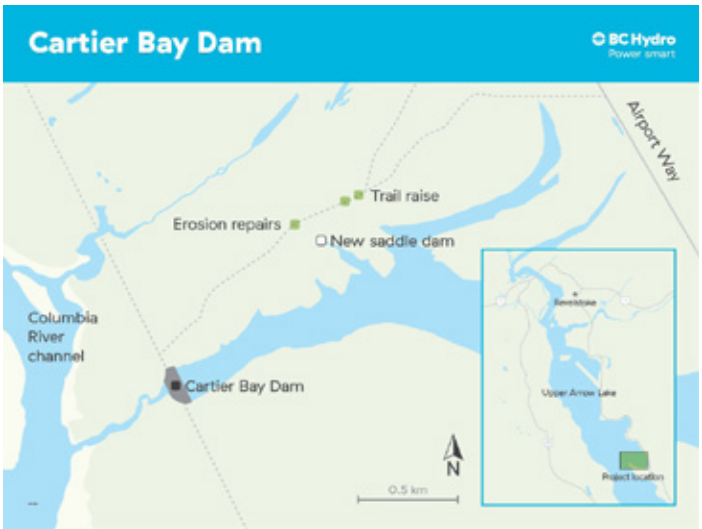
Martha Creek boat ramp

Boat ramp use study

We ran a boat ramp use study for ten years from 2010 until 2019 to help us understand how user satisfaction, as well as volume and frequency of ramp use, has changed with boat launch upgrades throughout Arrow Lakes and Kinbasket Reservoirs. We monitored traffic using the boat ramps and conducted periodic face-to-face interviews both before and after the upgrades occurred. The final report determined that user satisfaction has significantly increased with the upgrades while the change in volume of public use is mixed. Some sites experienced an increase in volume of public use while other sites saw a decrease or no change in volume. This suggests that these projects have been effective in providing benefits to recreational interests in the area.

Drawdown zone habitat maintenance and enhancement

The Cartier Bay wetland on Upper Arrow Lakes is one of the most important regional wetlands for waterfowl during spring and fall migration and serves as a nursery pond for breeding western toad and long-toed salamander. The lower tier of this wetland is a deep pond favoured by diving ducks. Its depth is maintained by the historic Arrowhead rail ballast that was slowly failing due to the eroding force of water passing through the outlet. We took steps to reinforce the pond outlet in 2016 to assure pond depth was maintained. In 2020, erosion developed along the pond's north bank and we installed sandbags as a temporary mitigation in October of that year. During the next available work window when the reservoir is low, we will reduce erosion risk by making a small elevation adjustment to the pond level at the main control structure and repair the newly eroded area with a low berm and infill of the eroded channel.



Cartier Bay wetland

Revelstoke Reservoir. Photo by Jen Walker–Larsen.

Burton Flats vegetation monitoring

Over the last few years, we have implemented two phases of habitat restoration and enhancement near the town of Burton on Arrow Lakes Reservoir. The drawdown zone flats south of Burton Creek provided relatively little habitat, but a restoration opportunity was identified, and a project is helping to restore ecological function. A small spring associated with Burton Creek flows under Highway 6 and feeds into the drawdown zone parallel to the highway. The watercourse is fed by high groundwater levels in the area, which provided a viable water source for the wetland. This feature, which originally provided minimal surface water or habitat for wildlife, has been transformed into a series of groundwater tiered ponds of differing sizes and depths to increase the availability and diversity of suitable habitats for migratory birds and breeding amphibians. Excavated material from the pond basins was mounded, and these mounds were planted with a high diversity of native plants. Phase 2 was initiated in the spring of 2021 with the addition of two more ponds deeper in the drawdown zone and was finalized in the fall of 2021 with a final round of vegetation enhancement. Phase 2 restocking of plants was informed by the Phase 1 revegetation treatments.

New vegetation at the Burton Wildlife Enhancement Project area.

There are two monitoring studies underway at Burton: the first documents the effectiveness of revegetation efforts; the second monitors the use of ponds and revegetated areas by wildlife. The team has been encouraged to see rapid influx of upstream nutrients into the ponds, and colonization by a diversity of aquatic insects and amphibians. It's anticipated that the build up of nutrients and biomass will foster a trophic cascade to support a food web and community of wildlife that greatly exceeds baseline conditions.

Arrow Lakes Reservoir soft constraints performance 2021

Soft constraint	Target	2021 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 23% of the time during the recreation season (May 24 to September 30) and above 1,424 feet 56% 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 40% of the time between April 30 and July 16. The reservoir was below 1,438 feet for 100% 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 0% 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 60% of the time between May 1 and October 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 1,441.8 feet on July 2, about 2.2 feet below full pool. Due to low runoff conditions in the Columbia (82% of normal at The Dalles), the Columbia system was operated in proportional draft from July through October. For this reason, the reservoir drafted to about 1,418.5 feet on August 31 and 1,418.2 feet on September 30.
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.	We are 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.**

Questions? Please get in touch.

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The Columbia River in Castlegar. Photo by Matt Casselman.

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)
Bull trout monitoring program (Kinbasket Reservoir)
Rainbow trout monitoring program (Kinbasket Reservoir)
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)
Amphibian and reptile monitoring study (Kinbasket and Arrow Lakes Reservoir)
Heritage monitoring wind and wave erosion study (Arrow Lakes Reservoir)
Archaeological overview assessment (Kinbasket, Revelstoke, and Arrow Lakes Reservoir)
Juvenile fish habitat use (mid–Columbia River)
Inventory of mosquito populations (Revelstoke area)
Revelstoke Dam Minimum Flow

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