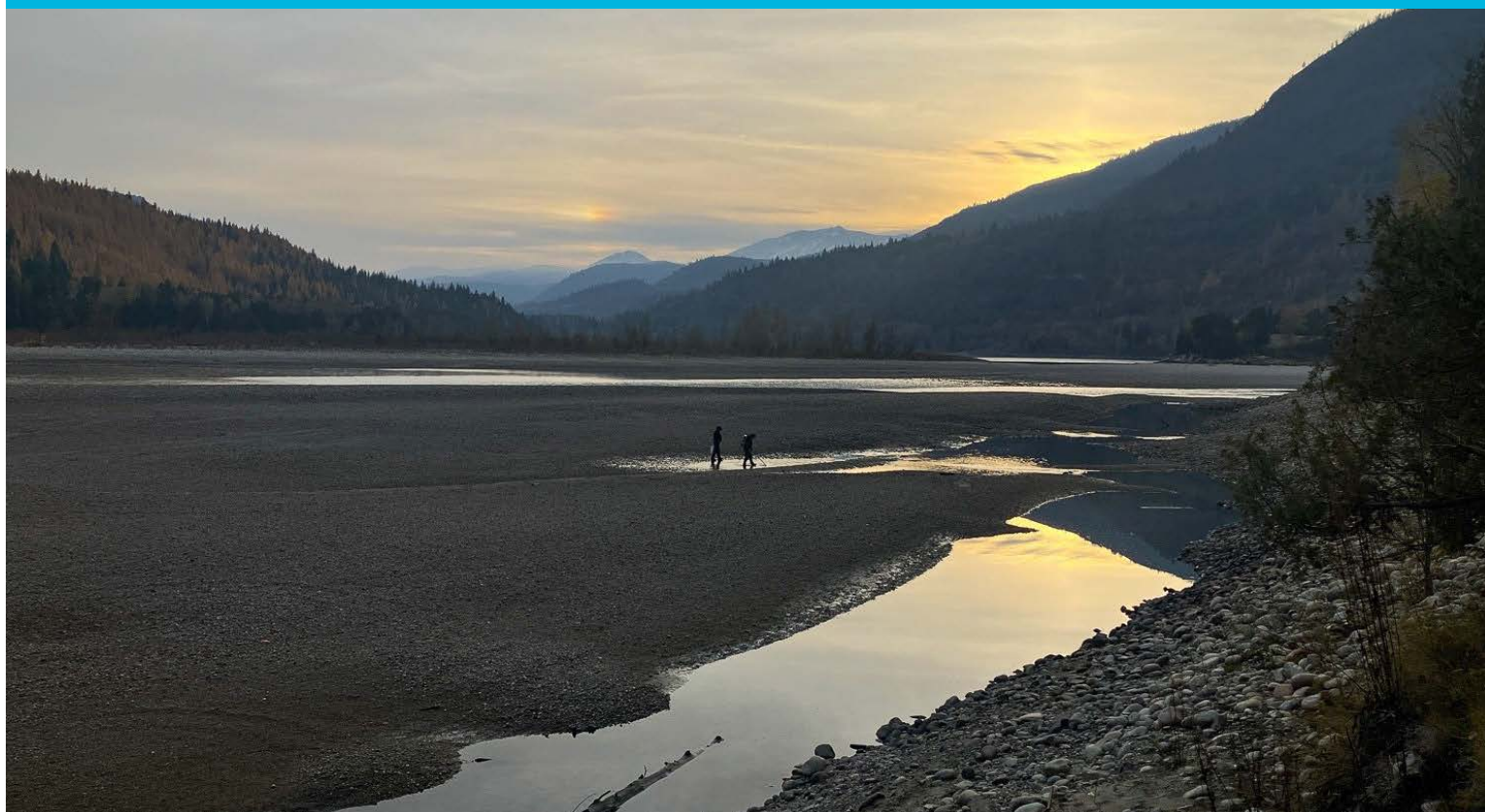


Columbia River Water Use Plan update



May 2024

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: Crews salvaging fish in Genelle, November 2023

 **BC Hydro**
Power smart

Fisheries

Fish salvage

Flow reductions from Arrow Lakes Reservoir have the potential to strand or trap fish in pools or along the banks of the Columbia River. BC Hydro has carried out fish salvage programs on the Columbia River since the mid-1990's. Under the WUP, a more detailed fish salvage program has been carried out from 2007 to 2023. During a reduction, fish are collected from pools using dip nets, seine nets, and electrofishing. The species and age of fish are recorded, and then the fish are moved back into the Columbia River. Conditions at each stranding location, such as the number of pools, are recorded to help understand the factors that contribute to fish stranding.

Not all flow changes on the Columbia River will cause fish stranding. BC Hydro biologists use data collected from WUP studies in past years to estimate whether a fish salvage crew is needed during a flow reduction. From over 20 years of data, we've learned what areas of the river are likely to strand fish and at what river levels. Time of year is also an important factor in fish stranding, since smaller juvenile fish may not be present in the winter. The duration of time that parts of the river have been underwater is also important, since the longer an area is underwater, the more likely it will be for fish to be found there. Since every year and flow reduction is different, BC Hydro developed a predictive model to integrate all relevant factors to estimate how many fish might be stranded during a reduction. Fish salvage crews were on site in 2023 where there was a risk of stranding fish.

From January to December 2023, BC Hydro assessed 42 flow reductions from the Hugh L. Keenleyside Dam for fish stranding risk and fish salvage crews responded to 13 reductions. More reductions occurred 2023 than normal because there were no rainbow trout spawning protection flows in the spring and there was a sudden drop in runoff from the rapid snow melt in May. Repair work at the Hugh L. Keenleyside Dam in November also required 11 short-term reductions to ensure the work could be done safely, and salvage crews found these reductions had low risk of stranding fish. Overall, crews salvaged over 2,000 fish in 2023 from over 1,500 pools that formed during the 13 reductions that were assessed.

Although 2023 was the last year of the Lower Columbia River Fish Stranding Assessment and Ramping Protocol (CLBMON-42A) fish stranding assessment program, BC Hydro Environment Field Operations will take over the Columbia River fish salvage program in 2024.



Salvage work underway at an isolated pool at the Genelle stranding site, November 2023

Fish population indexing

We continued the Lower Columbia River fish indexing program in 2023, marking 15 years of our annual fish population surveys under the WUP. Key species include rainbow trout, mountain whitefish, and walleye. The 2023 survey results won't be finalized until August 2024, but the estimates of rainbow trout are:

- 2010–2014: stable at ~22,000
- 2015–2018: sharply increasing to ~40,000
- 2019: decreasing to ~38,000
- 2020: decreasing to ~35,000
- 2021: slightly decreasing to ~33,000
- 2022: decreasing to ~28,000

The physical condition of rainbow trout improved from 2018 to 2022. This assessment is based on the weight of the fish, as heavier fish in proportion to length are considered to be in better condition. This suggests that rainbow trout may compete against each other for food since fewer fish means more food per fish.

Estimates of mountain whitefish abundance have remained relatively stable between 2010 and 2022 (41,000–47,000). 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 migrate to the Lower Columbia in the summer.

This project also allows us to monitor the occurrence of new, introduced species. For example, in 2009 it recorded the first instance of northern pike in the Columbia River. 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 2023—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 smaller areas near Genelle.

We continued to use drone surveys, traditional helicopter surveys, and on-the-ground monitoring at key spawning locations. When water clarity is excellent, the drone photographs provide clear photos of redds (gravel nests) dug by the spawning trout. The spawning study is now complete.

Rainbow trout spawning protection flows

Rainbow trout typically spawn from March to June. Rainbow trout eggs are laid in gravel nests (redds) and may be vulnerable to dewatering during water flow reductions. This vulnerability exists 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.

Since 1992, we have implemented rainbow trout spawning protection flows (RTSPF) downstream of the Hugh L. Keenleyside Dam. These protection flows maintain stable or increasing water levels during the peak spawning period to prevent eggs laid in the Columbia River from being dewatered. These flows are released from Arrow Lakes Reservoir and last from April through June. While water flows from the Kootenay River may fluctuate during this time, the stable or increasing flows from Arrow Lakes Reservoir reduce the chance of eggs being dewatered.

The ability to meet RTSPF 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 adjustments to downstream flows under certain water conditions, causing the stable or increasing RTSPF 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 Lakes Reservoir flows from April through June for rainbow trout redds protection, subject to meeting flood control requirements on the reservoir. In exchange, we reshape Arrow Lakes Reservoir flows from July through January to aid the U.S. in meeting their salmon migration flow objectives.

The results of the monitoring since 2007 shows that 97% to 99% of rainbow trout redds in the Lower Columbia River are protected with spawning protection flows. During this time, the adult rainbow trout population in the Lower Columbia River increased from ~22,000 in 2007 to ~38,000 in 2019. While this may suggest that RTSPF were working, we recognized that RTSPF had been in place every year until 2019. Without comparison to years without spawning protection flows, it was unclear if the increase in the adult population was due to the protection flows or to other factors.

An experimental approach was implemented between 2019 and 2023 to help determine if the RTSPF were contributing to the population increase in rainbow trout. This involved alternating between 'off' years (no RTSPF) and 'on' years (RTSPF). Each year, during this 'on' and 'off' approach, rainbow trout spawning and population were monitored. Additional monitoring was carried out during 'off' years. During this time, Arrow Lakes Reservoir was operated as necessary to meet regulatory requirements under our water licenses and the CRT. This experiment was endorsed by the Columbia River Rainbow Trout Flows Technical Forum, which includes representatives from regulatory agencies, First Nations, and BC Hydro.

The results of the 'on' and 'off' years during the experimental period were similar to past years when protection flows were always in place. In 2023, the final year of the experiment, we saw both an 'off' year and severe drought conditions. Study results indicated that 4% of redds were dewatered and 96% of redds were protected, which is not expected to affect the rainbow trout population.

The 2023 and overall five-year study results for redd dewatering, productivity, and fish indexing were shared with the Technical Committee in February 2024. The Committee

agreed to apply to the Comptroller of Water Rights to extend our fish population indexing program for up to two additional years in order to capture the results from the 2023 drought year.

Pending operational requirements and environmental conditions, 2024 will be operated as an 'on' year. As always, we will capture any stranded fish during flow changes and return them to the Columbia River. The 2024 results will be shared with the Technical Committee in early 2025.

White sturgeon recovery

A key component of the recovery program for endangered Upper Columbia River white sturgeon is the use of conservation aquaculture to rebuild a natural age class structure in the population. BC Hydro has been actively involved in the program since its inception in 2001, which includes annual releases of juvenile sturgeon raised in the hatchery back into the Columbia River. In 2024, we'll be releasing juvenile sturgeon below the Hugh L. Keenleyside Dam and into Arrow Lakes Reservoir at Shelter Bay. We continue to monitor the growth, survival, and habitat use of juvenile sturgeon released from the conservation aquaculture program to ensure it can be adaptively managed to new information.

Upper Columbia River white sturgeon are listed as endangered under the Species at Risk Act (SARA) in Canada because the population is suffering from recruitment failure, where insufficient numbers of fish survive during early life stages to ensure the population can persist. While the specific cause of 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. The outcome from this study was a recommendation to enhance the substrates at the spawning site in the tailrace of the Arrow Lakes Generating Station, where current conditions consist of a small area of larger rip-rap material. A working group (comprised of BC Hydro, regulators, and First Nations) recommended placing a specific mix of rocks and gravel to improve conditions for incubating eggs and larvae. This gravel and rock mixture provides more complexity for growth and development while providing shelter from predators during this critical life stage.

An excavator on a barge carefully placed the material onto the spawning bed. This work started in October 2022, paused during challenging winter conditions in December and January, and resumed in February. The work was completed in April 2023, and four spawning events were detected on the spawning bed in June and July. We will monitor the area carefully in 2024 and beyond, to determine how the newly placed substrates are holding up and to document spawning in the area.

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 associated with spawning substrate restoration.



A juvenile white sturgeon

Mid-Columbia River white sturgeon spawn monitoring

In 2023, we held a mid-Columbia River White Sturgeon Technical Forum, with representatives from Fisheries and Oceans Canada, the BC Ministry of Water, Land, and Resource Stewardship, Ktunaxa Nation Council, and Okanagan Nation Alliance. Participants discussed study results to-date and remaining uncertainties, then recommended certain studies be extended to address those uncertainties in Arrow Lakes Reservoir and the mid-Columbia River. These studies were extended to 2027 or to the Water Use Plan Order Review (WUPOR), whichever comes first. The extended programs include monitoring juvenile sturgeon growth, survival, and habitat use, monitoring of white sturgeon spawning near Revelstoke, and continuing releases of juveniles from the aquaculture program.

In 2023, and as recommended in the Technical Forum, we relocated a streamside hatchery trailer to a site on the mid-Columbia River immediately downstream of the primary spawning area. The intent of the streamside hatchery trailer is to improve survival during incubation for eggs collected from wild spawning events. Once the eggs hatch, larvae are transported to the traditional hatchery facility and raised until they are at least 700 grams in weight before being returned to the river. We saw promising results from this project in 2023 and will install the trailer in the same location again this year.

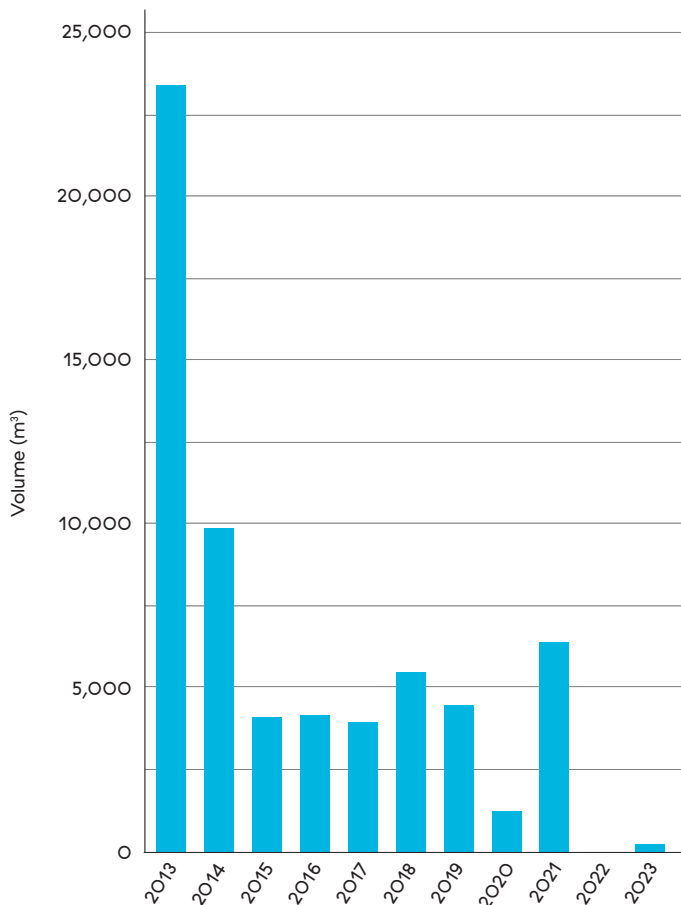
WOODY DEBRIS REMOVAL

We're continuing to meet with Debris Management Committee members 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.

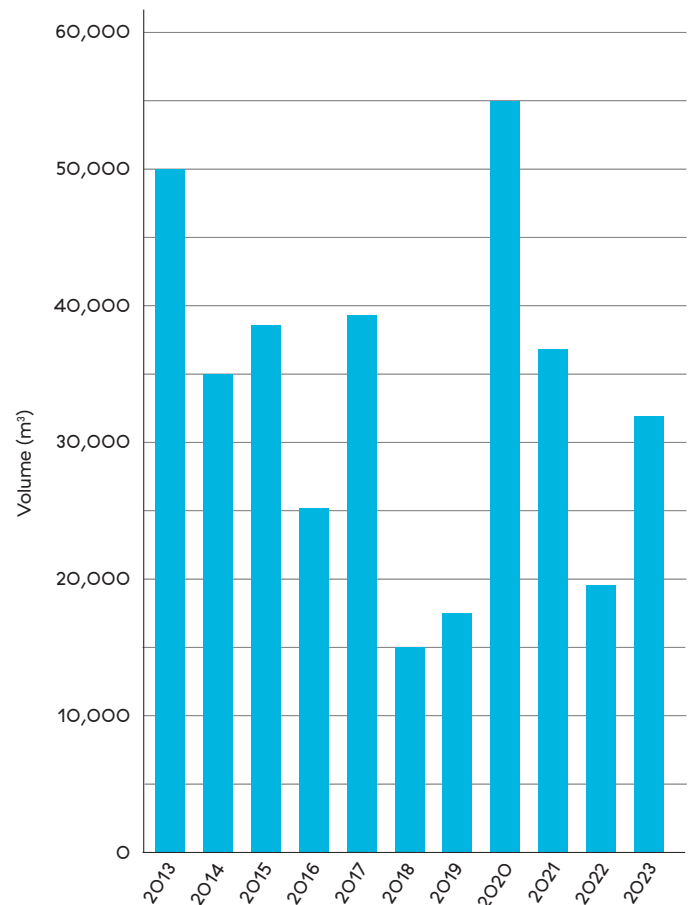
Since 2007, we've funded close to \$11.1 million of debris work that has removed over 437,000 cubic metres (m³) of woody debris from Kinbasket Reservoir and over 91,459 m³ from Arrow Lakes Reservoir.

Debris removed since 2013

Arrow Lakes Reservoir



Kinbasket Reservoir



Annual debris removal from Kinbasket reservoir contributes to the objective of removing navigational hazards and maintaining shoreline access. Woody debris was collected from the Kinbasket Reservoir drawdown zone in the fall and winter months. Work continued to remove woody debris deposited during the very high reservoir levels experienced in 2020. The amount of woody debris removed in 2023 was similar to 2022; however, a large portion of the woody debris removed in 2022 was floating debris.

In contrast, the collection of reservoir-derived wood was completed using land-based methods in 2023 due to significantly lower reservoir levels that precluded water-based collection. A total of 32,000 m³ of wood was collected and most was burned except the largest piles at Windfall Bay, in a remote part of Canoe Reach, which requires more snowfall to burn safely. Land-based debris collection in Canoe Reach continued from the previous fall in January and February 2023 when 12,750 m³ were piled and burned in northern and middle Canoe Reach (Windfall Bay). Due to high fire danger that started in May and persisted all summer, debris management did not restart until September. A further 2,900 m³ of debris was collected at Windfall Bay in the fall. Burning restarted in Canoe Reach mid-November once snow fell. In total, BC Hydro collected 15,650 m³ of debris.

In Columbia Reach, a total of 8,550 m³ of wood was collected using land-based removal with an excavator in southern parts of the reservoir along the Bush Arm and Columbia Reach and southern shoreline of Bear Island. There was an under-report of 7,800 m³ of wood debris collected in Columbia Reach from 2022 for a total of 16,350 m³.

Debris is removed from Arrow Lakes Reservoir on an annual basis, which contributes to achieving the management objectives of removing navigational hazards and maintaining shoreline access.

In 2023, the program was implemented on a small scale. Use of a barge to transport and unload the excavator from the water to the beaches as planned was not possible due to record low reservoir levels exposing unstable shoreline. Instead, only the beach immediately north of Shelter Bay boat launch was accessed by land and was cleared of debris. This beach is heavily used for recreation in the summer months as it is part of the Arrow Lakes Provincial Park (Shelter Bay Recreation Site); so, it was particularly beneficial to clear the beach of woody debris at this location.



Burning woody debris at Windfall Bay / Canoe Reach, November 2023



Debris cleared from Canoe Reach km 4, November 2023

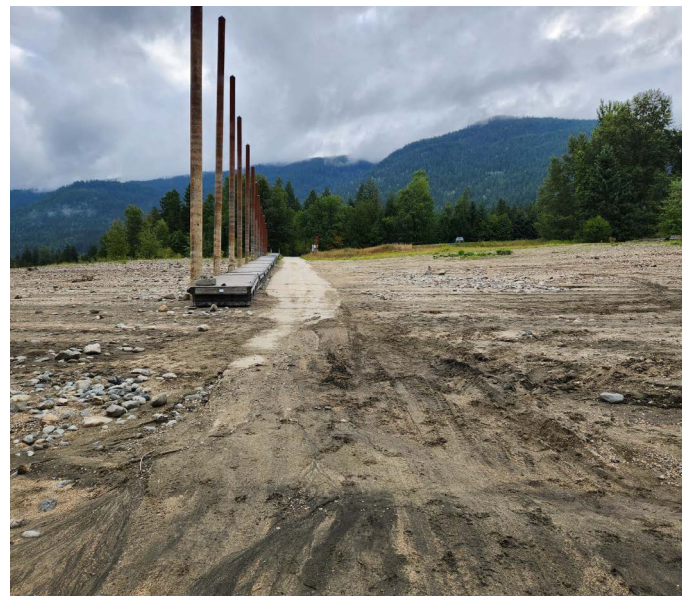


Shelter Bay Recreation Area, before and after debris removal, November 2023

BOAT RAMPS

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

The target recreation levels for Arrow Lakes Reservoir are between 437.4 metres (1,435 feet) and 438.9 metres (1,440 feet). The boat launches were constructed or upgraded to reduce impacts of lower reservoir levels during the recreation season of 434 metres (1,424 feet). Low water levels in 2023 made boat launch access a challenge; however, we were able to keep the boat launches usable for the majority of the peak recreation season, which runs from June 15 to September 15.



The Fauquier boat launch before and after clean-up, September 1, 2023

We recognize the importance of boating access to the local communities, and we do our best to provide access as long as possible during the recreation period. Last year, we undertook additional clearing work at the Fauquier boat launch to remove accumulated sediment and improve access for users. The clearing work was done under the supervision of an environmental monitor, and the sediment was trucked off site for disposal. Additional clearing work will take place again if required in the future. The low water levels over the 2023 winter period provided an opportunity to complete detailed inspections of most of the Arrow Lakes Reservoir boat launch breakwaters. The results of these inspections will be used to plan for minor repairs as opportunities allow.

In May 2023, we completed replacement of the northern breakwater at the MacDonald boat launch. Work was completed over a one-week period, under the BC Hydro Approved Work Practices for Boat Launches, ahead of the recreation season.



The new north breakwater at the MacDonald boat launch. Credit: Brooklyn Barge & Tug.

At the Valemout boat launch on Kinbasket Reservoir, work has been delayed until the spring of 2025 due to unfavourable reservoir levels. The planned work includes installation of a floating wave attenuator, which will act as the northern breakwater, as well as repairs to the rubble mound that acts as the southern breakwater at the Valemout marina.

At Bush Harbour, planning continues for the installation of the replacement breakwater. Due to design delays, construction is now expected to take place in the spring of 2025. We expect to reinstall the interim access solutions again this year, including the temporary floating breakwater, swim platform, and departure dock, water levels permitting.

Drawdown zone habitat maintenance and enhancement

CARTIER BAY WETLAND

The Cartier Bay wetland on the upper part of Arrow Lakes Reservoir is one of the most important regional wetlands for waterfowl during spring and fall migration. It also 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 October 2020, erosion along the north bank of the pond required the installation of sandbags as a temporary mitigation measure. In the spring of 2023, we took steps to reduce the erosion risk by making a small elevation adjustment to the pond level at the main control structure. We also repaired the newly eroded area by installing a low berm and infilling the eroded channel.

We also expect to do some vegetation transplantation in spring at the Airport Marsh wetland outflow as a way of mitigating the potential for erosion near the location of earlier erosion protection installation.



Completed remediation work at Cartier Bay, May 2023

Burton Flats vegetation monitoring

In the past, the flats south of Burton Creek provided relatively little habitat for wildlife. Over the last few years, we have implemented two phases of habitat restoration and enhancement near Burton, on Arrow Lakes Reservoir.

Phase 1:

A small spring (associated with Burton Creek) flows under Highway 6 and feeds into the flats 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

This phase of the project was initiated in the spring of 2021 with the addition of two more ponds deeper in the drawdown zone. The work was completed in the fall of 2021 with a final round of vegetation enhancement.

There are two monitoring studies underway at Burton. The first documents the effectiveness of revegetation efforts and 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 buildup of nutrients and biomass will foster a trophic cascade to support a food web and community of wildlife that greatly exceeds baseline conditions. The final year of wildlife monitoring concluded in 2023, and the revegetation monitoring will continue for another two years.



The Burton wetland, May 2023

Arrow Lakes Reservoir soft constraints performance 2023

Soft constraint	Target	2023 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 25% of the time during the recreation season (May 24 to September 30) and above 1,424 feet 46% 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 22% 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 64% 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 1,440.5 feet on June 23, about 3.5 feet below full pool. Arrow, reservoir drafted to about 1,401 feet on August 31 and 1,393 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 online at https://www.bchydro.com/toolbar/about/sustainability/environmental_responsibility/water-use-plans/southern-interior/columbia-river.html.

Questions? Please get in touch.

Mary Anne Coules

Southern Interior Community Relations, Lower Columbia

Phone: 250 365 4565

Email: maryanne.coules@bchydro.com

Susan Edgell

Southern Interior Community Relations, Upper Columbia

Phone: 778 694 9386

Email: susan.edgell@bchydro.com

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)
Cartier Bay wetland protection project (Revelstoke)
Airport Slough wetland protection project (Revelstoke)
Revegetation planting (Arrow Lakes Reservoir)
Sturgeon hatchery upgrade (mid-Columbia River)
Arrow feasibility study of wildlife physical works and high value habitat (Arrow Lakes Reservoir)
Lower Arrow wildlife physical works (Lower Arrow Lakes Reservoir)
Sturgeon experimental aquaculture (Lower 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)
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 (Revelstoke area)
Mica Dam Total Gas Pressure Monitoring (Kinbasket Reservoir)
Kinbasket and Revelstoke Reservoirs Kokanee Population Monitoring (Kinbasket and Revelstoke Reservoirs)
Kinbasket and Revelstoke Reservoirs Ecological Productivity Monitoring (Kinbasket and Revelstoke Reservoirs)
Kinbasket Fish Stranding Assessment (Kinbasket Reservoir)
Ecological productivity monitoring (Kinbasket and Revelstoke Reservoirs)
Fish indexing (Revelstoke Reservoir)
Plant response to inundation (Arrow Lakes Reservoir)
Physical habitat and ecological productivity (Mid-Columbia River & Lower Columbia Rivers)
Opportunistic assessment of high flow events (Lower Columbia River)
Rainbow trout spawning habitat assessment (Lower Columbia River)