

2023 Annual Report on the Effects of the Operation of Libby Dam and the Implementation of Non-operational Measures on the Kootenai River White Sturgeon

The U.S. Army Corps of Engineers (Corps), Bureau of Reclamation (Reclamation) and Bonneville Power Administration (Bonneville), collectively the “Action Agencies”, developed the 2020 Columbia River System Operations (CRSO) Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA). Concurrently with the development of the CRSO EIS, the Action Agencies consulted with the U.S. Fish and Wildlife Service (Service) and the National Marine Fisheries Service on the effects to threatened and endangered species from operations and maintenance of the CRS, consistent with Section 7 of the Endangered Species Act (ESA). The Service issued their Biological Opinion (2020 CRS BiOp) for the operations and maintenance of the CRS in July 2020, analyzing the effects on Kootenai River white sturgeon (sturgeon; *Acipenser transmontanus*) and bull trout (*Salvelinus confluentus*) and their designated critical habitat.

The Service's 2020 CRS BiOp includes Reasonable and Prudent Measure (RPM) 16.1(e) that states, “By March 31 of each year over the term of the action analyzed in this Opinion, the Action Agencies shall provide an annual report to the Service summarizing the adverse and beneficial effects of the action on the Kootenai sturgeon. Term and Condition 17.1.5, states, “to Implement RPM 16.1(e), the Action Agencies shall ensure the annual report to the Service includes information on the implementation and status of: 1) the Kootenai River White Sturgeon conservation aquaculture program; 2) flow-planning protocol process; 3) the Kootenai River Habitat Restoration Program; 4) the nutrient addition programs; and 5) Kootenai River White Sturgeon monitoring and reporting. This report is submitted to fulfill this requirement.

The actions described herein are primarily funded by Bonneville, except for the Flow Plan Implementation Protocol (FPIP; Section II), which is an action led by the Corps with support from Bonneville.

I. Conservation Aquaculture Program

As part of the CRS proposed action, Bonneville provides funding in accordance with the terms outlined in the Memorandum of Agreement (MOA) between Bonneville and the Kootenai Tribe of Idaho (KTOI) for the KTOI’s Kootenai River Native Fish Conservation Aquaculture Program for sturgeon (BPA and KTOI 2013). The production strategy is determined annually based on monitoring and evaluation and is coordinated with regional partners.

Additionally, Bonneville completed separate Section 7 ESA consultation with USFWS for funding the aquaculture Program and the USFWS issued a BiOp (USFWS 2013) evaluating Bonneville’s funding and KTOI’s Section 10(a)(1)(A) permit for the operation of the aquaculture program. Therefore, the summarized information below is to provide context of the relationship between the KTOI’s aquaculture program and overall efforts to conserve Kootenai River white sturgeon, but is not intended to meet the requirements of the conservation aquaculture BiOp (cited above) or the KTOI’s Section 10(a)(1)(A) permit.

The KTOI implements conservation aquaculture programs in coordination and consultation with Bonneville and Idaho Department of Fish and Game (IDFG), Montana Fish, Wildlife & Parks (MFWP) and British Columbia Ministry of Water, Land and Resource Stewardship (BCMWLRS) – collectively the co-managers. KTOI’s Kootenai River Native Fish Conservation Aquaculture Program (KRNFCAP or Program) has prevented extinction of the endangered sturgeon population and reintroduced burbot (*Lota lota maculosa*), both of which are culturally significant resources to the KTOI, related First Nations, and the

citizens of the Kootenai Basin. The Program goals for sturgeon are to rebuild a healthy age-class structure using conservation aquaculture techniques with wild, native broodstock, and preserve the existing gene pool by spawning, rearing, and releasing fish that survive, grow, and mature. The next generation of sturgeon will be predominantly hatchery-origin; these fish supply the reproductive potential to restore a self-sustaining population that would also support Tribal subsistence and cultural harvest and a public sport fishery. To date, the Program has successfully prevented extinction and rebuilt a healthy age-class structure by spawning >450 wild adults (~150 females crossed with ~300 males) and creating >350 unique families across >30 year-classes during 1990-present. The annual spawning plan captures approximately 80% of the genetic diversity from each wild spawning class (annually, since 2012) and overall has captured 96% of the genetic diversity of the wild population.

Program accomplishments include:

- During 2023, KTOI staff captured 15 females between March 20th and June 2nd. A total of 15 adult female sturgeon were transported to the Kootenai Tribal Sturgeon Hatcheries. Two of the females transported to the hatcheries were caught by IDFG on setlines. A total of 49 male adult sturgeon were captured between March 20th and June 12th. Between May 9th and June 19th, 5 adult males were transported to the Kootenai Tribal Sturgeon Hatcheries to use for spawning in-hatchery. Overall, a total of 38 unique males were used in spawning activities (four were used twice for spawning).
- Egg quality was determined to be good for 12 of the females; however, one female became over-ripe, resulting in poor fertilization. In addition, one female had an expired 2016 sonic transmitter lodged in its pelvic girdle/canal, preventing this fish from being able to release its eggs. Spawning events occurred from May 22nd to June 14th. A total of 12 family groups were created using 12 females and 38 males. A total of 36 unique crossings were created. All 12 family groups created were split between the two KTOI hatcheries post-fertilization for grow-out. Approximately 1,324,570 eggs were collected and 560,038 were kept for production. With an average of 62% neurulation, an estimated 219,238 larvae hatched out for hatchery production.
- A portion of all family groups were released as fertilized eggs or as yolk-sac larvae in addition to spawn retained for hatchery production. Eggs and larvae were released into designated critical habitat near Bonners Ferry, Idaho. A total of 202,973 fertilized eggs were released and a total of 285,929 yolk-sac larvae were released and 44,250 'first-feeding' larvae were released. A combined total of 533,152 early life stage sturgeon were released. Parental Based Tagging (PBT) will be used to verify egg and larvae release survival.

A complete report titled "Hatchery Management Plan Supporting Kootenai River White Sturgeon Restoration" detailing activities in 2023 can be found at <https://www.cbfish.org/Document.mvc/Viewer/P206787D>.

II. Flow Plan Implementation Protocol (FPIP)

Monthly precipitation in the Kootenai Basin through the fall, winter, and spring (October – June) of Water Year 2023 trended from normal to well below normal through the winter. As a result, the monthly April-through-August Water Supply Forecasts (WSF) for Koocanusa Reservoir steadily declined through May. The initial controlled flow (ICF) for The Dalles, Oregon, was calculated as 261,000 cubic feet per second (cfs) in the Declaration of Initiation of System Refill report issued by the Corps' Northwest Division Office on 27 April, which set the start of refill of Koocanusa Reservoir for 01 May. The official May WSF for Koocanusa Reservoir was 4.41 million acre-feet (MAF), or 72% of average, with a corresponding initial Variable Flow (VarQ) Flood Risk Management (FRM) flow of 4,000 cfs.

Prior to issuance of the May WSF - in preparation for a potential Tier 2 sturgeon operation - the FPIP Technical Team reviewed and discussed operational scenarios to achieve the now-routine ecological objectives for sturgeon spawning and recruitment of 1) providing river stage at Bonners Ferry of > 1,760.00-ft+ Mean Sea Level (MSL; flood stage at Bonners Ferry is 1,764.00-ft MSL) for as many days as possible during the peak of the local tributary discharge downstream of Libby Dam, and 2) providing flows at Bonners Ferry of >30,000 cfs for a duration concurrent with maximizing the duration of Kootenai River stage.

As indicated, the final May WSF - which dictates sturgeon tier volume, bull trout minimum flow, and end-of-September Kootenai Reservoir target elevation - was 4.41 MAF (72% of average), a **Tier 1** year with **no** associated sturgeon volume. With no sturgeon volume to execute, Libby Dam was operated to control and achieve refill of Kootenai Reservoir while targeting the required end-of-September reservoir elevation for the corresponding WSF. Given the lower-than-normal end-of-September drawdown elevation of 2,439.00-ft, the resulting Libby Dam outflows were shaped to provide stable summer river flows that exceeded the minimum bull trout flow requirement of 6,000 cfs for a Tier 1 year, while avoiding a “double peak” operation (e.g., increasing flows to meet reservoir elevation targets, followed by a flow reduction once it is achieved). Flow and stage objectives in the lower Kootenai River were partially met as described above. Kootenai River flow at Bonners Ferry was >30,000 cfs for 7 days, and river stage was > 1,760-ft MSL for 0 days. River stage during the spring freshet is strongly influenced by local tributary discharge downstream of Libby Dam, as well as the elevation of Kootenai Lake, which is managed for flood risk reduction in compliance with the 1938 International Joint Commission (IJC) rule curve.

River temperature at Bonners Ferry from May 1 through June 30 ranged from ~ 44.5 to 63.5°F (~7.0 to 17.5°C), with consistent temperature of 50°F/10°C observed after mid-May. Discharge temperature was near the pre-dam mean from late May through early July, at which time Selective Withdrawal System gates were removed incrementally through the remainder of the summer to release cooler water and avoid excessive temperatures in the lower river due to high air temperature and low flow.

A summary of the 2023 FPIP Sturgeon Flow Augmentation Operation can be found at: <https://pweb.crohms.org/tmt/documents/Kootenai-River/2023>.

III. Kootenai River Habitat Restoration Program (KRHRP)

In July 2009, KTOI completed the *Kootenai River Habitat Restoration Program Master Plan*, and has since also convened numerous adaptive management venues that have created a framework for potential large-scale ecosystem-based river habitat restoration projects to be implemented across the Lower Kootenai Ecosystem from near Bonners Ferry downstream to Kootenai Lake.

The goals for the KRHRP address:

- Morphology – Enhance physical habitat by reducing the negative effects to river and floodplain ecological processes caused by river response to the altered landscape.
- Riparian vegetation – Enhance native vegetation by establishing stream bank and floodplain conditions that sustain plant community development processes.
- Aquatic habitat – Enhance aquatic habitat conditions that support all life stages of native fish and promote sustainable populations.
- River stewardship – Create opportunities for river and floodplain stewardship in the community.

As identified in the KRHRP implementation milestones, KTOI, in coordination with the Corps, Bonneville, and multiple co-managers, continued to implement the KRHRP. Phase 1 (Braided Reach) and Phase 2 (Braided Reach and Straight Reach) of the KRHRP were implemented during 2012 – 2019, and Phase 3 (Meander Reach) continued through 2020-2023. The actions identified below are consistent with those described in the Proposed Action section of the Action Agencies' 2020 CRS Biological Assessment.

KTOI actions in 2023 to implement the KRHRP included:

- Completed the Westside / Cascade Creek Improvement Project within the Kootenai National Wildlife Refuge. This work was completed in partnership with USFWS and initiated a series of projects on the Kootenai National Wildlife Refuge. Stream, wetland, and riparian improvement actions were implemented on the northern portion of the Refuge near lower Cascade and Myrtle Creeks, adjacent to their confluence with Kootenai River. This project should substantially enhance ecosystem function by providing much needed biological inputs to the section of the mainstem Kootenai where sturgeon spawn, hatch, and rear.
- The KTOI previously implemented a series of restorative measures in Ball Creek to enhance potential for Kokanee spawning and recruitment. Upon inspection, if these habitat improvement actions are diminishing in efficacy, the KTOI has the funding to implement maintenance, repairs, or reengineering as needed. In 2023, the KTOI completed revegetation with native species when mortality of earlier plantings was identified, browse fencing maintenance where needed, seeding and mulching along bank areas where needed.
- Annually, the KTOI and/or their contractors inspect and evaluate the habitat structures and hydraulic attributes built within the braided reach of the Kootenai River. If the previously built structures are found to be in dis-repair or not providing the intended hydraulic or habitat complexity the Kootenai Tribe maintains the annual funding to perform the reengineering, maintenance or repairs as needed. In 2023, KTOI staff completed on the ground inspections and aerial inspections of established structures within the braided reach, no heavy O&M was needed (logs or rock required). Browse fencing was maintained, revegetation with native species was accomplished across restored areas where mortalities from previous plantings was identified.
- Advanced the partnership with the Service by facilitating design, NEPA, and permitting for future habitat restoration within the Kootenai National Wildlife Refuge during 2024-2025.
- Advanced a partnership with several private landowners along lower Deep Creek/Kootenai River confluence as part of a larger landscape restoration effort across Kootenai National Wildlife Refuge (2023-2025), Idaho Department of Lands property on Deep Creek (2022), and adjacent private lands (2024-2025), totaling over 2,000 acres.
- Advanced a partnership with LKB, BCMWLRS, and Creston (BC) Wildlife Management Area to implement future landscape restoration actions across 17,000 acres adjacent to the Kootenay River (2026-2028).

For additional information, see the Kootenai River Habitat Restoration Program (BPA Project #: 2002-002-00). Reports associated with this project are completed consistent with existing contractual requirements and will be uploaded to CB Fish (www.cbfish.org) as they are completed. The most recent report can be found here: <https://www.cbfish.org/Document.mvc/Viewer/P190053>.

IV. Kootenai River and Kootenay Lake Nutrient Addition

The overarching goal of the nutrient addition projects is to restore productive, healthy, and biologically diverse lower Kootenai River and Kootenay Lake ecosystems, with emphasis on native fish species

rehabilitation. It is designed to benefit the following fish species: sturgeon, burbot, bull trout, kokanee, and several other salmonids that are culturally significant to the KTOI and desirable to regional sport-fisheries.

KTOI implemented nutrient addition activities, like previous years, in the Kootenai River, Idaho, and supported monitoring of Kootenay Lake, British Columbia, following discontinuance of fertilizer additions for 2023. KTOI implemented the riverside nutrient addition station and BCMWLRS completed monitoring of trophic dynamics within the south Arm Kootenay Lake.

For additional information, see the Nutrient Addition Program (BPA Project #: 1994-049-00). Reports associated with this project are completed consistent with existing contractual requirements and will be uploaded to CB Fish (www.cbfish.org) as they are completed. The most recent report can be found here: <https://www.cbfish.org/Document.mvc/Viewer/P207286>.

V. Sturgeon Monitoring and Reporting

A. 2023 Idaho Department of Fish and Game and British Columbia Ministry of Water Land and Resource Stewardship Sturgeon Monitoring

In 2023, with funding from Bonneville, IDFG and BCMWLRS monitored juvenile and adult sturgeon populations, spawning migrations, and spawning success in the Kootenai(y) River and Kootenay Lake.

- A total of 281 adult sturgeon were caught with setlines and angling in both ID and BC, which represents an increase from 2022 (n = 184). Proportions of wild and recaptured fish were similar to 2022. The proportion of spawning sturgeon that migrated above the Highway 95 Bridge to suitable habitat in 2023 (31%) was more than expected given the duration of peak flows (7 days > 30kcfs at Bonners Ferry).
- Flows were successful in triggering spawning, and 202 eggs were collected on egg mats, which is a decrease from 2022 (n = 448). Of these, 11 were collected over gravel substrates at River Kilometer 245.5, which is a decrease from 2022 (n = 76). Four larval sturgeon were captured in passive drift nets, which is higher than catches prior to 2022, but substantially less than the high observed in 2022 (2014-2021 mean = 1.25; 2022 = 48). KTOI repeated egg and larval releases upstream of these sampling locations in 2023, and the origin of these larvae will not be known until PBT results are available.
- A total of 991 juvenile sturgeon were caught in gillnets in both ID (n = 801) and BC (n = 190), which is an increase from 2022 (n = 698). Gillnetting was performed using both a generalized random tessellation stratified (GRTS) design and index sites. The catch per unit effort (CPUE) for index sites was similar to those from 2015 to 2021, and greater than that of 2022. Ten new wild juvenile sturgeon, five each in ID and BC, were captured during 2023 gillnet surveys.

Additional information on biological monitoring related to sturgeon flows is available from BPA Project #: 1988-065-00. Reports associated with this project are completed consistent with existing contractual requirements and will be uploaded to CB Fish (www.cbfish.org) as they are completed. Currently, due to staffing issues, the IDFG reporting process is behind schedule; they are working to catch up over the next contractual period.

B. 2023 Montana Fish, Wildlife & Parks (FWP) Sturgeon Monitoring and Reporting

Bonneville funds MFWP to implement monitoring and reporting of KRWS. Since the most recent monitoring efforts in Montana began in 2009, a total of 599 sturgeon represented by 277 individuals have been captured. Annual total catch of sturgeon has been variable and ranged from 2-77 sturgeon per year using a combination of setlines and gillnets. In 2023, a total of 121 setlines were deployed for 2,656.3 hours and 43 sturgeon were captured. Since 2009, CPUE of sturgeon appears to be stable or slightly increasing in three standardized sampling reaches. CPUE indices of sturgeon on setlines declined in 2022 and 2023 from the peak CPUE indices observed in 2021. Overall, hatchery origin sturgeon have represented the vast majority (> 98%) of the sturgeon captured in Montana, and hatchery vs. wild composition results in 2023 were consistent with prior results from 2009-2022. The age composition of hatchery origin sturgeon in Montana appears to be comprised of mostly older juveniles (i.e., ≥ 10 -20 years old), and sturgeon from 18 unique broods have been captured. Mark-recapture data for individual sturgeon collected in Montana since 2009 has allowed several parameters to be evaluated including abundance, apparent survival, growth, condition and movement.

- Following the 2023 sampling season, 272 sturgeon were estimated in Montana using an open population framework. Abundance of wild juvenile and adult sturgeon in Montana remains low based on the low number captured, infrequent sightings, and or detections using sonic receivers in the past 15 years. Apparent annual survival of sturgeon captured in Montana is high (92-93%) and our results are consistent with recent estimates for hatchery origin sturgeon within the Kootenai / ay Basin.
- Average condition (relative weight (W_r); 81) of sturgeon in Montana is similar to condition estimates in Idaho and portions of British Columbia.
- Growth of sturgeon in Montana is highest for young sturgeon (< 10 years old; 50-90 mm/yr since release) and growth then decreases to about 35 mm/yr for sturgeon ≥ 15 years of age.
- About 90% of the hatchery origin sturgeon with known release records captured in Montana, were originally released in Idaho or British Columbia. Of the 46 individual sturgeon sonic tagged in Montana since 2012, 60% have not emigrated from Montana post-sonic tagging through 2023. Movements by individual sturgeon were highly variable and included several sturgeon that resided in very small areas (i.e., ≤ 10 rkm) of the Kootenai River in Montana and others that moved throughout the entirety of the Kootenai / ay River and Kootenay Lake.
- Egg mats were deployed for 6,383.9 hours in 2023 to document spawning by sturgeon in Montana, but no sturgeon eggs were captured. At this time, there is no evidence of spawning by sturgeon in Montana, but the presence of sexually mature sturgeon is possible, based on recent length, weight and age information.

Continued monitoring of sturgeon in Montana will provide additional information used to adaptively monitor, manage, and evaluate recovery efforts for sturgeon within the Kootenai / Kootenay River Basin. Additional information for Montana Fish, Wildlife & Parks Kootenai Sturgeon Monitoring and Reporting can be found under BPA Project #: 1995-004-00. Reports associated with this project are completed consistent with existing contractual requirements and will be uploaded to CB Fish (www.cbfish.org) as they are completed. The most recent report can be found here:

<https://www.cbfish.org/Document.mvc/Viewer/P206485>.

If you have trouble accessing any of the cited, hyperlinked reports on CB Fish, please contact Bonneville's F&W ESA Coordinator at: FWESAcoordinator@bpa.gov.