

**WHITE STURGEON MITIGATION AND RESTORATION IN THE COLUMBIA AND
SNAKE RIVERS UPSTREAM FROM BONNEVILLE DAM**

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EXECUTIVE SUMMARY

We report on our progress from January through December 2024 on determining the status of White Sturgeon populations and effects of mitigation measures on productivity in the Columbia River downstream from McNary Dam to Bonneville Dam. The study is a cooperative effort by the Oregon Department of Fish and Wildlife (ODFW; Report A), Washington Department of Fish and Wildlife (WDFW; Report B), and Columbia River Inter-Tribal Fish Commission (CRITFC; Report C). This report also serves as the study's annual technical report on Bonneville Power Administration funded Research, Monitoring, and Evaluation projects.

This is a multi-year study with many objectives requiring more than one year to complete; therefore, findings from a given year may be part of past reports or alternatively, may be part of more significant findings that are yet to be reported. Highlights of the 2024 results are:

Report A

- Overall abundance of White Sturgeon >54 cm Fork Length (FL) in Bonneville Reservoir was 155,406, a decrease of 27.9% from the estimate in 2021.
- Abundance of legal-size fish (96 – 137 cm FL) increased from 2021 (n = 10,063) to 2024 (n = 18,744).
- Condition (relative weight) remained high for all but one size class, although slightly decreased from 2021. Median relative weight of legal-size White Sturgeon had the only increase, while adult White Sturgeon (>160 cm FL) showed an average decrease of 15.8%.
- Age-0 recruitment was detected in Bonneville (n=6) and The Dalles (n=1) reservoirs, Ep and CPUE decreased in both reservoirs from 2023, recruitment remains low despite favorable hydrological conditions during spawning months.
- Recruitment was not detected in John Day Reservoir. This is the eleventh time in the last twelve years where no age-0 sturgeon were captured.

Report B

- Favorable weather conditions in January 2024 led to increased effort and catch rates across all three reservoirs.

- Sturgeon sport harvest estimates were 692 (103% of guideline) for Bonneville Reservoir, 271 (98.5% of guideline) for The Dalles Reservoir, and 96 (91.4% of guideline) for John Day Reservoir.
- Retention season length was lower than the 5-year average in each reservoir during the 2023 season. While angler trips had decreased from 2022, the number of fish harvested per trip increased.
- Oversize catch in Bonneville Reservoir was 0.2 percent of the 2024 oversize abundance estimate, similar to proportions in recent years (Figure B-4). Oversize catch was 10.1 percent of total 2024 sturgeon catch in The Dalles Reservoir and 36.8 percent of total 2024 sturgeon catch in John Day, continuing a trend of increasing oversize proportion in catch during recreational fisheries.

Report C

- Tagging efforts in Bonneville Reservoir captured 2,980 White Sturgeon in 92 overnight gillnet sets, a catch per unit effort (CPUE) of 32.4 sturgeon per set. This is the third highest CPUE value since the 2008-09 sampling season.
- Captured fish ranged from 46 – 260 cm FL, with a mean length of 95.3 cm FL. The mean length for 2023 increased 6.3 cm from mean fork length observed in 2019-20.
- The proportion of sublegal sized (<96 cm FL) catch was 56.3%, the proportion of legal sized catch (96-137 cm FL) was 43%, and the proportion of oversize (> 137 cm FL) catch was 0.7 % of the total observed.

**WHITE STURGEON MITIGATION AND RESTORATION IN THE COLUMBIA AND
SNAKE RIVERS UPSTREAM FROM BONNEVILLE DAM**

ANNUAL PROGRESS REPORT

JANUARY – DECEMBER 2024

Report A

**Evaluating the success of developing and implementing a management plan for enhancing
production of White Sturgeon in reservoirs between Bonneville and McNary dams**

This report includes: 1) An update of abundance, life history parameters, and population dynamics of White Sturgeon in the Bonneville Reservoir.
2) A summary of annual recruitment of age-0 White Sturgeon in three Columbia River reservoirs; Bonneville, The Dalles, and John Day

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ABSTRACT

This report summarizes data collected from January 1, 2024, through December 31, 2024, and provides: 1) an update of the abundance, life history parameters, and population dynamics for White Sturgeon *Acipenser transmontanus* in Bonneville Reservoir and 2) an evaluation of annual recruitment of age-0 White Sturgeon in the three lower impounded Columbia River reservoirs.

Sampling to estimate the abundance of White Sturgeon in Bonneville Reservoir was a cooperative effort among staff from Oregon Department of Fish and Wildlife (ODFW), the Washington Department of Fish and Wildlife (WDFW), the Columbia River Inter-Tribal Fish Commission (CRITFC), and Yakima Nation (YN). The estimated abundance of White Sturgeon ≥ 54 cm FL in Bonneville Reservoir in 2024 was 155,406 (95% CI: 130,641 – 191,756); a 28% decrease from the 2021 abundance estimate. Across all reported size classes, increases of White Sturgeon abundance was seen in three of the six size classes classified in this study. The greatest increase was observed in the sub-adult size class (138-166 cm FL), although this group represents the smallest percentage of the total estimated abundance. The greatest decrease in abundance occurred in the juvenile size class (54-70 cm FL), resulting in a 40% decrease in estimated abundance since the previous stock assessment in 2021. The overall median relative weight of White Sturgeon in Bonneville Reservoir showed very little change from 2021 resulting in an overall decrease of 2%. Although still considered healthy, sturgeon measuring 160 cm FL and larger showed the greatest drop of median relative weight from 105 to 88.

We assessed recruitment of age-0 White Sturgeon in Bonneville, The Dalles, and John Day reservoirs during October 2024. Recruitment was detected in Bonneville and The Dalles reservoirs but not in John Day Reservoir. In both reservoirs where recruitment was detected, there was a marked decrease compared to the recruitment in 2023: Bonneville at 35% and The Dalles at 82%. The lack of noticeable recruitment in the John Day Reservoir is an annual trend, where there has only been measurable recruitment once in the last ten years. The John Day Reservoir continues to be an area of concern with prolonged periods of no age-0 recruitment. With this being evident, even during years with favorable river flows and temperatures, it must be considered that other environmental and ecological factors may influence spawning success or egg and larval survival in this reservoir.

INTRODUCTION

White Sturgeon, *Acipenser transmontanus*, is the largest species of North American sturgeon and is found from southern California to the Gulf of Alaska (Scott and Crossman 1973). White Sturgeon inhabit approximately 1,600 km of the main stem Columbia River from the estuary along the Oregon/Washington border to Idaho and Canada. Overharvesting during the late 1800s resulted in substantial population declines, meriting the first protections placed on sturgeon harvest within the Columbia and Snake River systems. In 1899, Oregon and Washington state agreed to extend seasonal closures as well as a minimum size limit for harvested fish (Craig and Hacker 1940). By the 1950s, White Sturgeon abundance had increased enough to support limited commercial and recreational fisheries. Declining harvest opportunities for anadromous salmon and steelhead, *Oncorhynchus spp.*, at this time led to increased angler participation in the White Sturgeon fishery. Harvest of White Sturgeon doubled in the 1970s and again in the 1980s (Tracy 1993). In 1986, Oregon Department of Fish and Wildlife (ODFW) and other state, tribal, and federal agencies began long-term monitoring of sturgeon populations in the impounded lower Columbia River reservoirs (ILCRR), from Bonneville Dam to the mouth of the Snake River. This monitoring work was intended to develop a better understanding of White Sturgeon population dynamics and aid in developing appropriate management and mitigation actions to maintain and enhance White Sturgeon populations.

Project goals have evolved over time as new information becomes available. The current focus of this project is to implement and evaluate measures (i.e.: harvest closures, catch quotas, size limits, and sanctuaries) to protect and enhance White Sturgeon populations, and to mitigate the effects of the Federal Columbia River Power System (FCRPS) on the production of White Sturgeon in the ILCRR.

To assess the productivity of White Sturgeon populations, abundance and recruitment are measured throughout the impounded lower Columbia River basin. Stock assessments have been conducted on a three-year rotation among the ILCRR since 2001 to evaluate White Sturgeon abundance and population dynamics. These data are critical for assessing management and mitigation approaches. Recruitment of age-0 White Sturgeon is monitored in each reservoir annually to evaluate the relative success of spawning. This information has helped identify recruitment trends over time within individual reservoirs.

This report summarizes work performed from 1 January 2024 through 31 December 2024 for the Bonneville Power Administration Project 1986-050-00. During this period, staff from the ODFW, Washington Department of Fish and Wildlife (WDFW), Columbia River Inter-Tribal Fish Commission CRITFC), and Yakama Nation (YN) collaborated on three large scale efforts to assess White Sturgeon populations in the impounded reaches of the lower Columbia River upstream from Bonneville Dam:

- 1) From 29 November through 28 December 2023, CRITFC captured and tagged White Sturgeon completing the first pass of the mark recapture study.
- 2) From 2 June through 29 August 2024, ODFW and WDFW sampled for White Sturgeon in Bonneville Reservoir completing the second and third pass to update information on abundance, growth, survival, and condition.
- 3) During October 2024 we sampled for age-0 White Sturgeon in Bonneville, The Dalles, and John Day reservoirs to assess the relative annual spawning success in these reservoirs.

METHODS

Stock Assessment

Sampling for White Sturgeon in Bonneville Reservoir was divided into three separate events identified as periods 1 through 3. Sampling during period 1 took place from November 30, 2023, through December 28, 2023. Sampling was conducted by Tribal commercial fishers, contracted by CRITFC staff, using gill nets as a capture method (see Report C for details regarding Tribal gill net methodology). Sampling took place throughout the entire Bonneville Reservoir, excluding boat restricted zones. Sampling for periods 2 and 3 took place from June through August involving staff from ODFW, WDFW, CRITFC and YN utilizing baited setlines as the sampling method. Period 2 sampling occurred from June 2, through June 27, 2024, while period 3 took place from August 5 through August 29, 2024. To structure sampling activities, Bonneville Reservoir was divided into 8 sections (Figure A-1), with each section measuring approximately 6 km in length, excluding the boat restricted zones. Sampling effort was distributed equally throughout the reservoir, and all reservoir sections were sampled during each sampling period.

During periods 2 and 3, setlines were deployed to capture White Sturgeon (see Elliott and Beamesderfer 1990) as documented in [Method ID 784](#) (available at monitoringresources.org). Setlines were deployed on Mondays and allowed to soak for approximately 24 hours. They were then checked and reset on Tuesdays and Wednesdays. All gear was checked and removed from the water on Thursdays. The location for each set was determined by the field staff. Sets would either be reset each time in the same location or moved to a new location within the sampling section. The option to move set locations is to optimize catch and to avoid underwater hazards.

For captured White Sturgeon, biological data was collected which included fork length (FL), weight, and disposition (i.e., alive, dead, sacrificed). White Sturgeon were also checked for the presence/absence of scute removal scars along the right and left lateral line. Scute marks are used as secondary marks to indicate the presence of a variety of data parameters, e.g., presence of a Passive Integrated Transponder (PIT) tag, a year mark, or hatchery origin ([Method ID 2781](#)).

Using the data collected, White Sturgeon stock abundance and fish condition characteristics are estimated. Overall abundance (N) of White Sturgeon in Bonneville Reservoir in 2024 was estimated using a Schnabel population estimator (Schnabel 1938; Chapman 1952, 1954; [Method ID 780](#)). However, the total number of marked fish at the start of given period was adjusted to account for the removals of PIT-tagged fish via the sport and commercial fisheries.

The Schnabel estimator was first used to estimate the abundance of sturgeon <110 cm FL, which was the group with the largest number of recaptures. The length-frequency distribution of the 2024 setline catch was then used to apportion the Schnabel population estimate in 1 cm increments, which was then expanded to estimate abundance of the remaining size groups (>110 cm FL) based on the relative frequency of these size classes in the total 2024 setline catch after adjusting for gear vulnerability. In 2019, a new gear vulnerability curve was derived using empirical data from the previous 19 years of recapturing White Sturgeon using a standardized setline methodology (i.e., bait type, hook sizes). Confidence intervals for expanded estimates were calculated using the Delta Method with the variance obtained from the Schnabel estimate (Dorfman 1938).

The relationship between length (L) and weight (W) was described by the exponential function, $W = a * L^b$ ([Method ID 5554](#)). The condition of White Sturgeon in Bonneville Reservoir was assessed using relative

weight (W_r ; [Method ID 4038](#)). The standard weight equation for White Sturgeon $W_s=2.735 E-6*L^{3.232}$, was obtained from Beamesderfer (1993). Annual growth increments for White Sturgeon in Bonneville Reservoir were obtained from recaptures of PIT tagged fish ([Method ID 2782](#)).

Age-0 Indexing

Annual White Sturgeon recruitment is measured each year in October by staff from ODFW, WDFW, and YN. To evaluate recruitment of age-0 White Sturgeon ([Method ID 376](#)) sampling was conducted by ODFW in Bonneville Reservoir from October 14-17, The Dalles Reservoir from October 7-10, and John Day Reservoir from September 30 - October 4. WDFW sampling was conducted in Bonneville Reservoir from October 21-24, The Dalles Reservoir from October 14-17, and the John Day Reservoir from October 7-11 (Figure A-2).

Sinking gill nets were used to capture age-0 White Sturgeon ([Method ID 787](#)). A single gill net was deployed at each of the predetermined, standardized index sites located in each reservoir. Sampling took place at 13 sites within the Bonneville Reservoir, 12 within The Dalles Reservoir, and 23 within the John Day Reservoir. Sampling methodology and locations were consistent with years past, in some instances alternative index sites were used due to low water levels or if nets were consistently torn-up from sub-surface objects. While sampling in Bonneville and The Dalles reservoirs, gear was deployed on Monday, checked and re-set on Tuesday and Wednesday, and checked and removed from the water on Thursday. To cover the entirety of the John Day Reservoir, gill nets are initially set in the lower reservoir and at mid-week were moved higher in the reservoir and redeployed. Gear is set on Monday and checked on Tuesday, while only resetting 3 of the 6 nets. On Wednesday, the remaining 3 nets are checked and pulled. Nets are then moved upriver, and all 6 nets are deployed at the designated index sites. On Thursday, all nets are checked and reset and on Friday all nets are checked and removed from the water.

As nets were being hauled, all fish and debris were removed prior to being reset. Bycatch were enumerated and recorded into the data collection form with the appropriate disposition. Biological data from White Sturgeon captured during age-0 indexing were collected as detailed above in the Stock Assessment section ([Method ID 2781](#)). Ages of captured White Sturgeon were estimated following procedures outlined in Beamesderfer et al. (1989; [Method ID 2782](#)). In previous years, all untagged sturgeon ≥ 40 cm FL were tagged with a 12mm PIT tag but beginning in the 2023 season all sturgeon were tagged including age-0. Two sizes of PIT tags were used, 9mm PIT tags were used for sturgeon < 40 cm FL and the standard 12mm PIT tags were used for everything ≥ 40 cm FL.

To assess annual recruitment, both the proportion of positive efforts (E_p ; proportion of all sets that captured at least one White Sturgeon; [Method ID 3783](#)) and the catch-per-unit-effort (CPUE; number of White Sturgeon caught per set; [Method ID 5257](#)) were calculated.

RESULTS

Stock Assessment

Effort and Catch

During period 1, Tribal commercial fishers made 92 gill net sets in Bonneville Reservoir catching a total of 2,979 White Sturgeon. Of these, 2,640 (89%) were new fish and given PIT tags. During periods 2 and 3, staff from ODFW, WDFW and YN deployed a total of 415 setline sets catching 4,380 White Sturgeon (Table A-1). Of these, 3,717 (85%) were newly PIT tagged. Overall, a total of 7,359 White Sturgeon were captured during all three sampling periods, with 6,357 (86%) receiving PIT tags.

White Sturgeon were captured in all sampling sections within Bonneville Reservoir (Figure 1). For periods 2 and 3, there was an average catch rate of 548 White Sturgeon each week. For all sections and sampling weeks combined, CPUE was 10.0 White Sturgeon per setline. In general, catch rates were lowest in the upper most part of the reservoir with the tailrace, section 8, having a CPUE of 5.02 (Table A-1).

Size Structure, Growth and Condition

White Sturgeon captured in Bonneville Reservoir, using setlines, ranged in length from 46 to 259 cm fork length (FL), with a median length of 80 cm FL. The length distribution of the setline catch was 49% ≤ 70 cm FL, 36% 71-95 cm FL, 8% 96-109 cm FL, 4% 110-137 cm FL, 0.4% 138-166 cm FL, and 2% greater than 167 cm FL. The 2024 estimated abundance of White Sturgeon ≥ 54 cm FL in Bonneville Reservoir decreased by 27.9% from the abundance estimated during the 2021 stock assessment (Table A-2). Increases were observed in three of six size class groups in which all sturgeon are distributed, the greatest increase occurred in fish measuring 110-137 cm FL. For this size class, there was an increase of 245% from the previous stock assessment in 2021. The next greatest increase occurred in fish measuring 138-166 cm FL, which roughly increased by 88%.

Growth data were updated to include recoveries of marked White Sturgeon through 2024. Annual growth rates were estimated from recaptures of marked White Sturgeon in Bonneville Reservoir (Figure A-3). Only data from White Sturgeon marked and recaptured in Bonneville Reservoir and at large for greater than six months were included in this analysis. Estimates of annual growth less than 0 and greater than 15 cm/yr were omitted from analysis. This resulted in 5,551 unique annual growth rates which were then grouped into 5 cm FL bins and the mean growth rate for each bin was estimated (Figure A-4). Annual growth rates measured in 2024 were relatively similar to recent estimates.

Weights of White Sturgeon in Bonneville Reservoir ranged from 0.65-124.5 kg, with a median weight of 4.9 kg. The relationship between fork length (L) and weight (W), shown in Figure A-5, was described by the exponential function: $W = 3.00 E - 6 * L^{3.17}$.

Weights of White Sturgeon ranged from 48-340 kg, with a median relative weight of 102, which is a proxy for body condition. Median relative weights by size class were relatively high for most groups (greater than 100; Table A-3). Median relative weights tend to fluctuate over time. Median relative weight of White Sturgeon greater than 160 cm FL had the greatest decrease in 2024 to 88.4 from 105.0 in 2021, which is the lowest median relative weight observed of any size class in the time series. While sturgeon in the 96-137 cm FL size class had an increase in median relative weight, the median relative weight of all other size classes decreased relative to 2021 observations.

Abundance

The estimated abundance of White Sturgeon (≥ 54 cm FL) in Bonneville Reservoir during 2024 was 155,406 (95% CI: 130,641-191,756). The estimated abundance of White Sturgeon per size class showed a decrease in three of the six size class groups. The greatest decrease occurred in the smallest size class, fish measuring 54–70 cm FL with a 40% decrease (49,694 sturgeon), followed by fish measuring 71–95 cm FL which were down in abundance by 25% of the previous estimate (18,817 sturgeon). The estimated abundance of legal-sized White Sturgeon (96–137 cm FL) was 18,744 (95% CI: 15,410-23,919). The greatest increase in estimated abundance occurred in the size range 110–137 cm FL at 245% (4,350 sturgeon). When parsed out by 1-cm bins, it is apparent how much the population has changed, even from the size distribution in recent years (Figure A-6). While the population within the legal-size slot has grown, the abundance of White Sturgeon less than 96 cm FL is much lower than previously observed over recent stock assessments.

Age-0 Indexing

During age-0 indexing, crews set 115 gillnets. Nets fished for a total of 2,640 h, with an average soak time of 23 h. In all reservoirs combined, a total of 62 White Sturgeon were captured resulting in an average CPUE of 0.54 sturgeon per set (Table A-4). Of these, 10 were age-0 sturgeon (Figure A-7). Based on historic data and aging analysis, White Sturgeon measuring ≤ 30 cm FL are age-0. The remaining 52 sturgeon are age-1 or older. Captured White Sturgeon ranged in length from 24 to 104 cm FL. The average fork length of age-0 White Sturgeon was 27.1 cm FL (range: 24-30 cm FL). A total of 52 PIT-tags were applied to captured White Sturgeon across the three reservoirs and of those, 10 were applied to age-0 sturgeon. Two mortalities were encountered in the gill nets, both in Bonneville Reservoir, one was age-0 and the other was 98 cm FL.

Bonneville Reservoir recruitment index was 0.15, a decrease from the previous year, and similar to recent values observed in 2021-2022 (Table A-5). The Dalles recruitment index value of 0.03 decreased over fivefold from 2023. For the tenth time in the last eleven years, John Day Reservoir had a recruitment index value of 0.

Incidental catch for all species captured during age-0 gillnet sampling were identified and enumerated (Table A-6).

A principal factor related to successful spawning years is adequate dam discharge into the tailraces of the dams during the spring months. The 2024 spring discharge averaged only 175 kcfs which likely contributed to below average spawning success. Based on some data exploration, a daily average discharge at McNary Dam of 250 kcfs is the minimum daily outflow needed for successful spawning recruitment.

John Day Reservoir

No white sturgeon were captured in 39 net sets in 2024. Since 2012, there has been only one instance (2019) of detectable recruitment in the John Day Reservoir, and only six measurable recruitments since 2000.

The Dalles Reservoir

A total of 10 White Sturgeon were captured in 36 net sets in 2024. Of these, one was classified as age-0. White Sturgeon, of any size, were captured in 22% of the sets, while age-0 White Sturgeon were captured in 3% of net sets. CPUE was 0.28 for all White Sturgeon and 0.03 for age-0 White Sturgeon.

Bonneville Reservoir

In 40 net sets, a total of 52 White Sturgeon were captured in 2024. Of these, nine were classified as age-0. White Sturgeon, of any size, were captured in 25% of the net sets, while age-0 White Sturgeon were found in 10% of the net sets. CPUE was 1.3 for all White Sturgeon and 0.23 for age-0 White Sturgeon.

DISCUSSION

Stock Assessment

The estimated abundance distribution of White Sturgeon in Bonneville Reservoir for 2024 shows a general trend of fish growing out of the small size classes and distributing throughout larger size classes. The juvenile (50-70 cm FL), sub-legal (71-95 cm FL) and adult (160+ cm FL) size classes are the only groups showing decreases in estimated abundance. The largest decrease of estimated abundance occurred in the smallest size class, White Sturgeon measuring 54–70 cm FL, showing a 40% decrease since the previous stock assessment in 2021 (Table A-2). The large decrease of this size class is related to two factors; the annual growth of White Sturgeon moving into higher size classes, and the low-level recruitment of age-0 fish that has been observed in Bonneville Reservoir since 2015 (Table A-5). Despite favorable recruitment occurring in 2019 and 2020, the lack of or low recruitment in the remaining years since 2014 has not adequately replaced fish growing out of the smallest size class (Figure A-6). When favorable recruitment does occur annually over a several year period, juvenile White Sturgeon populations remain more stable. This can be seen examining the steady recruitment that occurred from 1996 through 1999 and again in 2006 through 2009 (Table-A-5) and the consistent abundance observed within the 2006 and 2009 stock assessments and the 2018 and 2021 stock assessments (Table A-2).

The 2024 stock assessment of Bonneville Reservoir resulted in an abundance estimate of 155,406 White Sturgeon. This is a 28% decrease from the previous stock assessment in 2021 (Table A-2). Across all reported size classes, increases of White Sturgeon abundance were observed in three of the six size classes classified in this study. The greatest abundance increase was in the upper portion of the legal slot limit (110-137 cm FL). The 2024 abundance of White Sturgeon in this size class was estimated to be 6,123, a 245% increase from the 2021 stock assessment. This represents the highest estimate of this size class on record for Bonneville Reservoir (Table A-2). The overall abundance of White Sturgeon within the complete legal-size slot (96 to 137 cm FL) was 18,744, an 86.3% increase relative to the 2021 stock assessment and the second highest estimate recorded for this reservoir (Table A-2). During the previous two stock assessments in Bonneville Reservoir (2018 and 2021), legal-size sturgeon accounted for 3.3% and 4.7% of the estimated abundance, respectively. In 2024, legal-size White Sturgeon accounted for 12.1% of the estimated abundance. The continued increase in legal-size White Sturgeon is further evidence that large numbers of juvenile fish are growing into larger size classes. The combined proportion of juvenile and sublegal White Sturgeon in 2018 and 2021 was 95.1% and 80.9%, respectively. With the estimated abundance of juvenile and sublegal-size White Sturgeon in 2024 declining to 55.3% (n =132,675) of the

total population, this trend is likely to continue if growth rates do not decrease or a large portion of sturgeon recruit to the population.

The subadult (138-166 cm FL) abundance estimate increased 87.9% from the 2021 stock assessment, accounting for 0.4% of the total estimated abundance. While accounting for a relatively small proportion of the total abundance estimate, this is the highest number of White Sturgeon estimated in this size class since 2012. The 2024 stock assessment estimated a decrease of 17.3% of adult White Sturgeon (167+ cm FL) although they represent 2.2% of the total abundance estimate compared to 1.9% in 2021 (Table A-2). Due to relatively low encounter rates for adult White Sturgeon, coupled with the expansion technique used to generate the abundance estimate, this estimate is extremely sensitive to small changes. Even small differences in capture frequency (e.g., \pm one fish) can have a substantial effect on the subsequent abundance estimate. Therefore, it may be more appropriate to consider trends in abundances for these fish, rather than the point estimate of abundance. The growth and development of White Sturgeon into larger size classes where they are of reproductive size is vital to the persistence of the Bonneville Reservoir White Sturgeon population. More White Sturgeon developing into the broodstock size class should increase the likelihood of successful spawning events, but we have not observed great boosts in recruitment in recent years. Recent declines in age-0 recruitment in Bonneville Reservoir likely point to other biological processes or environmental factors that are limiting success.

Population abundance estimates are an important measurement tool to monitor the overall sustainability of a population, but other factors must be considered when looking at the complete health of a population. Indicators of body condition, such as relative weight and annual growth, provide an indirect means of evaluating ecological connections to influences of climate change and food availability, and the effects of management strategies, especially when making size-specific comparisons within and among populations. This is especially relevant in closed systems such as reservoirs where natural mobility and food availability may be truncated. Median relative growth rates tend to follow cyclical pattern over time. This may be the result the changes of food availability over time, or potentially some other unknown environmental factors. It can be observed that, in general, the median annual growth rate appears to have increased in recent years exhibiting an upward trend through size classes that were assessed (Figure A-3). Growth rates of White Sturgeon in Bonneville Reservoir have been trending upward since 2014. This upward trend in annual growth, especially observed in sublegal (71-95 cm FL) and legal-sized (96-137 cm FL) White Sturgeon, is another factor contributing to large increases in the subsequent size classes (Figure A-4). Median relative weight, which is used to express body condition, is variable over time but has maintained a value of 90 or greater across all size classes since 1994 except in two instances occurring in 2012 and 2024. Adult White Sturgeon had a median relative weight value of 88.4, a 15.8% decrease from 2021. Overall, the population showed a decrease in body condition, based on median relative weight, of 2.1% for the 2024 stock assessment (Table A-3).

While mean growth rates over long term periods are informative, it is known that growth rates of juvenile and sub-adult White Sturgeon from ILCRR can vary substantially over time (Figure A-4). Reliability on growth rates for estimating future legal-size abundance can lead to both an over estimation and under estimation of fish population within the larger size classes. If recent growth rates are to be used as a factor to estimate population abundance across size classes, only recent data should be used in the matrix growth model to forecast White Sturgeon forward in time. This will be beneficial not to overestimate, and over exploit, legal-size populations as well as adult size broodstock fish while considering harvest guidelines and future recruitment.

Age-0 Indexing

There was no recruitment detected in the John Day Reservoir, continuing a trend of no to low recruitment since 2000 (Table A-5). Although age-0 recruitment was detected in both Bonneville and The Dalles reservoirs, the recruitment index (E_p) and CPUE remain low. Successful recruitment is tied to environmental factors that trigger White Sturgeon to actively spawn. If conditions are not adequate, spawning may not be successful, or fertilized eggs are not viable. One such environmental condition is rate of flow. Sturgeon are broadcast spawners and rely on turbulent water to mix eggs and milt, transport fertilized eggs downstream, and deposit eggs to settle out into the substrate. In an undisturbed setting, this would occur at the downstream of rapids or waterfalls. In the ILCRR this occurs in the spillways of the dams. A principal factor related to successful spawning years is adequate dam discharge into the tail races of the dams during the spring months. It has been observed that successful spawning occurs when flows are at a minimum of 250 kcfs, based on historical outflow data (Figure A-8). The spring discharge below McNary Dam in 2024 was below the minimum 250 kcfs, averaging only 175 kcfs, which likely contributed to below average spawning success. Since 2018, despite years in which favorable hydrological conditions occur during the late spring and early summer months when spawning takes place, only Bonneville Reservoir has produced measurable recruitment on an annual basis.

Adaptive Management and Lessons Learned

The Stock Assessment conducted in Bonneville Reservoir in 2024 has indicated that the overall abundance of White Sturgeon (≥ 54 cm FL) has decreased since the previous stock assessment in 2021. In addition to the overall abundance decrease, there has been a decrease in the juvenile and sublegal size classes, as well as decreases in the adult size class. Even with the reduction in broodstock sized fish, the proportion of these fish to the overall population increased in 2024. Due to the limited number of broodstock sized fish that are encountered during a sampling season, this number is potentially biased due to infrequency of capture and how this estimate is derived in the abundance modeling. The decrease in broodstock sized White Sturgeon has the potential to lead to lower age-0 recruitment in the future. The lack of detectable age-0 White Sturgeon in the John Day Reservoir in the last ten years, and the overall decline of recruitment in The Dalles Reservoir since 2017 is of the utmost concern from a management perspective. Bonneville Reservoir continues to be the most productive reservoir in which recruitment is measured, but CPUE is on a general downward trend. The overall lack of recruitment will lead to a decrease in the abundance of legal-size, harvestable White Sturgeon within all reservoirs. The increased abundance of legal-size sturgeon in Bonneville Reservoir could lead to incorrect conclusions by the public that these stocks can sustain greater harvest guidelines. Declines in estimated abundance of juvenile and sublegal sturgeon have been observed over the last few stock assessments in Bonneville Reservoir. Without favorable measurable recruitment on an annual basis, the Bonneville Reservoir White Sturgeon population will continue to grow and recruit into the larger size classes with fewer juvenile fish filling those vacancies. It will be beneficial to continue to allow fish to develop into the adult portion of the population to increase the likelihood of successful age-0 recruitment in the future. For these reasons, we recommend keeping exploitation rates for harvest fisheries in Bonneville Reservoir at conservative levels.

Water velocity, which is heavily influenced by dam discharge, appears to be a major component of White Sturgeon spawning success in the ILCRR (Parsley 1993; Parsley et al. 1993; Parsley and Beckman 1994; Counihan and Chapman 2018). Data from age-0 indexing and dam discharge data suggests that higher discharge rates (which create the physical conditions required for successful spawning), generally results in higher levels of age-0 recruitment (Figure A-8). When the average daily discharge rate at McNary Dam during May through July (the primary spawning period for White Sturgeon in the Columbia River) reaches or exceeds 250 kcfs, there has generally been a detectable level of recruitment in all reservoirs. Even with

adequate flow and strong numbers of broodstock adults, long term recruitment in John Day Reservoir remains extremely poor. This suggests other factors may be influencing age-0 recruitment in the John Day Reservoir.

Results obtained through this contract will continue to be shared through a variety of inter-agency and stakeholder meetings including annual meetings of the Sturgeon Management Task Force Technical and Policy Committees, U.S. v. Oregon coordination meetings, meetings with commercial and recreational advisor groups, and a wide variety of other *ad hoc* meetings as needed.

ACKNOWLEDGEMENTS

We would like to thank the following people who helped collect the data used in this report. ODFW: Jadon Snauer and Kile Gianetti; WDFW: Brad Cady, Kevin Fox, Tom SanFilippo, Erick Rockwood, Shaffryn Schade, and Mathew Sturza; CRITFC: Teddy Walsey, Steven Begay, Jackie Culps, Tony Spino, and Phillip Watlamet. We would also like to thank Blaine Parker for his help coordinating our cooperative sampling program with CRITFC and the individual treaty tribes.

FIGURES

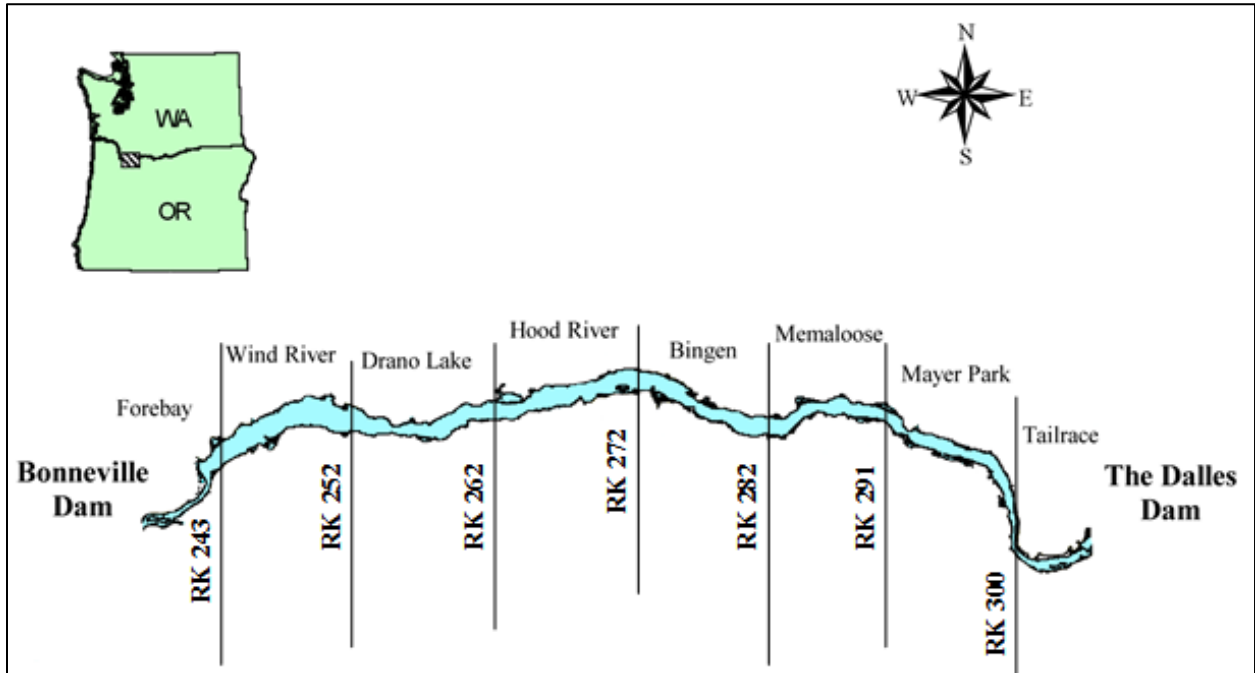


Figure A-1: Map of Bonneville Reservoir.

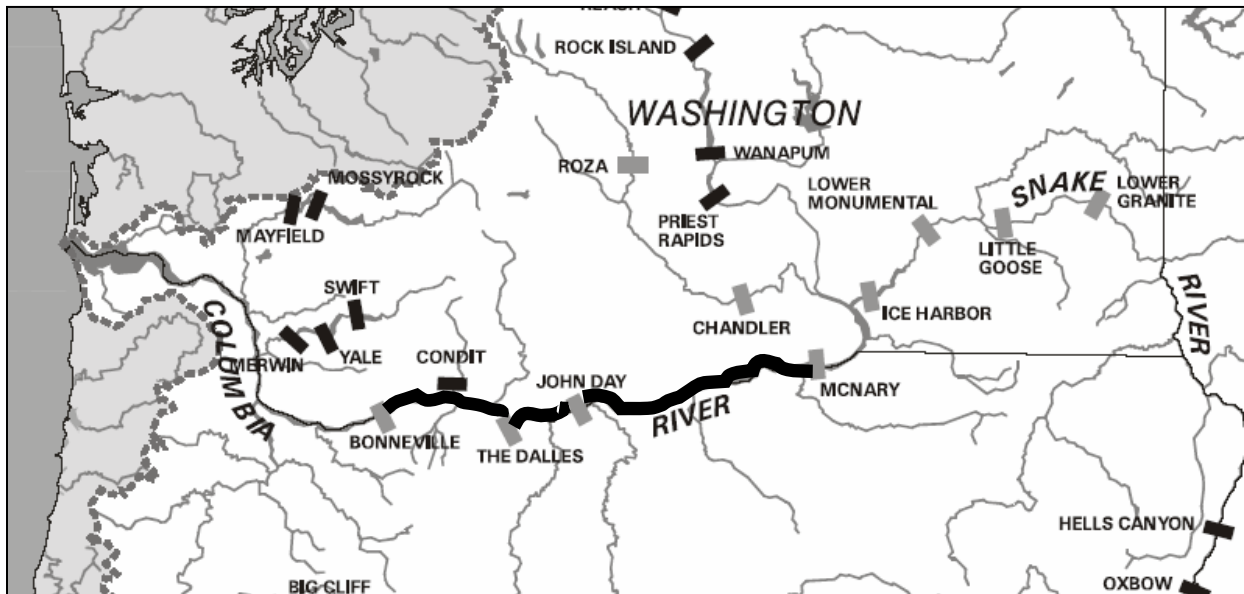


Figure A-2: Map of the mid and lower Columbia River basins with bolded river sections indicating the reservoirs in which age-0 sampling took place during 2024. Black and grey blocks denote dams in the region.

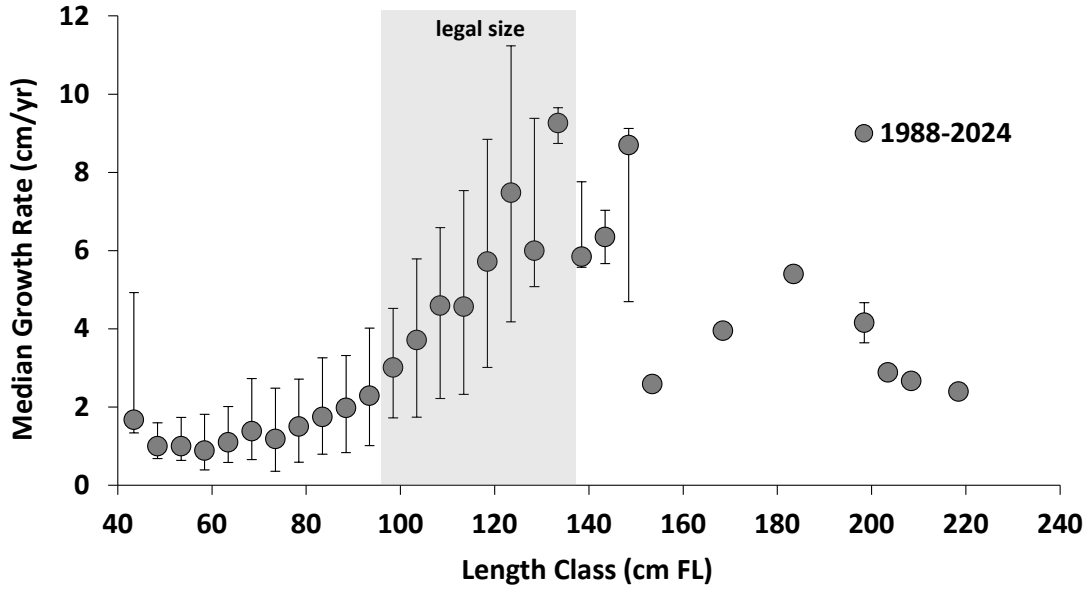


Figure A-3: Median annual growth rates by size class of White Sturgeon from Bonneville Reservoir, 1987–2024. Error bars represent one standard deviation.

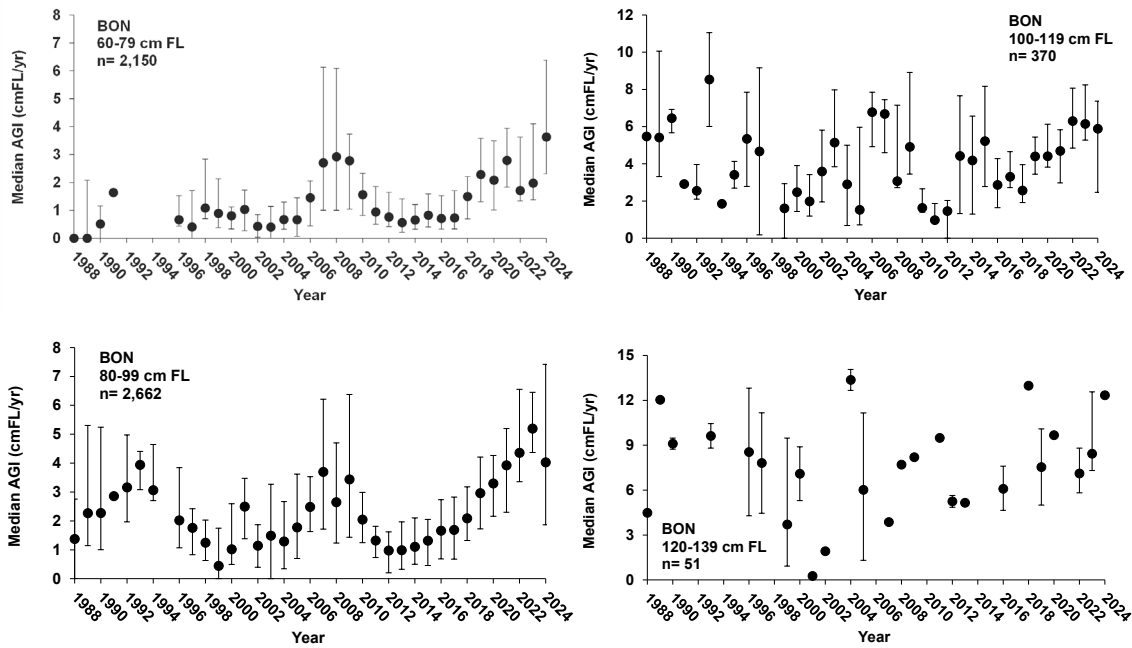


Figure A-4: Median annual growth rates by size class of White Sturgeon from Bonneville Reservoir, 1987–2024.

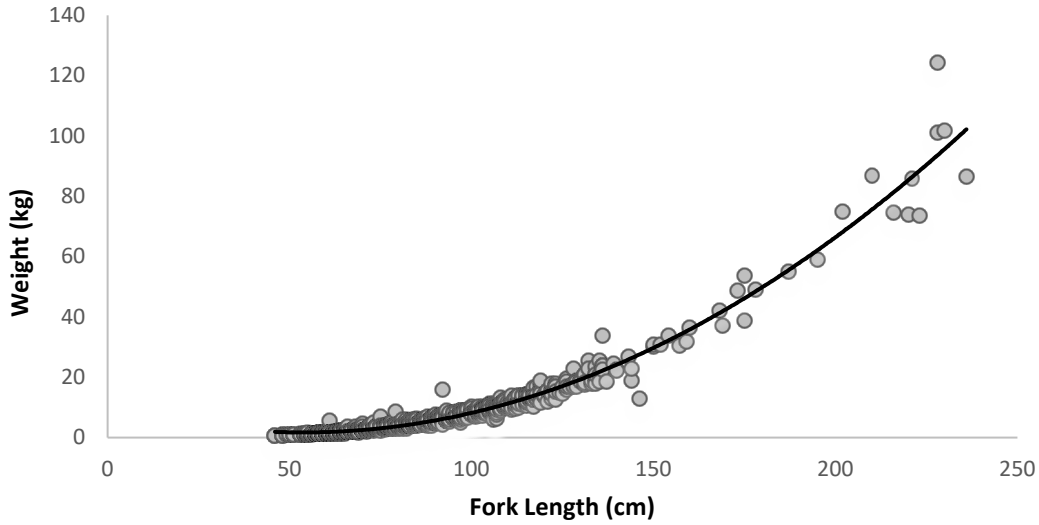


Figure A-5: Length-weight relationship of White Sturgeon captured with setlines during stock assessment sampling in Bonneville Reservoir. The line represents a best fit curve of the data.

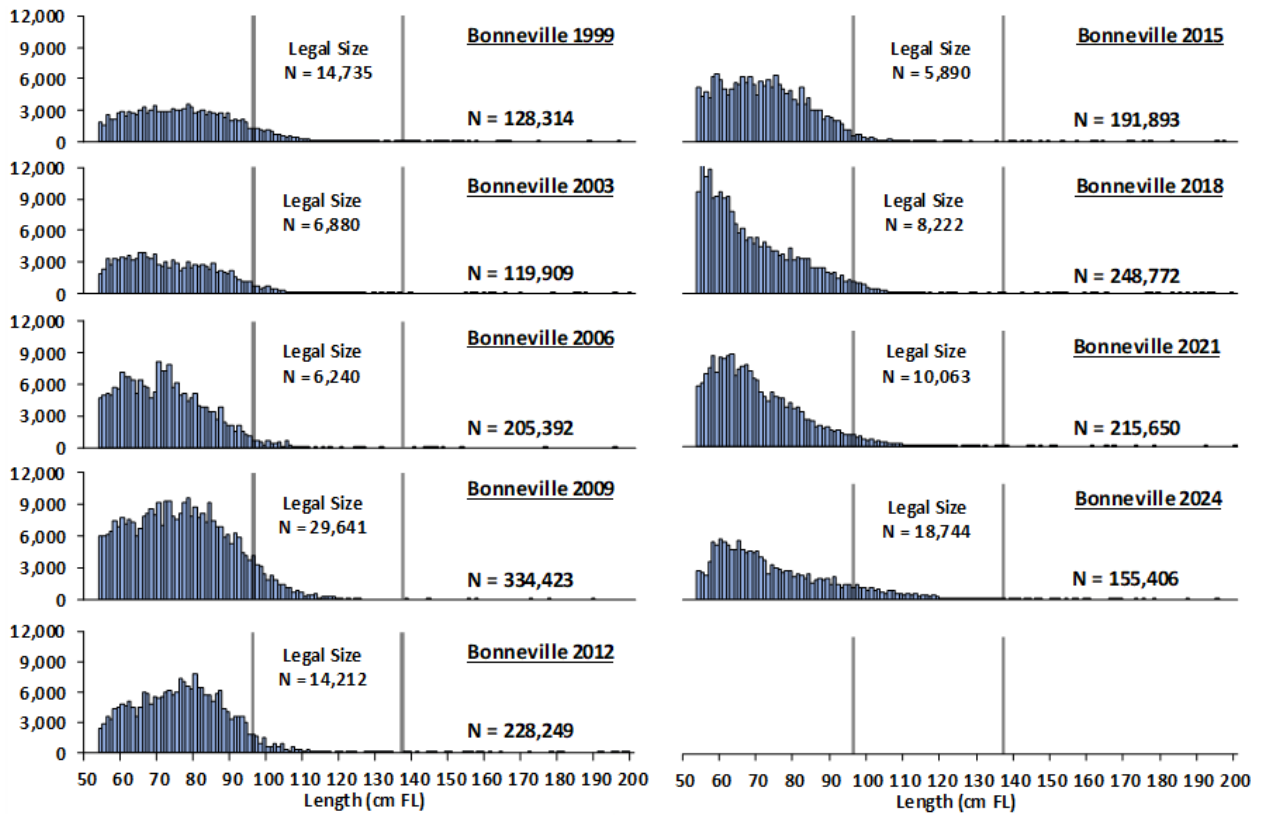


Figure A-6: Estimated abundance of White Sturgeon ≥ 54 cm FL in Bonneville Reservoir, 1997–2024.

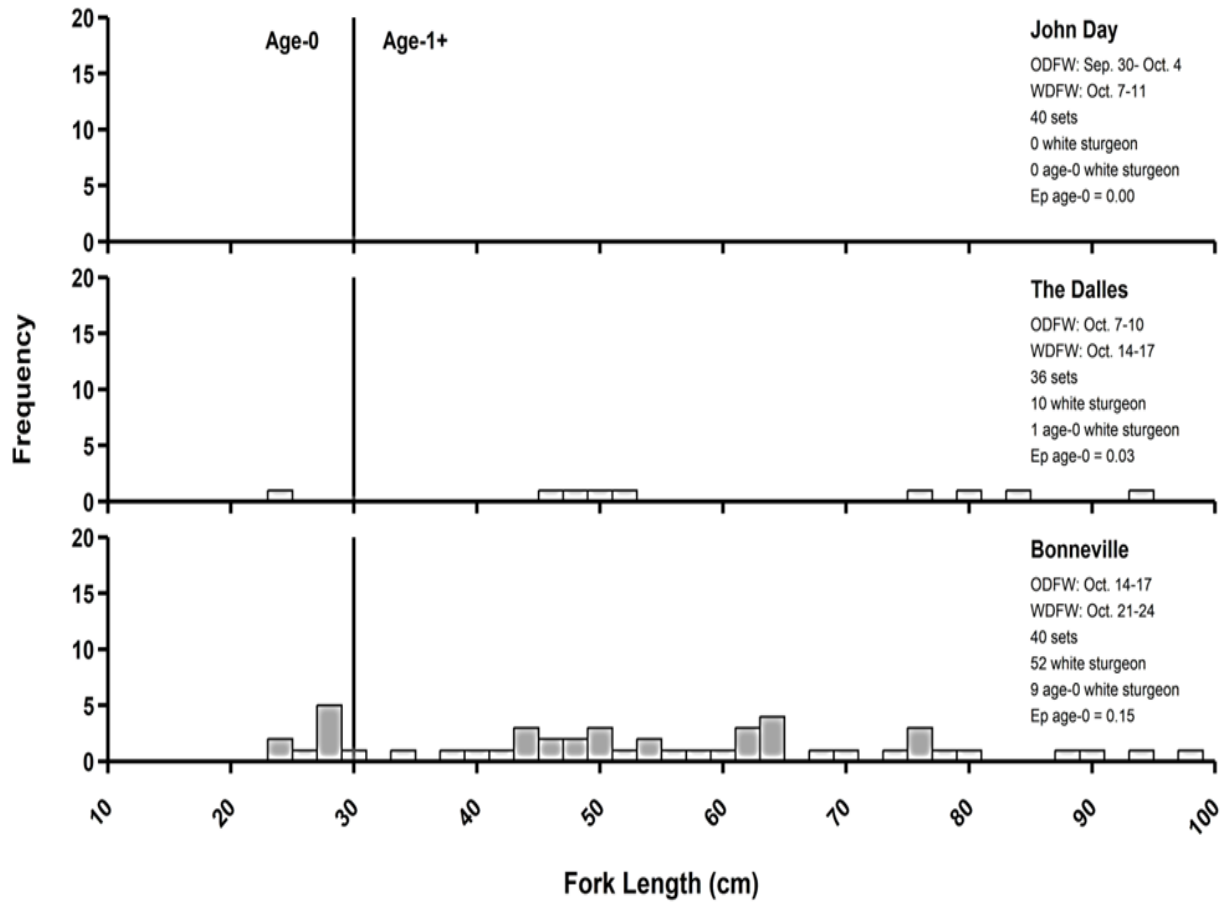


Figure A-6: Length-frequency distribution of White Sturgeon caught from Bonneville, The Dalles, and John Day reservoirs during the 2024 age-0 recruitment indexing surveys.

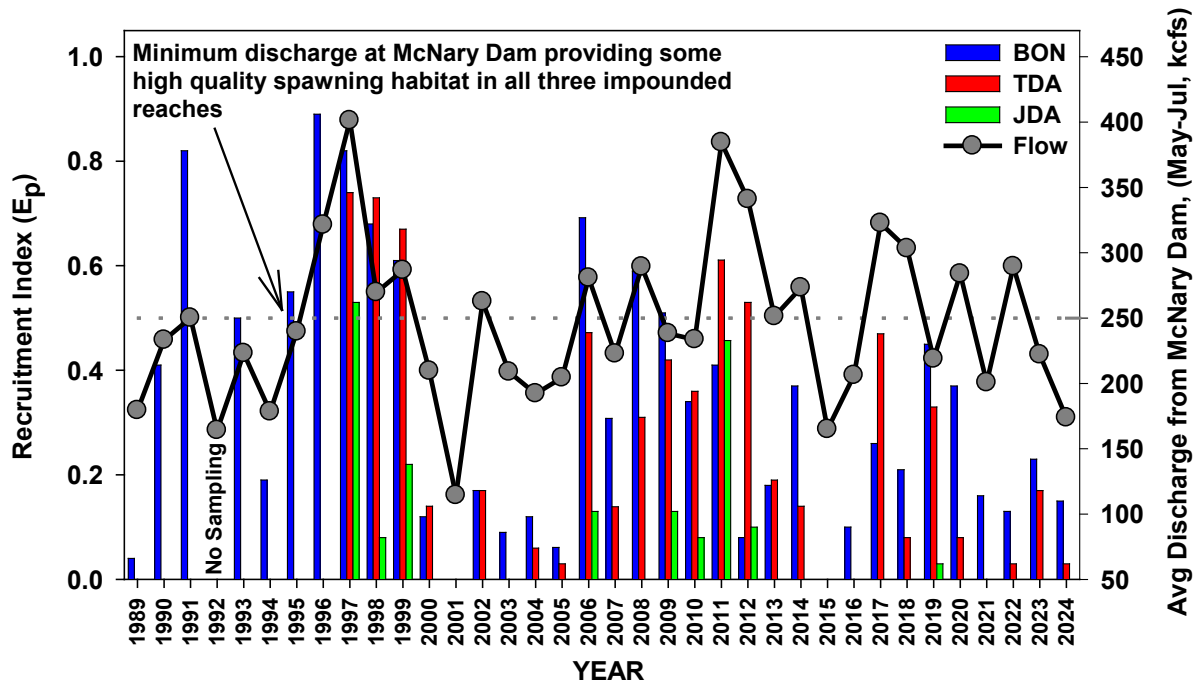


Figure A-7: Annual recruitment of age-0 White Sturgeon and average daily discharge from McNary Dam (May – July), 1989–2024. Note: Beginning in 2006, age-0 indexing in Bonneville Reservoir switched from trawl surveys to gillnet surveys.

TABLES

Table A-1: Sampling effort (number of setlines), catch (WST), and catch-per-unit-effort (CPUE), for White Sturgeon in Bonneville Reservoir by week and sampling section in periods 2 and 3.

Week		<u>Sampling Section</u>								Weekly Totals	
		1	2	3	4	5	6	7	8		
Period 2	23	Effort							25	24	49
		WST							221	188	409
		CPUE							8.84	7.83	8.35
	24	Effort	24	26							50
		WST	89	220							309
		CPUE	3.71	8.46							6.18
	25	Effort			28	28					56
		WST			275	291					566
		CPUE			9.82	10.4					10.1
	26	Effort					25	30			55
		WST					232	362			594
		CPUE					9.28	12.1			10.8
Period 3	33	Effort	24	26							50
		WST	194	344							538
		CPUE	8.08	13.2							10.8
	34	Effort						27	26		53
		WST						350	213		563
		CPUE						13	8.19		10.6
	35	Effort			28	28					56
		WST			354	429					783
		CPUE			12.6	15.3					14
	36	Effort					24	22			46
		WST					314	304			618
		CPUE					13.8	13.8			13.4
Section	Effort	48	52	56	56	49	52	52	50	415	
Totals	WST	283	564	629	720	546	666	571	401	4380	
	CPUE	5.89	10.8	11.2	12.2	11.1	12.8	11	5.02	*10.5	

* Average weekly CPUE

Table A-2: Abundance estimates by size-class from stock assessments in Bonneville Reservoir 1999–2024.

	54-70 cm FL	71-95 cm FL	96-109 cm FL	110-137 cm FL	96-137 cm FL ¹	138-166 cm FL	167+ cm FL	All
Year	(21-27" FL)	(28-37" FL)	(38-42" FL)	(43-54" FL)	(38-54" FL)	(55-65" FL)	(66+" FL)	(54+ cm FL)
1999	45,501	67,166	11,507	3,228	14,735	620	292	128,314
2003	55,015	57,117	5,860	1,020	6,880	151	746	119,909
2006	100,081	98,472	5,648	592	6,240	355	243	205,392
2009	123,420	180,021	26,322	3,319	29,641	277	1,064	334,423
2012	76,489	134,570	11,757	2,455	14,212	1,004	1,974	228,249
2015	90,965	93,995	4,845	1,045	5,890	433	610	191,893
2018 ^{2,3}	161,594	74,962	7,344	878	8,222	521	3,473	248,772
2021	125,758	75,428	8,290	1,773	10,063	330	4,070	215,650
2024	76,064	56,611	12,621	6,123	18,744	620	3,367	155,406
2024 95% CI's					(15,410-23,919)			(130,641-191,756)

¹ 96 – 137 cm FL represents the size range of legally harvestable fish (sport and commercial) in BON

² Methodology used to correct for setline size selectivity was updated in 2018

³ Numbers for 2018 were updated

⁴ 95% confidence intervals (CI's) estimated using the Delta Method

Table A-3: Median relative weights of White Sturgeon from Bonneville Reservoir, 1994–2024. Shaded values represent estimates with a low sample size (n<5).

Median Relative Weights						
	<70 cm FL	70-95 cm FL	96-137 cm FL	138-159 cm FL	160+ cm FL	All
Year	(<31 in TL)	(31-48 in TL)	(48-60 in TL)	(60-70 in TL)	(70+ in TL)	
1994	109.2	106.7	107.4	102.9	95.8	106.6
1999	--	96.8	102.0	101.4	93.1	97.3
2003	93.6	91.5	90.9	95.3	100.8	91.8
2006	100.1	94.1	96.0	98.2	90.7	95.4
2009	95.0	100.2	97.5	108.2	90.3	99.3
2012	96.2	91.5	87.9	88.7	94.1	92.2
2015	93.0	92.7	98.6	109.9	96.5	93.0
2018	98.2	91.0	93.0	95.5	99.0	92.1
2021	103.1	105.1	99.9	95.4	105.0	104.1
2024	102.1	102.5	100.9	95.3	88.4	102.0

Table A-4: Effort and catch of White Sturgeon in Columbia River reservoirs during age-0 sampling, October 2024. BON = Bonneville, TDA = The Dalles, and JDA = John Day reservoir.

Parameter	<u>Reservoir</u>			Combined
	BON	TDA	JDA	
Gill Net Sets	39	36	40	115
Whites Sturgeon Catch (all sizes)	52	10	0	62
White Sturgeon Catch (Age-0)	9	1	0	10
White Sturgeon CPUE	1.33	0.28	0	0.54
Age-0 White Sturgeon CPUE	0.23	0.03	0	0.09
Prop. of Positive Sets (all sizes)	0.64	0.22	0	0.29
Prop. of Positive Sets (Age-0)	0.15	0.03	0	0.06

Table A-5: Annual recruitment index for age-0 White Sturgeon in Columbia and Snake River reservoirs, 1989–2024. Recruitment, in Ep, is equal to the proportion of sets capturing at least one age-0 White Sturgeon. Dashes indicate when sampling did not occur, see notes for specific information.

Year	LCR	Will. R.	BON ¹	TDA	JDA	MCN	IHA	LGO
1989			0.04					
1990			0.41					
1991			0.82					
1992								
1993			0.50					
1994			0.19					
1995			0.55					
1996			0.89					
1997			0.82	0.74	0.53		0.00	
1998			0.68	0.73	0.08			0.32
1999			0.61	0.67	0.22	0.08	0.03	0.08
2000			0.12	0.14	0.00	0.00	0.00	0.00
2001			0.00	0.00	0.00	0.00	0.00	0.00
2002			0.17	0.17	0.00	0.06	0.00	0.00
2003			0.09	0.00	0.00	0.00	0.00	0.00
2004	0.44		0.12	0.06	0.00	0.00	0.00	0.00
2005	0.49		0.06	0.03	0.00	0.03	0.00	0.00
2006	0.52		0.69	0.47	0.13	0.06		
2007 ²	--		0.31	0.14	0.00	0.06		
2008	0.45		0.59	0.31	0.00	0.06		
2009	0.78		0.51	0.42	0.13	0.06		
2010	0.18	0.24	0.34	0.36	0.08	0.00		
2011	0.34	0.06	0.41	0.61	0.46	0.26		
2012	0.35	0.22	0.08	0.53	0.10			
2013 ³	0.12	--	0.18	0.19	0.00			
2014	0.31	0.38	0.37	0.14	0.00			
2015	0.05	0.26	0.00	0.00	0.00			
2016	0.14	0.50	0.10	0.00	0.00			
2017	0.58	0.46	0.26	0.47	0.00			
2018	0.27	0.83	0.21	0.08	0.00			
2019	0.19	0.58	0.45	0.33	0.03			
2020 ⁴	--	--	0.37	0.08	0.00			
2021	0.02	0.17	0.16	0.00	0.00			
2022	0.18	0.29	0.13	0.03	0.00			
2023	0.07	0.42	0.23	0.17	0.00			
2024	0.02	0.08	0.15	0.03	0.00			

¹ Index values for BON from 1989-2005 (shaded area) are based on standardized trawl efforts conducted by the USGS. Index values for BON from 2006 to present are based on standardized gillnet efforts.

² No sampling in the lower Columbia River in 2007.

³ Incomplete sampling in the lower Columbia River, and no sampling in the Willamette River in 2013.

⁴ No sampling in either the lower Columbia River or the Willamette River in 2020 due to COVID-19 restrictions.

Table A-6: Catch of no-target species during sampling for age-0 sturgeon in Bonneville, The Dalles, and John Day reservoirs, October 2023. Disposition: 1 = alive and released, 3 = dead or dying at capture. No animals were sacrificed in 2023.

Species	Bonneville			The Dalles			John Day			Combined		
	1	3	Total	1	3	Total	1	3	Total	1	3	Total
American Shad <i>Alosa sapidissima</i>	1		1	1		1				2		2
Bullhead Catfish <i>Ameiurus</i> spp.							7		7	7		7
Channel Catfish <i>Ictalurus punctatus</i>	1		1	1		1	30	2	32	32	2	34
Chinook Salmon <i>Oncorhynchus tshawytscha</i>					1	1				1		1
Chiselmouth <i>Acrocheilus alutaceus</i>		1	1								1	1
Coho Salmon <i>Oncorhynchus kisutch</i>	1	5	6							1	5	6
Black Crappie <i>Pomoxis nigromaculatus</i>							1		1	1		1
Largescale Sucker <i>Catostomus macrcheilus</i>							1		1	1		1
Northern Pike minnow <i>Ptychocheilus oregonensis</i>	18	88	106	9	33	42	7	6	13	34	127	161
Peamouth Chub <i>Mylocheilus caurinus</i>	89	321	410	2	7	9	1		1	92	328	420
Pumpkinseed <i>Lepomis gibbosus</i>	1	1		1		1				2	1	3
Sculpin <i>Sculpin</i> spp.	3		3							3		3
Smallmouth Bass <i>Microcheilus caurinus</i>	5	3	8	2	2	4	10	5	15	17	10	27
Walleye <i>Sander vitreus</i>	1	7	8		17	17	16	130	146	17	164	181
Yellow Perch <i>Perca flavescens</i>	7	4	11	3	22	25	76	313	389	86	339	425

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**WHITE STURGEON MITIGATION AND RESTORATION IN THE COLUMBIA AND
SNAKE RIVERS UPSTREAM FROM BONNEVILLE DAM**

ANNUAL PROGRESS REPORT

JANUARY – DECEMBER 2024

Report B

Evaluate the success of developing and implementing a management plan to enhance production of white sturgeon in reservoirs between Bonneville and Priest Rapids dams

This report includes: Progress on implementing the fisheries management component of the white sturgeon management plan for the Columbia River between Bonneville and Priest Rapids dams including results of surveying 2024 sport and commercial white sturgeon fisheries.

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March 2025

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ABSTRACT

In 2024, staff from the Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), and the Columbia Inter-Tribal Fish Commission (CRITFC) conducted monitoring of sturgeon fisheries between Bonneville Dam and McNary Dam, a region referred to as Zone 6. The non-Treaty recreational effort and harvest per unit effort (HPUE) showed an increase across all three reservoirs compared to the previous season. The recreational harvest in Bonneville Reservoir was 692 fish, representing 102.5% of the harvest guideline. In The Dalles Reservoir, 271 fish were harvested (98.5% of the guideline), while 96 fish were harvested in the John Day Reservoir (91.4% of the guideline).

The treaty commercial harvests were documented, with Bonneville Reservoir reporting a harvest of 1,111 fish, exceeding the established guideline by 165%. In 2024, the catch guideline for The Dalles Reservoir was adjusted, increasing by 265 fish, reflecting an increase in the abundance of legal-sized fish. The reservoir recorded a treaty commercial harvest of 852 fish, which represented 103% of the guideline, while John Day Reservoir documented a harvest of 206 fish, or 98% of the guideline.

Compared to 2023, recreational fisheries experienced increased effort and higher catch rates. This rise can be attributed to multiple factors, including warmer water temperatures and milder weather conditions during the retention season which allowed anglers to extend their time on the water. Additionally, heightened interest in the fishery, potentially driven by the urgency to harvest a fish before a possible early season closure, has contributed to increased participation, along with no retention opportunities below Bonneville Dam. As a result, managing the Zone 6 fisheries has become increasingly complex, requiring careful monitoring and adaptive strategies to balance sustainability with growing angler demand.

INTRODUCTION

This annual report describes progress made by the Washington Department of Fish and Wildlife (WDFW) toward completing tasks outlined in the Statement of Work for Bonneville Power Administration Project 1986-050-00, White Sturgeon Mitigation and Restoration in the Columbia River Upstream from Bonneville Dam. The reporting period is from January 1 through December 31, 2024.

Washington Department of Fish and Wildlife (WDFW), in cooperation with Oregon Department of Fish and Wildlife (ODFW), monitored the 2024 recreational fishery on the Columbia River from Bonneville Dam upstream to McNary Dam (Columbia River commercial management unit Zone 6) to estimate white sturgeon *Acipenser transmontanus* harvest. The Columbia Inter-Tribal Fish Commission (CRITFC) monitored the treaty commercial fisheries in Zone 6.

METHODS

Compliance with the Sturgeon Management Task Force (SMTF) annual harvest guidelines was addressed through in-season management actions. Monitoring of the 2024 recreational fishery was conducted in Bonneville and The Dalles reservoirs, and the portion of the John Day Reservoir between Crow Butte Park at river kilometer (rkm) 423 (Figure B-1) and McNary Dam at rkm 470, where fishing was concentrated. Methods were similar to those used annually since 1995 (James et al., 1996), and follow accepted procedures documented in Method ID 3784 on [monitoringmethods.org](https://www.monitoringmethods.org) (also described in James et.al., 1996).

Angling effort (angler hours) was estimated by counting anglers within representative index areas and expanding those counts to the entire reservoir using an established relationship derived from the 1987 to 1991 aerial counts of anglers within and outside of established index areas (Hale and James, 1993). Thirty-nine indices of angler effort (17 in Bonneville Reservoir, 10 in The Dalles Reservoir, and 12 in John Day Reservoir) were established at popular fishing locations and vantage points in each reservoir and have remained essentially the same since 1995. One Oregon bank index area (rkm 262) was reassigned upriver and shared by two adjacent locations (rkm 270 and rkm 271) in 2000 to account for a shift in Oregon bank angler effort (James et al., 2001). Another Oregon bank index area (rkm 439) was dropped in 2013 due to closure by the landowner. One Washington bank index area (rkm 270) was dropped in 2005 due to lack of angler use. Subsequently, access to that site has been restricted by the landowner (Burlington Northern Railroad). Harvest estimates were derived for each angling method (bank/boat), reservoir subsection, and weekend/weekday type to account for differential catch and sampling rates. Harvest and angling effort estimates were derived for each day the fisheries were open.

RESULTS

Recreational sturgeon-retention fisheries open on January 1 in the Zone 6 reservoirs per permanent rule and continue seven days-per-week until the reservoir-specific guideline is met (Table 15). On October 31, 2023, the states held a Joint State hearing to consider altering the seven days-per-week seasons in Bonneville Reservoir and The Dalles Reservoir. Three days-per-week seasons on Mondays, Wednesdays, and Saturdays were adopted for both fisheries. The fisheries were adopted to open on Monday, January 1, then follow the days-per-week structure until February 7 in Bonneville Reservoir and January 29 in The Dalles Reservoir. Permanent rules were not altered in John Day Reservoir for the 2024 season. After guidelines are met and retention is closed for the year, catch-and-release angling is allowed, except within the designated sanctuary areas downstream of the dam tailraces between May 1 and August 31.

Opening day in Bonneville Reservoir saw particularly high levels of effort and harvest, with 488 fish harvested representing a 184% increase over the 2023 opening day total. The surge in participation and catch success indicated the guideline would likely be reached much earlier than forecasted, prompting the states to close the retention fishery after two days (the end of January 3). This decision, made during a Joint State hearing on January 3, ensured a minimal exceedance of current established harvest limits. In Bonneville Reservoir, the 2024 harvest was estimated at 692 fish, representing 103% of the guideline and a two-day season much shorter than the 5-year

average of 16 days (Figure B-2). Overall, effort and success rates were extremely high, with a 90% rise in overall effort and an 80% increase in catch rates compared to 2023 (Figure B-3).

The Dalles Reservoir fishery experienced similar increases in effort and harvest during the 2024 season, with a total harvest of 271 fish, equivalent to 99% of the revised guideline (Figure B-2). Harvest on opening day was near quadruple the previous year's opening day total, with a 297% increase, reflecting both higher angler effort and improved catch rates. Across the entire retention season, average catch rates rose by 111%, and effort doubled compared to 2023 (Figure B-3). This also led to an early closure of the retention fishery after two days and 189 fish harvested, as decided at the same Joint State hearing mentioned above. After the SMTF increased the non-treaty guideline from 190 to 275 fish in mid-January, two additional retention days, February 24 and February 28, were adopted during a Joint State hearing. This resulted in a final season-total harvest of 271 fish in The Dalles Reservoir over four days of retention.

Effort and harvest in the John Day Reservoir during 2024 were similar to what occurred during the 2020–2022 seasons (Figures B-2 and B-3). Catch rates were steady throughout the season, with slightly more harvest in January and slightly less in March relative to these years. This is in contrast with 2023, where milder weather conditions and warmer water temperatures allowed anglers to fish more often and for longer periods of time during periods of relatively high catch rates. This led to a closure on January 29, 2023, the shortest retention season on record in the John Day Reservoir. Retention during 2024 was closed on March 14 after a season length of 74 days and an estimated harvest of 95 fish, similar to the average season length of 71 days between 2020–2022.

The oversize catch in Bonneville Reservoir accounted for 0.2 percent of the 2024 oversize abundance estimate, consistent with proportions observed in recent years (Figure B-4). In The Dalles Reservoir, the oversize catch represented 10.1 percent of the total 2024 sturgeon catch, and in John Day Reservoir it comprised 36.8 percent of the total 2024 sturgeon catch, reflecting an ongoing trend of increasing oversize catch proportions in these fisheries.

Treaty commercial sturgeon harvests were 1,111 (165% of 675 fish guideline) for Bonneville Reservoir, 825 (103% of 852 fish guideline) for The Dalles Reservoir, and 206 fish (98% of 210 fish guideline) for John Day Reservoir (Table B-1). For ceremonial and subsistence purposes an estimated 394 sturgeon were harvested in Bonneville Reservoir, 61 sturgeon in The Dalles Reservoir, and 15 sturgeon harvested in John Day Reservoir.

DISCUSSION/CONCLUSION

The combination of record levels of effort and higher than average catch rates in Bonneville Reservoir and The Dalles Reservoir led to further reductions in season length compared to the previous five years. Several factors likely led to this combination. Water temperature in these reservoirs was over three degrees Celsius higher than average, likely having a positive effect on catch rates. Weather during the first week of January 2024 was also mild, with warmer daytime temperature and light wind. This likely encouraged more anglers to participate, especially anglers with smaller boats that typically may not be suited for winter conditions in the Columbia River Gorge. Daily effort since 2022 also continues to increase sharply in these fisheries, suggesting an increasing level of popularity not fully explained by positive angling conditions. These higher, more dynamic levels of daily effort and harvest have necessitated managers to set alternative season structures in these fisheries.

Conversely, with the exception of the 2023 season, season-length has been relatively consistent in the John Day Reservoir recreational fishery over the previous five years. During 2024, the accrual of harvest followed a fairly predictable pattern with anglers finding success during the first few weeks in January, followed by a drop in catch rates until they increased again during March after water temperatures also increased. Because of lower levels of daily harvest and consistent season lengths, managers have not altered season structure in recent years.

In The Dalles Reservoir and John Day Reservoir, oversize catches are far more common than in Bonneville Reservoir (Figure B-4). The proportion of oversize sturgeon in the total catch increased for the fourth consecutive year during 2024 in these two fisheries. However, the proportion of oversize sturgeon abundance that was caught remained steady, indicating the relative abundance of oversize fish. Overall, the proportion of the oversize population handled in recreational retention fisheries continues to be limited.

ADAPTIVE MANAGEMENT AND LESSONS LEARNED

Recent increases in daily effort and unseasonably high-water temperatures, leading to higher catch rates, have outpaced increases in the abundance of legal-sized fish in Bonneville and The Dalles reservoirs. This has led to fewer days open for retention in these fisheries. The staggered three days-per-week approach was successful in staying within or not grossly exceeding catch guidelines, however alternative strategies may need to be considered in the future in order to increase the season length of these fisheries. In the John Day Reservoir fishery, daily effort and catch has remained seasonally consistent, leading to relatively predictable season lengths even with a seven days-per-week schedule. Therefore, the approach in this fishery appears to be working and changes to season structure have not been considered.

FIGURES

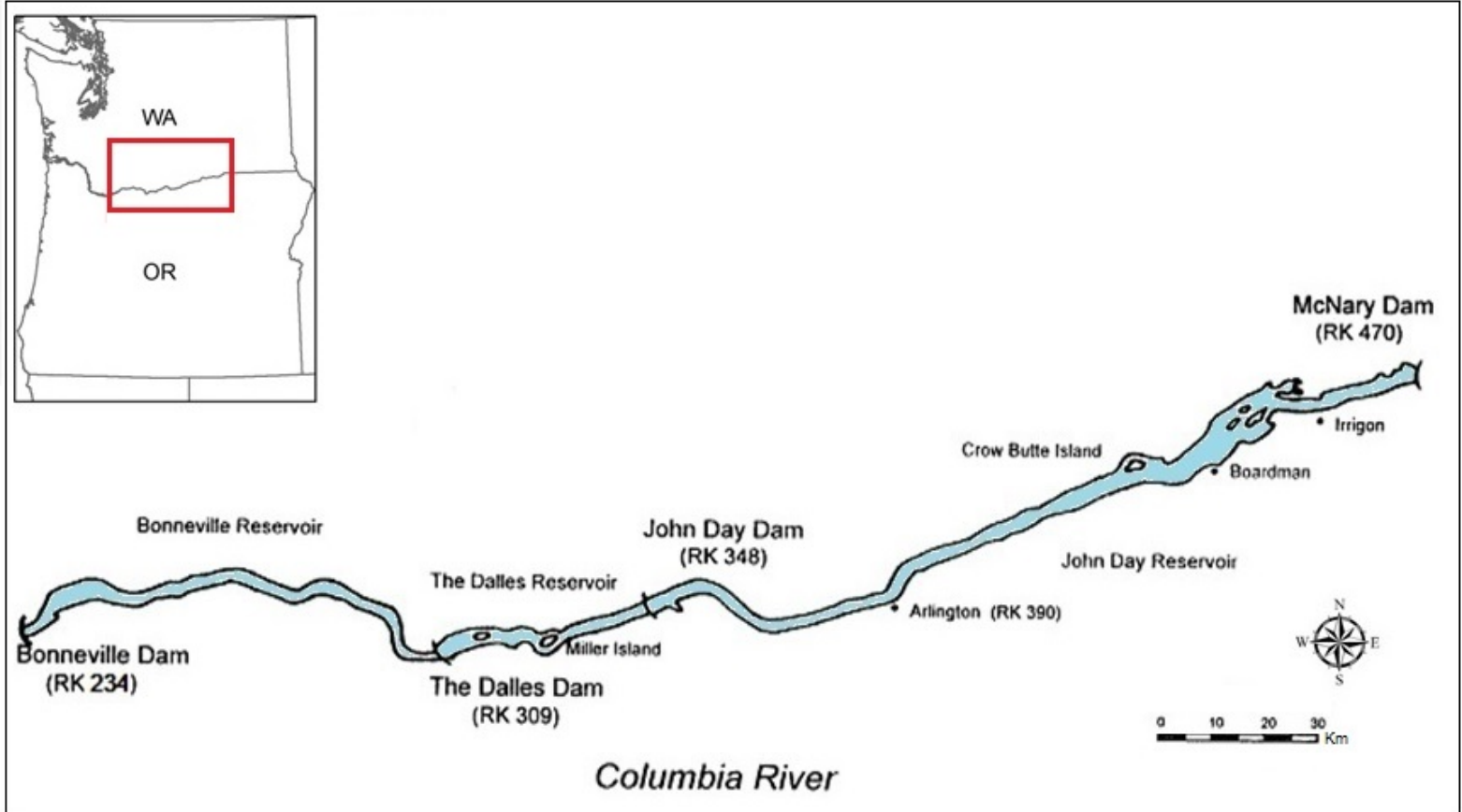


Figure B-1. The recreational fishery survey on the Columbia River occurs throughout Bonneville and The Dalles reservoirs, and from Crow Butte Island upstream to McNary Dam in John Day Reservoir. Commercial fisheries occur throughout all three reservoirs.

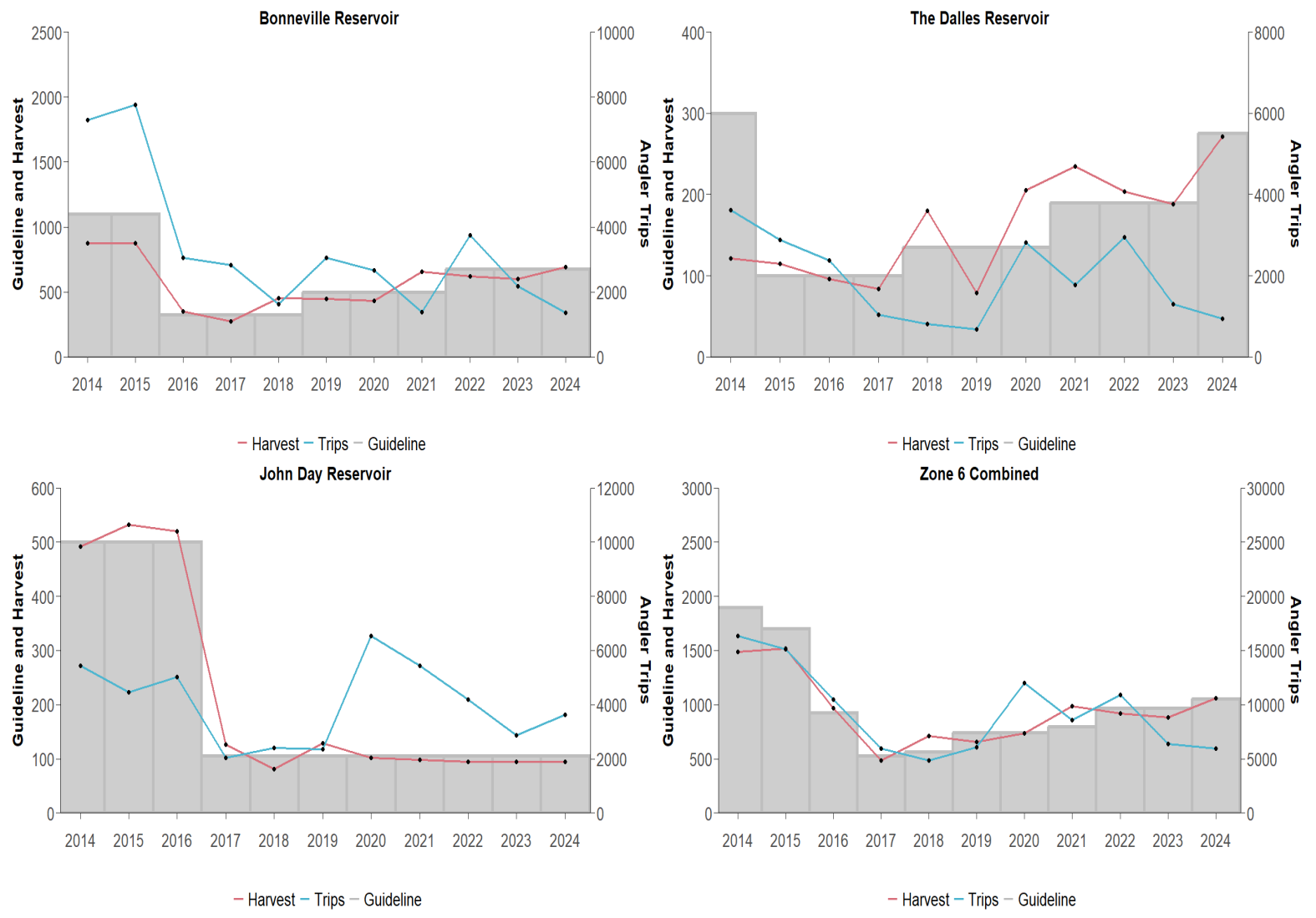


Figure B-2. Sport effort in terms of total angler trips (blue line) and harvest (red line) compared to harvest guidelines (gray bars) in Zone 6 reservoirs on the Columbia River, 2014–2024.

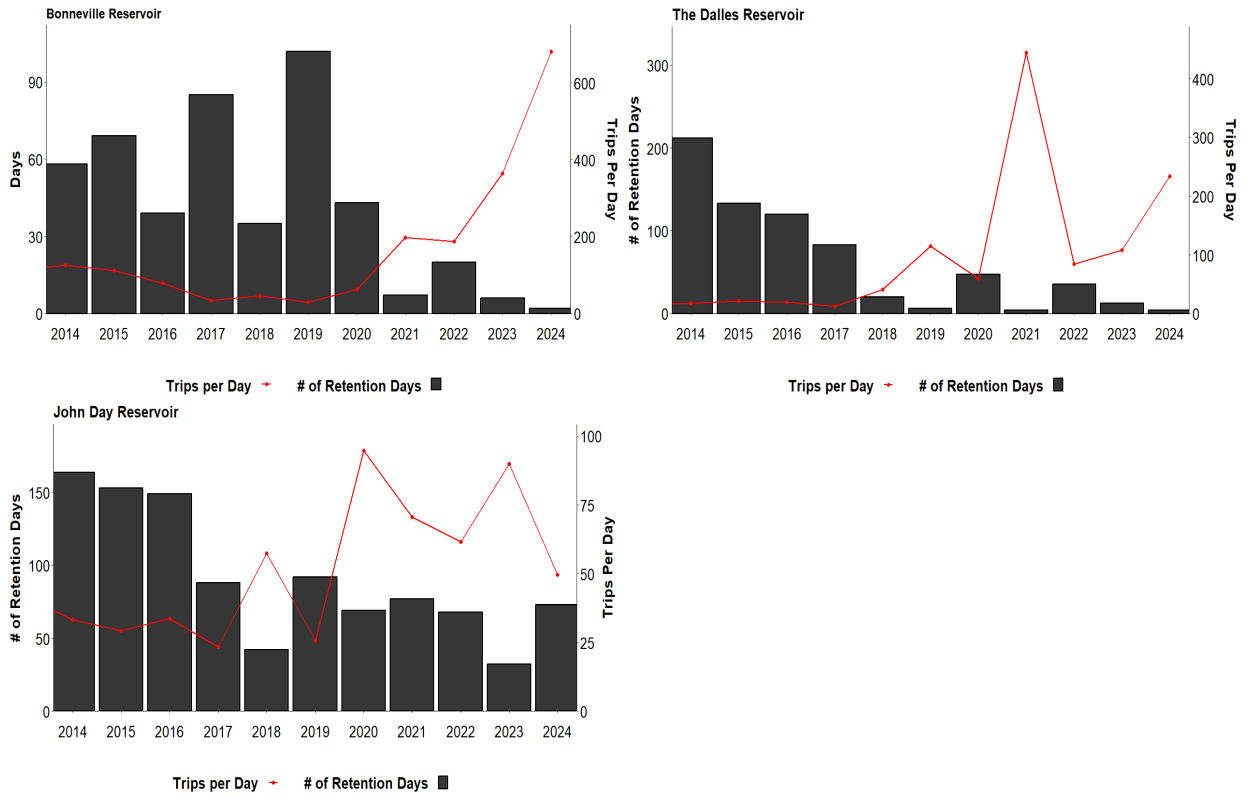


Figure B-3. Length of retention season (gray bars) and angler trips per day (red line) for the Zone 6 reservoirs on the Columbia River, 2014-2024.

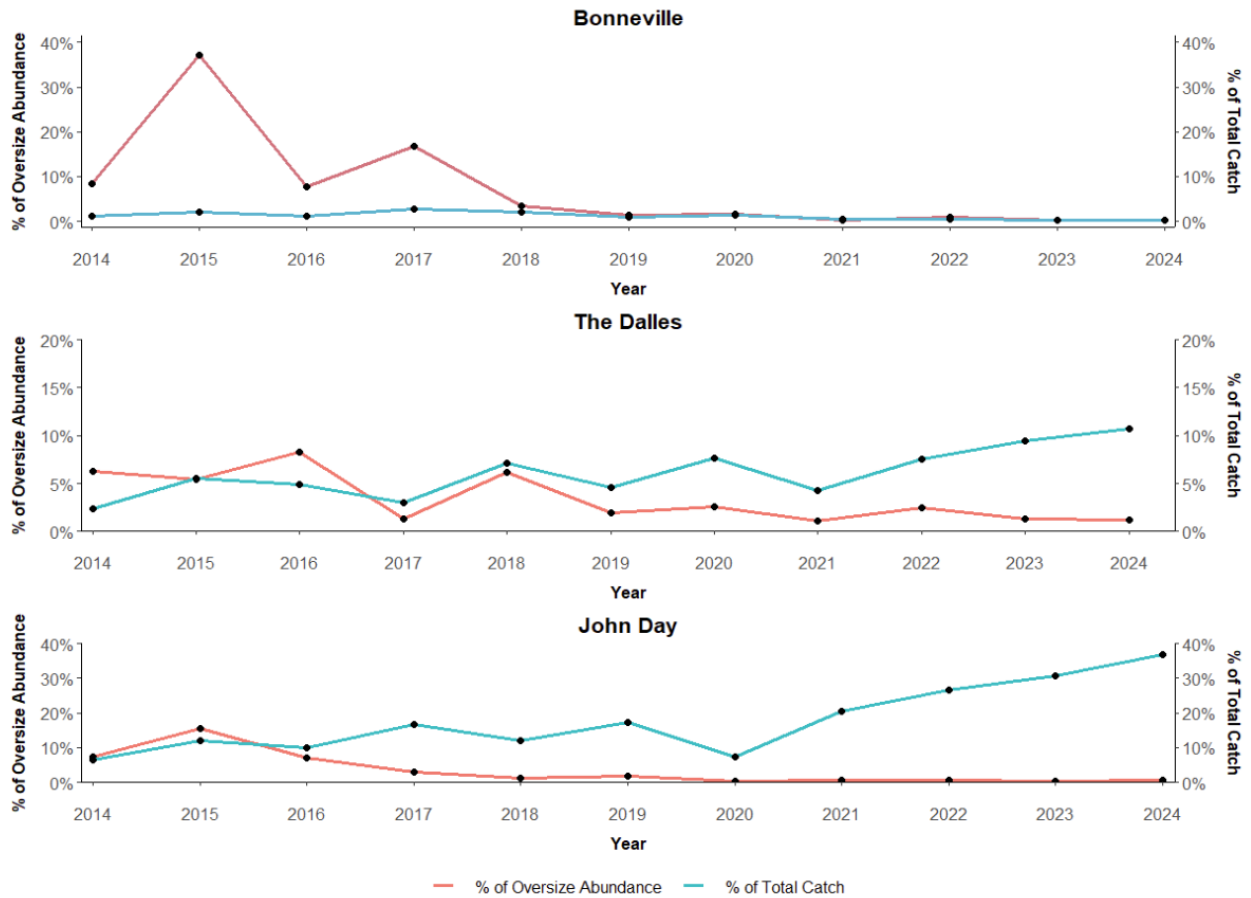


Figure B-4. The reported handling rates of over legal-size sturgeon during retention fishing periods is plotted as a percentage of estimated oversize abundance (blue line, primary y-axis) and as a percentage of total sturgeon catch (red line, secondary y-axis). Spawning sanctuaries were implemented in The Dalles and John Day reservoirs in 2006, in Bonneville Reservoir in 2014, and updated in all three areas in 2019.

TABLES

Area/Fishery	2015		2016		2017		2018		2019		2020		2021		2022		2023		2024	
	Guide-line	Catch	Guide-line	Catch ¹	Guide-line	Catch	Guide-line	Catch	Guide-line	Catch	Guide-line	Catch	Guide-line	Catch	Guide-line	Catch	Guide-line	Catch	Guide-line	Catch
Bonneville Pool																				
Sport	1,100	874	325	349	325	276	325	452	500	448	500	431	500	655	675	622	675	600	675	692
Treaty Commercial	1,100	445	325	236	325	388	325	406	500	630	500	748	500	1,537	675	909	675	830	675	1,111
Total	2,200	1,319	650	585	650	644	650	858	1,000	1,078	1,000	1,179	1,000	2,192	1,350	1,531	1,350	1,430	1,350	1,803
Treaty Subsistence		68		45		63		43		90		249		168		192		175		394
Abundance estimate	5,890						8,222						10,063						18,744	
The Dalles Pool																				
Sport	100	115	100	96	100	84	135	180	135	79	135	205	190	235	190	204	190	188	275	271
Treaty Commercial	325	258	325	264	325	326	415	415	415	426	415	508	560	523	560	829	560	441	825	852
Total	425	373	425	360	425	410	550	595	550	505	550	713	750	758	750	1,033	750	629	1,100	1,123
Treaty Subsistence		33		33		26		33		34		34		36		71		91		61
Abundance estimate			3,664						5,650											
John Day Pool																				
Sport	500	532	500	520	105	126	105	81	105	129	105	102	105	98	105	94	105	95	105	96
Treaty Commercial	1,000	884	1,000	881	295	209	210	166	175	187	210	182	210	166	210	187	210	268	210	206
Total	1,500	1,416	1,500	1,401	400	335	315	247	280	316	315	284	315	264	315	281	315	363	315	302
Treaty Subsistence		107		66		14		13		16		12		29		12		17		15
Abundance estimate			5,177						6,443											
Zone 6 Total																				
Sport	1,700	1,521	925	965	530	486	565	713	740	656	740	738	795	988	970	920	970	883	1,055	1,059
Treaty Commercial	2,425	1,587	1,650	1,381	945	903	950	987	1,090	1,243	1,125	1,438	1,270	2,226	1,445	1,925	1,445	1,539	1,710	2,169
Total	4,125	3,108	2,575	2,346	1,475	1,389	1,515	1,700	1,830	1,899	1,865	2,176	2,065	3,214	2,415	2,845	2,415	2,422	2,765	3,228
Treaty Subsistence		208		144		103		89		140		295		233		275		283		470
Sport retention periods:																				
Bonneville Pool		WI-3/1 6/19-21, 26-28 7/3-5		WI-2/7 6/18		WI-3/24 6/10, 23		WI-2/3 6/15		WI-4/12		WI-2/13		WI-1/7		WI - 1/23, 3/8		WI, 1/2 - 1/11 (MwSa)		WI-1/3 (MwSa)
The Dalles Pool		WI-5/13		WI-4/29		WI-3/24		WI-1/9 6/15		WI-6		WI-2/17		WI-1/4		WI - 3/22 (MwF)		WI, 1/2-1/25 (MwSa)		WI-1/3 (MwSa) 2/24, 2/28
John Day Pool		WI-6/2		WI-5/28		WI-3/23		WI-2/11		WI-4/2		WI-3/9		WI-3/18		WI - 3/10		WI - 1/23, 2/11, 2/15, 2/18		WI-3/14
Commercial open periods ¹																				
Bonneville Pool		WI-1/31 S 2/23-3/21 G		WI-1/31 S 3/14-3/21 G 8/1-8/13 S 11/4-11/26 S		WI-1/31 S 3/6-17 G		WI-1/31 S 3/5-14 8/6-25 10/17-31		WI-1/31 S 3/1-3/23 G		WI-1/31 S 2/27-3/7 G		WI-1/31 S 3/1-3/5 G		WI-1/31 S 3/2-3/4 G		WI-1/31 S 2/27-3/1 S		WI-1/31 S 2/10-2/12 S 3/2-3/4 S
The Dalles Pool		WI-1/31 S 2/2-2/24 G		WI-1/31 S 2/1-3/12 G 11/7-11/12 S		WI-1/31 S 2/1-3/4 G		WI-1/31 S 2/1-16 2/22-3/3 3/15-19		WI-1/31 S 2/1-2/19 G		WI-1/31 S 2/1-2/8 G		WI-1/31 S 2/1-2/6 G		WI-1/31 S 2/1-2/15 G		WI-1/31 S 2/4-2/6 G 3/6/3/8 S		WI-1/31 S 2/10-2/12 S 3/7-3/11 S
John Day Pool		WI-1/31 S 2/2-2/24 G		WI-1/31 S 2/1-3/12 G 11/7-11/12 S		WI-1/31 S 2/1-3/4 G		WI-1/31 S 2/1-3/3 3/15-24 12/11-30 S		WI-1/31 S 2/1-2/27 G		WI-1/31 S 2/1-2/8 G		WI-1/31 S 2/1-2/6 G		WI-1/31 S 2/1-2/28 G		WI-1/31 S 2/1-2/13 G		WI-1/31 S 2/10-2/12 S 3/2-3/4 S

Table B-1. Zone 6 White Sturgeon Harvest Guidelines and Harvest Estimates, 2015–2024.

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**WHITE STURGEON MITIGATION AND RESTORATION IN THE COLUMBIA AND
SNAKE RIVERS UPSTREAM FROM BONNEVILLE DAM**

ANNUAL PROGRESS REPORT
JANUARY – DECEMBER 2024

Report C

Evaluate the success of developing and implementing a management plan to enhance production of White Sturgeon in reservoirs between Bonneville and Priest Rapids dams

This report includes: Results regarding capture and marking efforts in Bonneville Reservoir for White Sturgeon population-abundance estimates for 2023-24.

Prepared by:

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March 2025

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ABSTRACT

Tribal fishers and Yakama Nation fisheries technicians completed Bonneville Reservoir tagging effort in December 2023. Our sampling is a first step in a two-step coordinated process to document White Sturgeon populations in management Zone 6 (i.e. Bonneville, The Dalles, and John Day reservoirs). These reservoirs have been monitored cooperatively by tribal and state fishery managers since the 1990s (Parker 2015). The winter sampling effort, using highly experienced tribal commercial sturgeon fishers and commercial gear, has been an integral part of the co-management effort to document changes in the White Sturgeon population structure for Zone 6 reservoirs. This co-management effort is in cooperation with Oregon Department of Fish and Wildlife and Washington Department of Fish and Wildlife.

INTRODUCTION

This annual report documents the efforts of the Columbia River Inter-Tribal Fish Commission (CRITFC) and its subcontractors, the Yakama Nation (YN) and contract tribal fishers. Jointly, we completed tasks outlined in the Statement of Work for Bonneville Power Administration Project 1986-050-00, White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers Upstream from Bonneville Dam. Winter tagging work was initiated in Bonneville Reservoir on November 29, 2023, and was completed on December 28, 2023 (Figure 1). Tagging efforts often straddle two separate reporting periods (i.e. two separate calendar years) due to the number of weeks necessary to capture and mark the numbers of fish specified in our deliverable. However, the density of sturgeon in Bonneville Reservoir this sample year facilitated high catch rates, so work was completed within the 2023 calendar year, but will be noted as the 2023-24 sampling period within this report.

In addition to winter tagging in Bonneville Reservoir, YN technicians monitored tribal commercial fisheries, specifically the winter setline (January) and gillnet seasons (February and March). Monitoring of tribal fisheries was a cooperative effort with Washington Department of Fish and Wildlife (WDFW), with the results reported in WDFW's companion annual report (Report B). From June-August of 2024, YN technicians worked cooperatively with WDFW stock assessment staff to conduct the summer phase of the population assessment in Bonneville Reservoir. In October 2024, YN fishery technicians again worked with Oregon Department of Fish and Wildlife (ODFW) and WDFW staff to conduct annual young-of-year White Sturgeon surveys in John Day, The Dalles, and Bonneville reservoirs. In December of 2024, White Sturgeon tagging efforts were initiated in John Day Reservoir and results will be reported in the 2025 report.

METHODS

Tagging procedures used are described in (Parker 2015). In addition, the capture and tagging procedures are described in [Method ID. 775 \(monitoringmethods.org\)](#).

RESULTS

Bonneville Reservoir sampling in the winter of 2023-24 captured in 2,980 sturgeons in 92 overnight gillnet sets, a catch per unit effort (CPUE) of 32.4 sturgeons per set. Fish ranged in length from 46 cm fork length (FL) to 260 cm FL, with a mean of 95.3 cm FL (Table C-1). The proportion of sublegal (<97 cm FL) fish was 56.3%, the proportion of legal sized (96-137 cm FL) fish was 43%, and the proportion of oversize (> 137 cm FL) White Sturgeons was 0.7 % of the catch (Table C-2). We applied new PIT tags to 2,640 sturgeons for an 88.6 % overall tagging rate. The incidental catch total of 37 fish, comprising 4 species, was dominated by Common Carp and Coho Salmon (Table C-3).

DISCUSSION

Bonneville Reservoir sampling in 2023-24 was completed in approximately one month, which was several weeks faster than the previous sampling periods in 2017-18 and 2020-21. This was likely because the previous two sampling periods were completed with just two fishers, instead of three fishers in 2023-24. In 2023-24, the CPUE was approximately 2.3 times higher than the 2020-21 CPUE (Table C-1), potentially due to a population shift of larger fish, which are more vulnerable to the commercial sized nets (i.e. 20.3 cm stretched mesh). The 2023-24 CPUE was the third highest value since the 2008-09 sampling period (Table C-2.). The total 2023-24 catch was less than the 2020-21 catch, although the proportion of PIT tags applied increased slightly to 85% from 82% in 2020-21. The mean fork length of sturgeon increased from 89.0 cm to 95.3 cm between the 2020-21 and 2023-24 sampling seasons, respectively. Although a considerable difference, it is not as large as the one seen between 2017-18 and 2020-21 which had an increase of 14.1 cm in 3 years (Table C-2).

The substantive increases in the proportion of legal fish and the corresponding increase in mean fork length may be due in part to the selectivity of the gillnet gear which is designed for larger fish (Figure C-2). The size disparity between the two gears in 2023-24 was like that in 2020-21, unlike the nearly identical length distribution profiles in 2017-18 (Figure C-3). Another potential explanation is the general overall decline of recruitment in Bonneville Reservoir. The combination of back-to-back years of negligible recruitment documented in 2015 and 2016,

along with increased availability of resources from lack of competition with smaller fish may contribute to the increased growth rates of the older juvenile fish (Figure C-4).

ADAPTIVE MANAGEMENT AND LESSONS LEARNED

The legal and oversized portions of the White Sturgeon population in Bonneville appears to be on an upward trend since bottoming out in 2014-18 (Table C-2). However, there is some concern with the downward shift in recruitment that has occurred for decades (Figure C-4). Bonneville Reservoir can be subject to occasional periods of over recruitment, like what occurred after the high recruitment periods in the late 1990s. At this point in time, the fish appear to be growing quickly, but managers may need to exercise some caution if recruitment continues along its current trend, at which point Bonneville Reservoir might become recruitment limited like The Dalles and John Day reservoirs.

ACKNOWLEDGEMENTS

Our sincere appreciation to Yakama Nation fishery technician CRITFC technician Teddy Walsey and to tribal fishers Alfred M^cConville, Louis Longee, and Chris Sargeant and their crew members for their dedication that made our tagging efforts a success. We thank Maria Jim for her data entry and proofing work during field season and Megan Begay for her efforts on daily operations and coordination. We thank ODFW staff who facilitated our data management. We also thank Denise Kelsey for her skill and expertise in the redesign of our field manual, improvement of our Survey 123 electronic data sheets, and assistance in training the technicians.

IN MEMORY

Maria Jim worked with YN Fisheries for 10 years. She started with the Zone 6 genetic sampling program and progressed into a Fisheries Tech who participated in all facets of the Harvest Monitoring Program. She was always willing to partake in all work ventures and did so with a smile on her face and a good attitude. She was well liked and respected among her colleagues, state and federal staffs, and the tribal fishing community. Maria was integral assisting with the winter sturgeon tagging harvest data collection, QA/QC and transfer of the data to the appropriate entities. Her long family history of fishing along the Columbia River made her a valuable member of our Harvest Monitoring Program and she is greatly missed every day.

FIGURES

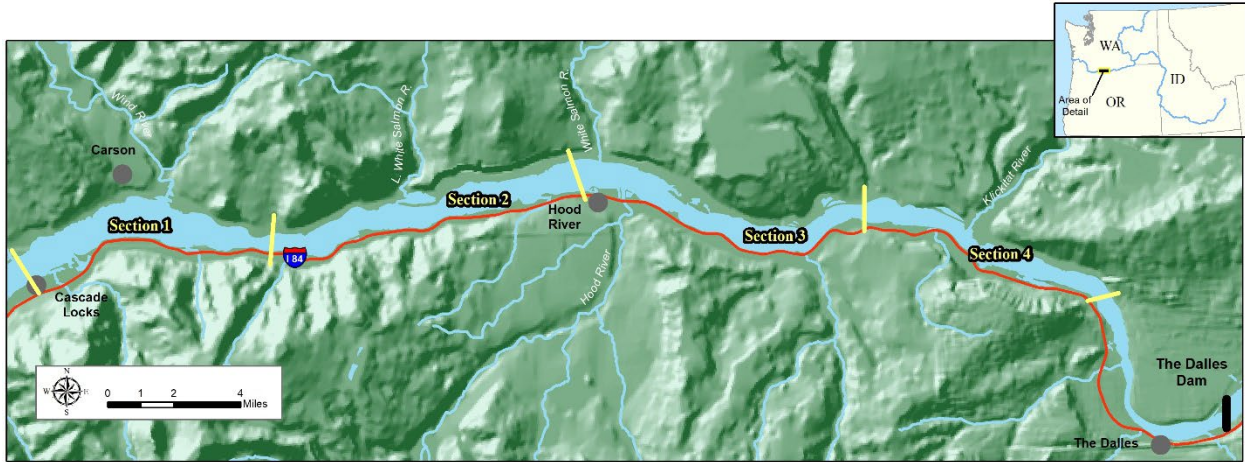


Figure C-1. Bonneville Reservoir, within the Columbia River, with sampled reaches delineated by yellow bars for November 2023 to December 2023 survey period.
Methods

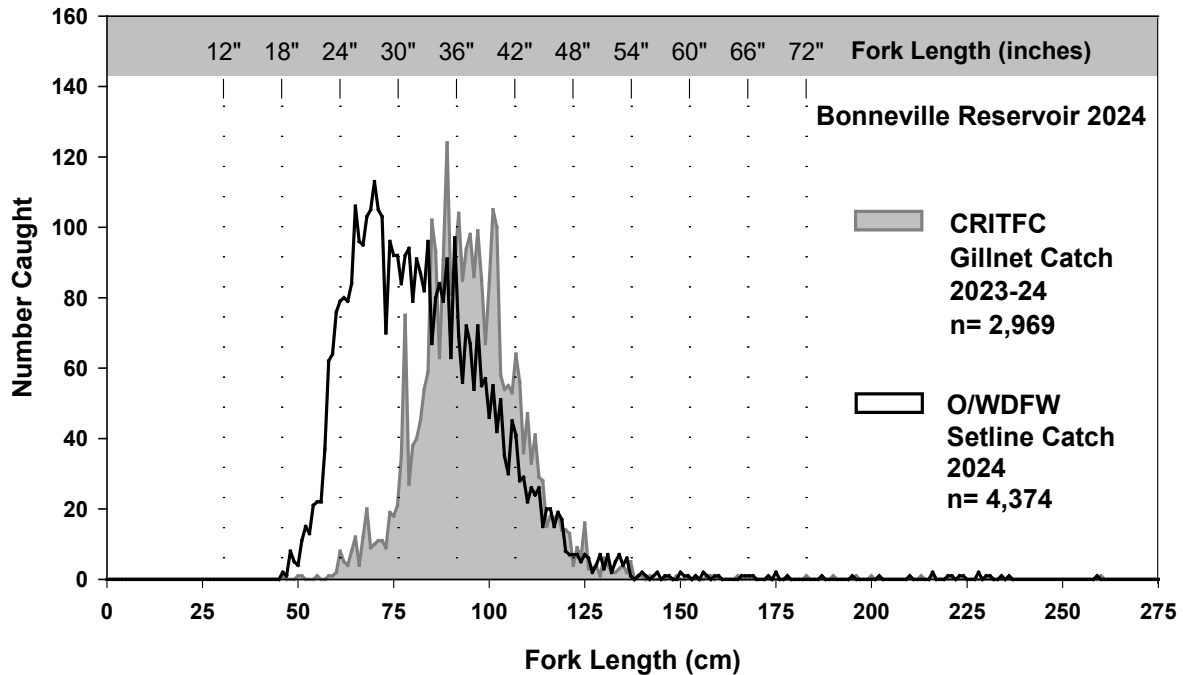


Figure C-2. Length frequency differences between White Sturgeon captured during winter tagging using gillnets and summer 2023-24 stock assessment using setlines in Bonneville Reservoir (from 2025 SMTF Technical Report).

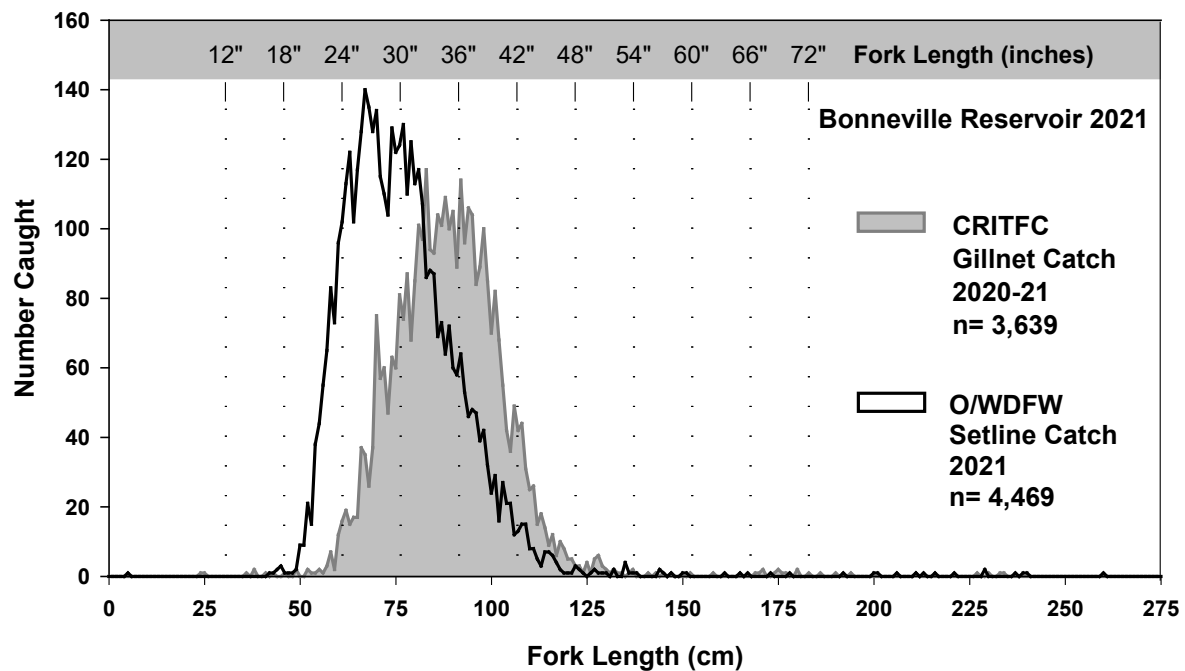
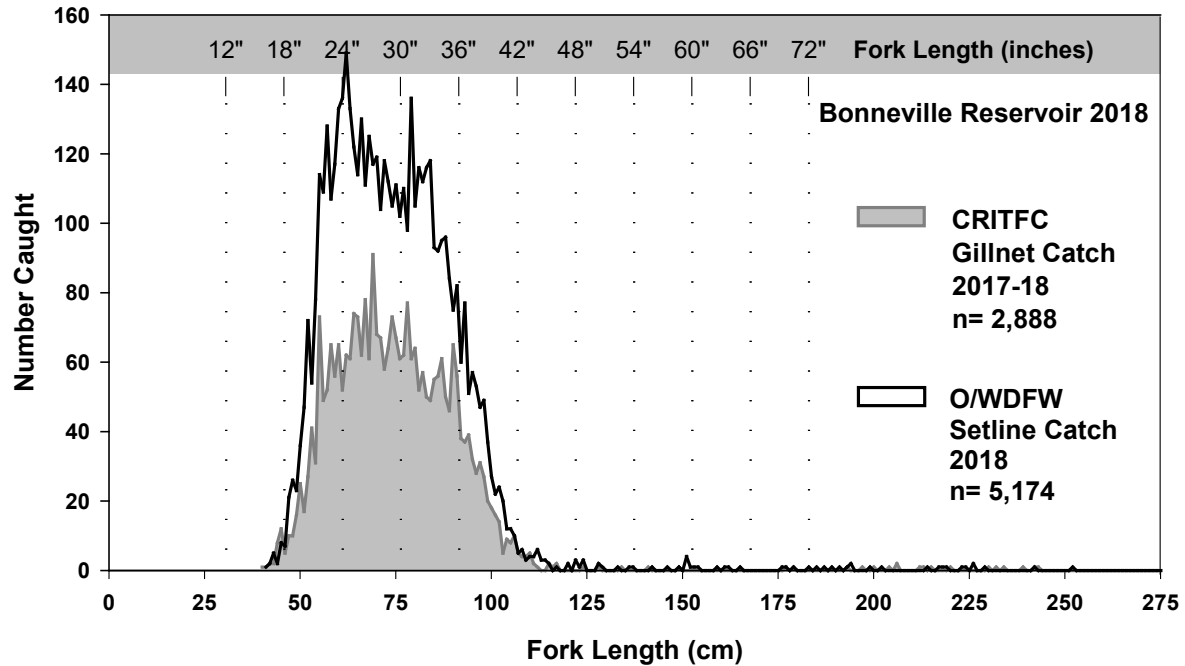


Figure C-3. Length frequency differences between White Sturgeon captured during winter tagging using gillnets and summer stock assessment using setlines in Bonneville Reservoir for the sample seasons 2017-18 and 2020-21 (from the 2019 and 2022 SMTF Technical Reports, respectively).

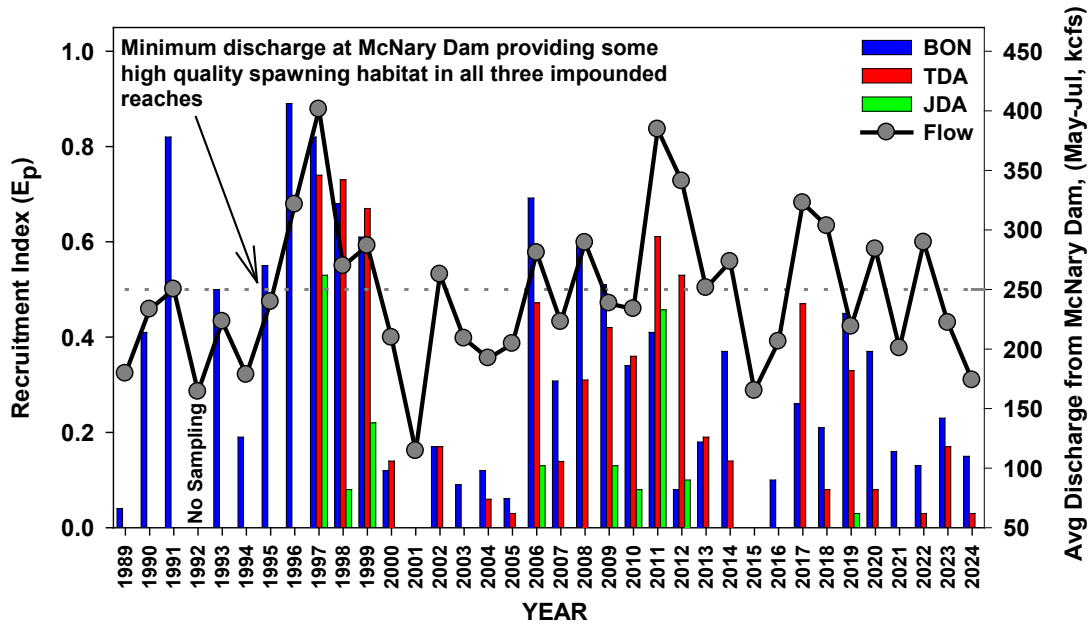


Figure C-4. Annual recruitment of age-0 White Sturgeon and average daily discharge from McNary Dam (May – July), 1989 – 2024. Note: Beginning in 2006, age-0 indexing in BON Reservoir switched from trawl surveys to gillnet surveys. Sampling in TDA and JDA reservoirs began in 1997 (from 2025 SMTF Technical Report).

TABLES

Table 1. Sampling period, catch, number of sets, and catch per set (CPUE) of White Sturgeon with gillnets in Bonneville Reservoir for sampling periods in 2008-09, 2011-12, 2014-15, 2017-18, 2020-21, and 2023-24.

Sampling Period	Catch	No. of Sets	Catch per Set
2008-09	3,739	75	9.9
2011-12	4,599	141	32.6
2014-15	3,290	648	5.1
2017-18	2,909	559	5.2
2020-21	3,640	260	14.0
<u>2023-24</u>	<u>2,992</u>	<u>92</u>	<u>32.4</u>

Table C-2. Proportions of sub-legal (<109 cm FL), legal (109–137 cm FL), and over legal (>137 cm FL) and mean fork length (cm) of White Sturgeons captured with gillnets in sampling periods between 2008-09 and 2023-24 sampling periods in Bonneville Reservoir.

Sample Period	Sub-Legal	Legal	Over Legal	Mean Fork Length (cm)
2008-09	92.1%	7.8%	0.01%	78.2
2011-12	88.3%	11.3%	0.4%	82.0
2014-15	92.0%	7.3%	0.7%	76.4
2017-18	91.9%	7.4%	0.4%	74.9
2020-21	70.0%	29.3%	0.7%	89.0
2023-24	56.3.0%	43.0%	0.6%	95.3

Table 3. Incidentally caught species from the 2023-24 gillnet sampling effort in Bonneville Reservoir.

Species	Released Alive	Released Dead	Total
Chinook Salmon ¹ <i>Oncorhynchus tshawytscha</i>	0	2	2
Coho Salmon ¹ <i>Oncorhynchus kisutch</i>	0	10	10
Common Carp <i>Cyprinus carpio</i>	24	0	24
Smallmouth Bass <i>Micropterus dolomieu</i>	1	0	1

¹ Chinook and Coho Salmon incidentally captured were likely post-spawn fall run fish from the Klickitat River, Washington.

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[Monitoringmethods.org Method ID. 775](https://monitoringmethods.org/MethodID/775)

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