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

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Edited By:

Kevin J. Rybacki
Oregon Department of Fish and Wildlife
Clackamas, Oregon, USA

In Cooperation With:
Columbia River Inter-Tribal Fish Commission
Washington Department of Fish and Wildlife

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EXECUTIVE SUMMARY

We report on our progress from January through December 2020 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 (RM&E) 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 2020 results are:

Report A

- Overall abundance of White Sturgeon >54 cm Fork Length (cm FL) decreased 19% from 82,880 to 67,048 in The Dalles Reservoir from 2017 - 2020.

- Abundance of legal-size fish (110 – 137 cm FL) increased 54% from 2017 (n = 3,664) to 2020 (n = 5,650).

- Condition (relative weight) increased for all size classes from 2017 - 2020. Relative weight across all classes increased from 98 to 113.

- Mean annual growth rates have increased since 2017 stock assessment and are greater when compared to the long-term average (1987 - 2017).

- During 2020 age-0 White Sturgeon young-of-year sampling, measurable recruitment was detected in both Bonneville (n=88) and The Dalles reservoirs (n=4), but not John Day. This marks the seventh time in the last eight years in which no age-0 recruitment were detected in the John Day Reservoir.

Report B

- The number of White Sturgeon retention days in 2019 was 44 in Bonneville Reservoir, 48 in The Dalles Reservoir, and 69 in John Day Reservoir.

- Sturgeon sport harvest estimates were 431 (86% of 500 fish guideline) for Bonneville Reservoir, 205 (152% of 135 fish guideline) for The Dalles Reservoir, and 102 (97% of 105 fish guideline) for John Day Reservoir.

- There were 2,661 angler trips in Bonneville Reservoir, 2,815 in The Dalles Reservoir, and 6,541 in John Day Reservoir. Sturgeon angler trips in Bonneville Reservoir

decreased by 13% from 2019 but the season length was reduced and HPUE increased by 10%. Angler trips in The Dalles Reservoir increased 410% from 2019 while HPUE decreased 37% from a ten year high in2019. Angler trips in John Day Reservoir increased 277% from 2019 while harvest decreased 72%.

- Oversize catch in Bonneville Reservoir was 1.6% of the 2018 oversize abundance estimate, and 1.4% of total 2020 sturgeon catch (oversize catch is not monitored outside of retention seasons). In The Dalles Reservoir, oversize catch was 2.5% of the 2020 oversize abundance estimate, and 7.7% of total 2020 sturgeon catch. In John Day Reservoir, oversize catch was 0.3% of the 2019 oversize abundance estimate, and 7.4% of total 2020 sturgeon catch.

Report C

- Tagging efforts in The Dalles Reservoir captured in 3,940 White Sturgeon in 138 overnight gillnet sets, a catch per unit effort (CPUE) of 28.6 sturgeon per set. Captured fish ranged from 29 – 238 cm Fork Length (cm FL), with a mean of 86.1 cm FL.

- There was a 134% increase in catch rate from the 2016-17 sampling period to the 2019-20 sampling period (28.6 fish per set v. 12.2 fish per set).

- The mean size of fish caught in 2019-20 was 86.1 cm FL compared to 88.7 cm FL in 2016-17.

- The proportion of legal-sized sturgeon increased from 6.1% (2016-17) to 7.7% (2019-20) while the proportion of over-sized sturgeon decreased from 0.9% (2016-17) to 0.4% (2019-20). Proportions of sub-legal sturgeon sampled decreased slightly from 93.0% (2016-17) to 91.8% (2019-20).

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

ANNUAL PROGRESS REPORT

JANUARY – DECEMBER 2020

REPORT A

Evaluate the success of developing and implementing a management plan to enhance 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 Dalles Reservoir.

2) A summary of annual recruitment of age-0 White Sturgeon in three Columbia River reservoirs.

Prepared by:

Kevin J. Rybacki
Michael W. Lovejoy
Colin G. Chapman
Philip C. Simpson

Oregon Department of Fish and Wildlife
17330 SE Evelyn St.
Clackamas, Oregon, USA

March 10, 2021

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ABSTRACT

This report summarizes data collected from 1 January 2020 through 31 December 2020 and provides: 1) an update of abundance, life history parameters, and population dynamics for White Sturgeon *Acipenser transmontanus* in The Dalles Reservoir, and 2) an evaluation of annual recruitment of age-0 White Sturgeon in three impounded lower Columbia River reservoirs.

Sampling to estimate the abundance of White Sturgeon in The Dalles Reservoir was coordinated with staff from the Oregon Department of Fish and Wildlife (ODFW), the Columbia River Inter-Tribal Fish Commission (CRITFC), Yakima Nation (YN), and the Washington Department of Fish and Wildlife (WDFW). The estimated abundance of White Sturgeon ≥ 54 cm FL in The Dalles Reservoir in 2020 (n = 67,048) was 19% less than the 2017 estimate (n = 82,880) and the lowest since stock assessments began in 1997. While abundance decreased overall, abundance of legal-sized fish (110 – 137 cm FL) increased by 54% (n = 5,650), the highest estimate since 2002. Concerns regarding future recruitment into the legal slot exist for The Dalles Reservoir due to decreased abundance of sub-legal and juvenile White Sturgeon. The condition of White Sturgeon in The Dalles Reservoir was the highest on record with the mean relative weight estimated at 113.39 in 2020. Information from recaptured individuals has indicated that somatic growth has also increased since the 2017 stock assessment in the Dalles Reservoir. Growth rates of juvenile and sub-adult White Sturgeon can vary dramatically over time and this observed increase was preceded by decreases across multiple stock assessments (2011, 2014 and 2017) in The Dalles Reservoir. Shifts in growth rates and relative weight are likely attributed to environmental factors that influence food abundance in relation to White Sturgeon densities. Variations in somatic growth follows a similar pattern in all three zone 6 reservoirs.

During 2020 age-0 White Sturgeon young-of-year sampling, measurable recruitment was detected in both Bonneville and The Dalles reservoirs, but not John Day Reservoir. This marks the seventh time in the last eight years in which no age-0 recruitment was detected in the John Day Reservoir. The consistent lack of measurable recruitment in the John Day Reservoir is of particular concern given little to no detection of age-0 White Sturgeon even during favorable spawning conditions. Therefore, it's possible that other environmental and ecological factors may influence spawning success in this reservoir. While age-0 recruitment was detected in The Dalles Reservoir, recruitment indices were low, considering the desirable flow conditions observed this year.

Adaptive management actions taken include increasing harvest guidelines in The Dalles Reservoir from 550 to 750 for the 2021 – 2023 period and integrating recent growth rate data (2017 – 2020) into population abundance models. Implementation of the most recent data available will hopefully prevent overestimation of future legal-size abundance, over-exploitation, and reduced escapement to the broodstock population. Also, further study of the hydraulic conditions and habitat below McNary Dam may help identify factors that limit White Sturgeon growth, condition and recruitment in years with adequate flow. To this end, ODFW will proceed with an acoustic telemetry study of adult White Sturgeon below McNary Dam and throughout John Day Reservoir initiated in 2018.

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 kilometers of the main stem Columbia River from the estuary to Idaho and Canada. Overharvest 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 states 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 *Oncorhynchus sp.* 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, ODFW and other tribal, state 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 for effects of the Federal Columbia River Power System (FCRPS) on production of White Sturgeon in the ILCRR.

To assess the productivity of White Sturgeon populations, abundance and recruitment are monitored 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 2020 through 31 December 2020 for the Bonneville Power Administration Project 1986-050-00. During this period, staff from the Oregon Department of Fish and Wildlife (ODFW), the Columbia River Inter-Tribal Fish Commission (CRITFC), Yakima Nation (YN), and the Washington Department of Fish and Wildlife (WDFW) collaborated on two large-scale efforts to assess White Sturgeon populations in the impounded reaches of the lower Columbia River upstream from Bonneville Dam:

1) From June through August 2020, we sampled for White Sturgeon in the Dalles Reservoir to update information on abundance, growth, survival, and condition.

2) During October 2020, we sampled for age-0 White Sturgeon in Bonneville, The Dalles, and John Day reservoirs to assess annual recruitment success.

METHODS

Stock Assessment

Sampling for White Sturgeon in The Dalles Reservoir was divided into three periods. Sampling during the winter marking period (period 1) took place from 02 December 2019 through 10 January 2020. During this time, tribal commercial fishers, contracted by CRITFC staff, used gill nets distributed throughout the reservoir to capture White Sturgeon (see Report C for details regarding sampling methodology). Sampling during the summer recapture periods took place from 8 June to 25 June 2020 (period 2), and from 27 July to 13 August 2020 (period 3) and involved staff from ODFW, WDFW, and YN. The Dalles Reservoir was divided into 6 sampling sections (excluding boat restricted zones), with each section averaging approximately 6.5 km in length (Figure A-1). Sampling effort was distributed equally throughout the reservoir, with all reservoir sections being sampled during each period. During periods 2 and 3, setlines were used to capture White Sturgeon as documented in Method ID 784 available at monitoringresources.org. Setlines were deployed on Mondays. Subsequently, each set was checked then reset on Tuesdays and Wednesdays. All gear was checked and removed from the water on Thursdays.

Biological data collected from captured White Sturgeon included fork length, weight, disposition (i.e., alive, dead, sacrificed), and the presence of pectoral fin and/or scute removal scars (Method ID 2781). If a White Sturgeon had a PIT tag applied, the second movable lateral scute from the left side of the fish was removed as a secondary external mark to aid in future identification of PIT tagged individuals. Due to COVID19 safety concerns in 2020, small tissue and pectoral fin samples were not taken to minimize close contact between personnel.

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 The Dalles 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 Beamsderfer (1993). Annual growth increments (AGI) for White Sturgeon in The Dalles Reservoir were obtained from recaptures of PIT-tagged fish (Method ID 2782).

Overall abundance (N) of White Sturgeon in The Dalles Reservoir in 2020 was estimated using a Schnabel abundance estimator (Schnabel 1938; Chapman 1952, 1954) (Method ID 780). The total number of marked fish at the start of a given period was adjusted to account for removals of PIT-tagged fish via sport and commercial fisheries.

The Schnabel abundance estimator was first used to estimate the abundance of sturgeon in the 70 – 109 cm FL size class. The length-frequency distribution of the 2020 setline catch was then used to apportion the Schnabel estimates by 1 cm increments. The abundance estimate was then expanded to estimate the abundance of the remaining two size groups (< 70 cm FL and ≥ 110 cm FL) based on the relative frequency of the 2020 setline catch after adjusting for gear selectivity. In 2018 a new setline selectivity curve was derived using empirical data from the last 19 years of mark-recapture sampling in the ILCRR. Confidence intervals for the expanded abundance estimates were calculated using the delta method (Dorfman 1938).

Age-0 Indexing

During October 2020, staff from ODFW, WDFW, and YN conducted sampling in Bonneville, The Dalles, and John Day reservoirs to evaluate annual recruitment of age-0 White Sturgeon (Figure A-2) **(**Method ID 376**)**. Sampling took place in John Day Reservoir from 5 - 9 October, The Dalles Reservoir from 12 - 15 October, and in Bonneville Reservoir from 17 - 20 October.

Sinking gill nets were used to capture age-0 White Sturgeon (Method ID 787). A single gill net was deployed at several predetermined, standard sites within each reservoir. Sampling methodology and net locations were consistent with past years.

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 Beamsderfer et al. (1989) (Method ID 2782).

To assess annual recruitment, both the proportion of positive efforts (E_p; proportion of all sets that captured at least one 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 set 138 gill nets in The Dalles Reservoir and caught a total of 3,940 White Sturgeon of which, 2,987 (or 76%) were PIT-tagged. During periods 2 and 3, staff from ODFW, WDFW and YN set 326 setlines in The Dalles Reservoir and caught a total of 2,294 White Sturgeon (Table A-1) of which, 1,715 (or 75%) were PIT-tagged. Overall, a total of 6,234 White Sturgeon were captured during all sampling periods, with 4,702 (or 75%) receiving a PIT tag.

White Sturgeon were captured in all sections of The Dalles Reservoir (Figure A-1). For periods 2 and 3, there was an average catch of 382 White Sturgeon per section. For all sections and weeks combined (periods 2 and 3), CPUE was 7.0 White Sturgeon per setline (Table A-1).

Size, Growth and Condition

White Sturgeon captured using setlines (periods 2 and 3) ranged in length from 46 - 261 cm FL, with a median length of 85 cm FL (Figure A - 3). The length frequency distribution of the setline catch was: 12.4% ≤ 70 cm FL, 73.5% 71-109 cm FL, 60.7% 96-109 cm FL, 11.8% 110-137 cm FL, 1.7% 138-166 cm FL, and 0.6% ≥ 167 cm FL. Seven White Sturgeon were released without obtaining fork length measurements.

Weights of White Sturgeon ranged from 1.0 - 202 kg, with a median weight of 6.5 kg. The relationship between fork length (*L*) and weight (*W*) was described by the exponential function (Figure A-4):

$W = 4.0E - 6 * L^{3.1661}$

Relative weights of White Sturgeon ranged from 22 - 262, with a mean relative weight of 113 (Figure A-5; Table A-2).

Since the 2017 stock assessment mean annual growth rates have increase and are greater when compared to the long term average from previous years (Figure A-6).

Abundance

The estimated abundance of White Sturgeon (≥ 54 cm FL) in The Dalles Reservoir during 2020 was 67,048 (95% CI: 62,060 - 87,945; Table A-3; Figure A-7). The estimated abundance of legally harvestable White Sturgeon (110 - 137 cm FL) was 5,650 (95% CI: 4,386 - 7,938; Table A-3; Figure A-7). Additional size-specific abundance estimates of White Sturgeon in The Dalles Reservoir from 1997 - 2020 are provided in Table A-3. Abundance estimates of White Sturgeon in each of the impounded lower Columbia River reservoirs and the Hanford reach of McNary Reservoir from 1987 - 2020 are presented in Appendix Table i.

Age-0 Indexing

During age-0 indexing, in all reservoirs combined, 168 White Sturgeon were captured in 115 net sets for an average CPUE of 1.5 fish per set (Table A-4). Of the 168 White Sturgeon captured, 92 (or 54.8%) were age-0, the other 78 White Sturgeon were age-1 or older. Age-0 White Sturgeon were captured in Bonneville and The Dalles Reservoirs in 2020; no age-0 White Sturgeon were captured in the John Day Reservoir (Table A-4). Captured White Sturgeon ranged in length from 17.8 to 86 cm FL, and all age-0 White Sturgeon were ≤ 30.0 cm FL with a mean FL = 24.5cm (range: 18 - 30.0 cm FL) (Figure A-8). We applied a total of 65 (39% of total catch) PIT tags to White Sturgeon from Bonneville, the Dalles, and John Day reservoirs during age-0 indexing in 2020. Incidental catch of other fish species captured during age-0 sampling is presented in Appendix Table A-6.

John Day Reservoir

A total of 5 White Sturgeon were captured in 40 net sets. Of the 5 White Sturgeon captured, none were classified as age-0. White Sturgeon of any size were captured in 13% of the sets. The CPUE was 0.13 for all White Sturgeon (Table A-4).

The Dalles Reservoir

A total of 18 White Sturgeon were captured in 36 net sets. Of the 18 White Sturgeon captured, 4 (or 22.2%) were classified as age-0. White Sturgeon of any size were captured in 25% of the sets,

while age-0 White Sturgeon were captured in 8% of the sets. The CPUE was 0.50 for all White Sturgeon and 0.11 for age-0 White Sturgeon (Table A-4).

Bonneville Reservoir

A total of 145 White Sturgeon were captured in 39 net sets. Of the 145 White Sturgeon captured, 88 (or 60.7%) were classified as age-0. White Sturgeon of any size were captured in 79% of the sets, while age-0 White Sturgeon were captured in 37% of the sets. The CPUE was 2.74 for all White Sturgeon and 2.26 for age-0 White Sturgeon (Table A-4).

DISCUSSION

Stock Assessment

The estimated abundance of White Sturgeon ≥ 54 cm FL in The Dalles Reservoir in 2020 (n = 67,048) was 19% less than the 2017 estimate (n = 82,880). This was the lowest estimate recorded in The Dalles Reservoir since stock assessment began in 1997 (Table A-3). All size classes below the legal size class (110-137 cm FL) decreased in abundance (Table A-3) since 2017. The greatest reduction occurred in the 96-109 cm FL size class, with an observed decrease in abundance of 44%. Similarly, White Sturgeon in the 54-109 cm FL size class, decreased by 25%. Trends in current abundance can be traced back to trends in age-0 recruitment, and age-0 recruitment during the period from 2000-2005 was very low. This has resulted in decreases within the size classes below the legal slot since this time. Since 2005 we have seen greater recruitment than that observed during the truncated period of 2000-2005. Recruitment from 2005 through 2012 showed an influx of fish although much smaller than the recruitment from the 1990s. This is particularly concerning because despite adequate discharge levels below The Dalles Dam, recruitment has remained inconsistent with continued periodic weak recruiting years even under favorable environmental conditions.

The abundance of legal-sized fish increased by 54% (n=5,650) in 2020, is the highest observed since 2002, and is the third highest on record. This is indicative of a large recruitment class observed in the late 1990s growing into this size class. Annual recruitment is demonstrated on Figure A-9 while Figure 5 visibly demonstrates the size class movement through time. These figures show the large recruitment class from the late 1990s growing into the 2020 legal slot and years of poor to adequate recruitment leading to lower abundance of all smaller size classes. The estimated abundance of adult White Sturgeon (≥ 167 cm FL) increased by 42% (to n = 2,098) from 2017 levels (Table A-3). However, 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 in catch. Therefore, it may be more appropriate to consider trends in abundance indices for these fish, rather than the point estimate of abundance. Monitoring this trend is becoming increasingly important to ensure an adequate number of broodstock are available to produce measurable age-0 recruitment when conditions become favorable.

Indicators of body condition, such as relative weight, may provide an indirect means of evaluating ecological relations and the effects of management strategies, especially when making size-specific comparisons within or among populations. The overall condition of White Sturgeon in The Dalles Reservoir in 2020 was the highest ever recorded, with the mean relative weight of

White Sturgeon estimated at 113.39 (Figure A-5; Table A-2). The increase in the condition of White Sturgeon in The Dalles Reservoir was observed across all size classes. Observing high condition factors in conjunction with the low abundance estimates suggest a potential density dependence in The Dalles Reservoir. Continued monitoring of both factors is necessary to verify possible correlations

Information from recaptured individuals has indicated that somatic growth has increased since the 2017 stock assessment and is greater than the 30-year average (Figure A-7). Growth rates can have an effect on estimations of future legal-size abundance, which can lead to over-exploitation and reduced escapement to the broodstock population. While it is impossible to forecast future growth rates, recent growth data should be applied when forecasting future abundance instead of long-term averages.

Age-0 Indexing

In 2020, recruitment of age-0 White Sturgeon was detected in Bonneville and The Dalles reservoirs, but not in John Day Reservoir. Since 2012, we have only captured one (in 2019) age-0 White Sturgeon in the John Day Reservoir (Figure A-8). John Day Reservoir also went through a six-year period where no recruitment was detected from 2000 - 2005. Although age-0 White Sturgeon were captured in the Dalles Reservoir, both E_p and CPUE were low, even with adequate discharge for favorable spawning conditions and the large number of age-0 White Sturgeon captured in Bonneville Reservoir.

ADAPTIVE MANAGEMENT & LESSONS LEARNED

The stock assessment in The Dalles Reservoir in 2020 indicated that the overall abundance of White Sturgeon (≥ 54 cm FL) was the lowest on record; particularly amongst sub-legal and juvenile fish. Although there was a substantial increase (54%) in legal-size fish (110-137 cm FL), a cautious approach to fisheries is warranted as there are still fewer sub-legal fish (< 110 cm FL) set to recruit into the legal slot than in years past. Therefore, the annual harvest quota for The Dalles Reservoir was increased only slightly from 550 fish to 750 fish for 2021 – 2023.

In the impounded lower Columbia River, water velocity, which is heavily influenced by dam discharge, appears to be a major component of White Sturgeon spawning success (Chapman and Counihan, 2018, Parsley 1993; Parsley et al., 1993; Parsley and Beckman, 1994). Data from age-0 indexing, combined with dam discharge data, suggest that higher discharge rates (which create the physical conditions required for successful spawning) generally result in higher levels of age-0 recruitment (Figure A-9). When the average daily discharge rate at McNary Dam during May - July (the primary spawning period of White Sturgeon in the lower Columbia River) reaches or exceeds 250 kcfs, there has generally been a detectible level of recruitment in all reservoirs. Although, even with adequate flow and strong numbers of adult (i.e., broodstock) individuals, recent recruitment in John Day Reservoir remains extremely poor. This suggests other factors may be influencing age-0 recruitment in John Day Reservoir.

Further study of the hydraulic conditions and habitat below McNary Dam may help identify factors that limit White Sturgeon recruitment in years with adequate flow. To this end, ODFW will proceed with an acoustic telemetry study of adult White Sturgeon below McNary Dam and

throughout John Day Reservoir initiated in 2018. The purpose of this study is to track adult movements within the reservoir throughout the year and monitor their movements in and out of the tailrace, especially in late spring when spawning typically occurs.

Results obtained through this contract work 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, US. 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: Zane Kroneberger, Mike Lovejoy, James Morrill and Peter Stevens; WDFW: Brad Cady, Kevin Fox, Laura Llyod Bryan Moser, Shaffryn Shade, Mathew Sturza and Teddy Walsey; CRITFC: Steven Begay, Maria Jin and Philip Waltamet. We would also like to thank Blaine Parker for his help coordinating our cooperative sampling program with CRITFC and the individual treaty tribes.

FIGURES

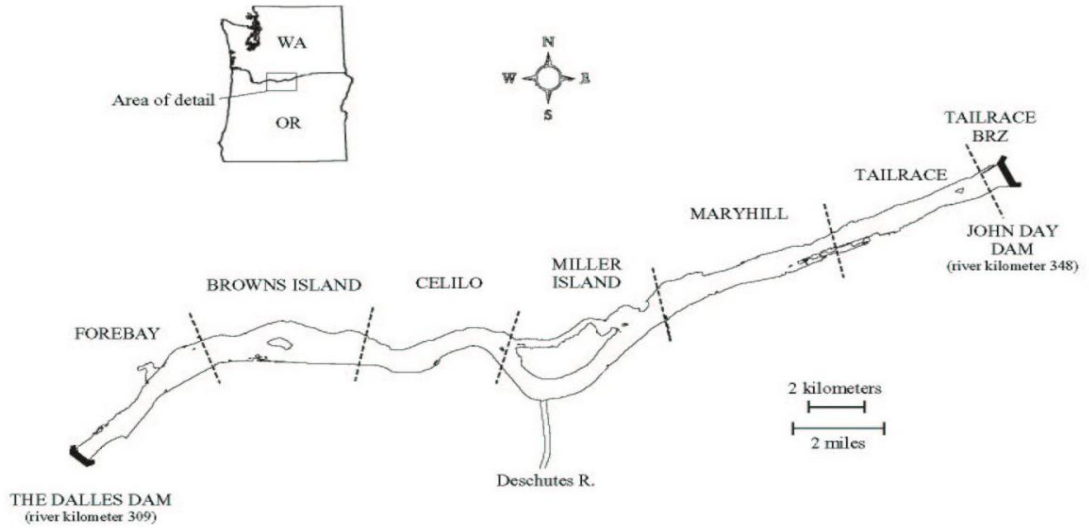

Figure A-1. Stock assessment sampling sections in The Dalles Reservoir for the 2020 stock assessment.

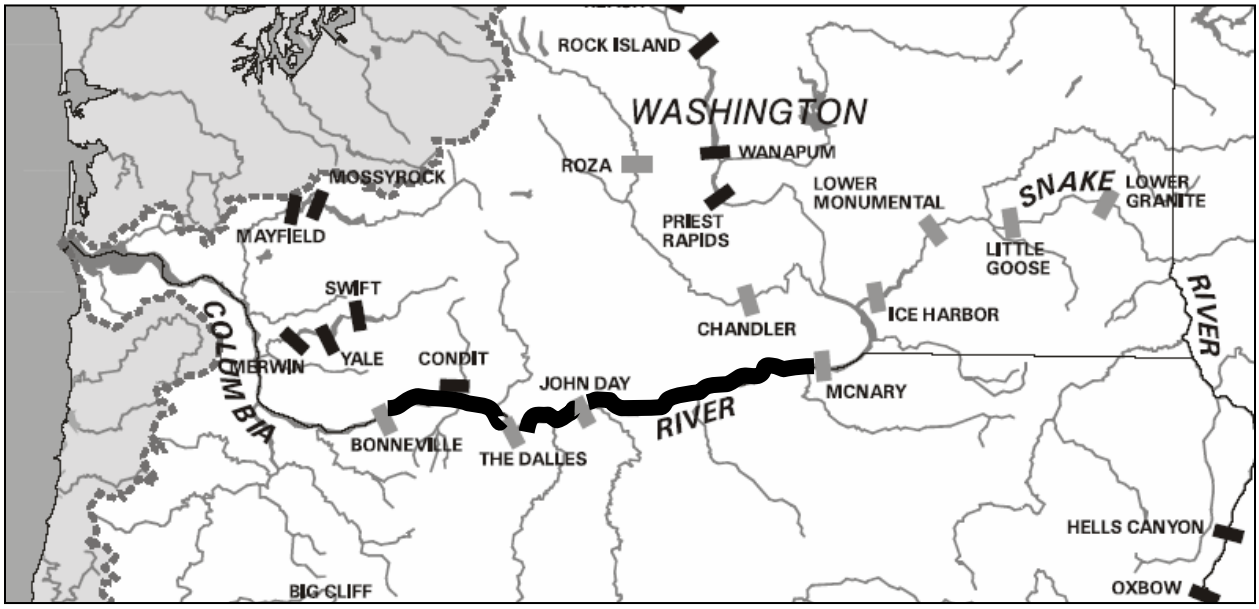

Figure A-2. Map of age-0 indexing locations in the Columbia River. Highlighted river sections indicate the reservoirs in which age-0 sampling took place during October of 2020. Dark (Non-USACE) and grey (USACE) blocks denote dams in the region.

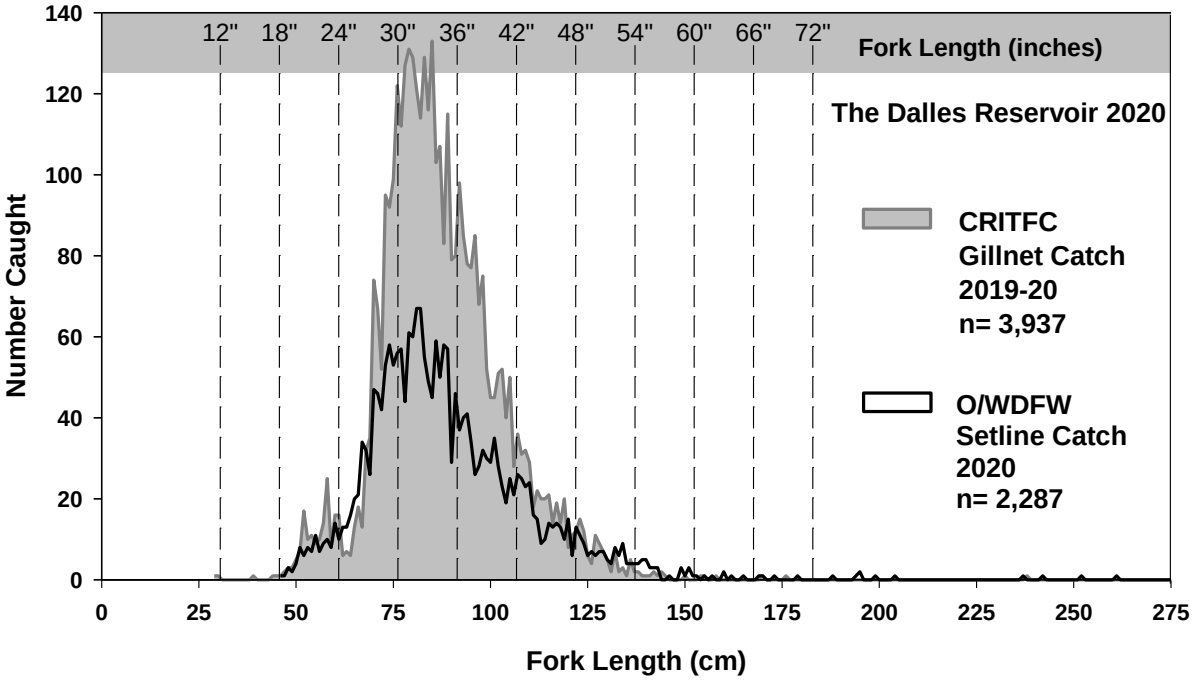

Figure A-3. Length Frequency of White Sturgeon captured with gillnets and setlines during the 2019 - 20 stock assessment in The Dalles Reservoir.

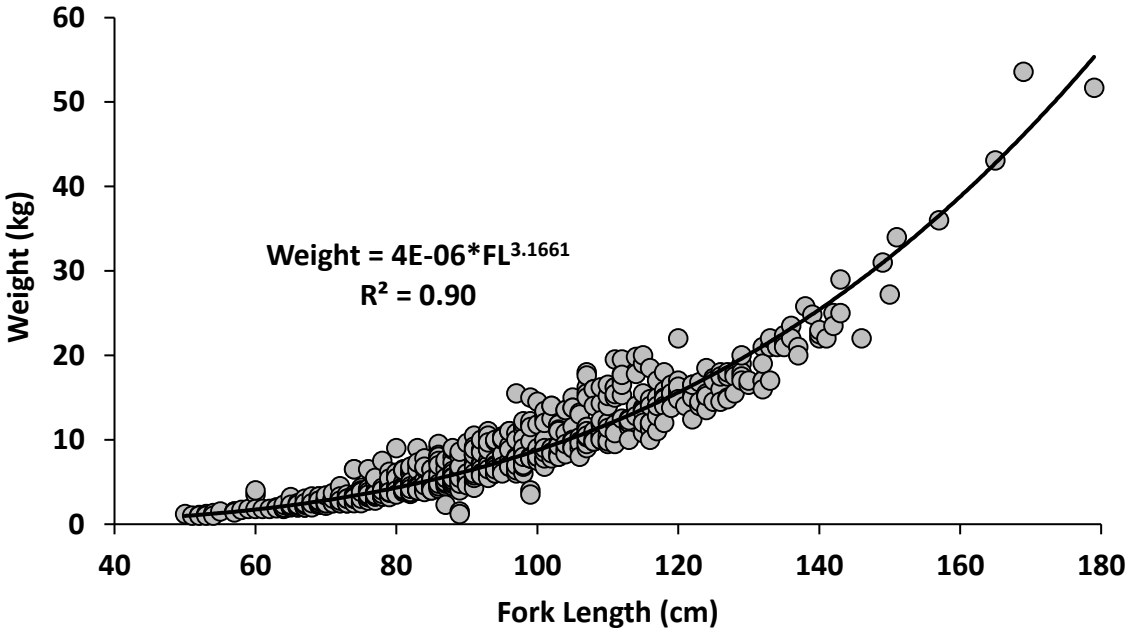

Figure A-4. Length-weight relationship of White Sturgeon captured with setlines during the 2020 stock assessment in The Dalles Reservoir.

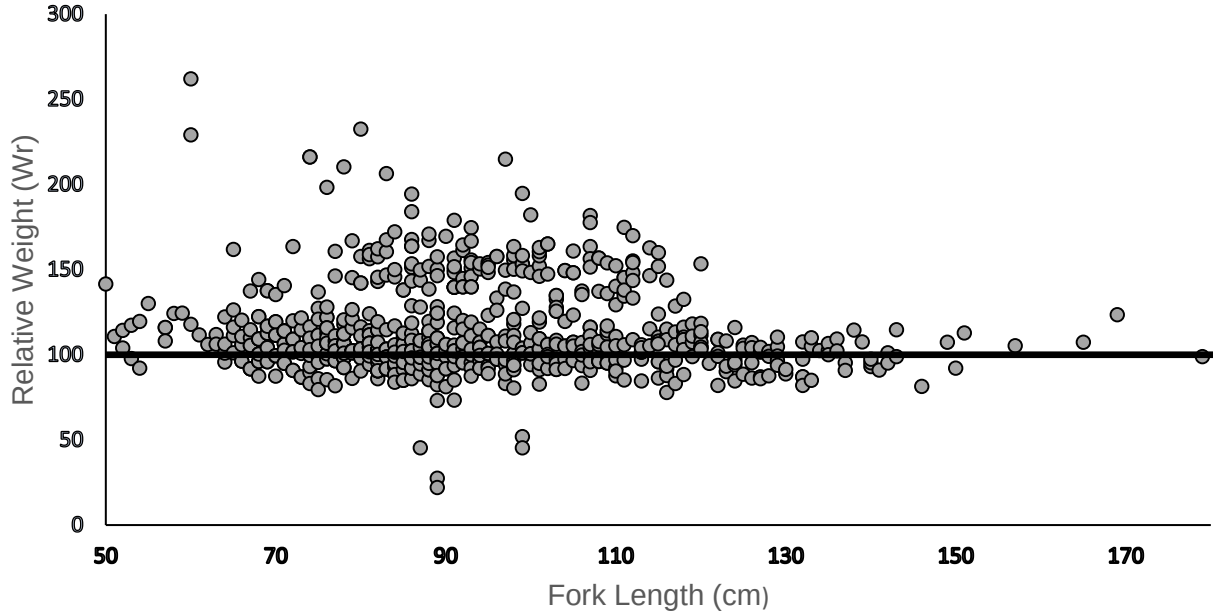

Figure A-5. Relative weights of White Sturgeon captured with setlines during the 2020 stock assessment in The Dalles Reservoir.

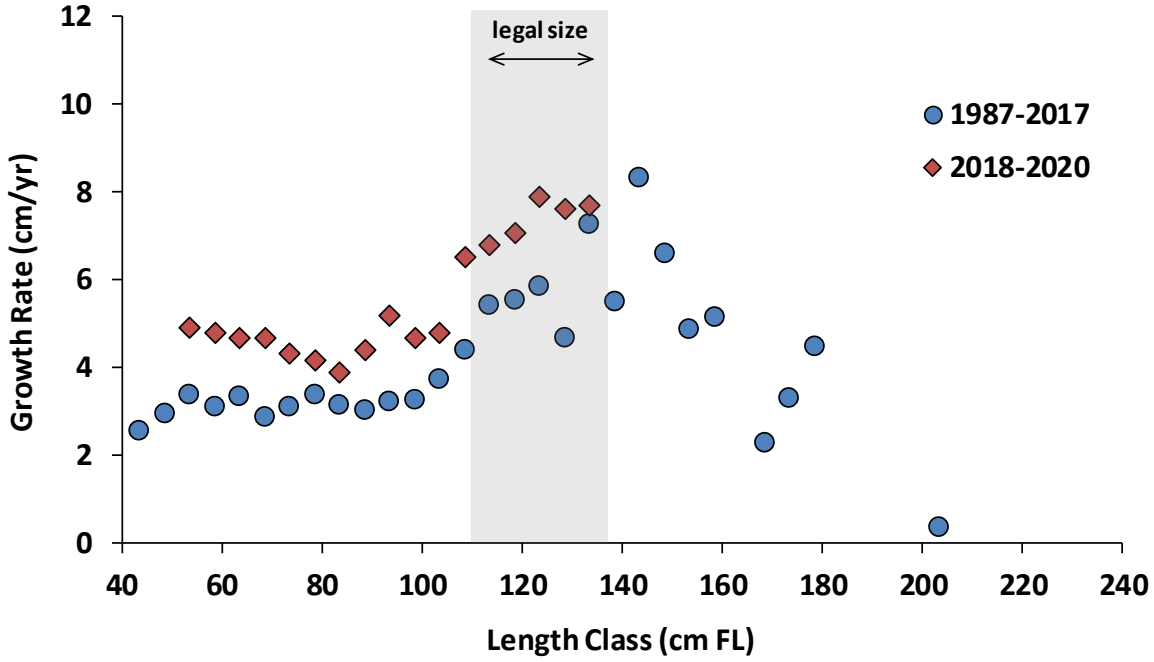

Figure A-6. Mean annual growth rates of White Sturgeon from The Dalles Reservoir, 1987 - 2017 and 2018 - 2020

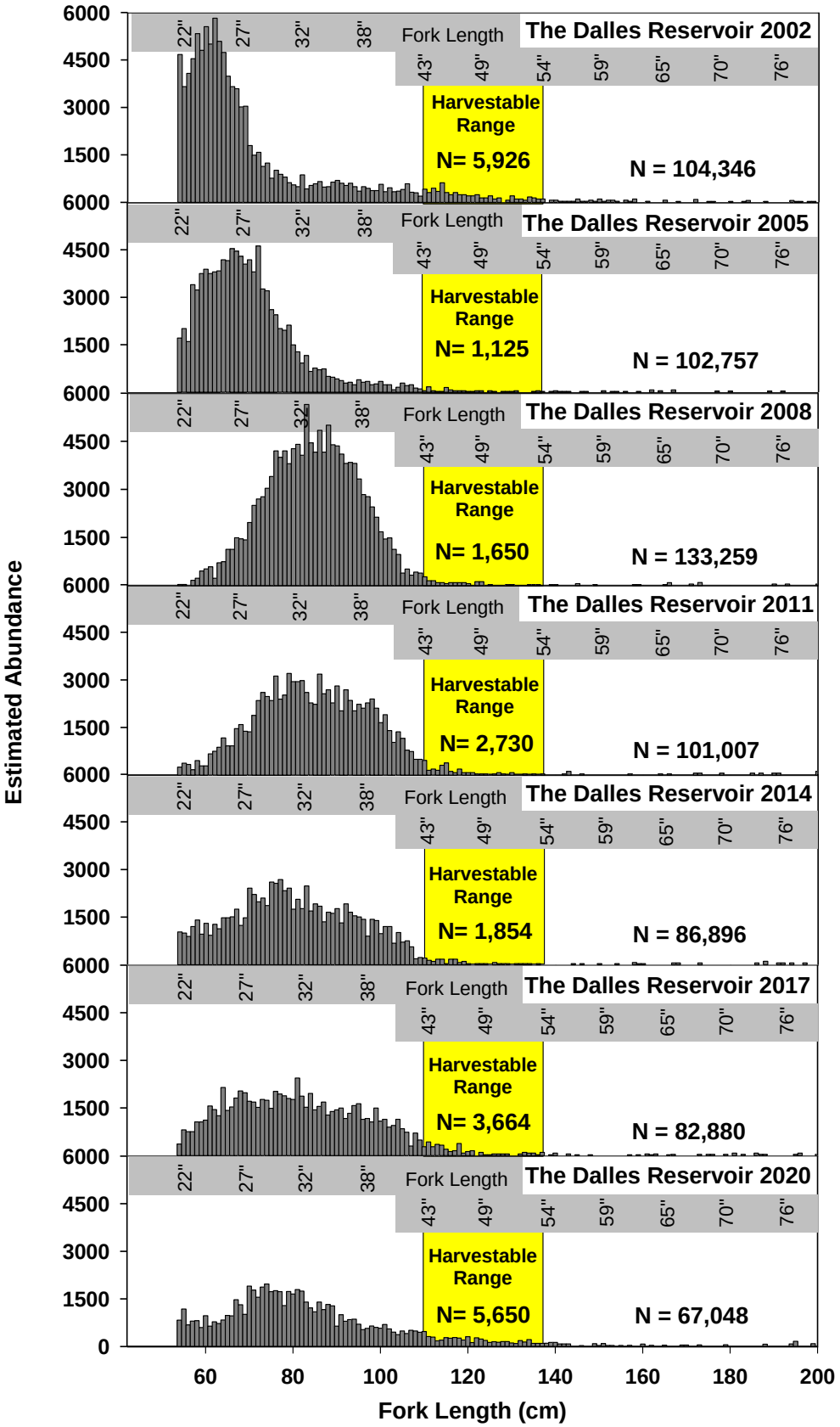

Figure A-7. Estimated abundance of White Sturgeon in The Dalles Reservoir, 2002 - 2020.

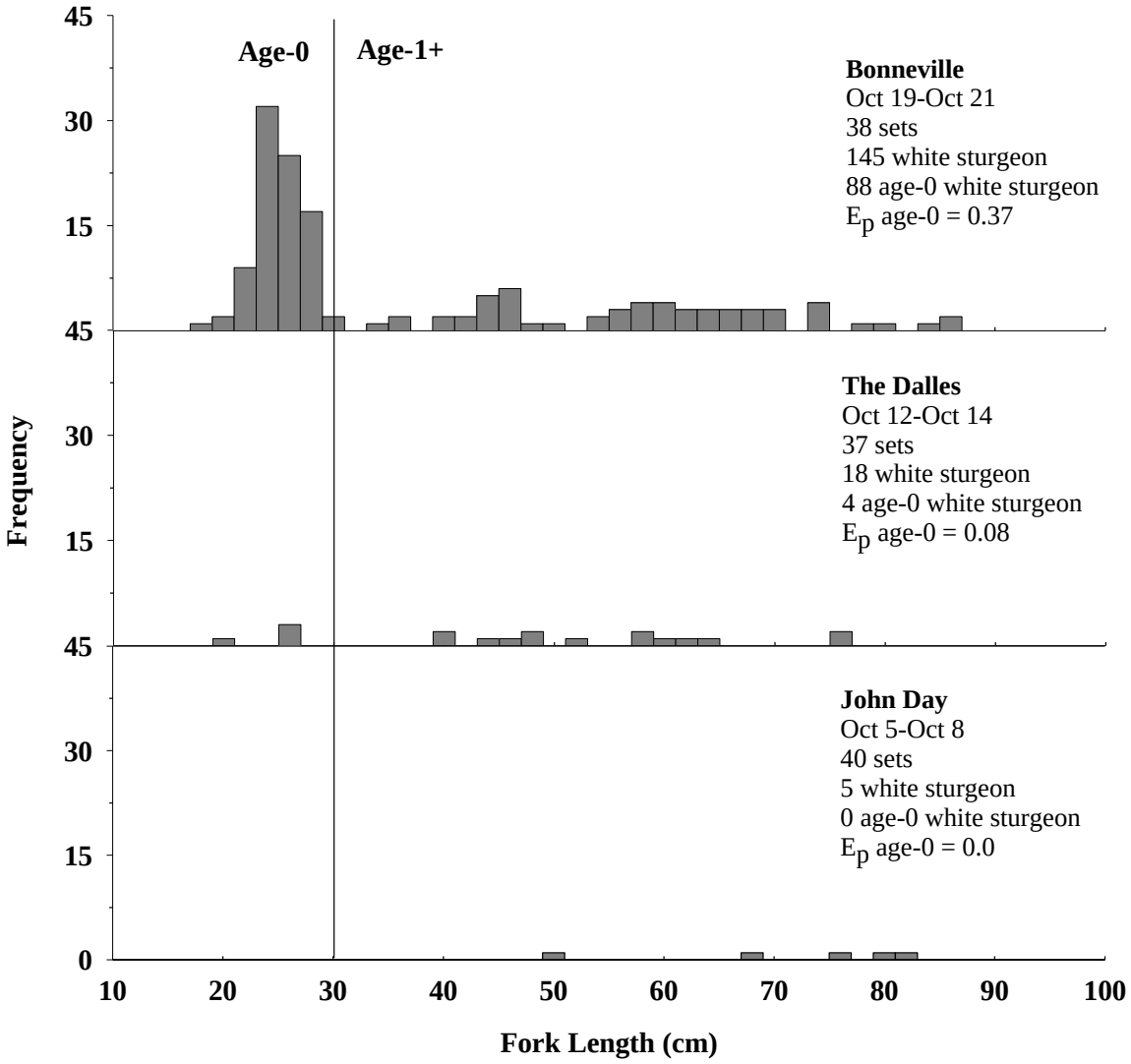

Figure A-8. Length-frequency distributions and catch data for White Sturgeon captured during age-0 indexing, October 2020.

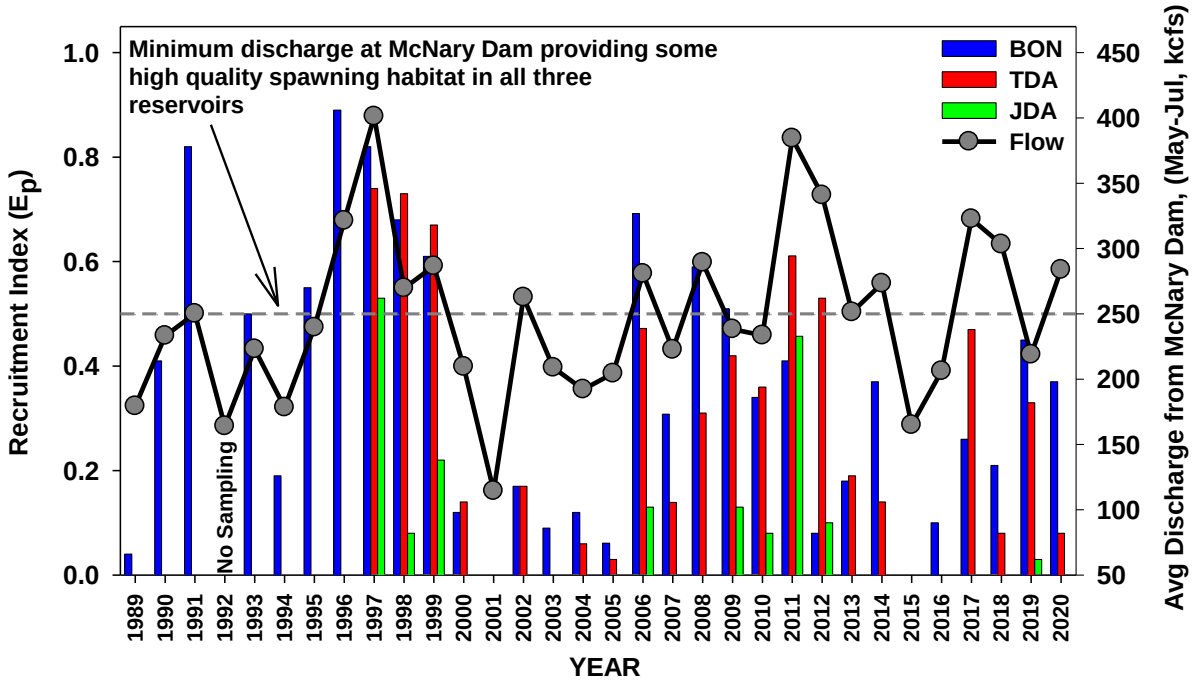

Figure A-9. Annual recruitment of age-0 White Sturgeon in Bonneville, The Dalles, and John Day reservoirs, and average discharge at McNary Dam (May - July) from 1989 to 2020. Index values in The Dalles and John Day reservoirs are based on data from standardized gill net efforts initiated in 1997. *In 2006 age-0 indexing in Bonneville Reservoir switched from USGS trawl surveys to ODFW/WDFW/CRITFC gillnet surveys.

TABLES

Table A-1. Sampling effort (number of setlines), catch (number of White Sturgeon), and catch-per-unit-effort (CPUE) for the 2020 The Dalles stock assessment by week and sampling section for periods 2 and 3.

Week			Sampling Section						Weekly Totals
			1	2	3	4	5	6	
Period 2	24	Effort			46	17			63
		Catch			212	115			327
		CPUE			4.6	6.8			5.2
	24	Effort					29	24	49
		Catch					187	179	366
		CPUE					6.4	7.5	7.5
	26	Effort	26	33					62
		Catch	132	243					375
		CPUE	5.1	7.4					6.0
Period 3	31	Effort			27	31			60
		Catch			220	282			502
		CPUE			8.1	9.1			8.4
	32	Effort					27	20	60
		Catch					199	189	388
		CPUE					7.4	9.5	6.5
	33	Effort	24	25					60
		Catch	37	299					336
		CPUE	1.5	12.0					5.6
Section Totals		Effort	50	58	73	48	56	44	**329**
		Catch	169	542	432	397	386	368	**2,294**
		CPUE	3.4	9.3	5.9	8.3	6.9	8.4	**7.0**

Table A-2. Mean relative weights of sturgeon from The Dalles Reservoir, 1997 - 2020. Shaded values represent estimates with small sample sizes (n < 15).

	Mean Relative Weight					
Year	<70 cm FL (<31 in TL)	70-109 cm FL (31-48 in TL)	110-137 cm FL (48-60 in TL)	138-159 cm FL (60-70 in TL)	160+ cm FL (70+ in TL)	All
1997	102	107	106	105	100	106
2002	112	106	101	98	96	106
2005	111	104	102	102	95	107
2008	109	100	99	93	96	100
2011	94	96	105	87	--	96
2014	87	94	98	--	100	93
2017	98	99	96	91	90	98
2020	115	115	109	100	110	113

Table A-3. Summary of White Sturgeon abundance by size class, The Dalles Reservoir 1997 - 2020.

Year	54-70 cm FL (21-27" FL)	71-95 cm FL (28-37" FL)	96-109 cm FL (38-42" FL)	110-137 cm FL[1] (43-54" FL)	138-166 cm FL (55-65" FL)	167+ cm FL (66+" FL)	All
1997	10,360	38,220	16,384	8,147	202	191	73,504
2002	72,360	18,560	5,558	5,926	1,166	776	104,346
2005	60,832	36,740	3,181	1,125	465	414	102,757
2008	12,287	99,222	18,939	1,650	330	831	133,259
2011	13,301	63,733	19,929	2,730	308	1,006	101,007
2014	22,471	48,594	12,674	1,854	280	1,022	86,895
2017	22,806	41,377	13,151	3,664	404	1,477	82,880
2020[3]	16,495	34,319	7,348	5,650	1,138	2,098	67,048
(95%CI)[2]				(4,386-7,938)			(62,060-87,945)

[1] 110-137 cm FL represents the size range of legally harvestable fish (sport and commercial).
[2] 95% CI's estimated using the Delta Method.
[3] In 2020 the function used to correct the raw setline catch for gear selectivity was updated

Table A-4. Effort and catch of White Sturgeon in Columbia River reservoirs during age-0 sampling, October, 2020.

	Reservoir		
Parameter	BON	TDA	JDY
Gill Net Sets	39	36	40
Total Hours Fishing	898	828	878
White Sturgeon Catch (all sizes)	145	18	5
White Sturgeon Catch (Age-0)	88	4	0
White Sturgeon / Set (CPUE)	2.74	0.50	0.13
Age-0 White Sturgeon /Set (CPUE)	2.26	0.11	0
Prop. of positive sets (all sizes)	0.79	0.25	0.08
Prop. of positive sets (Age-0)	0.37	0.08	0

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APPENDIX

Table i. Abundance estimates for impounded lower Columbia River reservoirs and the Hanford Reach of McNary Reservoir, 1987-2017.

	30-72 inch total length	Number of fish by total length interval (inches)						Number/	Pounds/
Year	N (95% CI)	24-36	36-48	48-60	60-72	72+	Sum	Acre[a]	Acre[c]
				Hanford Reach and McNary Reservoir					
1995	5,234 (3,782-9,086)	900	2,700	3,400		1,250	8,250	0.2	8
2011	7,881	1,129	3,517	2,516	1,001	1,078	9,241	0.2	6
				Bonneville Reservoir					
1989	35,400 (27,500-45,400)	32,900	16,700	1,000	200	600	51,400	2.5	27
1994	35,200 (24,800-66,000)	31,300	18,300	1,300	200	900	52,000	2.5	--
1999	85,400 [b]	82,400	41,800	3,200	600	400	128,400	6.2	59
2003	74,000 [b]	84,500	33,000	1,100	120	780	119,500	5.7	46
2006	113,300 [b]	159,000	45,200	590	350	240	205,400	9.9	67
2009	235,713 [b]	223,955	106,086	3,112	3,749	1,064	334,424	16.1	149
2012	165,567 [b]	147,895	74,921	2,455	1,004	1,974	228,249	11.0	36
2015	116,629 [b]	147,439	42,365	1,045	433	610	191,893	9.2	61
2018				878	521	3,473	225,861	10.9	80

continued

Table i. (continued). Abundance estimates for impounded lower Columbia River reservoirs and the Hanford Reach of McNary Reservoir, 1987-2017.

	30-72 inch total length	Number of fish by total length interval (inches)						Number/	Pounds/
Year	N (95% CI)	24-36	36-48	48-60	60-72	72+	Sum	Acre[a]	Acre[c]
				The Dalles Reservoir					
1987	23,600 (15,700-33,600)	7,800	11,000	6,100	1,800	1,000	27,700	2.5	73
1988	9,000 (7,300-11,000)	4,200	4,300	1,500	500	800	11,300	1.0	32
1994	9,700 (7,500-14,000)	5,800	5,700	800	<50	300	12,600	1.1	--
2002	33,000 (26,200-42,000)	82,900	13,500	5,900	1,200	800	104,300	9.4	87
2005	45,700 (37,000-56,300)	90,600	10,200	1,100	500	400	102,800	9.3	69
2008	123,410 [b]	55,600	74,800	1,650	200	950	133,200	12.0	132
2011	91,001 [b]	42,097	54,866	2,730	269	1,044	101,006	9.1	132
2014	68,526 [b]	48,800	34,939	1,854	280	1,022	86,895	7.8	76
2017	64,296 [b]	42,853	34,481	3,664	379	1,503	82,880	7.5	89
				John Day Reservoir					
1990	3,900 (2,300-6,100)	16,600	1,700	400	100	500	19,300	0.4	3
1996	27,100 (23,800-30,800)	5,800	19,700	4,050	350	700	30,600	0.6	11
2001	19,600 [b]	14,900	12,800	1,100	300	900	30,000	0.6	9
2004	30,000 [b]	30,200	11,500	1,100	170	470	43,500	0.8	9
2007	39,020 [b]	17,834	21,793	1,587	529	841	42,584	0.8	10
2010	37,635 [b]	4,472	29,110	3,900	718	2,449	40,649	0.8	14
2013	27,377 [b]	5,351	13,478	9,344	1,501	1,315	30,989	0.6	12
2016	23,076 [b]	11,817	6,826	5,177	3,332	2,123	29,275	0.6	9
2019	24,688[b]	10,333	10,264	2,992	5,672	2,846	33,627	0.6	13.5

[a] Hanford Reach and McNary Reservoir = 45,500 acres; Bonneville Reservoir = 20,800 acres; The Dalles Reservoir = 11,100 acres; John Day Reservoir = 51,900 acres.

[b] Confidence intervals for these estimates are not provided because they are derived from expansion, not directly calculated from mark-recapture data.

[c] Total poundage is estimated by multiplying the within-year total abundance by the within-year median weight of sturgeon caught with setlines.

Table ii. Catch of non-target species during sampling for age-0 sturgeon in Bonneville, The Dalles, and John Day reservoirs, October 2020. Disposition: 1 = alive and released, 2 = sacrificed, 3 = dead or dying at capture.

Species	Bonneville			The Dalles			John Day			Total
	1	3	All	1	3	All	1	3	All	
American Shad (*Alosa sapidissima*)		12	12		1	1		25	25	38
Bluegill (*Lepomis macrochirus*)	1		1							1
Bridgelip Sucker (*Catostomus columbianus*)		2	2	2		2				4
Common Carp (*Cyprinus carpio*)	1		1							1
Channel Catfish(*Ictalurus punctatus)*	1		1	1		1	44	1	45	47
Chinook Salmon (Oncorhynchus tshawytscha)		1	1		1	1				2
Chiselmouth (*Acrocheilus alutaceus*)							1		1	1
Crappie (*Pomoxis spp.)*	1		1	2		2	1		1	2
Largescale Sucker (*Catostomus macrocheilus*)	7	5	12	4	2	6	1		1	19
Northern Pikeminnow (*Ptychocheilus oregonensis*)	15	55	70	20	46	66	7	15	22	158
Peamouth Chub (*Mylocheilus caurinus*)	31	22	53		2	2				55
Pumpkinseed (*Lepomis gibbosus*)	2	2	4	1		1				5
Sculpin (*Cottus spp.*)	1		1							1
Smallmouth Bass (*Micropterus dolomieu*)		2	2	4	1	5	4	5	9	16
Walleye (*Sander vitreus*)	2	2	4	1	5	6	4	63	67	77
Yellow Perch (*Perca flavescens*)	15	12	27	41	45	86	11	134	145	258
Total	77	115	192	76	103	179	73	243	316	687

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

ANNUAL PROGRESS REPORT
JANUARY – DECEMBER 2020

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 2020 sport and commercial white sturgeon fisheries.

Prepared by:

Dennis R. Gilliland
Matthew T. Sturza
Laura Heironimus

Washington Department of Fish and Wildlife
Southwest Region
5525 South 11th Street
Ridgefield, Washington 98642

January 19, 2021

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ABSTRACT

Decreasing trends in sturgeon harvest and guidelines through 2017 indicate that strong year classes from good spawning years in the mid to late 1990's have grown through the legal slot. HPUE estimates since 2015 suggest a declining legal abundance in John Day Reservoir, and rebounding legal abundance in The Dalles and Bonneville reservoirs. Sturgeon populations in the impoundments will continue to cycle through highs and lows corresponding to variable recruitment from years with high or low flows. The inherent nature of sturgeon recruitment under current flow regimes suggests that lean years are normal, with occasional good years.

Recreational fishery HPUE in Bonneville Reservoir increased slightly during 2020, but decreased in The Dalles and John Day reservoirs. It has fluctuated widely in all three pools over the last four seasons, but has been generally higher in Bonneville and The Dalles and lower in John Day than during the preceding four seasons. Legal size abundance in the two lower reservoirs appears to be increasing due to better recruitment during 2006-2011. Legal size abundance in John Day Reservoir appears not to be increasing, possibly due to as yet unknown factors affecting recruitment, survival, or growth factors.

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, 2020.

Washington Department of Fish and Wildlife (WDFW), in cooperation with Oregon Department of Fish and Wildlife (ODFW), conducted a survey of the 2020 sturgeon sport 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. In cooperation with Columbia Inter-Tribal Fish Commission (CRITFC) we monitored the treaty Indian commercial fisheries in Zone 6.

METHODS

Compliance with the Sturgeon Management Task Force (SMTF) annual harvest guidelines was addressed through in-season management actions. The 2020 sport fishery survey was conducted in Bonneville and The Dalles reservoirs, and that 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 (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 week.

RESULTS

There were 2,661 angler trips in Bonneville Reservoir, 2,815 in The Dalles Reservoir, and 6,541 in John Day Reservoir (Figure B-2). Sturgeon sport harvest estimates were 431 (86% of 500 fish guideline) for Bonneville Reservoir, 205 (152% of 135 fish guideline) for the Dalles Reservoir, and 102 (97% of 105 fish guideline) for John Day Reservoir (Figure B-2 and Table B-1). The number of sturgeon retention days in 2020 was 44 in Bonneville Reservoir, 48 in The Dalles Reservoir, and 69 in John Day Reservoir (Table B-1).

Oversize catch in Bonneville Reservoir was 1.6% of the 2018 oversize abundance estimate (Figure B-4), and 1.4% of total 2020 sturgeon catch. In The Dalles Reservoir, oversize catch was 2.5% of the 2020 oversize abundance estimate, and 7.7% of total 2020 sturgeon catch. In John Day Reservoir, oversize catch was 0.3% of the 2019 oversize abundance estimate, and 7.4% of total 2020 sturgeon catch.

Treaty commercial sturgeon harvests were 748 (150% of 500 fish guideline) for Bonneville Reservoir, 508 (122% of 415 fish guideline) for the Dalles Reservoir, and 182 (87% of 210 fish guideline) for John Day Reservoir (Figure B-2 and Table B-1). An estimated 249 sturgeon were harvested for ceremonial and subsistence use in Bonneville Reservoir, 34 sturgeon harvested in The Dalles Reservoir, and 12 sturgeon harvested in John Day Reservoir (Table B-1).

DISCUSSION/CONCLUSION

The decline in HPUE in all three reservoirs during the early to mid-2000's was followed by an increase in HPUE during 2010–2013 in Bonneville Reservoir, 2008–2010 in The Dalles Reservoir, and 2011–2016 in John Day Reservoir. While the John Day population gained the longest benefit from high flow years and increased production in the mid to late 1990's, that benefit was likely due in part to more conservative management decisions for that reservoir.

Bonneville and The Dalles reservoirs appear to be getting an increase in legal-size fish, possibly from the 2006 year class, while populations in John Day Reservoir have remained more suppressed.

The 2018 legal-size population estimate in Bonneville Reservoir increased 40% from the 2015 estimate, possibly due to the 2006 year class beginning to grow into the legal slot. Subsequently, the guideline was increased to 500 sturgeon in 2019 in both the commercial and sport fishery. In the 2020 sport fishery, sturgeon angler trips decreased by 13 percent, but the season length was reduced by 57 percent, indicating a sizeable increase in effort (Figure B-2) from 2019 (Gilliland, et.al, 2020). Harvest per unit effort (HPUE) slightly increased by 10%. Overall, sport anglers were similarly successful on a per trip basis between 2019 and 2020, but higher participation led to the guideline being nearly filled quicker in 2020.

In The Dalles Reservoir, sturgeon angler trips increased 410 percent from 2019 (Figure B-2). Both sport and commercial harvest have fluctuated but trended mostly downward from 2010 through 2016. The 2017 population estimated a substantial increase of the legal-size class from the 2014 estimate, which prompted an increase in the 2018 guideline to 135 fish for sport and 415 fish for commercial fisheries. In spite of the large increase in angler trips, total sport harvest in 2020 was up only 260%. Correspondingly HPUE dropped 37 percent, to a level more typical than the unusual highs of last two seasons, and closer to the 10-year average.

John Day Reservoir guidelines were substantially reduced in 2017 in response to declining legal size abundance. The sport guideline was reduced to 105 fish while the commercial guideline followed a stepped decline in harvest over a three-year period with guidelines set at 295, 210, and 175 fish each year respectively. The commercial guideline for 2020 was set at 210 fish. Sport angler HPUE markedly decreased by 72 percent from 2019, while sport angler trips in 2020 increased by 277 percent. This led to a season 13 days longer than in 2019 with the total number of sturgeon harvested reduced by 21 percent.

Commercial harvest increased 19 percent from 2019 in both Bonneville Reservoir and The Dalles Reservoir. Harvest guidelines were exceeded by 50 percent and 22 percent respectively. In John Day Reservoir commercial harvest decreased by 3 percent and the harvest guideline was not exceeded.

Estimated oversize catch as a percentage of abundance and total sturgeon catch during retention seasons (oversize catch is not monitored outside of retention seasons) was similar between 2019 and 2020 in Bonneville Reservoir (Figure B-4). In The Dalles Reservoir, oversize catch slightly increased from 1.9% to 2.5% of the estimated 2020 oversize abundance and from 4.6% to 7.1% of total catch. In John Day Reservoir, oversize catch decreased from 1.9% to 0.3% of estimated 2019 oversize abundance, and from 17.1% to 9.4% of total catch. Overall, the proportion of oversized sturgeon abundance caught in recreational fisheries is greatly reduced from 5-10 years ago while the proportion of oversized sturgeon within total sturgeon catch has remained similar.

ADAPTIVE MANAGEMENT AND LESSONS LEARNED

From 2015–2017 guidelines were reduced in all three reservoirs. HPUE for 2018 and 2019 was substantially up from 2017 in Bonneville and The Dalles reservoirs, possibly indicating some increasing legal-size recruitment. In John Day Reservoir HPUE dropped each year from 2016–2018 but increased in 2019. In 2020, HPUE in Bonneville Reservoir increased slightly, but dropped in The Dalles and John Day reservoirs, possibly due to winter weather reducing effort. It is also possible that colder weather, leading to cooler water temperatures, has a negative impact on HPUE. In summary, it appears that angling conditions and angler effort are closely linked and play a significant role in determining how quickly sport guidelines are met.

FIGURES

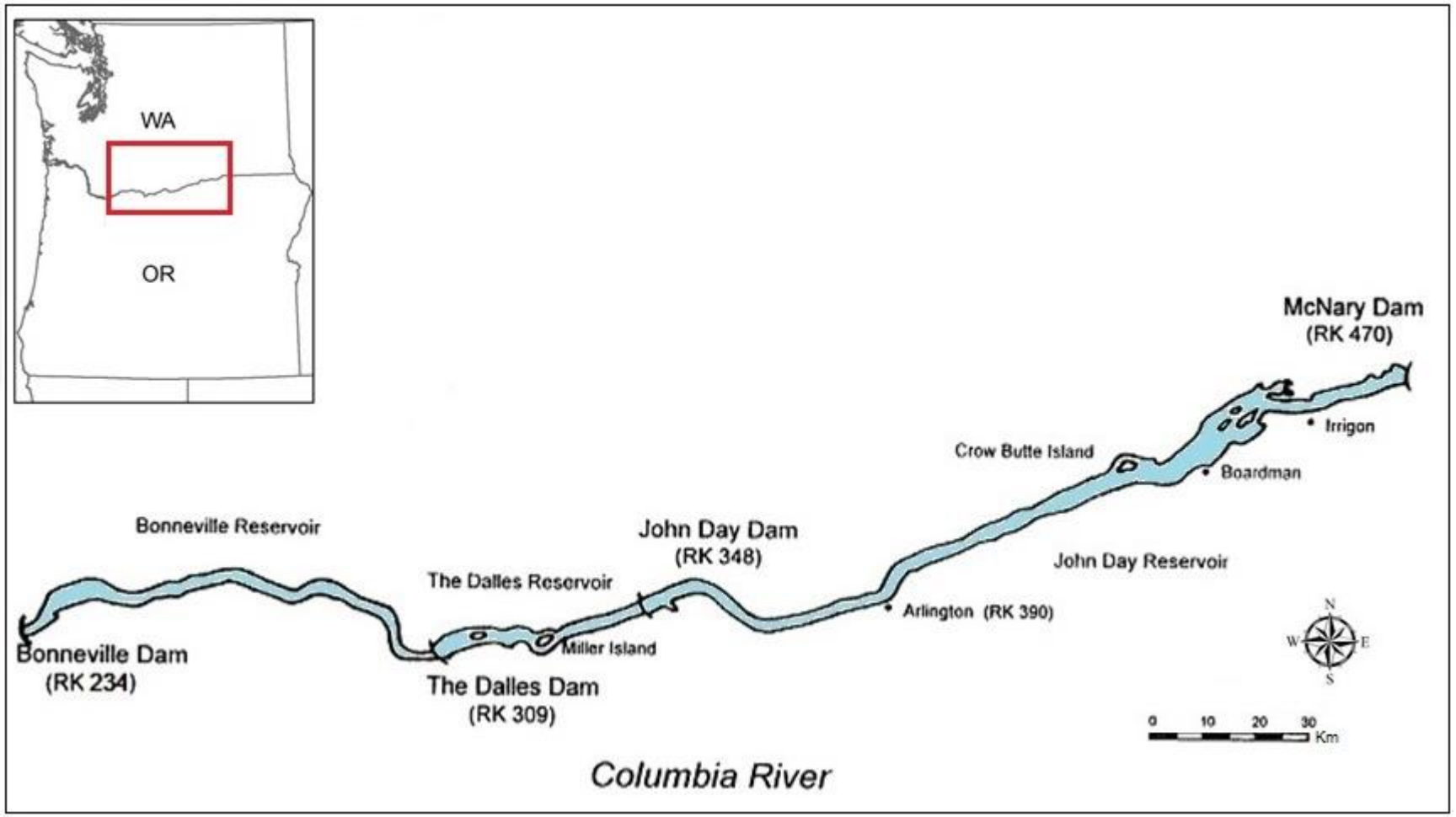

Figure B-2. The recreational fishery survey on the Columbia River occurs throughout Bonneville and The Dalles Reservoirs, and from Crow Butte Island upstream to McNary Dam on John Day Reservoir. Commercial fisheries occur throughout all three reservoirs.

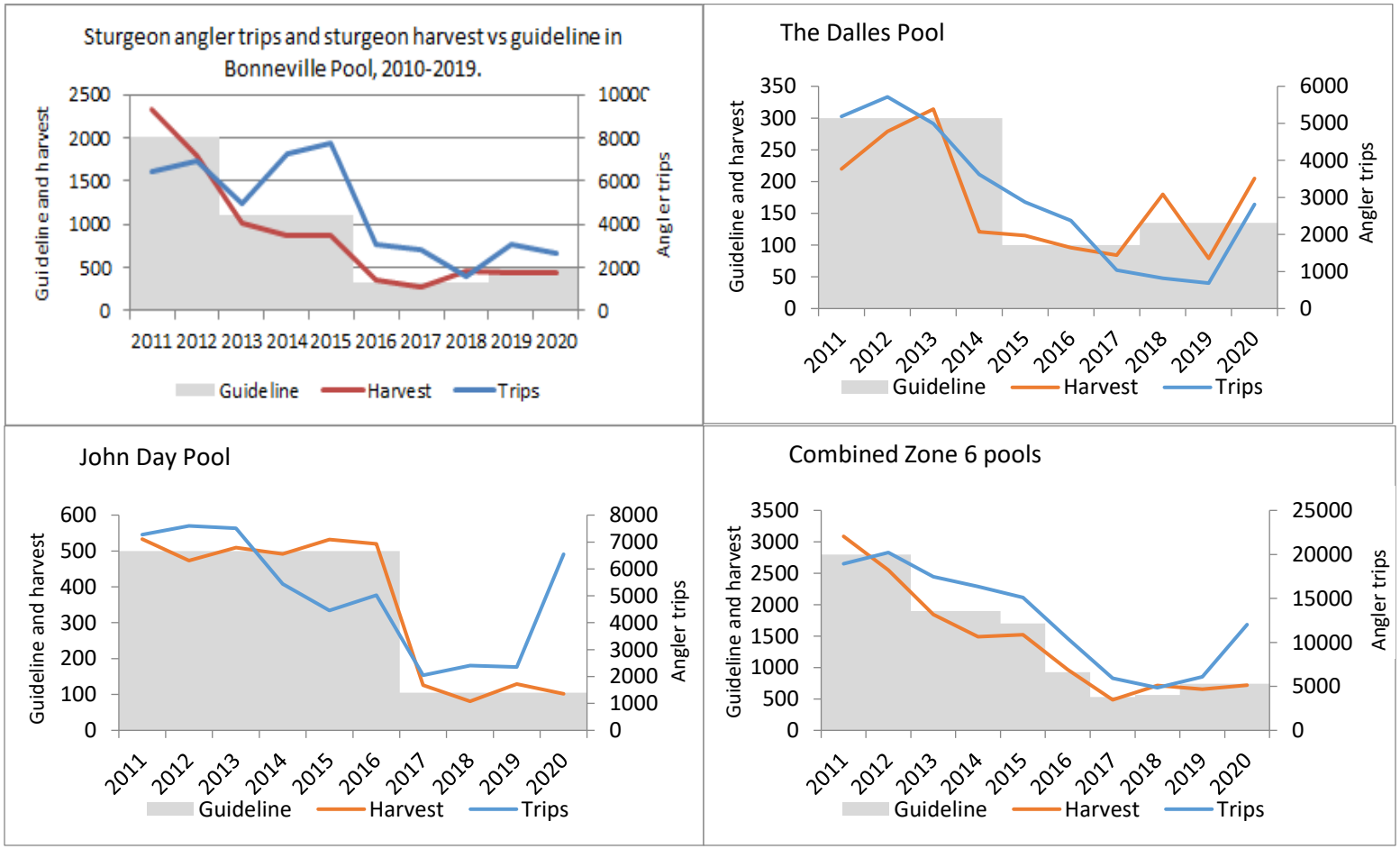

Figure B-2. Sport effort in terms of total angler trips (blue line) and harvest (red line) compared to harvest guidelines (gray bars) in Zone 6 reservoirs on the Columbia River, 2011–2020.

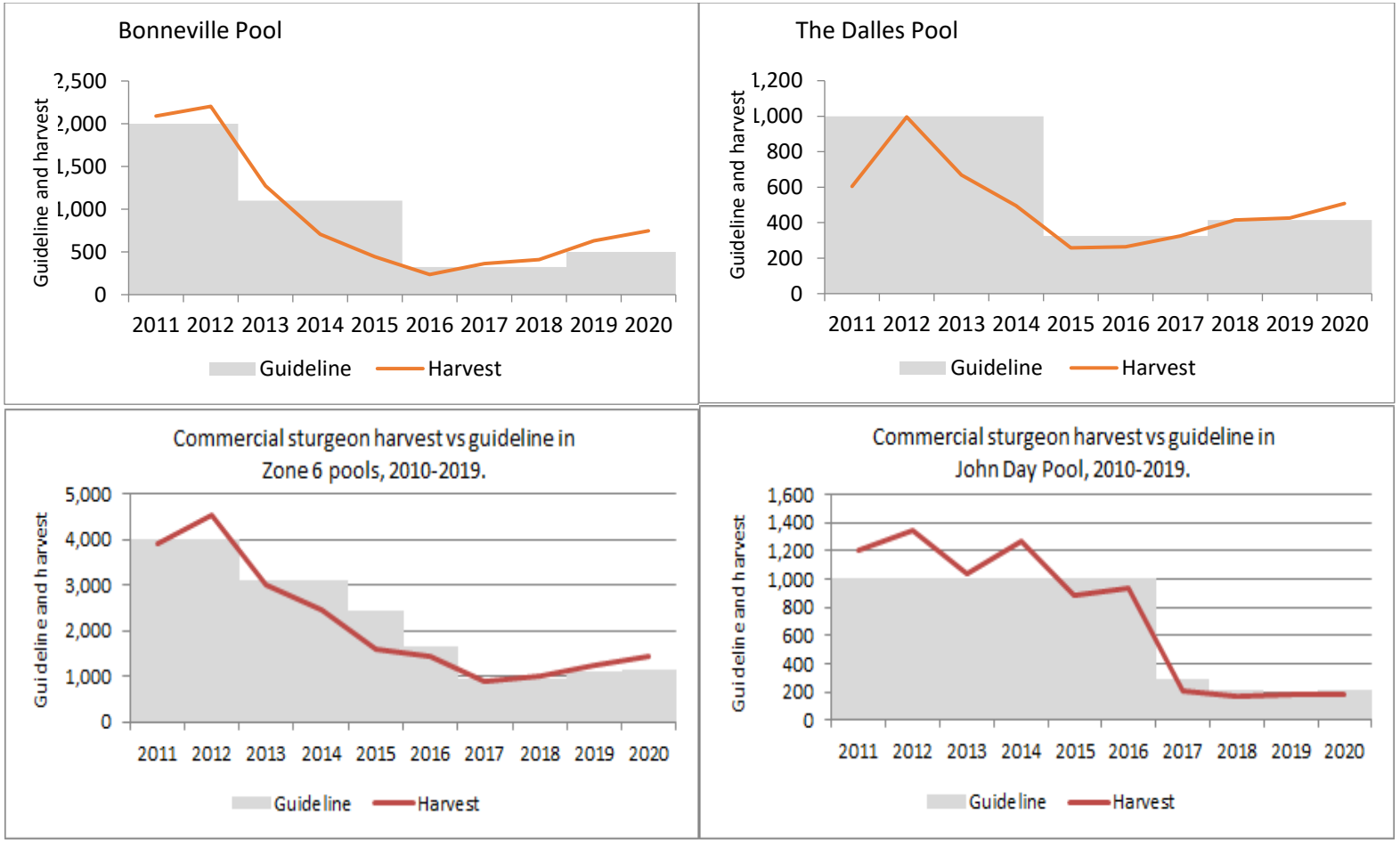

Figure B-3 Commercial harvest (red line) compared to harvest guidelines (gray bars) in Zone 6 reservoirs on the Columbia River, 2011–2020.

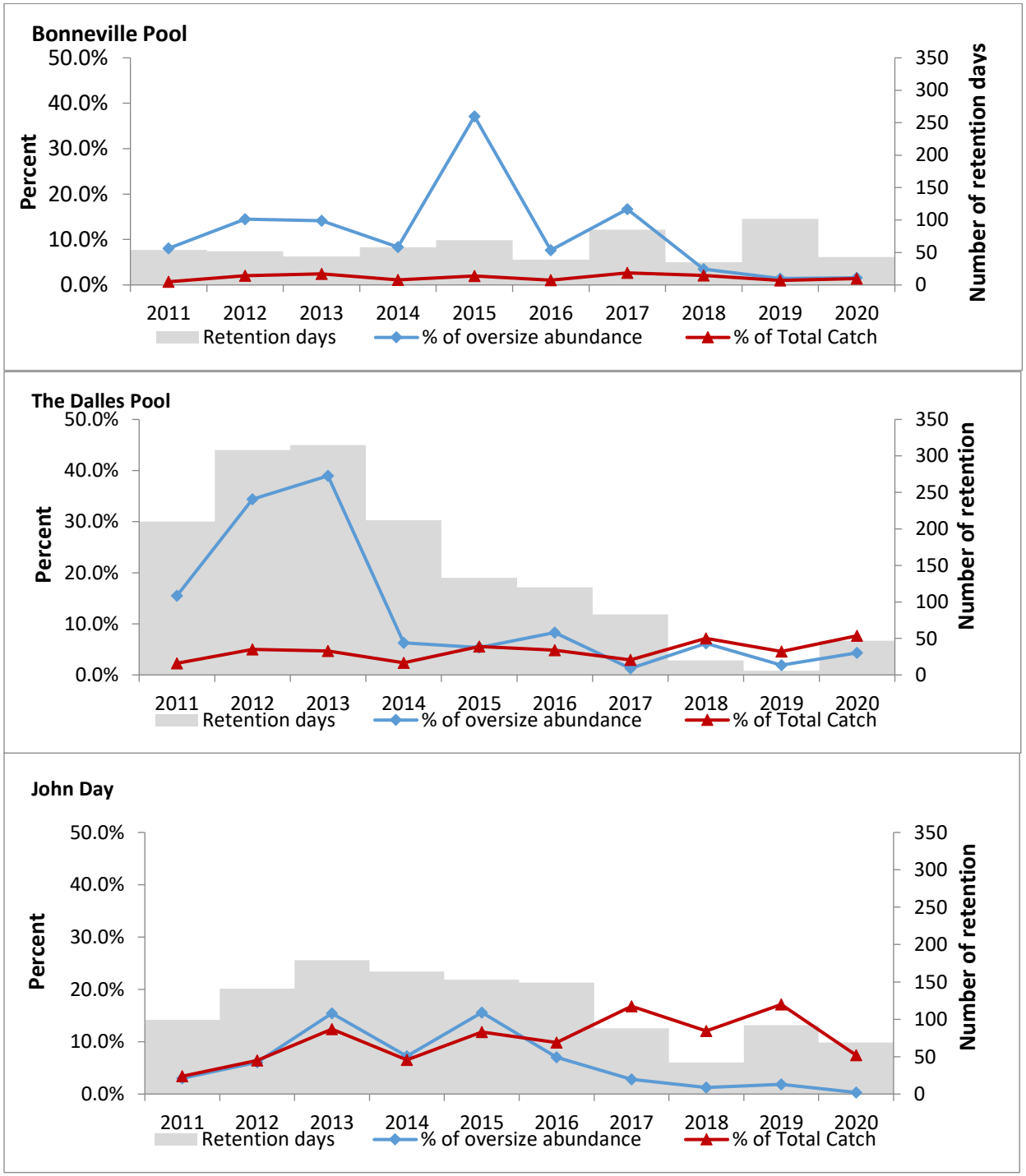

Figure B-4. The reported handling rates of over legal-size sturgeon during retention fishing periods is plotted as a percentage of estimated oversize abundance (blue line) and as a percentage of total sturgeon catch (red line). Gray bars represent the total number of retention fishing days in Zone 6 reservoirs, 2011–2020. 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

Table B-1. Zone 6 White Sturgeon Harvest Guidelines and Harvest Estimates, 2011–2020.

Area/Fishery	2011-2012			2013-2014			2015		2016		2017		2018		2019		2020	
	Guide-line	2011 Catch	2012 Catch	Guide-line	2013 Catch	2014 Catch	Guide-line	Catch	Guide-line	Catch[1]	Guide-line	Catch	Guide-line	Catch	Guide-line	Catch	Guide-line	Catch
Bonneville Pool																		
Sport	2,000	2,334	1,796	1,100	1,022	877	1,100	874	325	349	325	276	325	452	500	448	500	431
Treaty Commercial	2,000	2,089	2,203	1,100	1,277	706	1,100	445	325	236	325	368	325	406	500	630	500	748
Total	**4,000**	**4,423**	**3,999**	**2,200**	**2,299**	**1,583**	**2,200**	**1,319**	**650**	**585**	**650**	**644**	**650**	**858**	**1,000**	**1,078**	**1,000**	**1,179**
Treaty Subsistence		429	238		194	97		68		45		63		43		90		249
Abundance estimate			14,212				5,890						8,222		8,222		8,222	
The Dalles Pool																		
Sport	300	220	279	300	314	121	100	115	100	96	100	84	135	180	135	79	135	205
Treaty Commercial	1,000	604	996	1,000	676	496	325	258	325	264	325	326	415	415	415	426	415	508
Total	**1,300**	**824**	**1,275**	**1,300**	**990**	**617**	**425**	**373**	**425**	**360**	**425**	**410**	**550**	**595**	**550**	**505**	**550**	**713**
Treaty Subsistence		60	81		72	74		33		33		26		33		34		34
Abundance estimate	2,730					1,854					3,664							
John Day Pool																		
Sport	500	533	473	500	509	492	500	532	500	520	105	126	105	81	105	129	105	102
Treaty Commercial	1,000	1,208	1,347	1,000	1,050	1,267	1,000	884	1,000	881	295	209	210	166	175	187	210	182
Total	**1,500**	**1,741**	**1,820**	**1,500**	**1,559**	**1,759**	**1,500**	**1,416**	**1,500**	**1,401**	**400**	**335**	**315**	**247**	**280**	**316**	**315**	**284**
Treaty Subsistence		163	128		100	99		107		66		14		13		16		12
Abundance estimate				9,620					5,177									
Zone 6 Total																		
Sport	2,800	3,087	2,548	1,900	1,845	1,490	1,700	1,521	925	965	530	486	565	713	740	656	740	738
Treaty Commercial	4,000	3,901	4,546	3,100	3,003	2,469	2,425	1,587	1,650	1,381	945	903	950	987	1,090	1,243	1,125	1,438
Total	**6,800**	**6,988**	**7,094**	**5,000**	**4,848**	**3,959**	**4,125**	**3,108**	**2,575**	**2,346**	**1,475**	**1,389**	**1,515**	**1,700**	**1,830**	**1,899**	**1,865**	**2,176**
Treaty Subsistence		652	447		366	270		208		144		103		89		140		295
Sport retention periods:																		
Bonneville Pool		1/1-2/18 6/30-7/2 7/7-7/8	1/1-2/17 6/15-16 6/22-23		1/1-2/10 6/14-15 6/21	1/1-19; 2/1-17 2/24-3/9 6/13-14 6/20-21 7/11-12, 18-19		1/1-3/1 6/19-21, 26-28 7/3-5		1/1-2/7 6/18		1/1-3/24 6/10, 23		1/1-2/3 6/15		1/1-4/12		1/1-2/13
The Dalles Pool		1/1-7/29	1/1-11/3		1/1-11/11	1/1-7/31		1/1-5/13		1/1-4/29		1/1-3/24		1/1-19 6/15		1/1-6		1/1-2/17
John Day Pool		1/1-4/9	1/1-5/20		1/1-6/28	1/1-6/13		1/1-6/2		1/1-5/28		1/1-3/29		1/1-2/11		1/1-4/2		1/1-3/9
Commercial open periods [1]																		
Bonneville Pool		1/1-1/31 S 2/2-3/21 G 6/27-6/30 G 8/1-13 S 10/10-26 S	1/1-1/31 S 2/1-3/6 G		1/1-1/31 S 2/2-3/6 G	1/1-1/31 S 2/2-3/15 G		1/1-1/31 S 2/23-3/21 G		1/1-1/31 S 3/14-3/21 G 8/1-8/13 S 11/14-11/26 S		1/1-1/31 S 3/6-17 G		1/1-1/31 S 3/5-14 8/6-25 10/17-31		1/1-1/31 S 3/1-3/23 G		1/1-1/31 S 2/27-3/7 G
The Dalles Pool		1/1-1/31 S 2/2-3/21 G 6/27-6/30 G 8/1-13 S 10/10-31 S 11/2-12/3 S	1/1-1/31 S 2/1-3/21 G 7/30-8/11 S		1/1-1/31 S 2/2-3/21 G 5/24-6/15 G	1/1-1/31 S 2/2-3/3 G 3/12-22 G 11/25-12/31 S		1/1-1/31 S 2/2-2/24 G		1/1-1/31 S 2/1-3/12 G 11/7-11/12 S		1/1-1/31 S 2/1-3/4 G		1/1-1/31 S 2/1-16 2/22-3/3 3/15-19		1/1-1/31 S 2/1-2/19 G		1/1-1/31 S 2/1-2/8 G
John Day Pool		1/1-1/31 S 2/2-3/21 G 6/27-6/30 G 8/1-13 S 10/10-31 S	1/1-1/31 S 2/1-3/1 G		1/1-1/31 S 2/1-2/27 G	1/1-1/31 S 2/1-2/26 G		1/1-1/31 S 2/2-2/24 G		1/1-1/31 S 2/1-3/12 G 11/7-11/12 S		1/1-1/31 S 2/1-3/4 G 8/1-12 S 12/11-30 S		1/1-1/31 S 2/1-3/3 3/15-24 6/6-15 7/27-8/4		1/1-1/31 S 2/1-2/27 G 7/26-8/8 S		1/1-1/31 S 2/1-2/8 G 2/12-2/17 G 2/20-2/24 G
Size limits (in.)																		
BP Sport																		
BP Commercial																		
TD & JD Sport																		
TD & JD Comm.																		

[1] *S = setline; G = gillnet.*

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

ANNUAL PROGRESS REPORT

JANUARY – DECEMBER 2020

REPORT C

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

This report includes: A summary of field activities conducted in December 2019 - January 2020 that provide for partial White Sturgeon sampling, tagging and data collection necessary to conduct a White Sturgeon stock assessment in The Dalles Reservoir. The first part of field activities, conducted in December 2019, were also reported on as part of the January – December 2020 Annual Report**.**

Prepared by:

Blaine L. Parker

Columbia River Inter-Tribal Fish Commission
700 NE Multnomah Ave, Suite 1200
Portland, Oregon 97232

March 10, 2021

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ABSTRACT

Tribal fishers and Yakama Nation fisheries technicians completed The Dalles Reservoir tagging effort in January 2020. Sampling documented the change in population structure that has been monitored by tribal and state fishery managers for the past decade. The substantial increase in the numbers of oversize sturgeon combined with the bottoming out of the catch per unit values, confirms that the mode documented previously has come to fruition (Parker 2015).

INTRODUCTION

This annual report documents the efforts of the Columbia River Inter-Tribal Fish Commission (CRITFC) and its subcontractors, the Yakama Nation (YN) and contracted tribal fishers. Jointly, we worked on 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. Our winter tagging work was initiated in The Dalles Reservoir on December 2, 2019 and was completed on January 10, 2020. It is common for the winter tagging effort to straddle two separate reporting periods; due to the number of weeks necessary to capture and mark the numbers of fish specified in our deliverable.

In January 2020, the Commission and its tribal subcontractors completed winter tagging of White Sturgeon *Acipenser transmontanus* for The Dalles Reservoir (Figure 1). In 2020, YN technicians also monitored tribal commercial fisheries; January (setline), February and March (gillnets). Monitoring of tribal fisheries is a cooperative effort with Washington Department of Fish and Wildlife (WDFW), with the results reported in WDFW's annual report. In June, July and August of 2020, YN technicians worked cooperatively with WDFW and Oregon Department of Fish and Wildlife (ODFW) stock assessment staff to conduct the summer phase of the population assessment in John Day Reservoir. In October 2020, YN fishery technicians again worked alongside ODFW and WDFW staff to conduct annual young of year white sturgeon surveys in John Day, The Dalles and Bonneville reservoirs. In December of 2020, white sturgeon tagging efforts were initiated in Bonneville Reservoir; results will be reported in the 2020 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

Tagging efforts in The Dalles Reservoir captured in 3,940 sturgeon from 138 overnight gillnet sets, a catch per unit effort (CPUE) of 28.6 sturgeons per set. Fish ranged in length from 29 to 238 cm FL, with a mean of 86.1 cm FL. The proportion of sub-legal sturgeon was 91.8% for sturgeon less than 109 cm FL, the proportion of legal-sized sturgeon or fish greater than or equal to 109 cm FL and less than or equal to 137cm FL was 7.7% and the proportion of oversize sturgeon, fish greater than 137cm FL was 0.4 % of the catch or 13 fish. We applied PIT tags to a total of 2,987 fish for a 76.0% overall tagging rate on all captured sturgeon. The catch of 21

non-target species contained nearly equal numbers of carp, northern pikeminnow, steelhead, and walleye (Table C-1).

DISCUSSION/CONCLUSIONS

The Dalles Reservoir sampling in 2019-20 took place over four weeks, nearly identical to the effort expended in the 2016-17 tagging effort, yet the fish per set value more than doubled from the value calculated from the 2016-17 sampling period. The 2019-20 fish per set value was the highest value in nearly 20 years of sampling (Table C-2.) The increase in catch and catch rate positively affected the number of PIT tags applied, 2,987 in 2019-20 versus 1,735 in 2016-17; with 76% of captured fish in 2019-20 receiving tags. The 10% increase in the proportion of legal fish from 2016-17 is likely the peak of this population for the foreseeable future; as the slight decline in the abundance of sub-legal fish in our sampling confirms the generally poor recruitment since 2015 (Table C-3). This gap in recruitment, while not as severe as John Day (ODFW 2020 Annual Report), is substantial based upon the minimal representation of juvenile fish in our sampling (2021 SMTF Policy Report).

ADAPTIVE MANAGEMENT AND LESSONS LEARNED

The Dalles Reservoir sturgeon population is now on an upswing based on the increased numbers of legal and oversized sturgeon since bottoming out in 2007–08 (Table C-3). Correspondingly, catches of White Sturgeon have slowly increased concurrent with the population shifts in the sublegal and legal proportions of the population. At the January 2021 Sturgeon Management Task Force (SMTF) meeting, tribal and state policy representatives approved minor increases in commercial fishery and sport fishery guidelines for this reservoir, affirming the availability of additional legal fish.

ACKNOWLEDGEMENTS

Our sincere appreciation to Yakama Nation fishery technician Steven Begay and CRITFC technician Teddy Walsey and to tribal fishers Alfred M^{c}Conville and Robert Brigham 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. To Ruth Hannevig of ODFW for her patience and assistance with data entry and proofing of our catch data. We also thank Denise Kelsey and Joe Nowinski for their skill and expertise in the redesign of our field manual, data sheets, and data entry materials and their assistance in training the technicians.

FIGURES

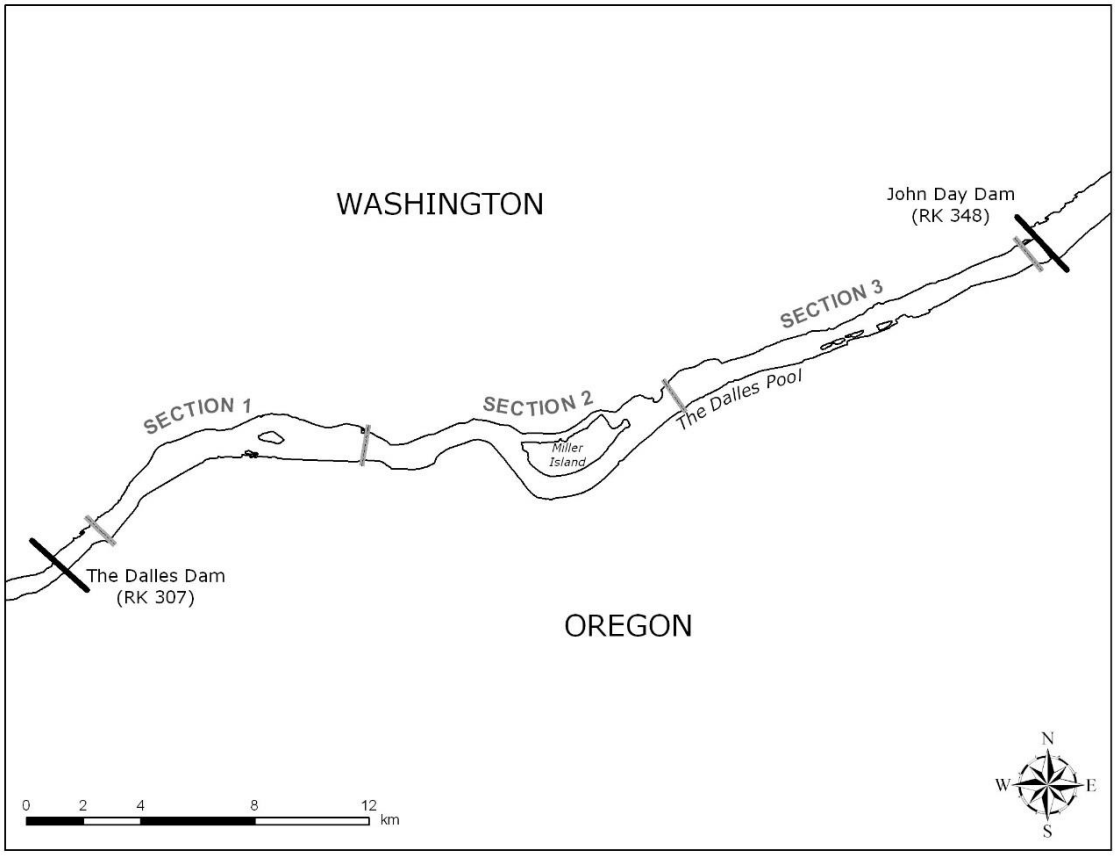

Figure C- 1. Map of The Dalles Reservoir Columbia River with sampled reaches for December 2019 and January 2020.

TABLES

Table C-1. Incidentally caught species from the 2019-20 gillnet sampling effort in The Dalles reservoir.

Species	Released Alive[1]	Released Dead[1]	Total
northern pikeminnow *Ptychocheilus oregonensis*	-	-	6
walleye *Sander vitreus*	-	-	5
common carp *Cyprinus carpio*	-	-	6
Steelhead *Oncorhynchus mykiss*	-	-	4

[1]Condition at release not recorded

Table C-2. Catch, number of sets, fish per set, and percentage PIT tagged of white sturgeon caught using gillnets in The Dalles Reservoir for 2001–02, 2004–05, 2007–08, 2010–11, 2013–14, 2016–17, and 2019-20 sampling periods.

Sampling Period	Sturgeon Catch	No. of Sets	Fish per Set	Percent Tagged
2001-02	3,063	1,031	2.9	61%
2004-05	3,357	1,059	3.2	49%
2007-08	4,371	228	19.2	89%
2010-11	3,892	227	17.1	81%
2013-14	3,245	184	17.7	73%
2016-17	2,698	222	12.2	64%
2019-20	3,940	138	28.6	76%

Table C-3. Proportions of sub-legal fish (<109 cm FL), legal fish (109–137 cm FL), and over legal fish (>137 cm FL) white sturgeon captured with gillnets in the 2001–02, 2004–05, 2007–08, 2010–11, 2013–14, 2016–17, and 2019-20 sampling periods in The Dalles reservoir.

Sample Period	Sub-Legal Sturgeon	Legal Sturgeon	Over Legal Sturgeon
2001-02	89.1%	7.6%	3.3%
2004-05	95.1%	3.3%	1.6%
2007-08	99.6%	0.3%	0.1%
2010-11	96.7%	3.0%	0.3%
2013-14	97.4%	2.2%	0.4%
2016-17	93.0%	6.1%	0.9%
2019-20	91.8%	7.7%	0.4%

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