Northwest **Power** and **Conservation** Council

April 5, 2022

MEMORANDUM

TO: **Fish and Wildlife Committee Members**

FROM: **Mark Fritsch**

SUBJECT: **White sturgeon status report for Lower and Mid-Columbia, and Lower Snake rivers**

BACKGROUND:

Presenter: Philip Simpson, Columbia River Sturgeon Project Leader, ODFW
Blaine Parker, Sturgeon Program Lead, CRITFC
Laura Heironimus, Sturgeon, Smelt, and Lamprey Unit Lead, WDFW

Summary: Philip, Blaine and Laura will each give a short report on sturgeon in the established management units, from the Columbia River below Bonneville, Bonneville to McNary, and McNary and lower Snake River, respectively. The information provided will include a short report on sturgeon in the management units and will cover population status, ongoing work, challenges, accomplishments, partners, and future needs for sturgeon.

Relevance: These reports address many measures in the 2014 Fish and Wildlife Program and 2020 addendum. In addition, it provides information to the region on the status of white sturgeon in the Columbia and Snake rivers.

Workplan: Fish and Wildlife Division work plan 2022; Program Implementation and performance. Sturgeon are listed as an emerging priority in the Council's 2014 Fish and Wildlife Program and 2020 addendum.

Background: The Fish and Wildlife Program supports three projects that are associated with Sturgeon management in the above management units.

- Project #1986-050-00, *Evaluate Sturgeon Populations in the Lower Columbia River*
- Project #2007-155-00, *Develop a Master Plan for a Rearing Facility to Enhance Selected Populations of White Sturgeon in the Columbia River Basin*
- Project #2008-455-00, *Sturgeon Management*

The Council's 2020 addendum to the 2014 Fish and Wildlife Program recognizes two additional measures that need particular attention:

- Evaluate whether alternative flow regimes might increase sturgeon productivity and recruitment in the lower Columbia below McNary Dam and if so, whether and how operations could be altered to provide those flow regimes without compromising protection for salmon, steelhead and lamprey.
- Increase sturgeon population monitoring between McNary and Priest Rapids dams and in the lower Snake River so that stock status is regularly reported for each area and pool.

More Info:

- The Council's White Sturgeon web page
- Columbia Basin White Sturgeon Planning Framework
- White Sturgeon Story Map

Northwest Power and Conservation Council

12 April 2022

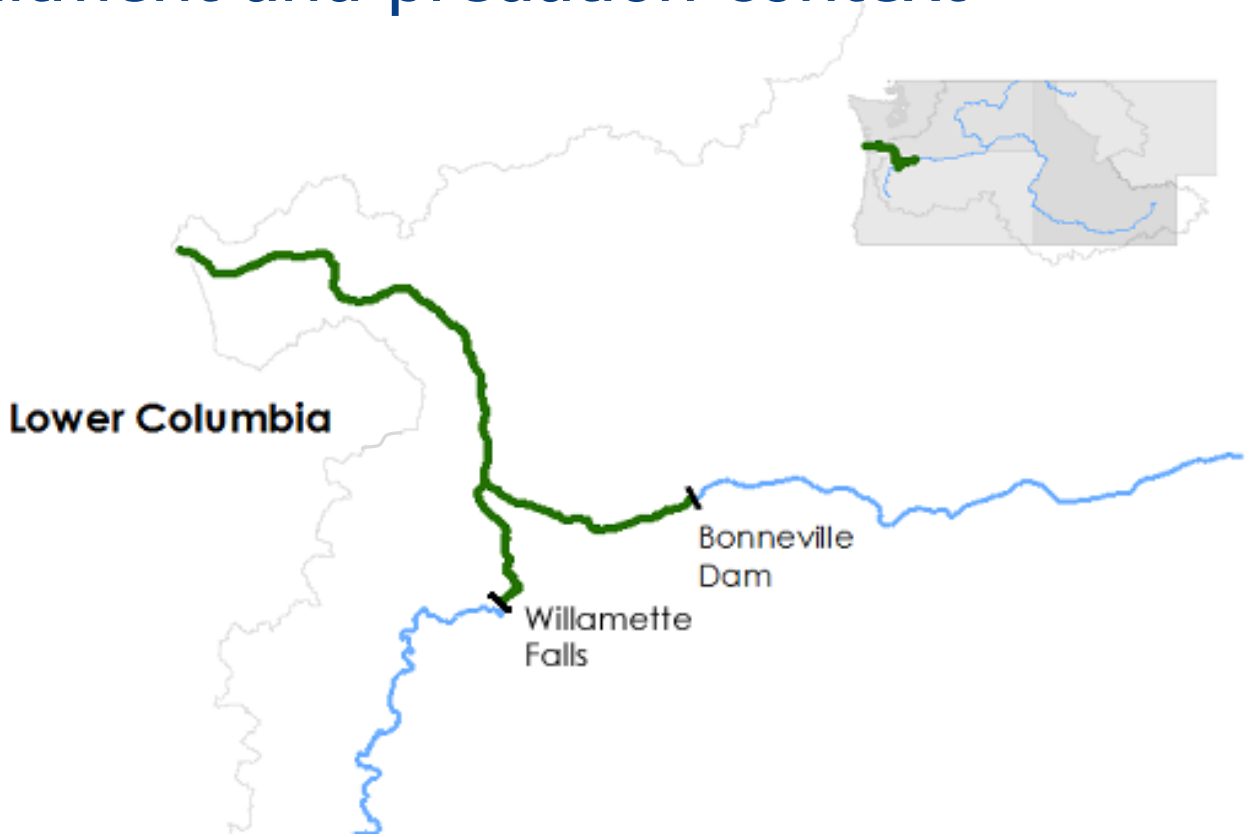
Lower Columbia River White Sturgeon Population Status Update

Phil Simpson

Columbia River Sturgeon Project Leader

Today's Topics

* 2021 stock assessment results
* Current population composition, status, and trends
* Recruitment and predation context

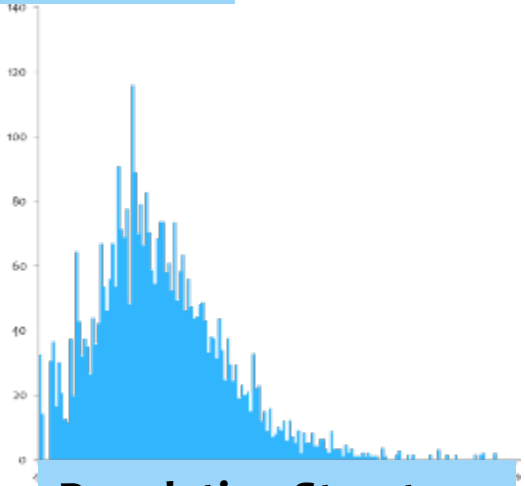


Metrics and Indicators

Juvenile Abundance

Adult Abundance

Age-0 Recruitment

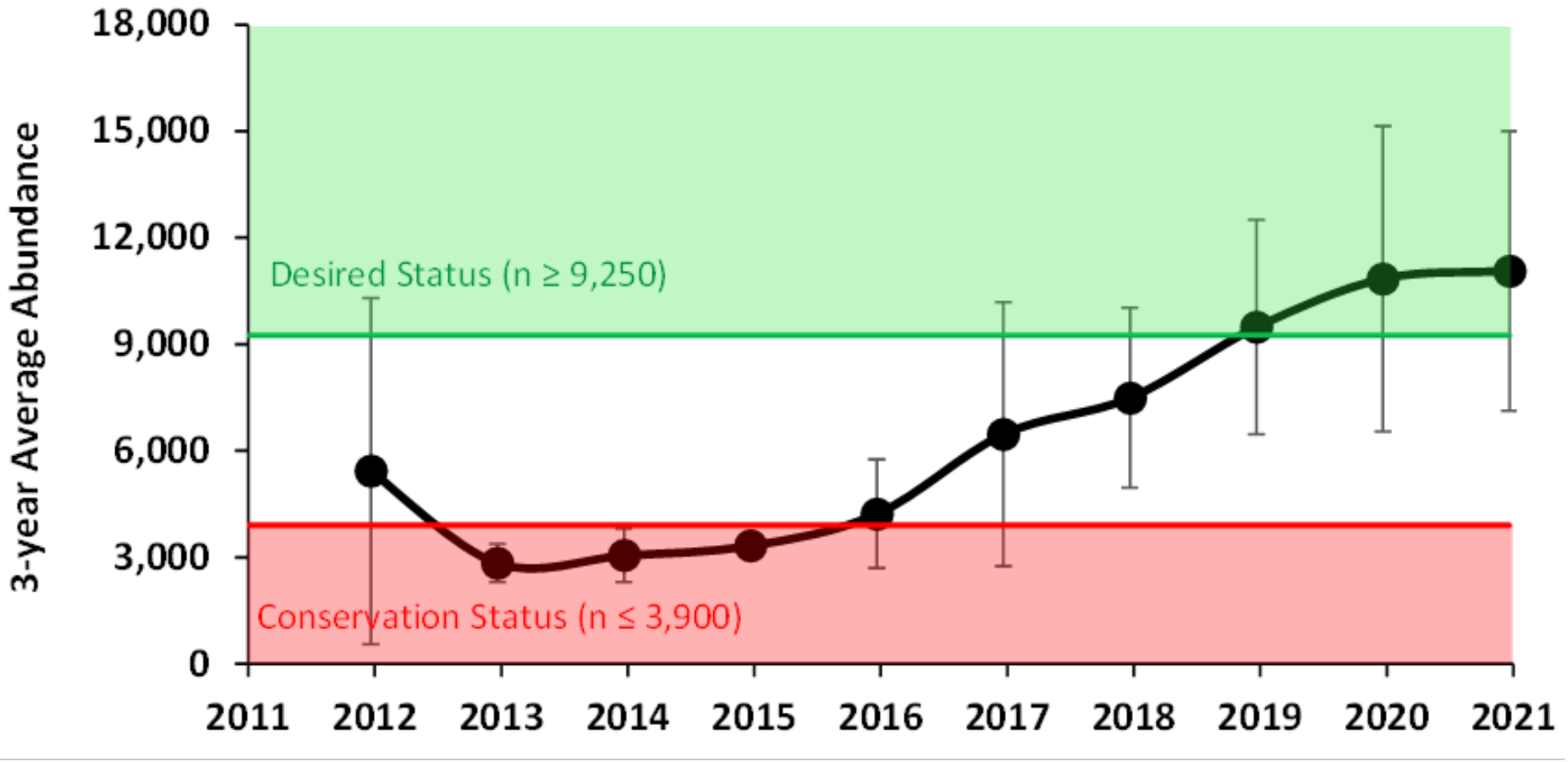


Population Structure

Pinnipeds

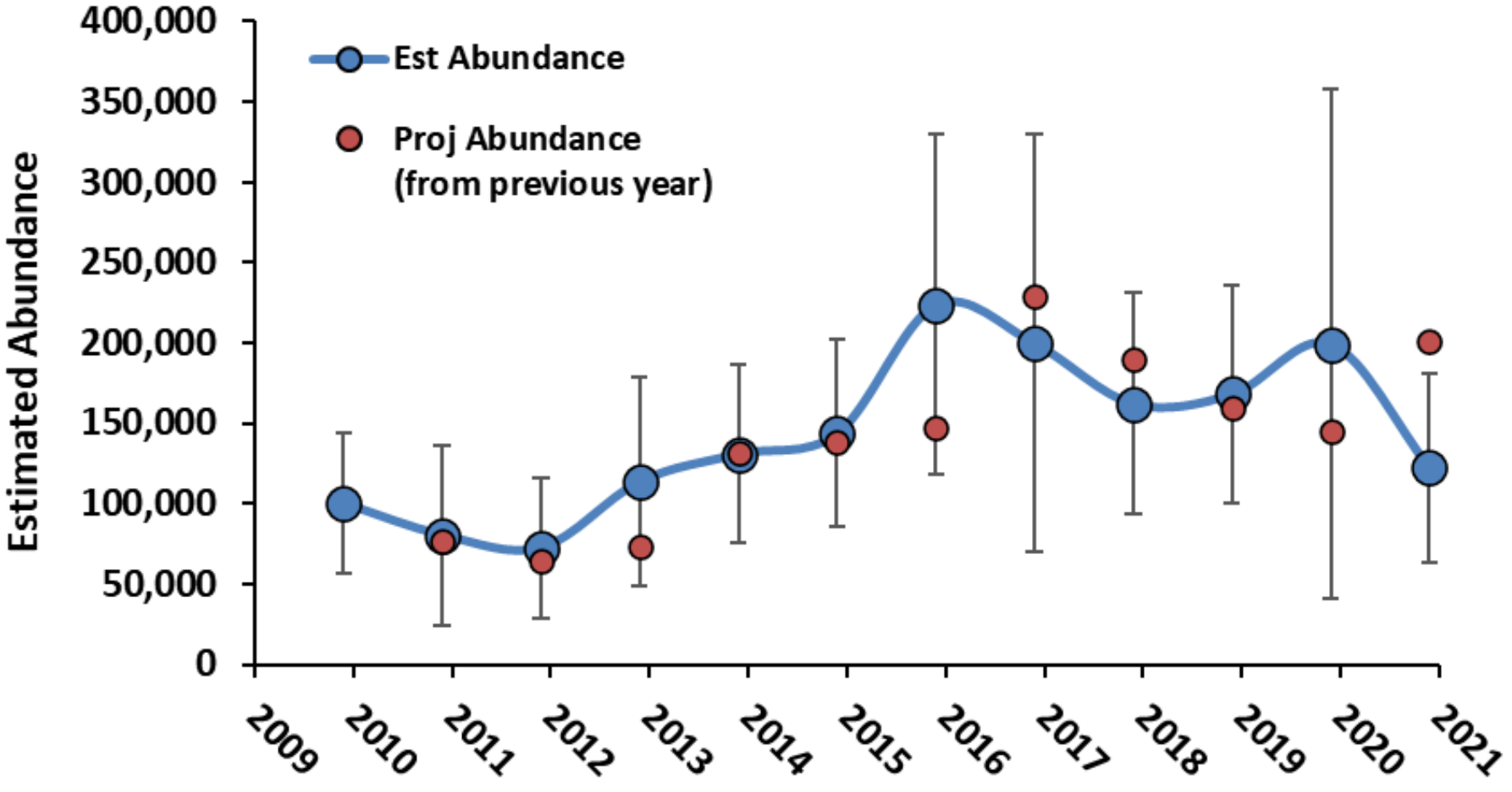
LCR White Sturgeon Abundance

Estimated Adult Abundance (3-yr average; 66+" FL)

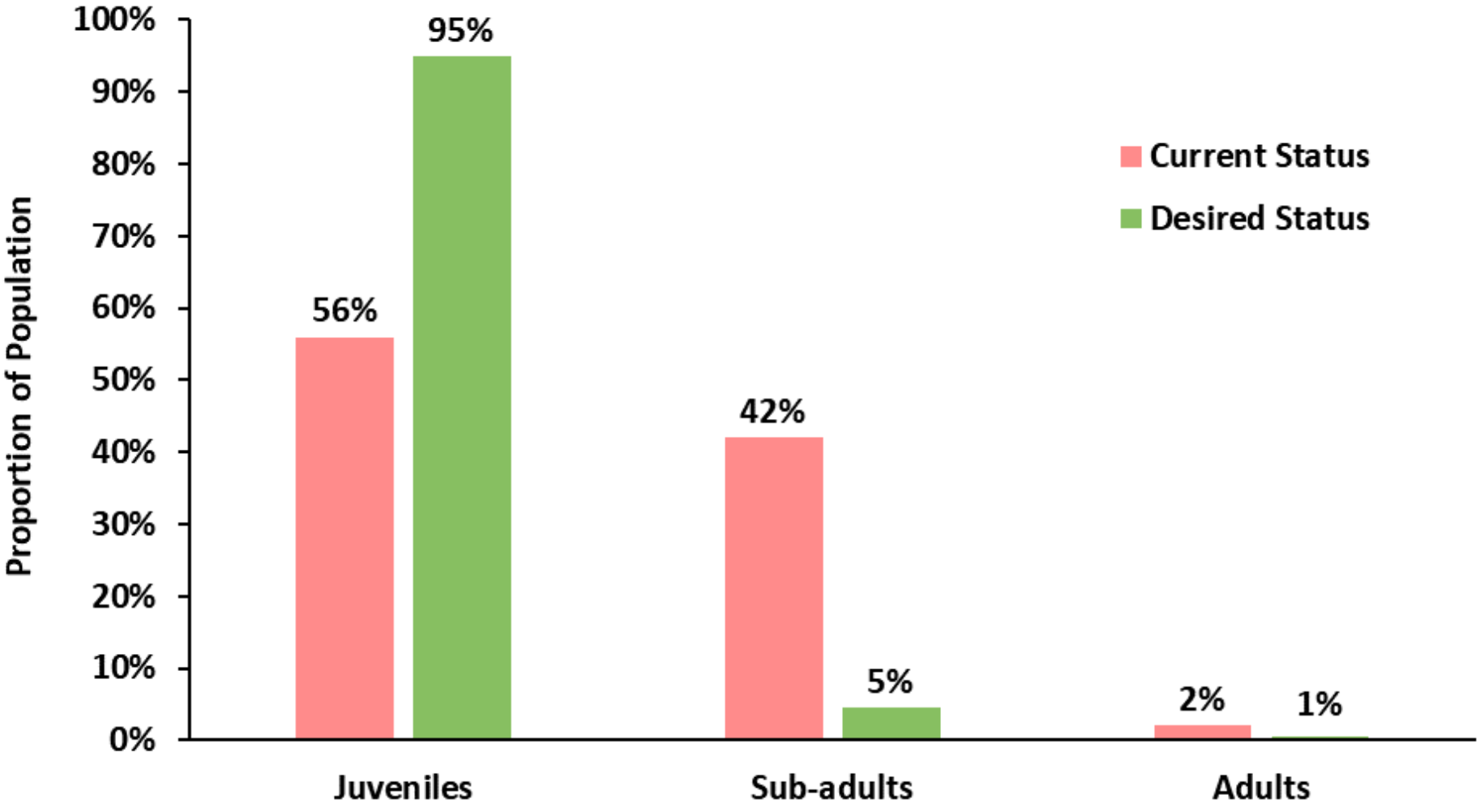


LCR White Sturgeon Abundance

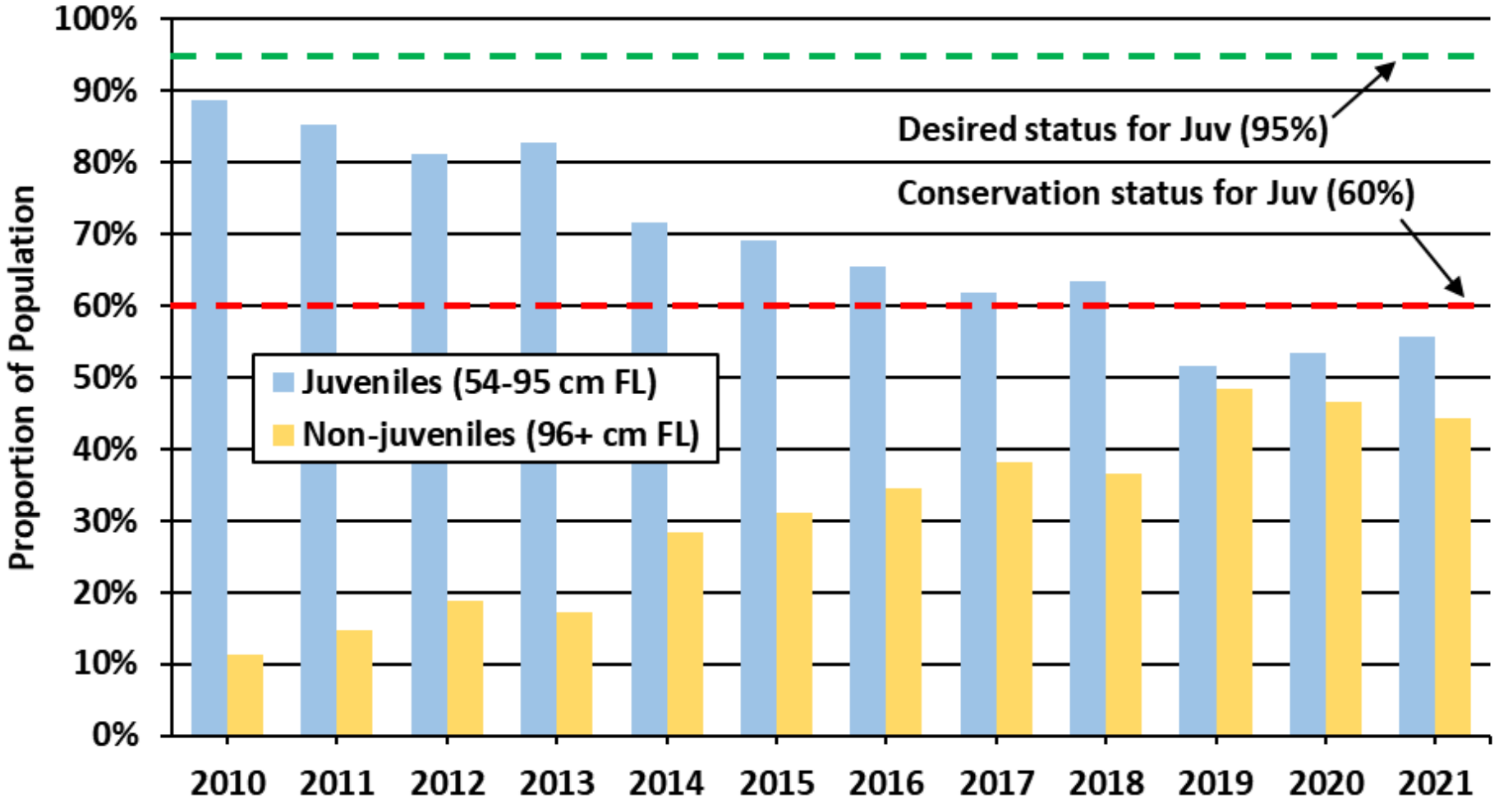
Estimated Legal Abundance (38” – 54” FL)



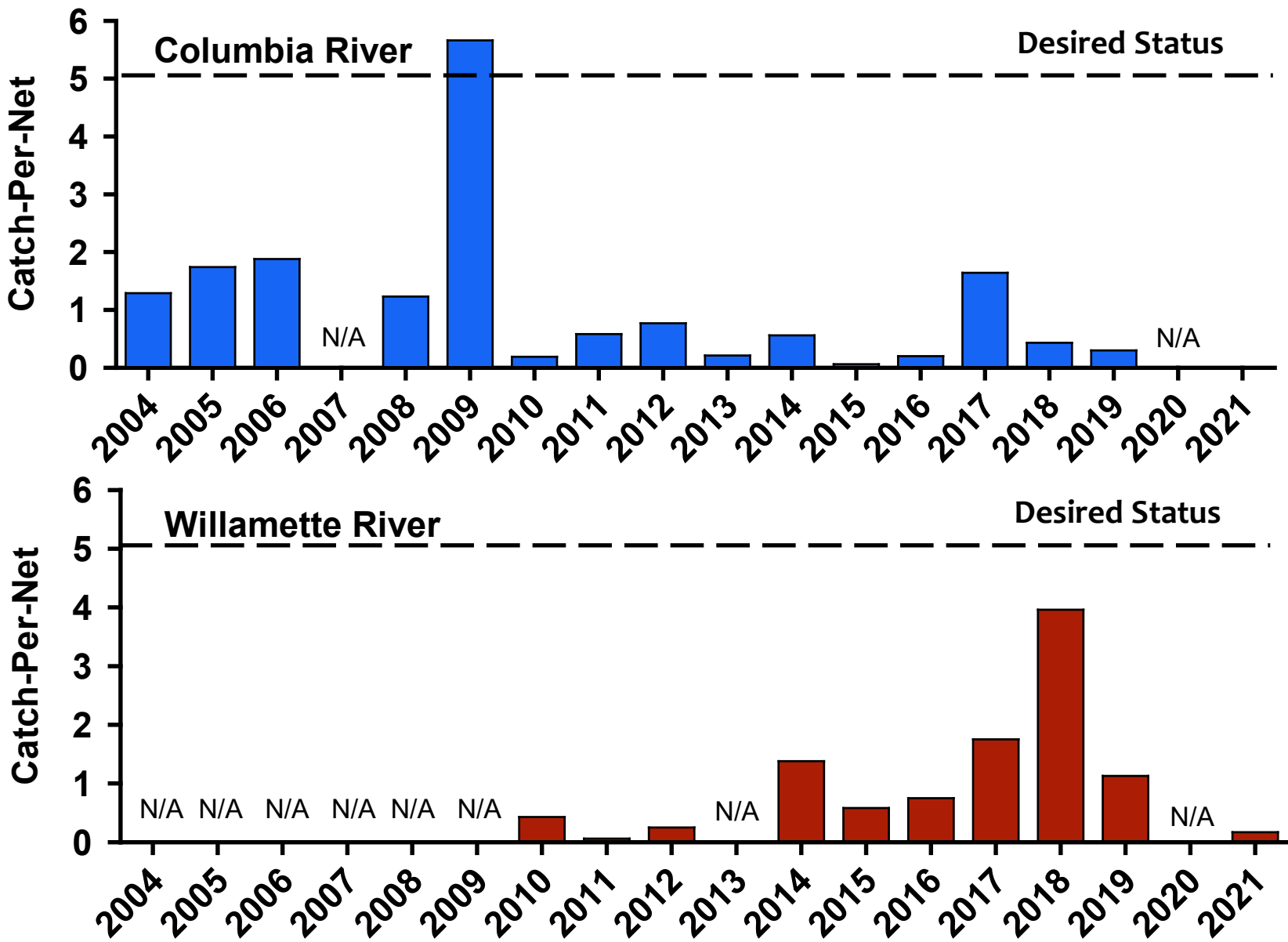
LCR Age Class Distribution



LCR Trend in Population % by Age Class

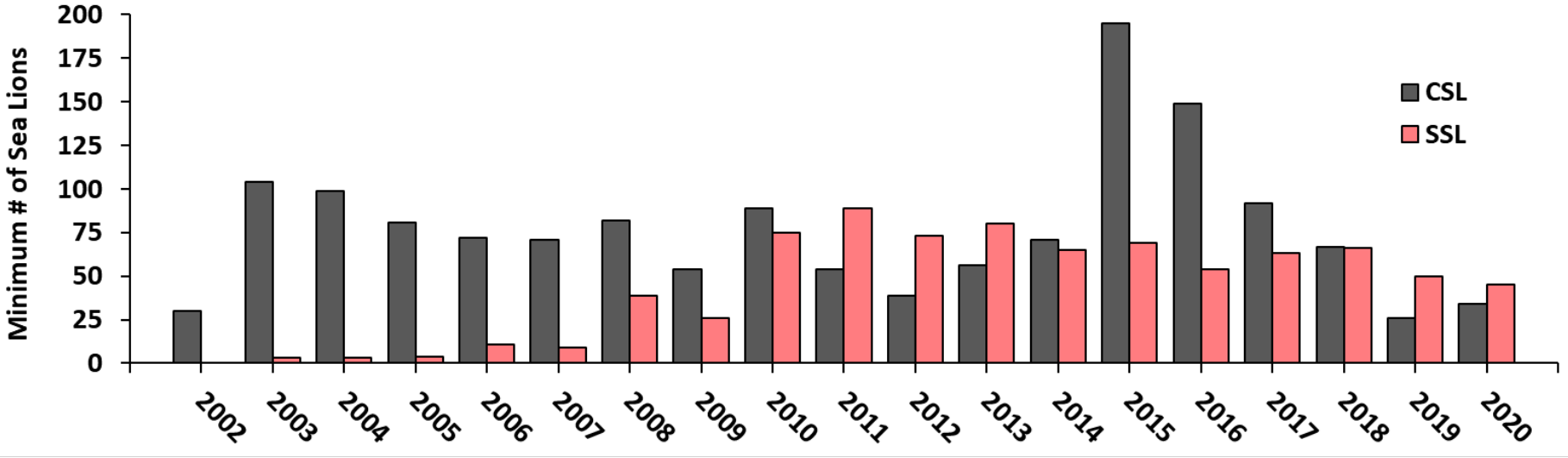


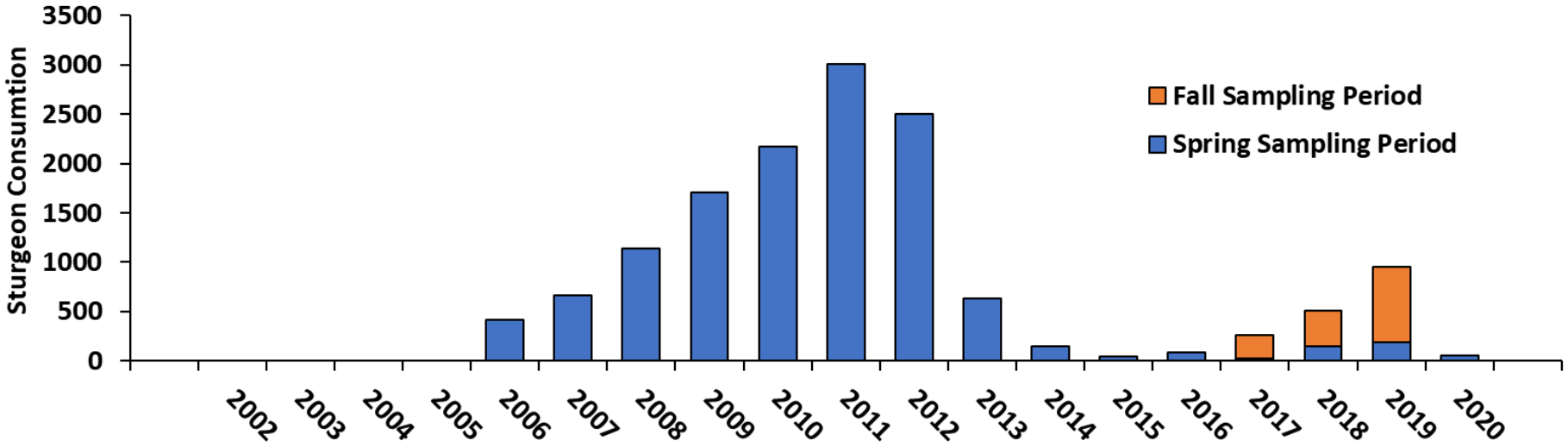
LCR White Sturgeon Recruitment



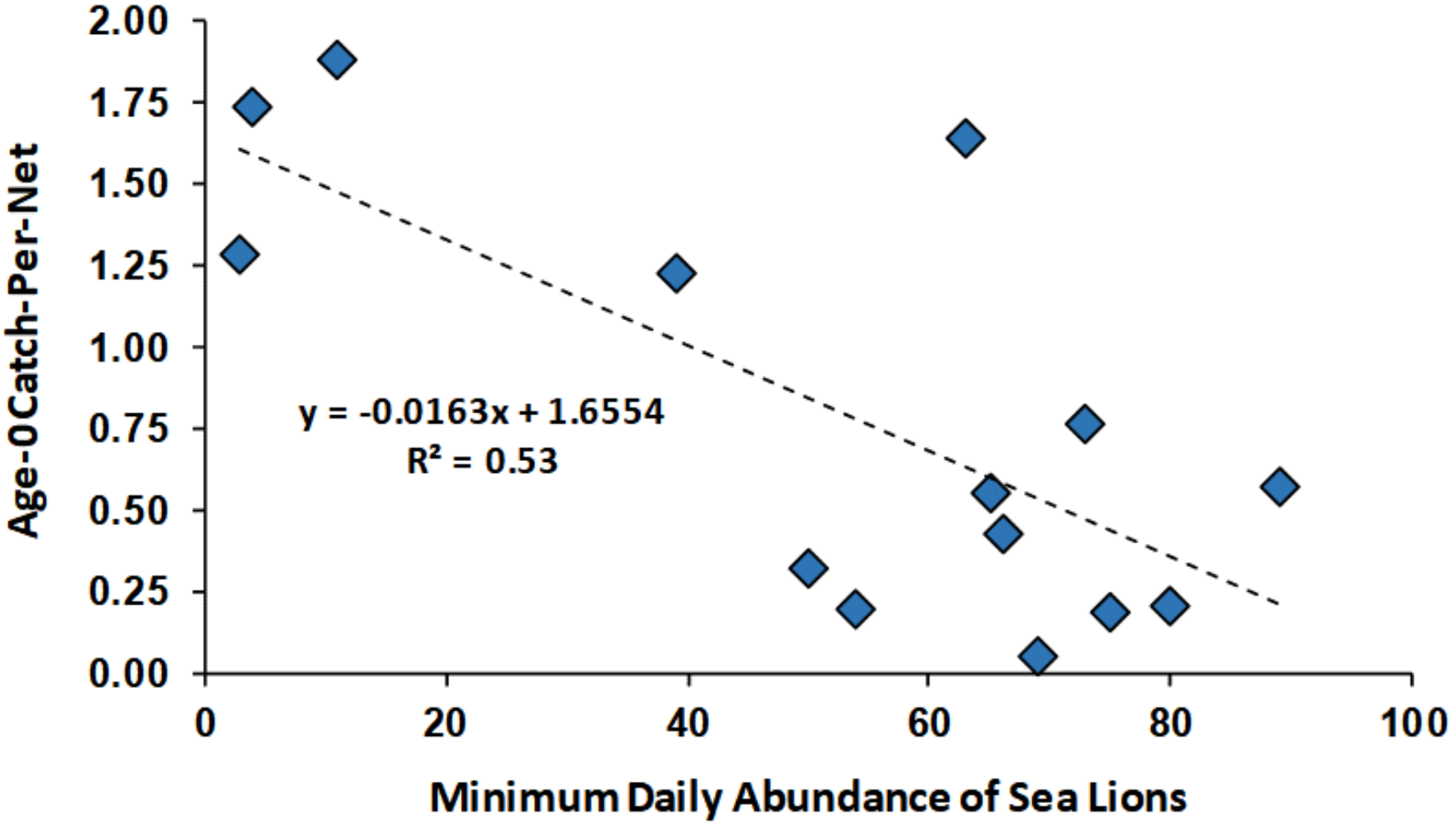
Sea lion Abundance & Predation

* Steller Sea Lions arrive in 2005 and sturgeon started being deliberately targeted





Sea lion Effects: Mainstem Col R.



Sea lion predation

Growing pinniped issue in the Willamette R

Season	Max daily # of SSL Observed	STG Predation Events Observed
2014-15	1-2	12
2015-16	1-2	8
2016-17	4	69
2017-18	11	79
2018-19	10	98
2019-20	8	27
2020-21	3	18

Summary

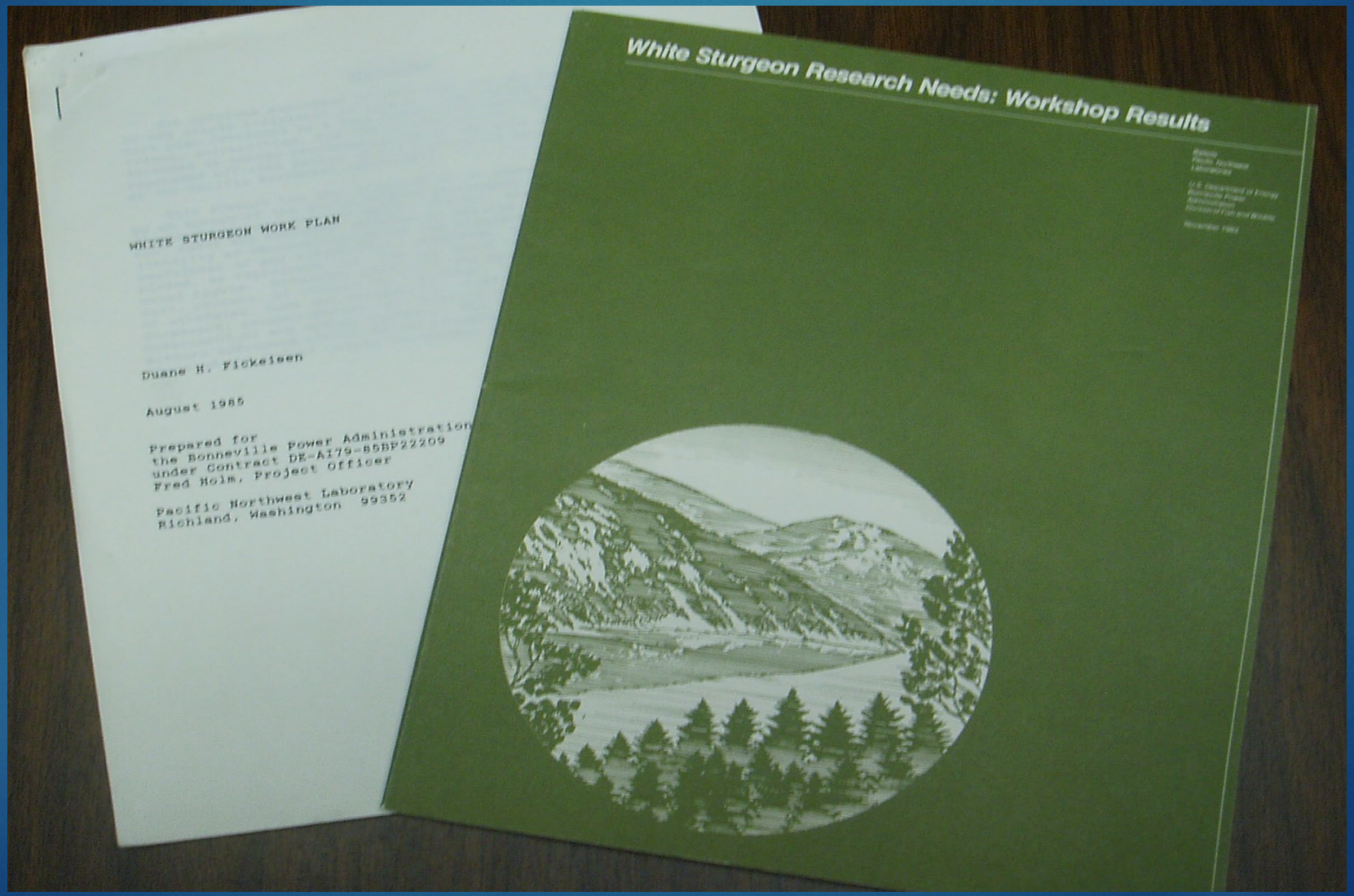
Metric	N	Interpretation	Brief Summary
Legal Abundance	122,395		Abundance estimate continues pre-2020 declining trend; significantly above conservation status level.
Adult Abundance	6,769 3-yr Avg 11,064		2021 3-year average abundance estimate is above desired status level; point estimate is above conservation status.
Population Structure	~53% Juveniles		Proportional abundance of juvenile and sub-legal fish <60% (conservation status).
Recruitment Index (CPN)	LCR: 0.02 WR: 0.17		Low numbers indicate continued productivity issues; sampling restored.
Sea Lion Abundance	High		High sea lion abundance is problematic for white sturgeon populations; recent changes in SSL management.
Fisheries	36,704 (Trips)		Interest in retention fisheries remains high; season setting is challenging with low guidelines.

Update on White Sturgeon Populations – Bonneville, The Dalles and John Day Reservoirs 2021-2022

BLAINE L. PARKER, STURGEON PROJECT LEADER
COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

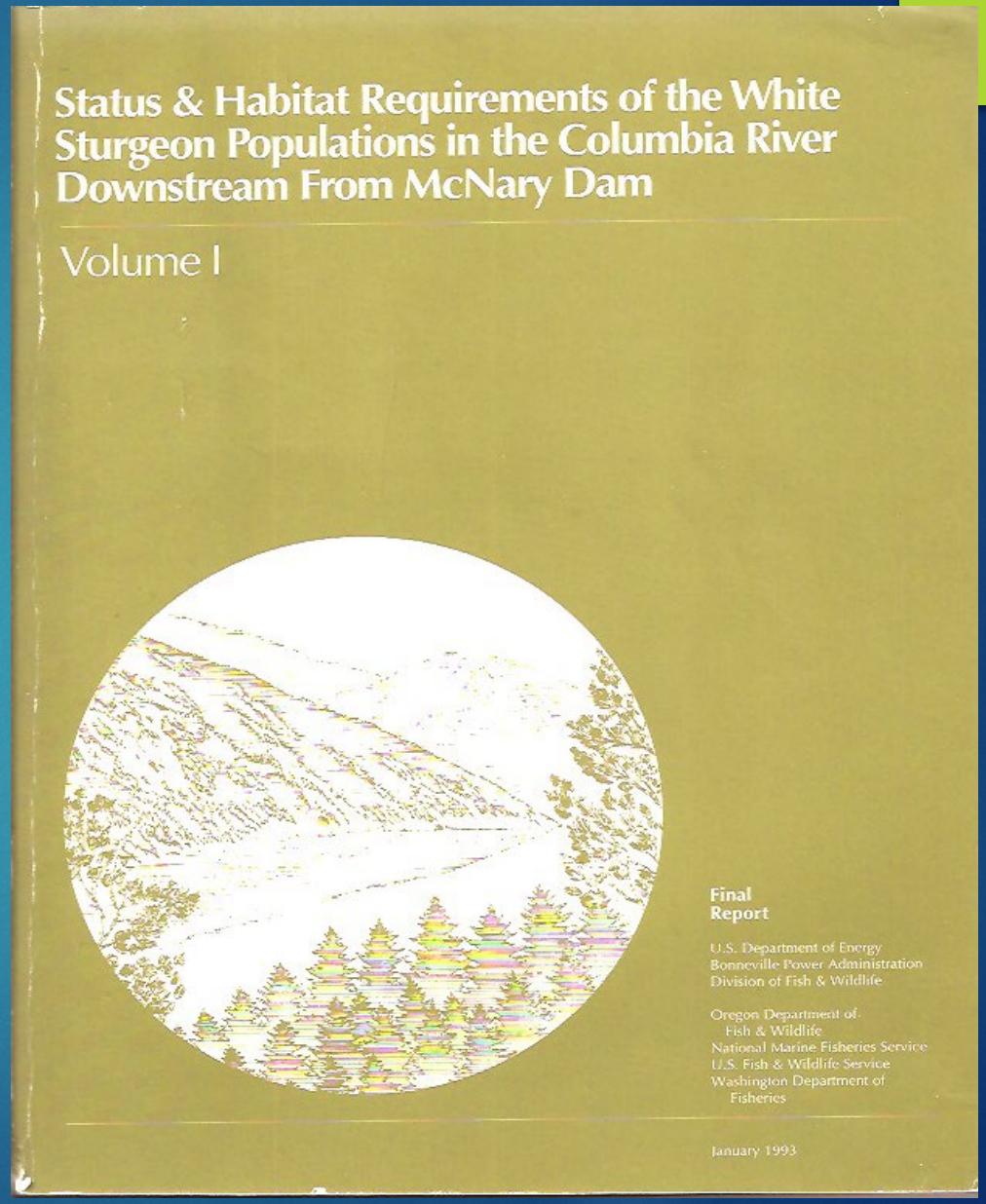
NORTHWEST POWER AND CONSERVATION COUNCIL
FISH AND WILDLIFE COMMITTEE MEETING
APRIL 12TH, 2022

In The Beginning…



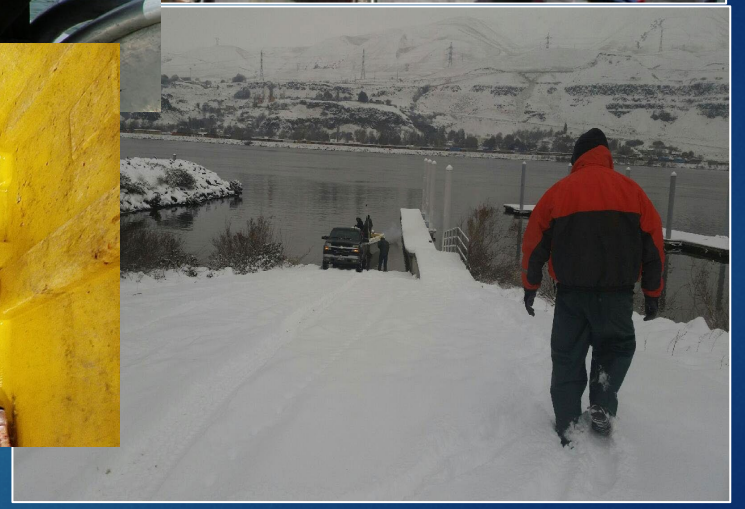
BPA Project 86-0500

- ORIGINATING FROM RESEARCH PLANNING EFFORT IN 1985 (Fickeisen 1985)
- ODFW PROJECT LEAD, KEY PARTNERS CRITFC, WDFW & USFWS
- PROTECT AND ENHANCE WHITE STURGEON POPULATIONS THROUGHOUT THE LOWER MIDDLE COLUMBIA RIVER
- TIME SERIES POPULATION MONITORING UNDERSTANDING POPULATION DYNAMICS
- YOUNG OF YEAR SURVEYS PAIRED HARVEST DATA HAS ENABLED MANAGEMENT OF THESE POPULATIONS
- PROJECT RESEARCHERS (PAST AND PRESENT) LARGEST KNOWN INFORMATION BASE OF ANY STURGEON SPECIES IN THE WORLD



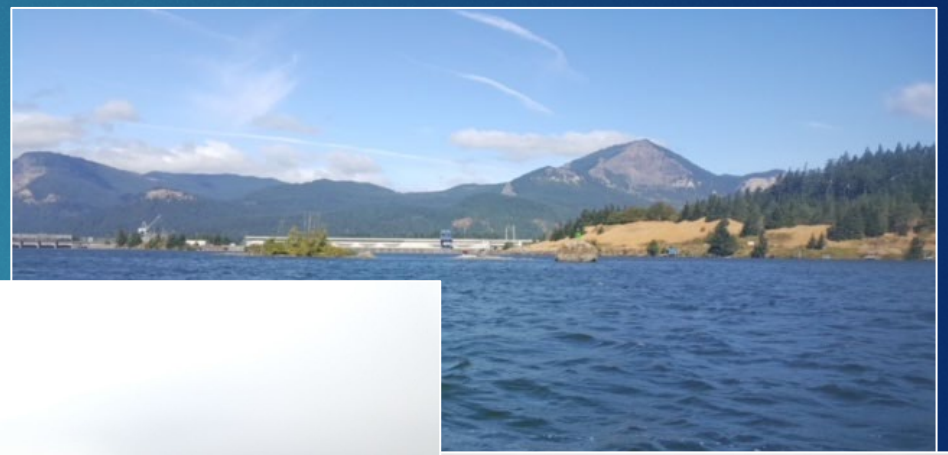
TODAY'S PRESENTATION

- COLLABORATIVE EFFORT BY CRITFC, ODFW AND WDFW
- RESERVOIR POPULATIONS ARE ASSESSED EVERY 3 YEARS
- ASSESSMENT IS A 2 PART PROCESS- *WINTER TAGGING* BY TRIBAL FISHERS AND YN TECHNICIANS - *SUMMER TAGGING & RECAPTURE* EFFORT BY ODFW, WDFW, AND YAKAMA NATION STAFF
- FALL RECRUITMENT MONITORING CONDUCTED BY STATE AND YAKAMA NATION CREW
- FISHERIES ARE MONITORED BY TRIBES AND STATES;
- WDFW PROVIDES FISHERY ANALYSIS, POPULATION ANALYSIS BY ODFW
- GENETICS BY CRITFC SCIENTISTS @ HAGERMAN FISH CULTURE EXPERIMENT STATION – GENETICS LABORATORY

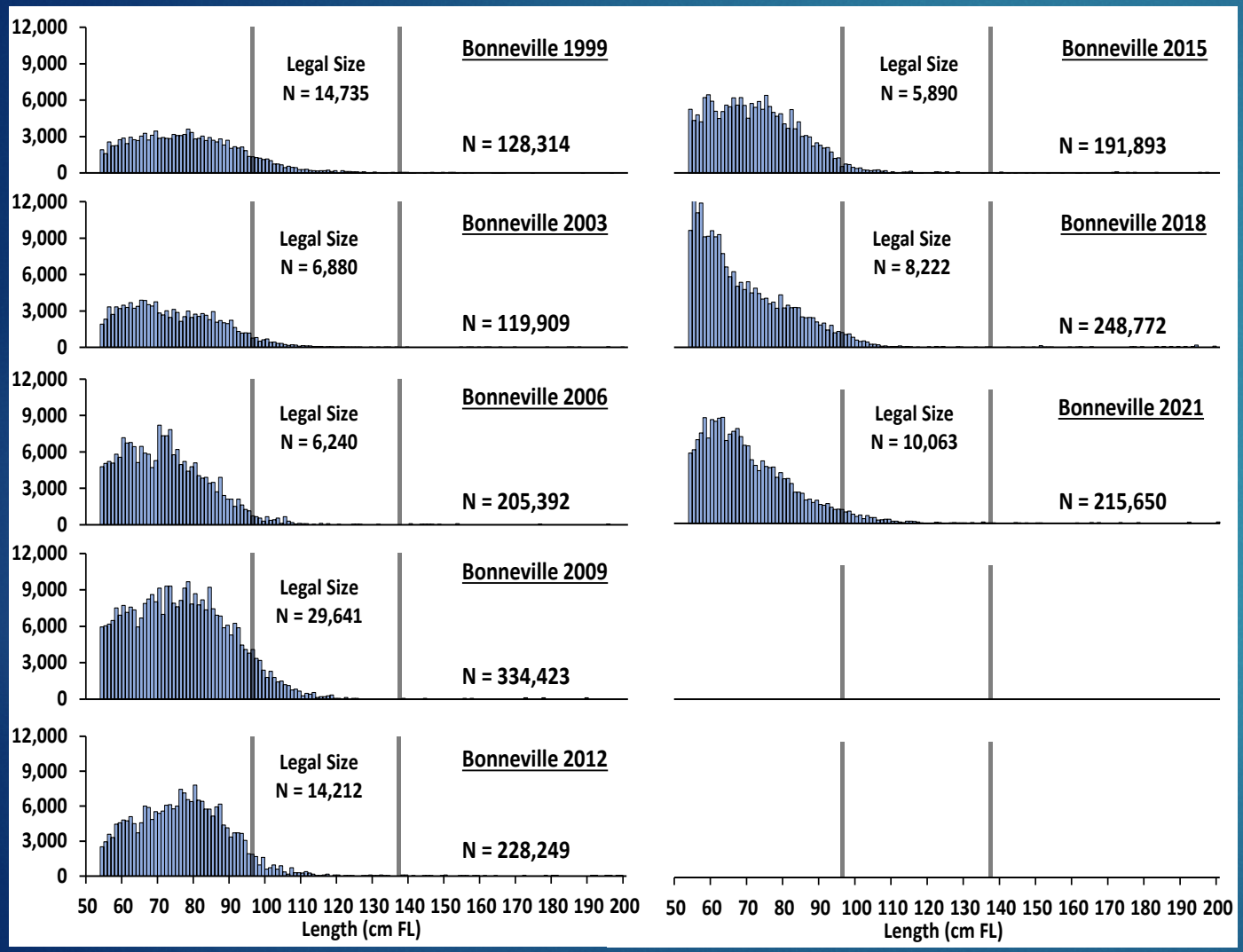


POPULATION TIME SERIES AND KEY POINTS

- **Bonneville Reservoir**
  1999 - 2021
- **The Dalles Reservoir**
  1997 – 2020
- **John Day Reservoir**
  - **2001 - 2022**

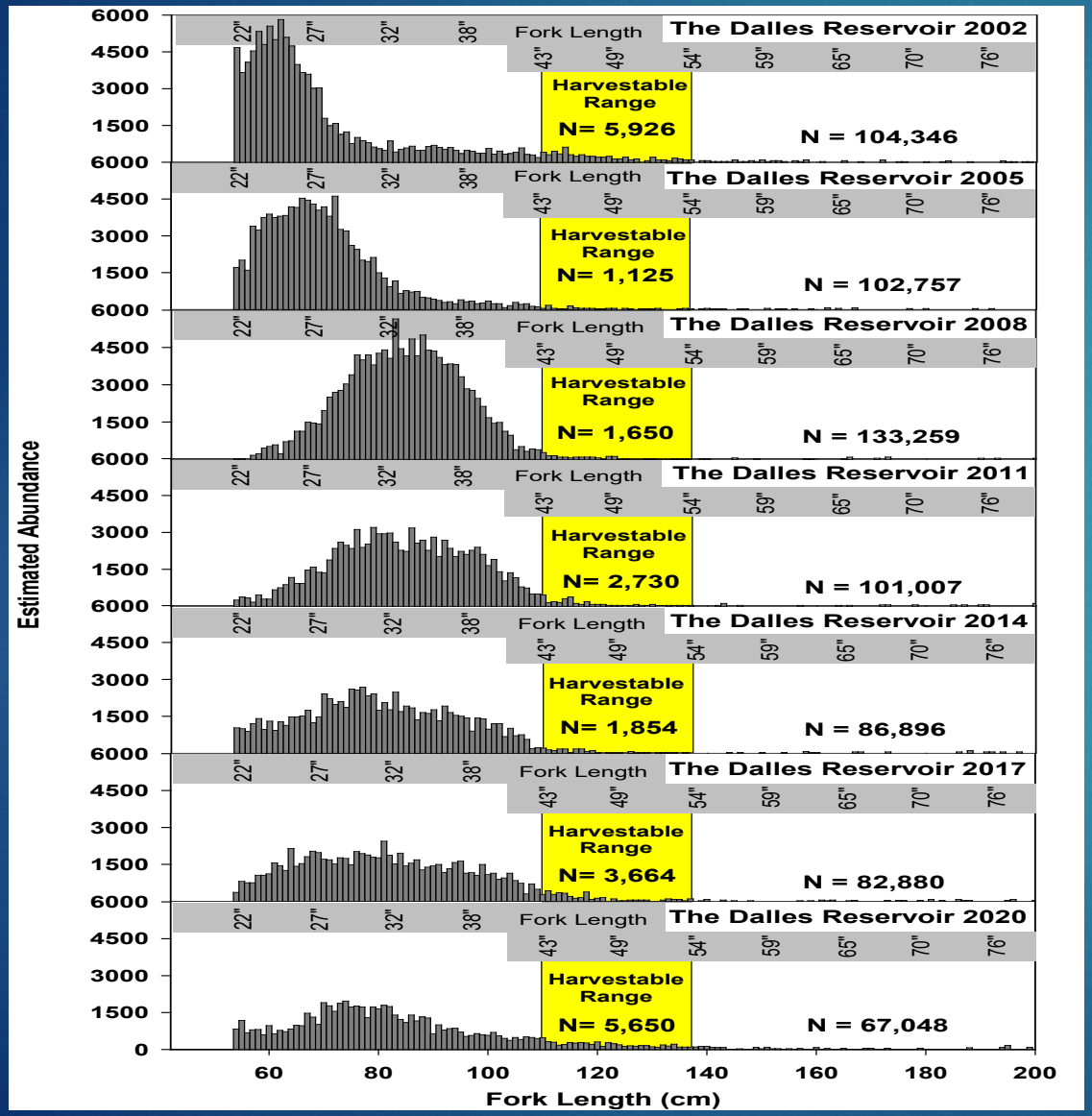


BONNEVILLE 1999 - 2021



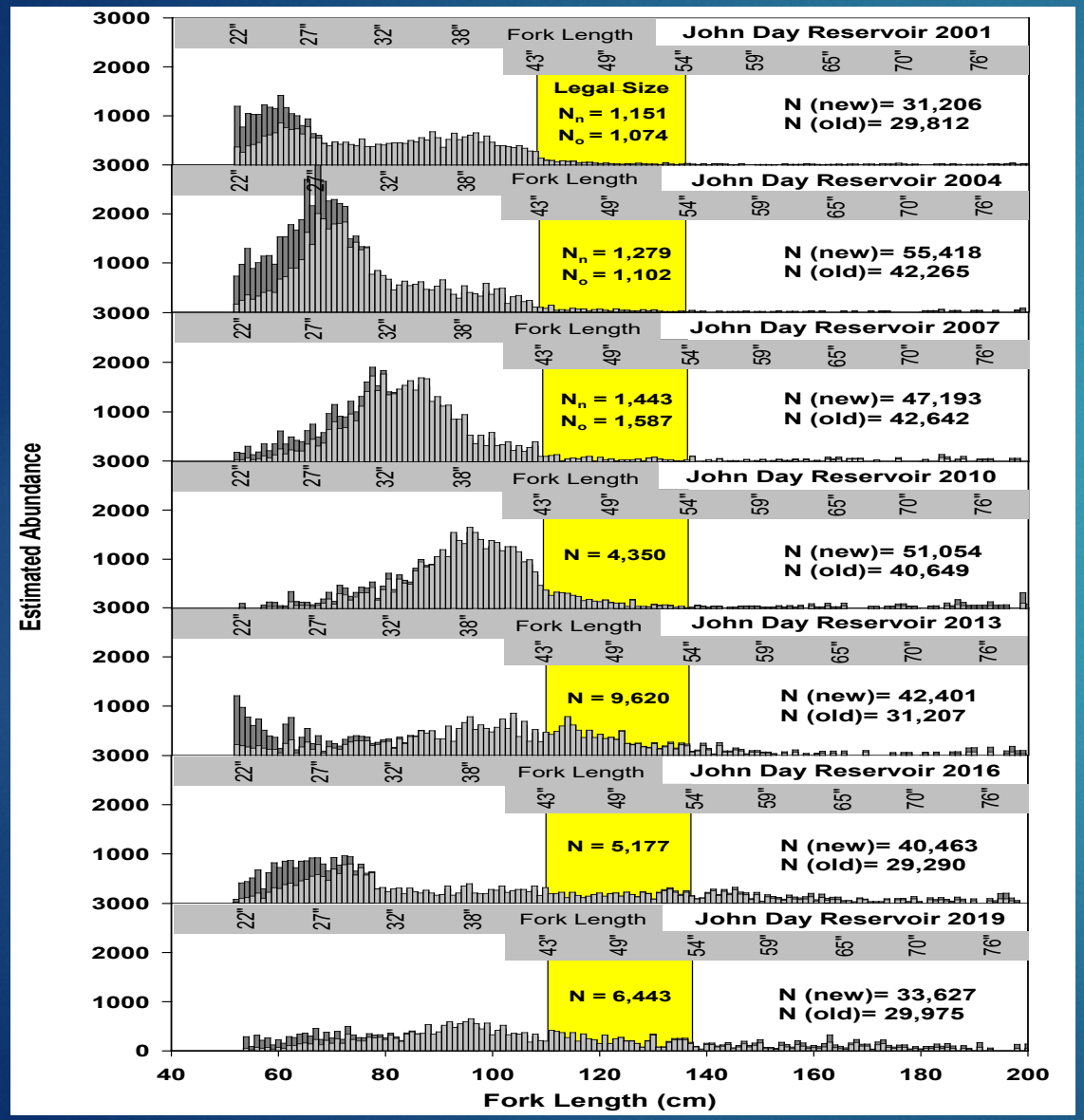
- **TREMENDOUS POPULATION SHIFTS**
- **HIGH DENSITIES, POOR CONDITION FACTORS CHARACTERIZE THIS PERIOD**
- **MOST RECENT SURVEY (2021) MAY SHOW STABILIZATION, GOOD WEIGHTS REPORTED BY FISHERS**
- **INCREASED SPECIFIC WEIGHTS AND HIGHER CONDITION FACTORS IN THE LATEST SURVEY**
- **NOTE:** The histogram for 2018 represents a shift from the use of estimated vulnerability curves to empirically-derived vulnerability curves because of the consensus among the technical staff that these curves better represented sampling gear performance and therefore overall estimate population structure.

THE DALLES 1997 – 2020



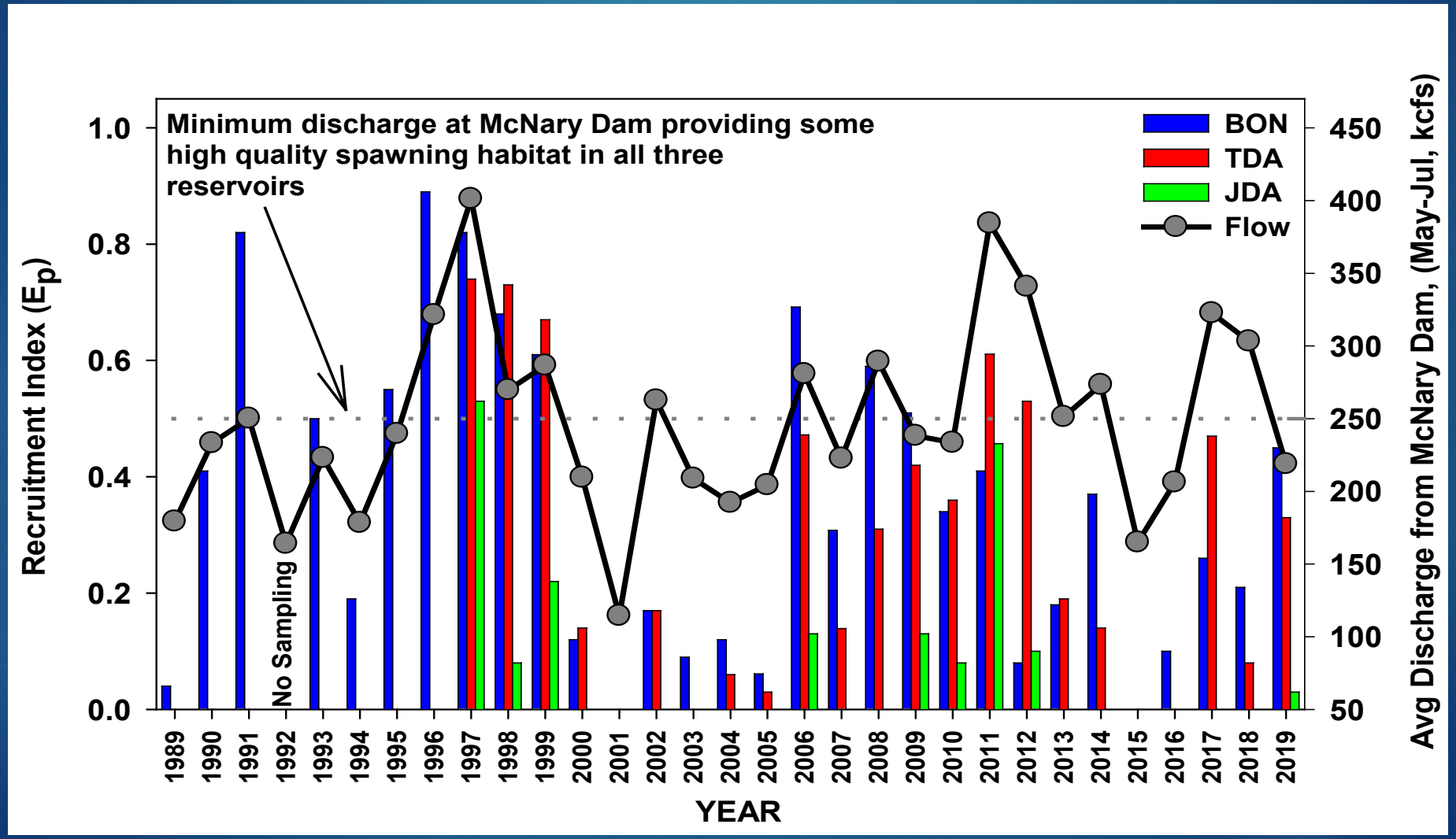
- POPULATION SURGED UPWARDS IN EARLY 2000'S, SIMILAR TO BN POPULATION
- TD FISH SLIGHTLY BETTER CONDITION FACTOR AND GROWTH THAN BN FISH
- DOWNSHIFT SIMILAR TO BN POPULATION
- OVERALL POPULATION DECLINE BETWEEN 2017 AND 2020, POOR RECRUITMENT FROM 2013-2016

JOHN DAY 2001 - 2019



- JOHN DAY POPULATION COMES FULL CIRCLE
- DENSITY AN ORDER OF MAGNITUDE LESS THAN BN & TD RESERVOIRS
- LACK OF RECRUITMENT HAS BEEN ISSUE FOR MANY YEARS
- BROOD STOCK NUMBERS GOOD, RECRUITMENT POOR AS A RULE

HIGH SPRING FLOWS PRODUCE JUVENILE STURGEON……MOST OF THE TIME



RECRUITMENT MONITORING - YOY SURVEYS

Year	LCR	Will. R.	BON[1]	TDA	JDA	MCN	IHA	LGO
1989			0					
1990			0.4					
1991			0.8					
1992								
1993			0.5					
1994			0.2					
1995			0.6					
1996			0.9					
1997			0.8	0.7	0.5		0	
1998			0.7	0.7	0.1			0.3
1999			0.6	0.7	0.2	0.1	0	0.1
2000			0.1	0.1	0	0	0	0
2001			0	0	0	0	0	0
2002			0.2	0.2	0	0.1	0	0
2003			0.1	0	0	0	0	0
2004	0.4		0.1	0.1	0	0	0	0
2005	0.5		0.1	0	0	0	0	0
2006	0.5		0.7	0.5	0.1	0.1		
2007			0.3	0.1	0	0.1		
2008	0.5		0.6	0.3	0	0.1		
2009	0.8		0.5	0.4	0.1	0.1		
2010	0.2	0.2	0.3	0.4	0.1	0		
2011	0.3	0.1	0.4	0.6	0.5	0.3		
2012	0.4	0.2	0.1	0.5	0.1			
2013	0.1		0.2	0.2	0			
2014	0.3	0.4	0.4	0.1	0			
2015	0.1	0.3	0	0	0			
2016	0.1	0.5	0.1	0	0			
2017	0.6	0.46	0.3	0.5	0			
2018	0.3	0.8	0.2	0.1	0			
2019	0.2	0.7	0.5	0.3	0			
2020	NS	NS	0.4	0.1	0			
2121	0	0.2	0.2	0	0			

FIELD SEASON 2022

- STOCK ASSESSMENT IN BONNEVILLE RESERVOIR (ODFW, WDFW, CRITFC)
- FALL YOUNG OF YEAR SURVEYS- BONNEVILLE, THE DALLES, & JOHN DAY RESERVOIRS (ODFW, WDFW, CRITFC)
- WINTER TAGGING IN THE DALLES RESERVOIR (YN /CRITFC)
- COVID-19 FIELD PROTOCOL? NO AFFECT 2022 FIELD SAMPLING

WHITE STUREON MASTER PLAN UPDATE

- MASTER PLAN #200715500
- STEP 2 IN PROCESS
- WELL TESTING INITIATED IN APRIL 2022, MOA IN PROCESS, NECESSARY FOR RFP FOR EGINEERING DESIGNS FOR FACILITY
- UPDATING MASTER PLAN DDRESSING ISRP QUESTIONS FROM PRIOR REVIEWS
- EC LAUNCH AWAITING WELL TESTING, ENGINEERING WORK, CHANGES FROM EARLIER PROCESS, MAYBE END OF 2022

2021 CONCLUSIONS

BONNEVILLE **–MAYBE FINDING EQUILIBRIUM WITH AVAILABLE HABITAT AND CURRENT POPULATION SIZE, FISHERS REPORT GOOD BODY CONDITION**

THE DALLES **– CONCERN WITH THE POPULATION DOWNTURN, BUT RECENT RECRUITMENT WILL REGISTER WITH THE NEXT ASSESSMENT IN 2023**

JOHN DAY – DECLINING ABUNDANCE, LIKELY TO CONTINUE, DUE TO 15 YEARS OF LITTLE OR NO RECRUITMENT (22 CONSECTIVE YEARS OF SAMPLING)

JOHN DAY SUPPLEMENTATION CANDIDATE FOR CRITFC STURGEON SUPPLEMENTATION MASTER PLAN #200715500 – MONITORING, SUPPLEMENTATION, RESEARCH ARE KEY ELEMENTS TO ENSURING WHITE STURGEON THRIVE IN THE COLUMBIA BASIN FOR THE NEXT 7 GENERATIONS


QUESTIONS?

White Sturgeon:
McNary Reservoir and the Lower Snake River

Northwest Power and Conservation Council

Laura Heironimus
Washington Department of Fish and Wildlife
Ridgefield, WA

McNary Reservoir & Hanford Reach

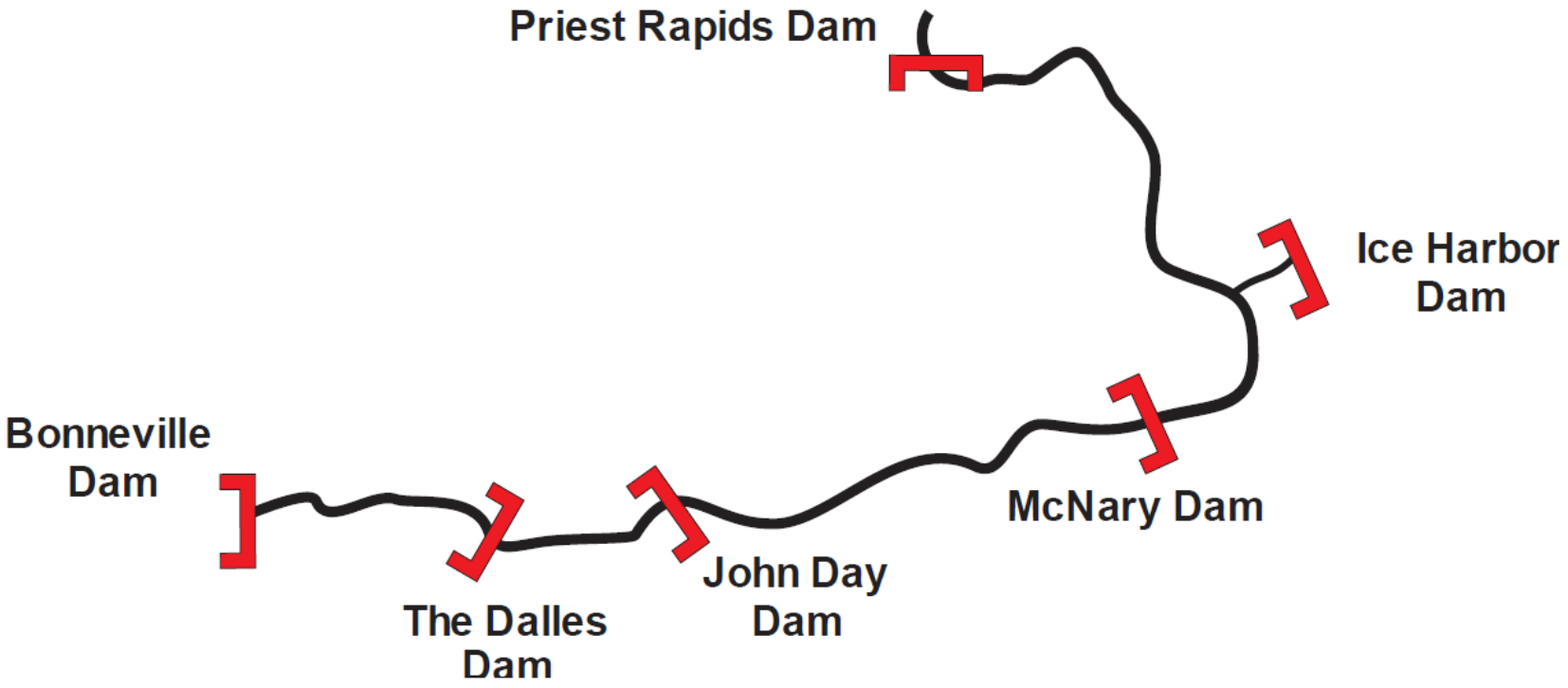


Figure 28. Map of the lower-mid-Columbia River sturgeon management unit.

Image: Columbia Basin White Sturgeon Planning Framework (NWPCC 2013)

Lower Snake Reservoirs

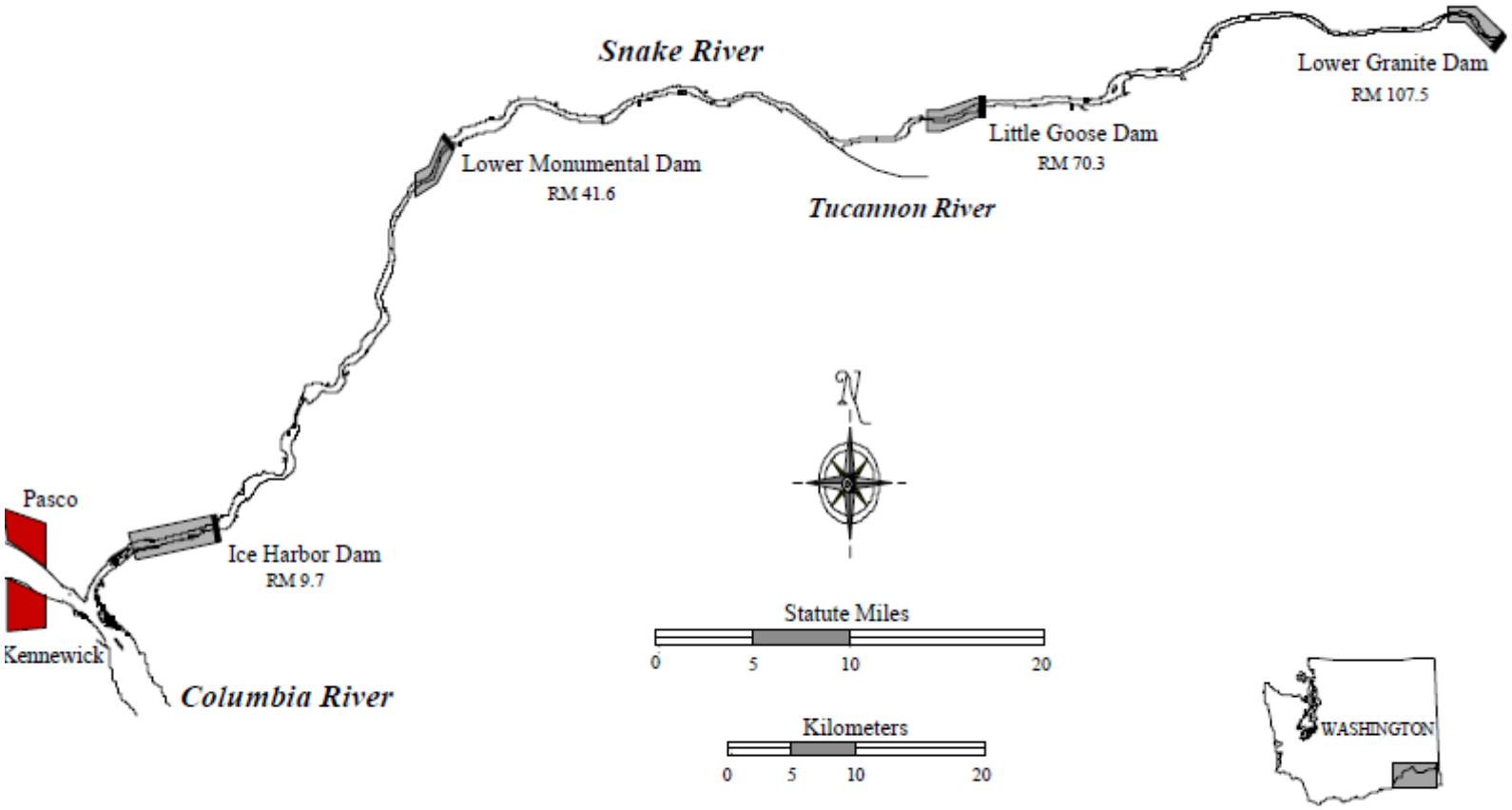


Figure 40. Lower Snake (Ice Harbor Dam to Lower Granite Dam) Management Unit.

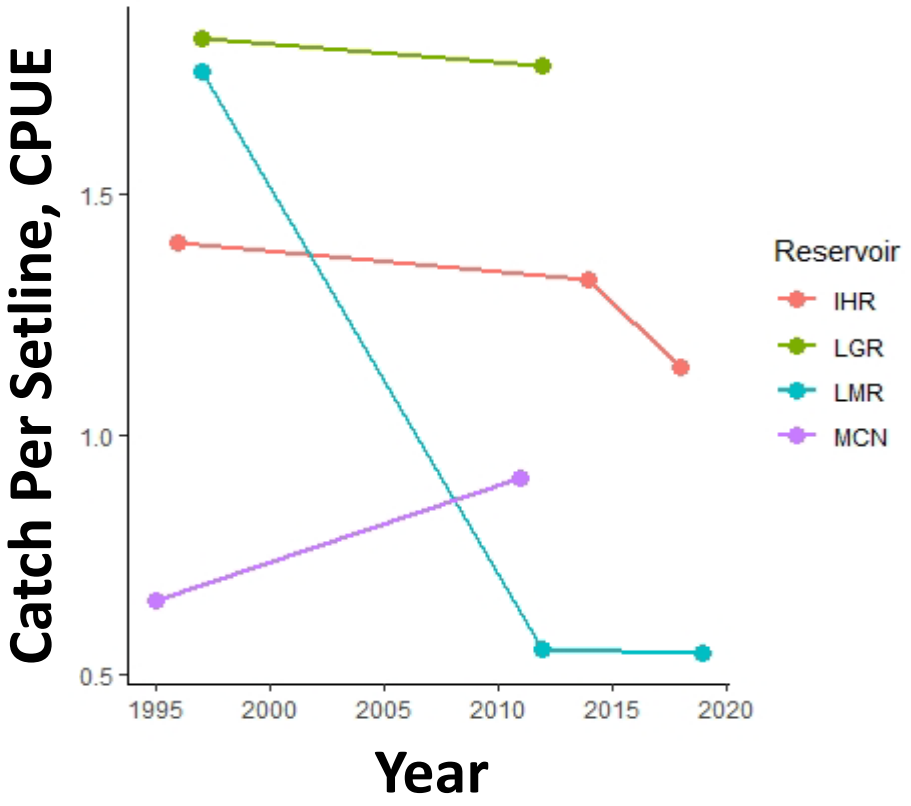
Image: Columbia Basin White Sturgeon Planning Framework (NWPCC 2013)

Overview

Area	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MCN										16 yrs.														11 yrs.				
IHR										18 yrs.											4 yrs.				4 yrs.			
LMR										15 yrs.											7 yrs.					3 yrs.		
LGR										15 yrs.													10 yrs.					

- The NWPCC supported funding for the 2018 and 2019 stock assessments in Ice Harbor and Lower Monumental through BPA cost-savings.
- No future funding has been identified; however, the 2020 ISRP recommended proposals for stock assessments in these areas (ISRP 2020-8).

Trends in Abundance



- In the Snake River, mean abundance estimates ranged 2,000-4,000 sturgeon per pool.
- In some instances, no abundance estimate was calculated due to low capture/recapture rates.
- In McNary Reservoir, the mean abundance estimate ranged 8,200-9,200 sturgeon.
- CPUE indicates a decline in all areas except McNary.

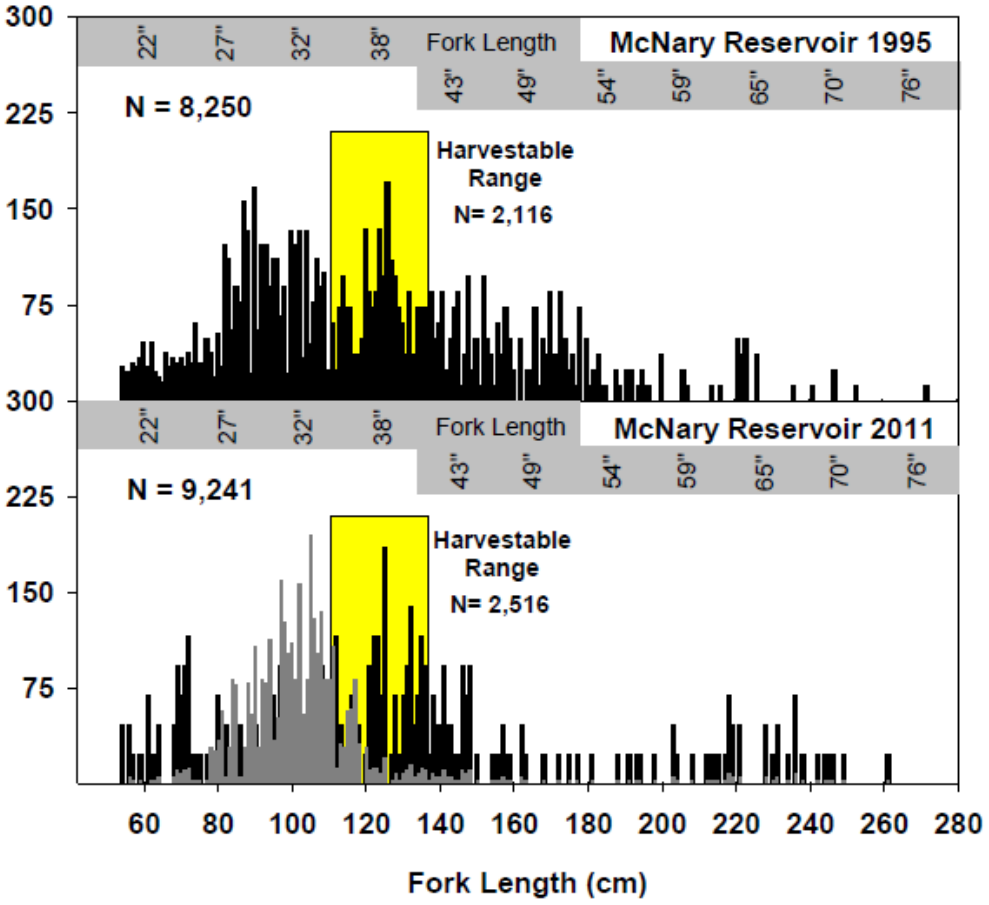
McNary Reservoir & Hanford Reach

Total Abundance

1995: 8,250

2011: 9,241*

*38% hatchery



in TL	Abund
24-35	900
36-47	2,700
48-59	2,116
60-71	1,284
72+	1,250

in TL	Abund
24-35	1,168
36-47	3,478
48-59	2,516
60-71	1,001
72+	1,078

Figure 32. Estimated abundance of white sturgeon (≥ 24 inches total length) in McNary reservoir, 1995 and 2011. Grey bars in the bottom graph represent the estimated 3,472 hatchery-reared fish now part of the white sturgeon population in McNary Reservoir.

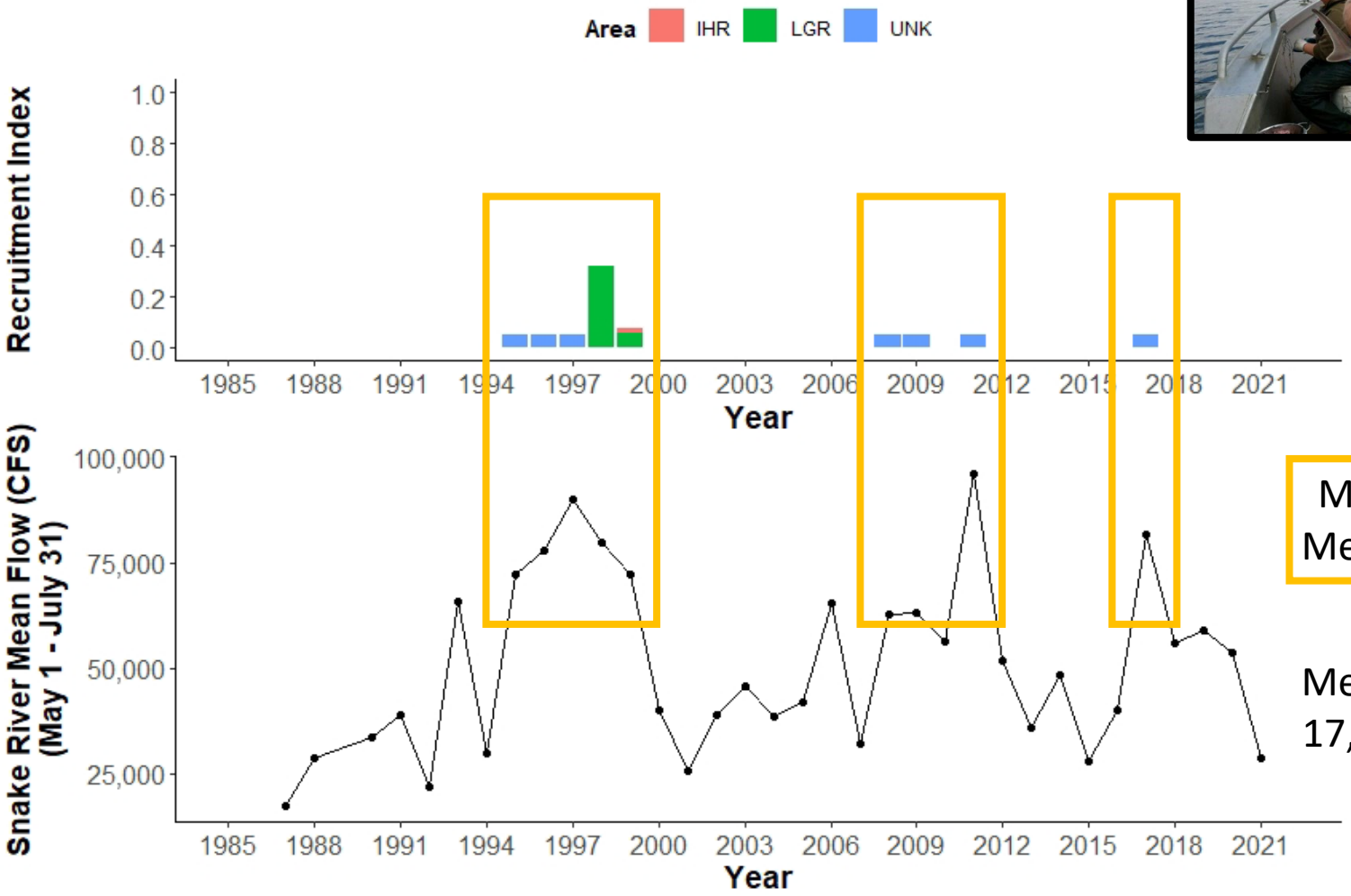
Young-of-Year Index Surveys

Area	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
MCN																										
IHR																										
LMR																										
LGR																										

EP = Proportion of nets with at least one sturgeon captured

0.0
0.01 - 0.20
0.21 - 0.40
0.41 - 0.60
0.61 - 0.80
0.81 - 1.00

Snake River Recruitment



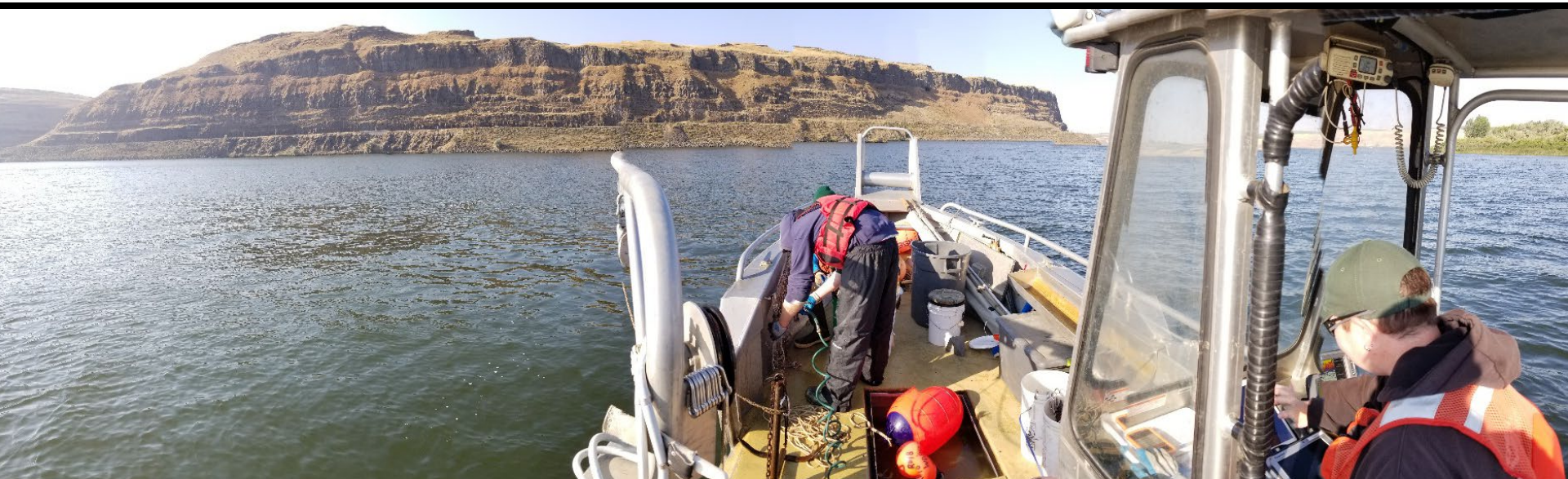
Min = 62,700 CFS
Mean = 76,800 CFS

Mean = 40,893 CFS
17,562–65,821 CFS

*Flow data comes from the USGS gage on the Snake River near Anatone.

Conclusions

- Unknown survival and growth of hatchery-origin sturgeon below Priest Rapids Dam.
- Concerns of slow growth and recruitment failure.
- Inconsistent and sparse monitoring.
- Difficulty assessing adaptive management actions.



Regulations

- All three Lower Snake reservoirs closed to sturgeon harvest in 2015 due to the detected decline in sturgeon abundance and lack of recruitment.
- McNary Reservoir and Hanford Reach were closed to sturgeon harvest in 2020 due to a lack of recent monitoring data and poor evidence for natural recruitment.
- Sturgeon spawning sanctuaries expanded through Aug. 31 and the sanctuary below Priest Rapids Dam was expanded to Vernita Bridge to improve recruitment.

Historical Range of White Sturgeon

Columbia River white sturgeon were one freely mixing population, able to move throughout the Columbia Basin.

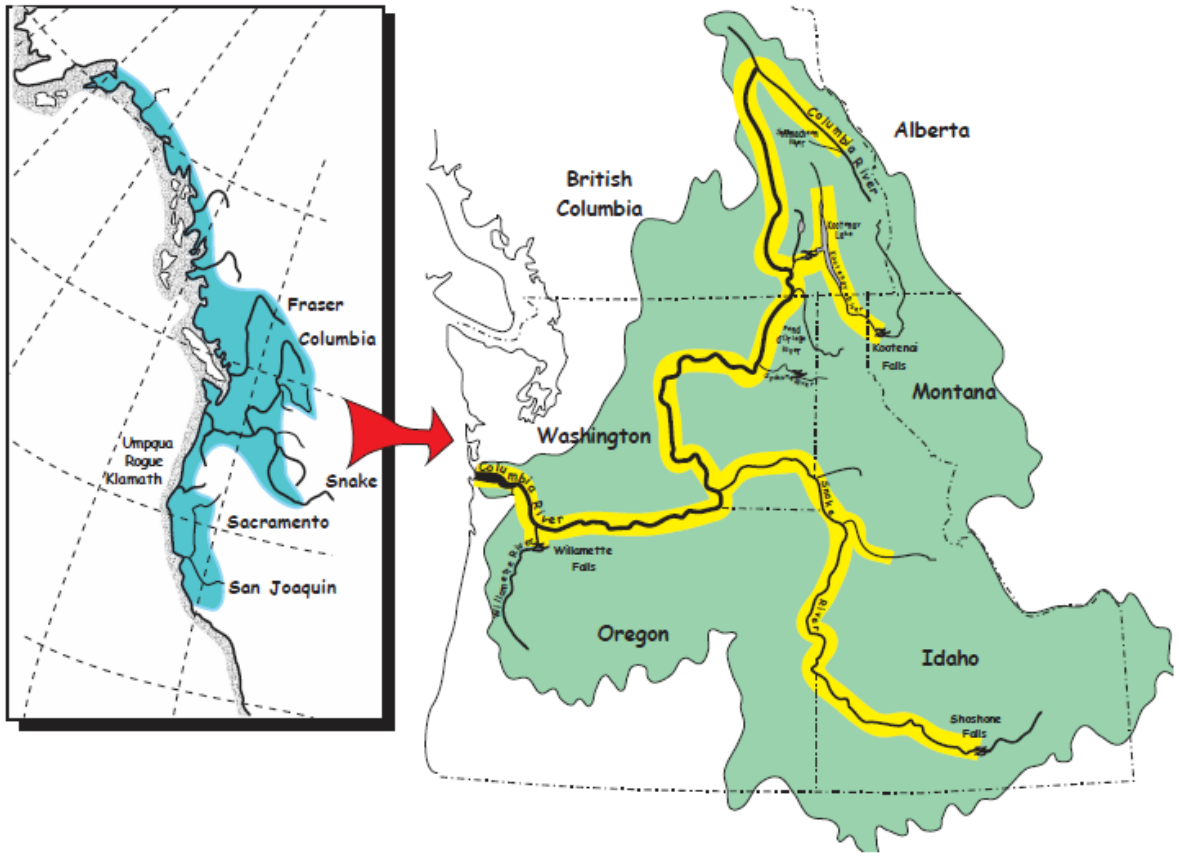
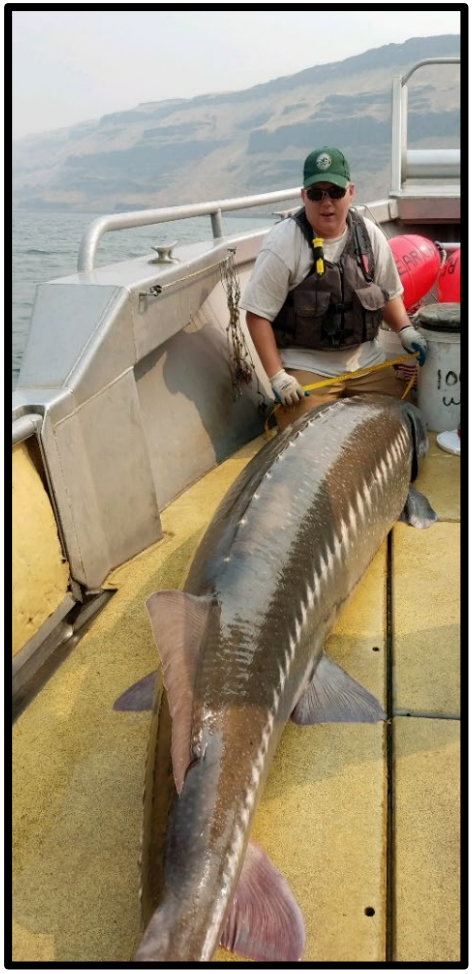


Figure 7. Historical range of white sturgeon.

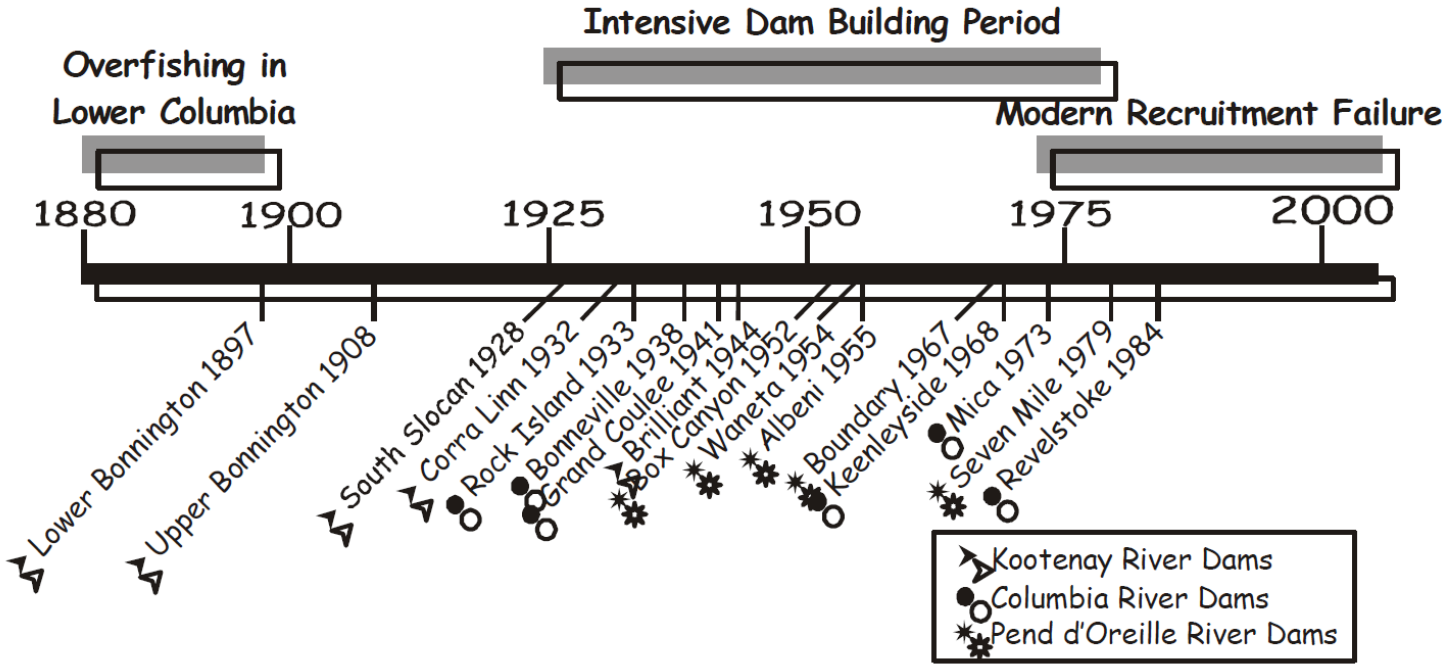


Source: NWPCC 2013

Impacts of the Hydropower System

- Construction of the Columbia Basin dams fragmented the once free-flowing river and altered the hydrograph in critical white sturgeon habitats (Parsley et al. 2007).

- While dam construction was not responsible for the historical decline of white sturgeon, impoundment has been the primary impediment to rebuilding of inland populations (Beamesderfer et al. 1995).



Source: NWPCC 2013

Impacts of the Hydropower System

Dam construction and operation affect white sturgeon by:

1. blocking movements between widely-distributed spawning, rearing, and feeding habitats needed to complete the life cycle;
2. flooding productive riverine habitats;
3. eliminating anadromous fish runs that provided food and marine-derived nutrients;
4. reducing habitat suitability by changing temperature patterns, flow, water chemistry, nutrient transport, and water clarity;
5. increasing mortality either directly as a result of dam construction and entrainment, or indirectly as a result of gas supersaturation; and
6. changing species composition and abundance of prey, competitor, and predator species.

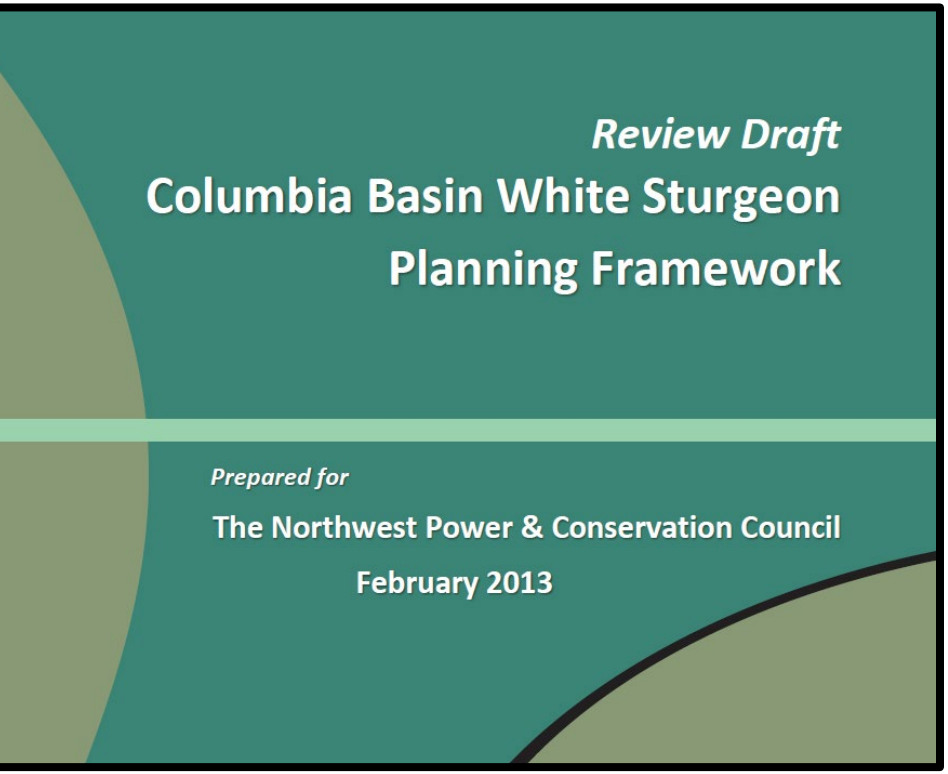
Source: NWPCC 2013

Impacts of the Hydropower System

- Spawning habitat availability is a key determinant in the productivity of impounded sturgeon populations.
- Most reservoirs and impounded river segments no longer provide suitable spawning conditions under many or all flow conditions.
- No flow measures have been implemented for the specific benefit of impounded sturgeon populations.
- Flow and other operational measures implemented for salmon have also failed to restore consistent sturgeon recruitment (Mallette 2008).

Source: NWPCC 2013

White Sturgeon Planning Framework



Information Contributed by:

- Columbia River Inter-Tribal Fish Commission
- Oregon Department of Fish and Wildlife
- Washington Department of Fish and Wildlife
- Cramer Fish Sciences
- Yakama Indian Nation
- Idaho Department of Fish and Game
- Idaho Power Company
- Colville Tribes
- Kootenai Tribe of Idaho

Prepared at the direction of the NWPCC to address questions after the 2010 ISRP review of BPA research, monitoring, and evaluation projects regarding sturgeon in the lower Columbia River.

…*"most important need for planning future research and restoration."* – ISRP review

Overview

Area	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MCN										16 yrs.														11 yrs.				
IHR										18 yrs.											4 yrs.				4 yrs.			
LMR										15 yrs.											7 yrs.					3 yrs.		
LGR										15 yrs.													10 yrs.					

- The NWPCC supported funding for the 2018 and 2019 stock assessments in Ice Harbor and Lower Monumental through BPA cost-savings.
- No future funding has been identified; however, the 2020 ISRP recommended proposals for stock assessments in these areas (ISRP 2020-8).

Needs & Uncertainties

Consistent with NWPCC 2013:

- To evaluate conservation and management actions, baseline tracking of population structure and trends is needed:
  - Monitoring on more frequent basis

- Uncertainty in population productivity (growth, length-weight relationships, relative weight)

- Uncertainty concerning how hydro operations influence spawning success, egg deposition, dispersal of free-swimming embryos, and access to rearing habitats.

- Need to determine and quantify critical habitat use by early life stages and the effects of environmental variables (flow, flow variability, contaminants).

We would like to work with the Northwest Power and Conservation Council to implement the Fish and Wildlife Program's white sturgeon recommendation for additional white sturgeon stock assessments in Snake River and McNary pools, and as needed throughout the Columbia River basin.