

Jennifer Anders
Chair
Montana

Tim Baker
Montana

Guy Norman
Washington

Patrick Oshie
Washington



Northwest Power and Conservation Council

Richard Devlin
Vice Chair
Oregon

Ted Ferrioli
Oregon

Jim Yost
Idaho

Jeffery C. Allen
Idaho

April 2, 2019

MEMORANDUM

TO: Council Members

FROM: Lynn Palensky

SUBJECT: White sturgeon status reports for the Columbia River Basin

BACKGROUND:

Summary: Representatives from the Program-funded white sturgeon projects will each give a short report on sturgeon in their management areas within the basin. Reports will cover population status, ongoing work, challenges, accomplishments, partners, and future needs for sturgeon. The last sturgeon reports were provided in April 2018.

Presenters:

- Peter Stevens, Oregon Department of Fish and Wildlife (on behalf of both ODFW and Washington Department of Fish and Wildlife): sturgeon below Bonneville Dam (unimpounded population)
- Blaine Parker, Columbia River Inter-Tribal Fish Commission: sturgeon from Bonneville to McNary Dams and CRITFC's sturgeon research
- Laura Heironimus, Washington Department of Fish and Wildlife: Lower Snake populations
- Jason McLellan, Colville Confederated Tribes, and Andy Miller, Spokane Tribe of Indians: Upper Columbia populations
- Shawn Young, Kootenai Tribe of Idaho and Ryan Hardy, Idaho Department of Fish and Game: will present on Kootenai River ESA-listed sturgeon population

Relevance: One of the many sturgeon measures in the 2014 Program calls on the "*Action Agencies and state agencies and tribes to report on sturgeon in the Columbia Basin on a regular basis*". These reports will also help inform the upcoming Program amendment discussions and recommendations for White Sturgeon.

Workplan: The work is being tracked in the Division's annual work plan as a high priority task, and sturgeon are listed as an [emerging priority](#) in the Council's 2014 Fish and Wildlife Program. See Program language for White Sturgeon [here](#).

Background: Ten White sturgeon projects are currently being funded in the Program:

Project #	Project Title	Sponsor	Working Budget 2018	Working budget 2019
198605000	White Sturgeon Mitigation and Restoration in the Lower Columbia and Snake Rivers	Oregon Department Of Fish and Wildlife	\$1,619,827	\$1,569,827
198806400	Kootenai River White Sturgeon Aquaculture Conservation Facility	Kootenai Tribe of Idaho	\$3,051,908	\$3,051,908
200200200	Restore Natural Recruitment of Kootenai River White Sturgeon	Kootenai Tribe of Idaho	\$6,670,500	\$5,000,000
200715500	Develop a Master Plan for a Rearing Facility to Enhance Selected Populations of White Sturgeon in the Columbia River Basin	Columbia River Inter-Tribal Fish Commission	\$178,503	\$142,674
199502700	Lake Roosevelt Sturgeon Recovery	Spokane Tribe of Indians	\$505,982	\$505,982
200737200	Lake Roosevelt Sturgeon Hatchery	Spokane Tribe of Indians	\$269,222	\$0
200811600	White Sturgeon Enhancement	Colville Confederated Tribes	\$669,224	\$549,159
200845500	Sturgeon Management	Yakama Nation	\$152,300	\$147,731
200850400	Sturgeon Genetics	Columbia River Inter-Tribal Fish Commission	\$172,614	\$43,6750
198806500	Kootenai River Fishery Investigations	Idaho Department of Fish and Game	\$1,011,919	\$941,919
		TOTAL	\$14,301,9999	\$12,345,950

Total spending for sturgeon work represents less than five percent of the Program.

More Info:

- The Council's White Sturgeon web [page](#)
- Columbia Basin White Sturgeon [Planning Framework](#)
- [Upper Columbia White Sturgeon Recovery Plan](#)
- [White Sturgeon Story Map \(new\)](#)
- 2018 Annual Sturgeon Reports to Council ([memo and presentations](#))



Northwest Power and Conservation Council
10 April 2019

Lower Columbia River White Sturgeon Population Status Update

Peter Stevens
Columbia River Sturgeon Project Leader

Today's Topics

- * 2018 stock assessment results
- * Current population composition, status, and trends
- * Recruitment and Predation context



Metrics and Indicators

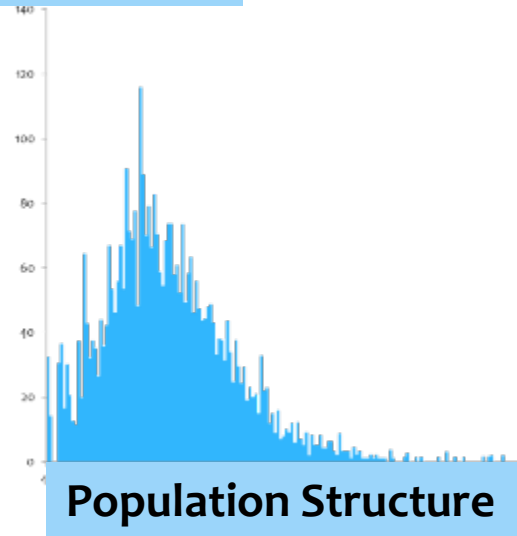


Juvenile Abundance



Adult Abundance

Age-0 Recruitment

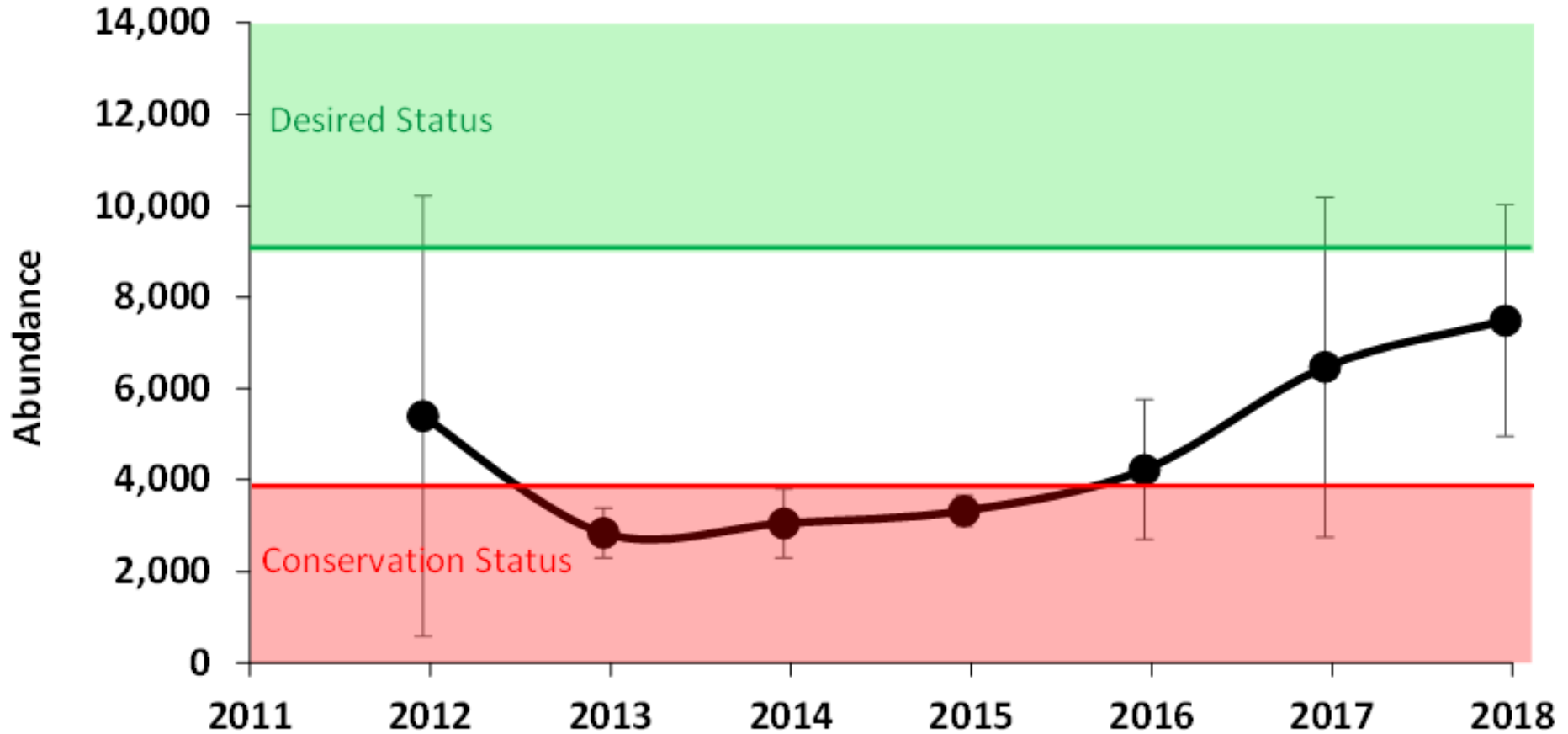


Population Structure

Pinnipeds

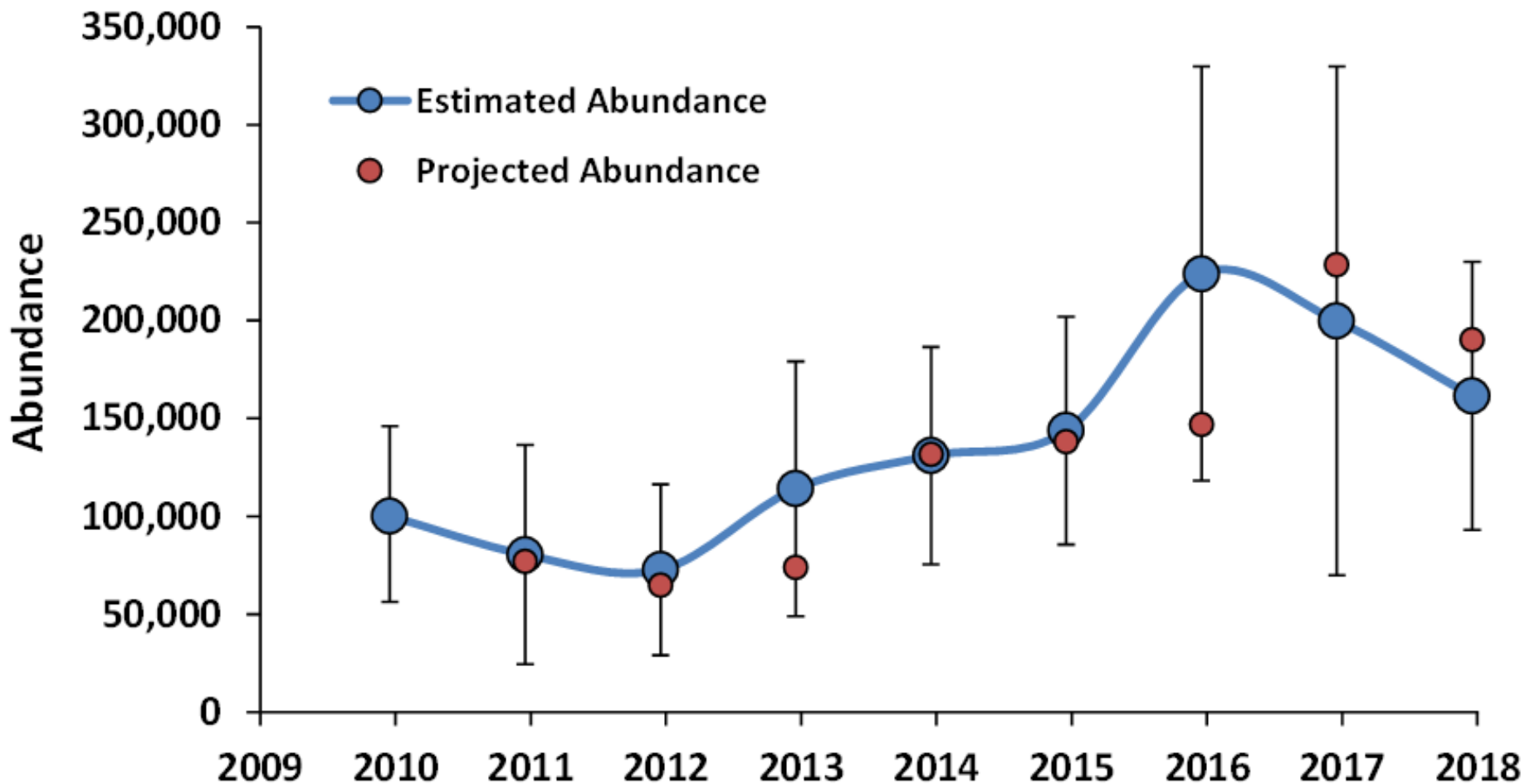


LCR White Sturgeon Abundance

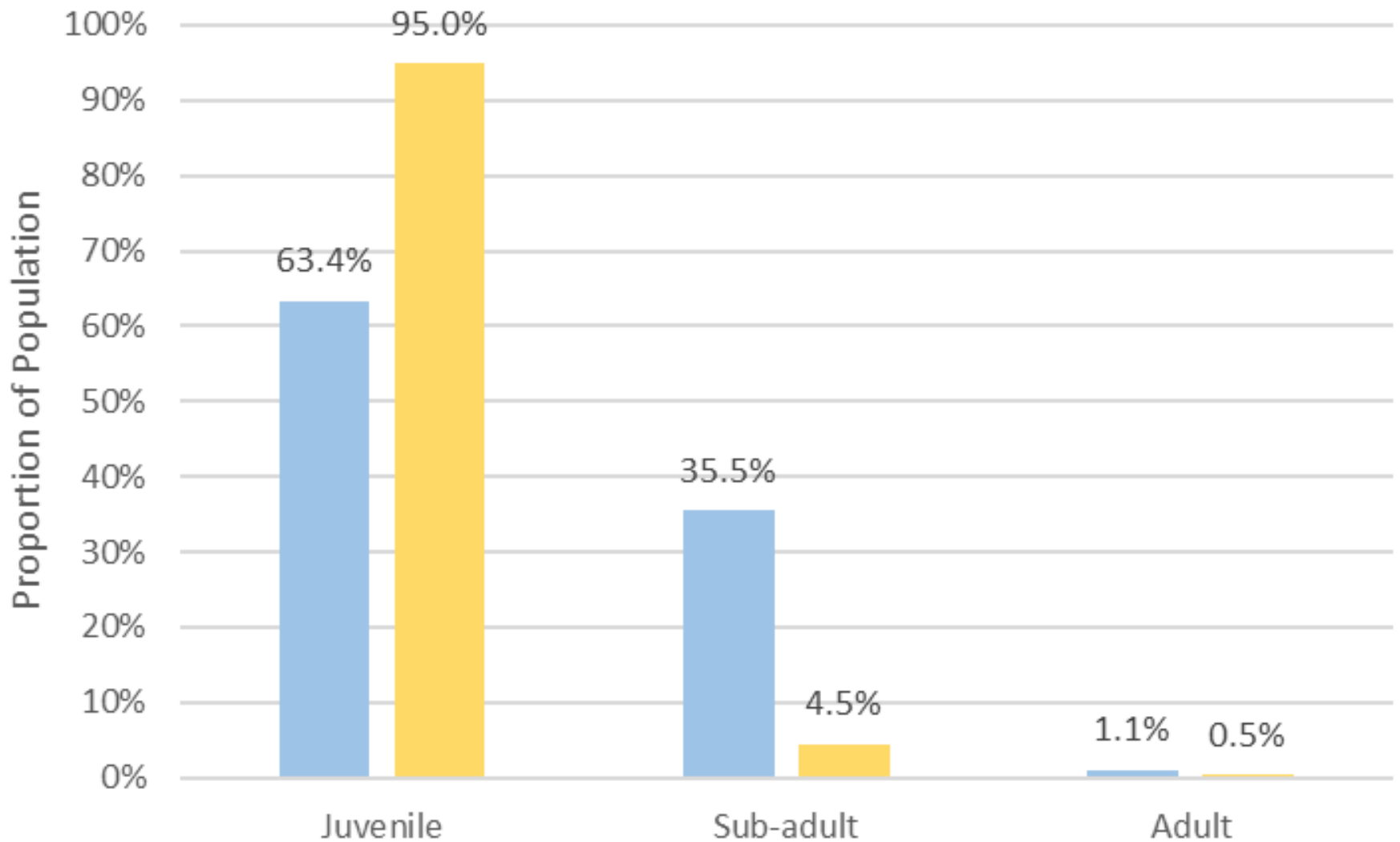


LCR White Sturgeon Abundance

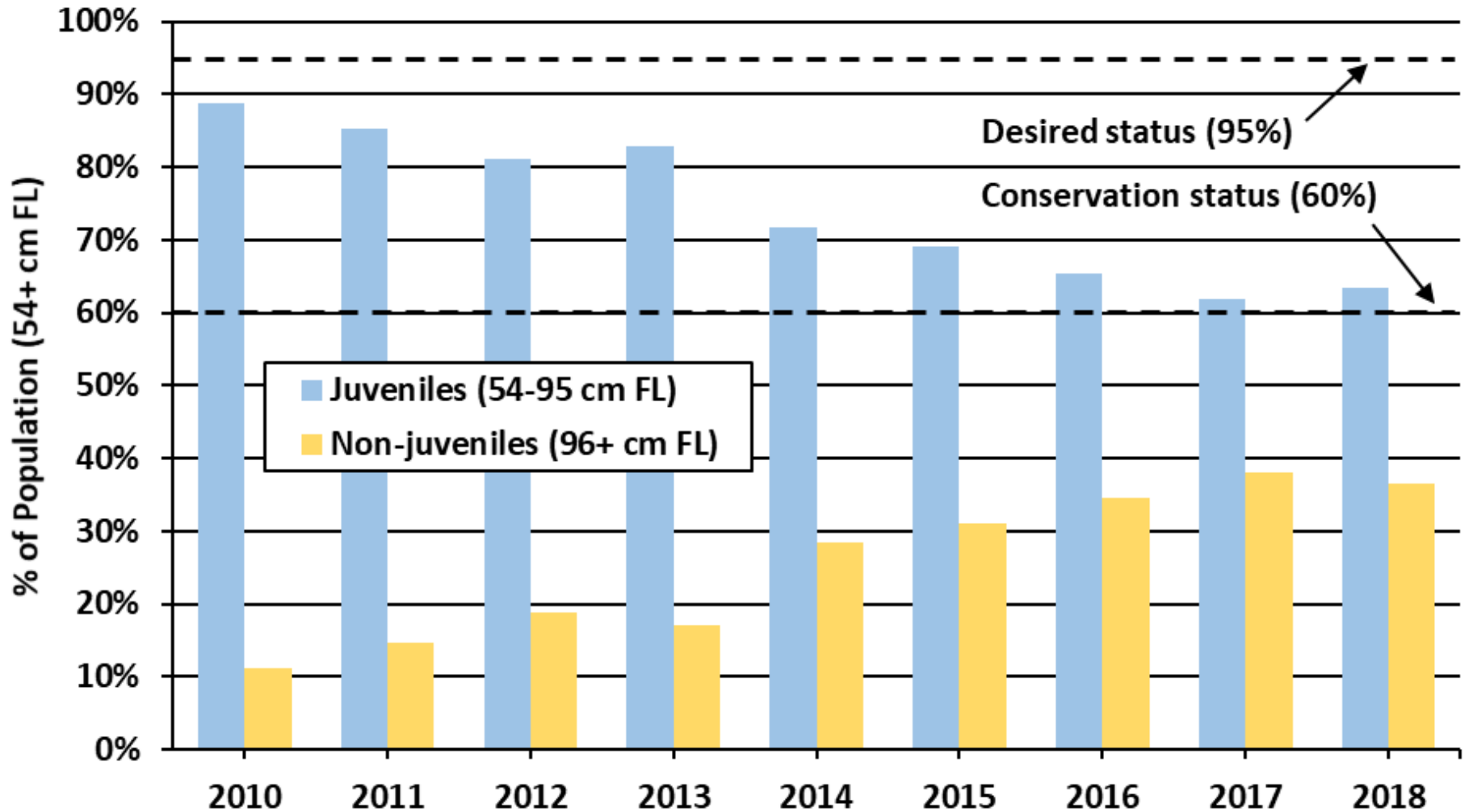
Estimated Legal Abundance (38" – 54" FL)



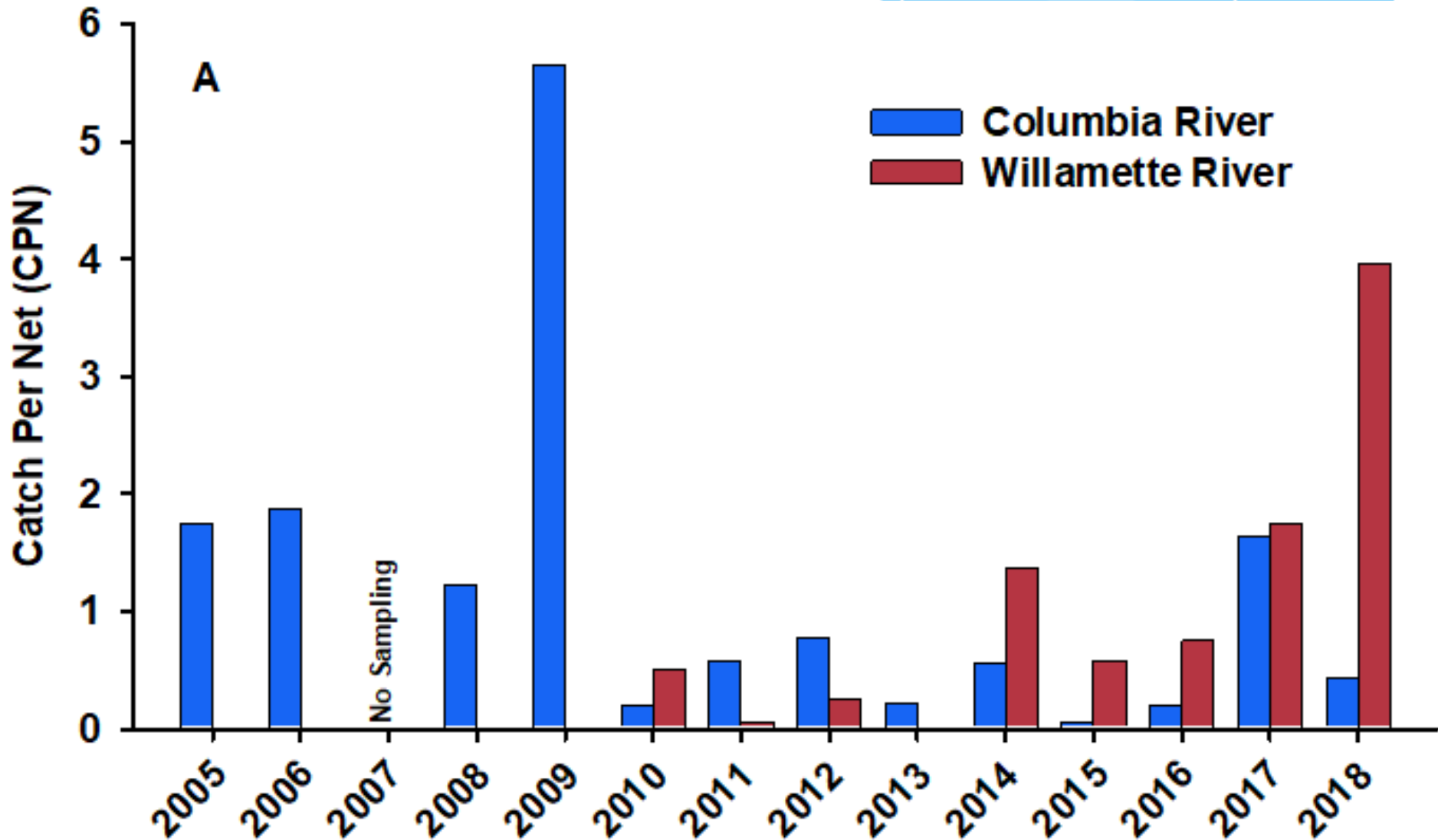
LCR Age Class Distribution



LCR Trend in Population % by Age Class

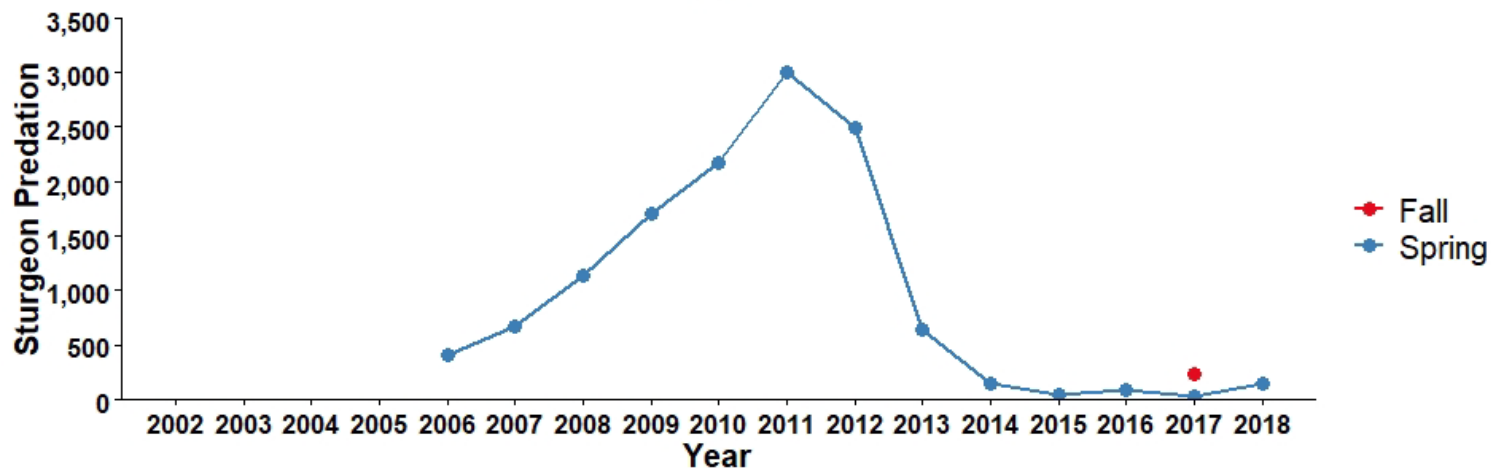
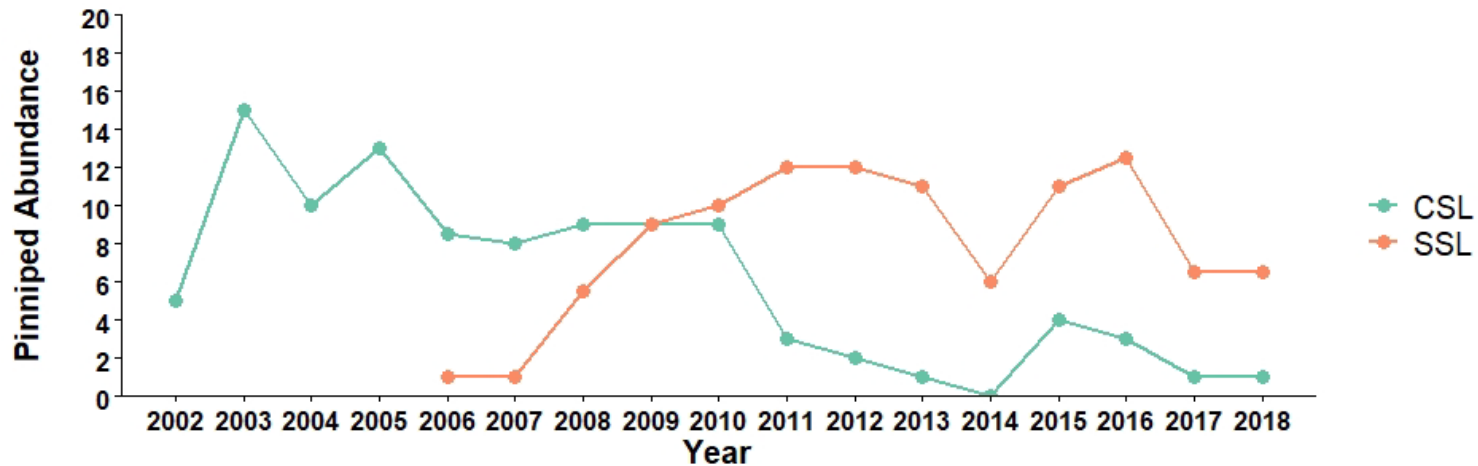


LCR White Sturgeon Recruitment



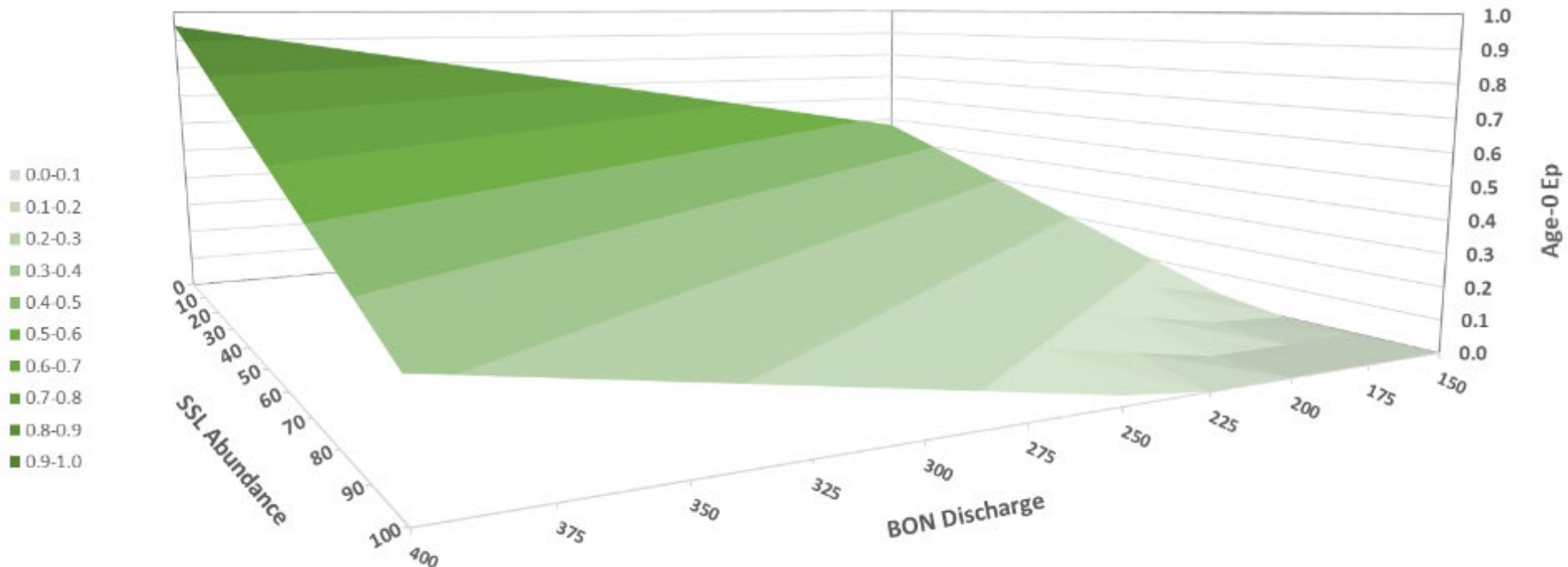
Sea lion Abundance & Predation

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



Sea lion Effects: Mainstem

$Ep \sim \text{Discharge} + \text{SSL Abundance}$



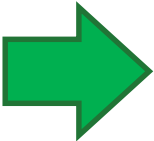
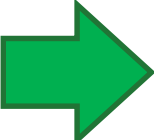


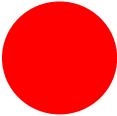
Sea lion predation

Growing pinniped issue in the Willamette



Year	Stellar Sea Lions Observed	Predation Events Observed
2014-15	1-2	-
2016	1-2	8
2017	1-4	69
2018	11	79

Summary

Metric	N	Interpretation	Brief Summary
Legal Abundance	162,180		Decrease from 2016 and 2017. However, increasing trend in CPUE setline tagging fisheries continues.
Adult Abundance	6,100 3-yr Avg 7,500		2018 3-yr adult abundance estimate is above conservation status, but not at desired status level.
Population Structure	~62% Juveniles		Continued low relative abundance of juvenile and sub-legal sized fish.
Recruitment Index (CPN)	CR: 0.43 WR: 3.96		Mixed. Columbia River lower in recent years but Willamette by far highest since monitoring began in 2010.
Sea Lion Abundance	High		High sea lion abundance is problematic for white sturgeon populations.



END

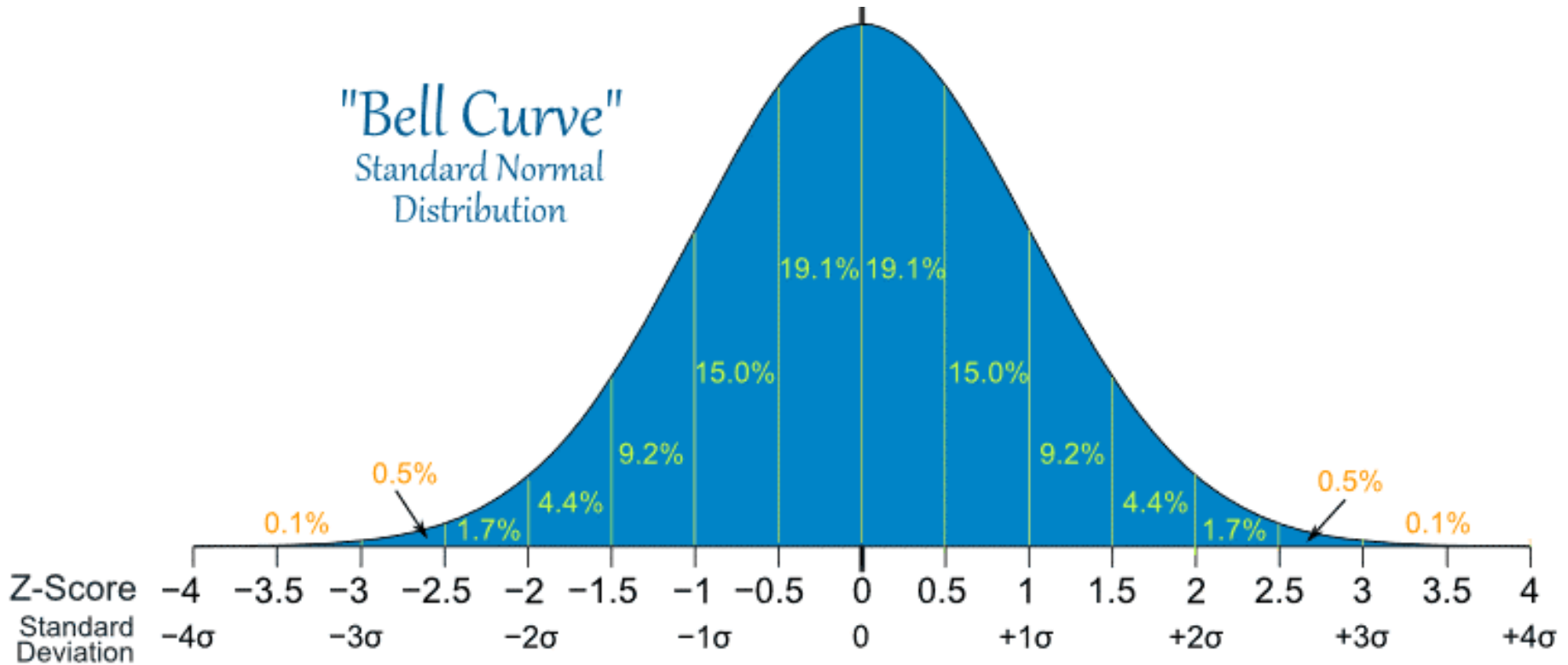
Questions/Discussion?

2018 LCR White Sturgeon Abundance

Size Class	\hat{N}	95% Confidence limits
Juveniles (22-38" FL)	371,733	214,103 – 529,363
Legal (38-54" FL)	162,182	93,410 – 230,953
Over-legals (54-65" FL)	28,659	16,506 – 40,811
Adults (>65" FL)	6,108	3,518 – 8,698
Total (22"+)	568,681	

Variability in Estimates

"Bell Curve"
Standard Normal
Distribution



Illegal harvest (aka poaching)

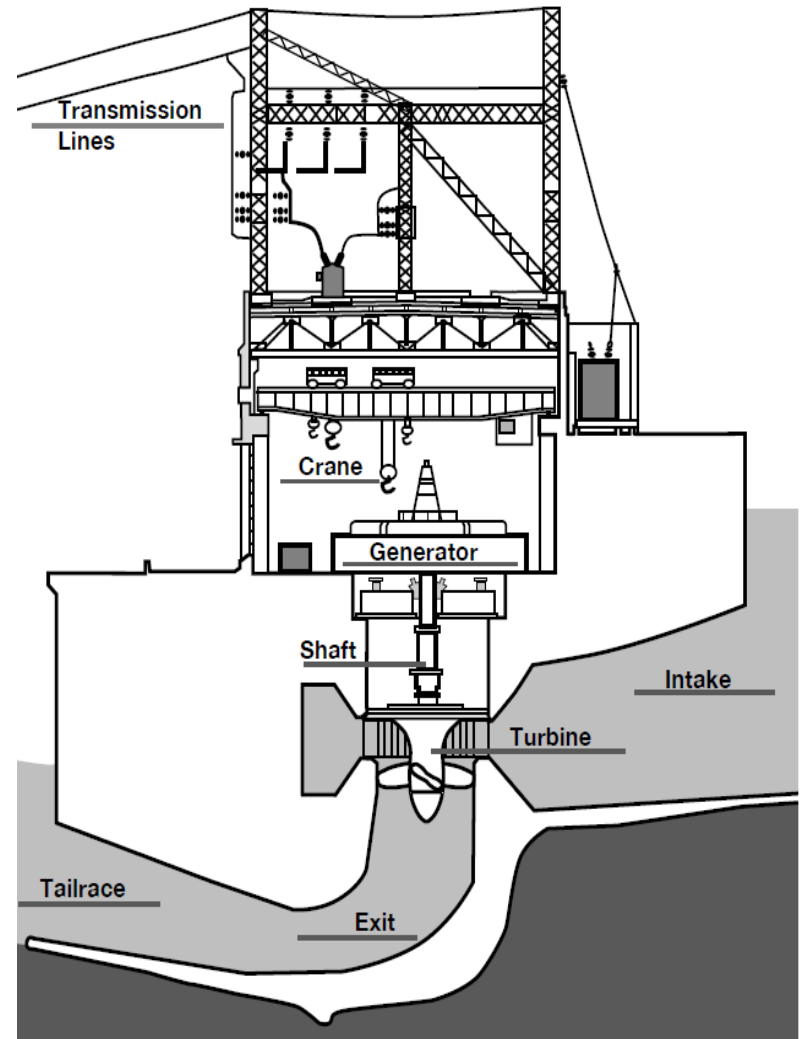


Image courtesy of MacGregor Campbell, OPB



Direct hydrosystem interactions

- * Sturgeon enter turbine draft tubes, penstocks and other orifices
- * Without proper deterrence fish can be exposed to blade strikes, blunt force injuries or barometric trauma
- * Fish are vulnerable during dewatering activities
 - * Proper dewatering protocol
 - * Problem recognition
 - * Slow-roll at startup



Lower Snake River:

A status review of the White Sturgeon
Acipenser transmontanus population

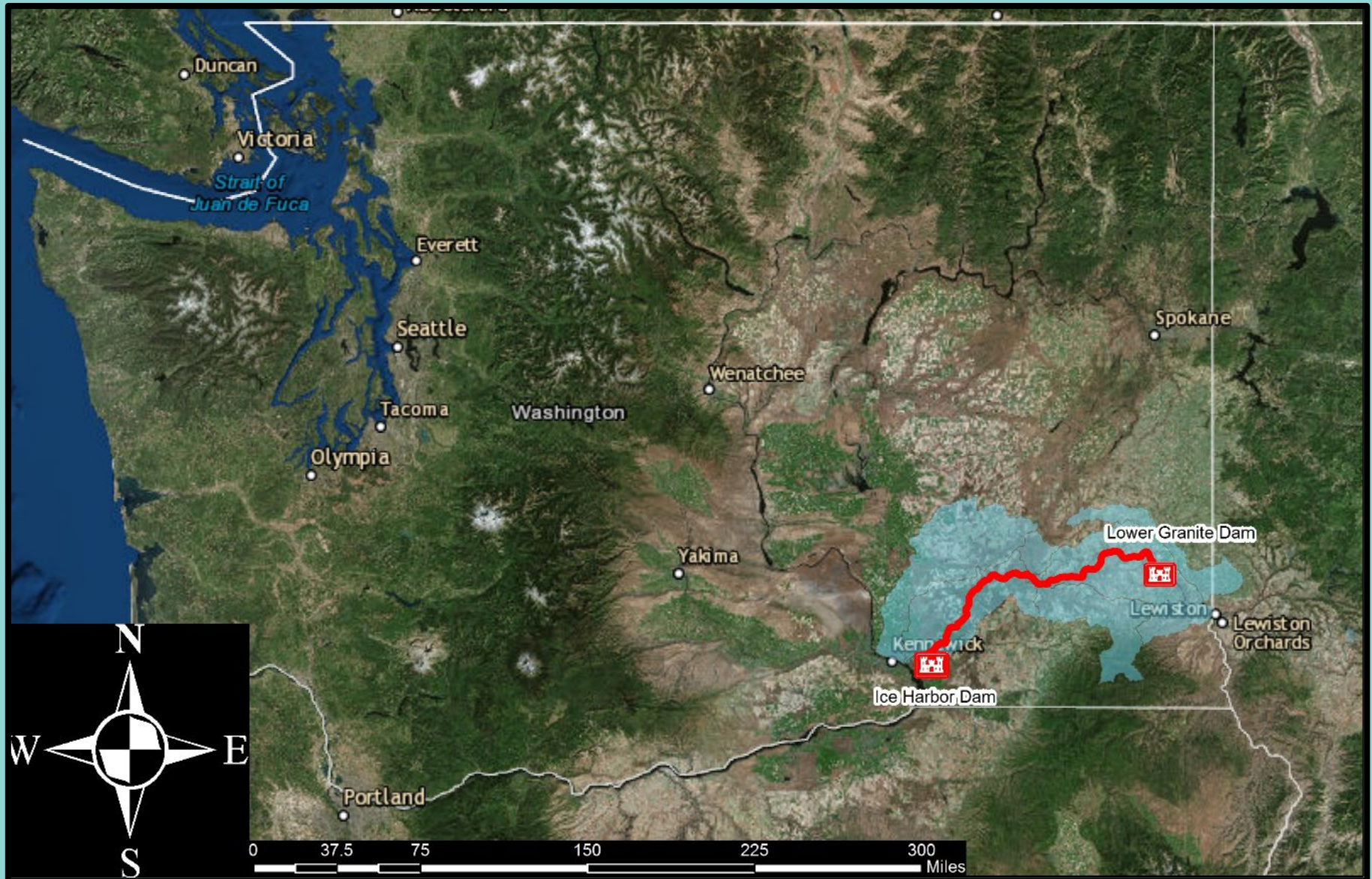


Outline



- Area Overview
- Population surveys
- Management challenges
- Next Steps

Lower Snake River



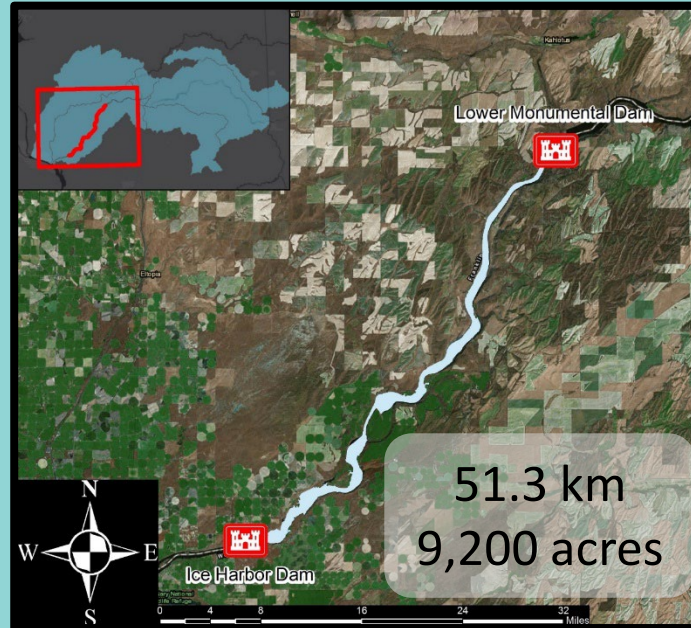
Ice Harbor Reservoir

Ice Harbor Dam

- Forms Lake Sacajawea
- Snake River KM 15.6
- Operational 1961

BPA "86-50" funded assessments

- Stock assessments: 
- Age-0 index surveys: 



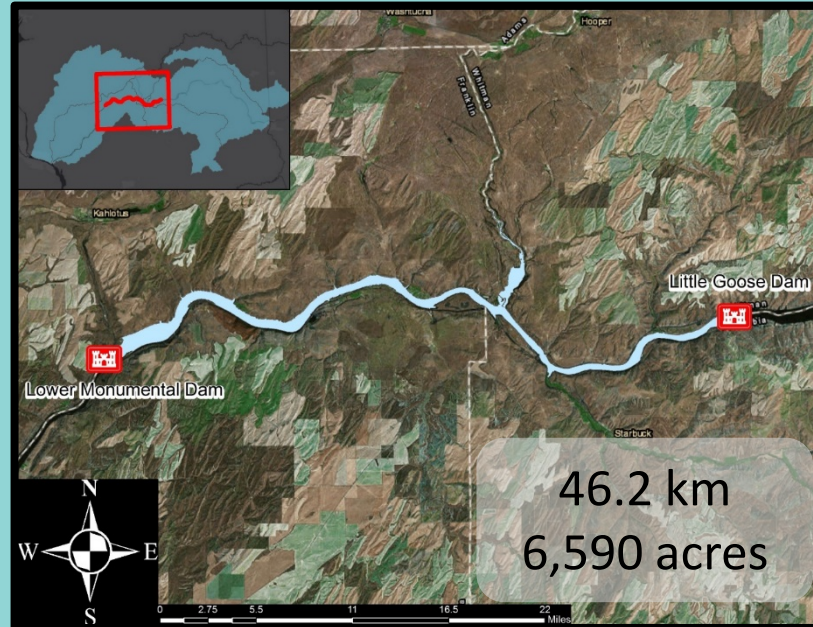
Lower Monumental Reservoir

Lower Monumental Dam

- Forms Lake Herbert G. West
- Snake River KM 66.9
- Operational 1969

BPA “86-50” funded assessments

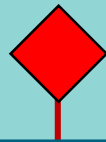
- Stock assessments: 
- Age-0 index surveys: 



1997



2012



2019

Little Goose Reservoir

Little Goose Dam

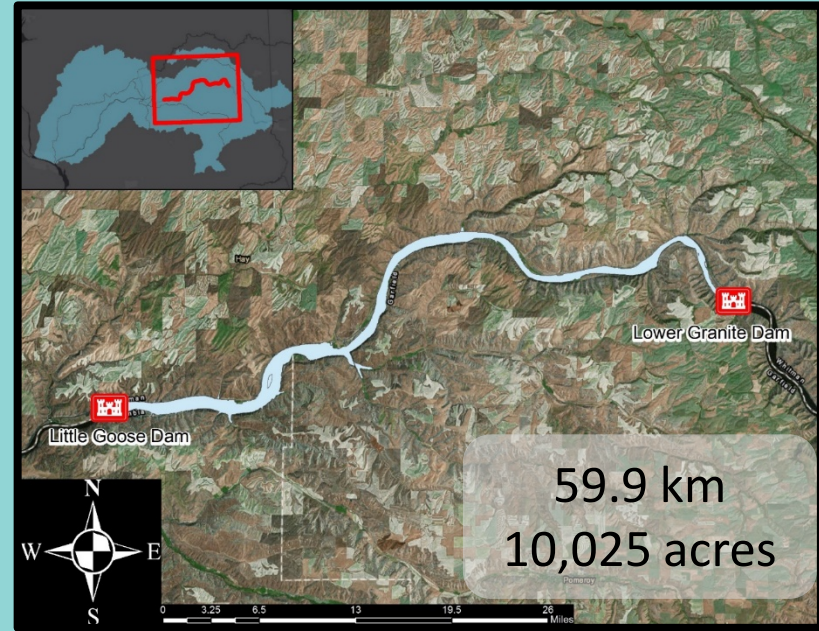
- Forms Lake Bryan
- Snake River KM 113.1
- Operational 1970

Lower Granite Dam

- Snake River KM 173.0
- Operational 1975

BPA "86-50" funded assessments

- Stock assessments: 
- Age-0 index surveys: 

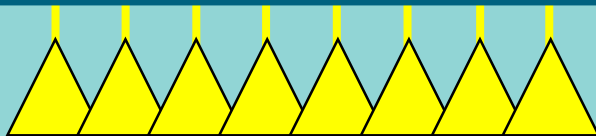


1997

2005



2012



Regulation Changes

- Stock decline triggered management to close all three reservoirs to retention in 2015.
- From 1997-2014, estimated recreational harvest rate was 10% in Ice Harbor Reservoir.



2018 Ice Harbor Stock Assessment



Sampling Design

GRTS sampling design

- Spatially balanced point selection
- Full reservoir coverage daily
 - 20 setlines per day
 - 6 weeks of sampling (Aug-Sep)

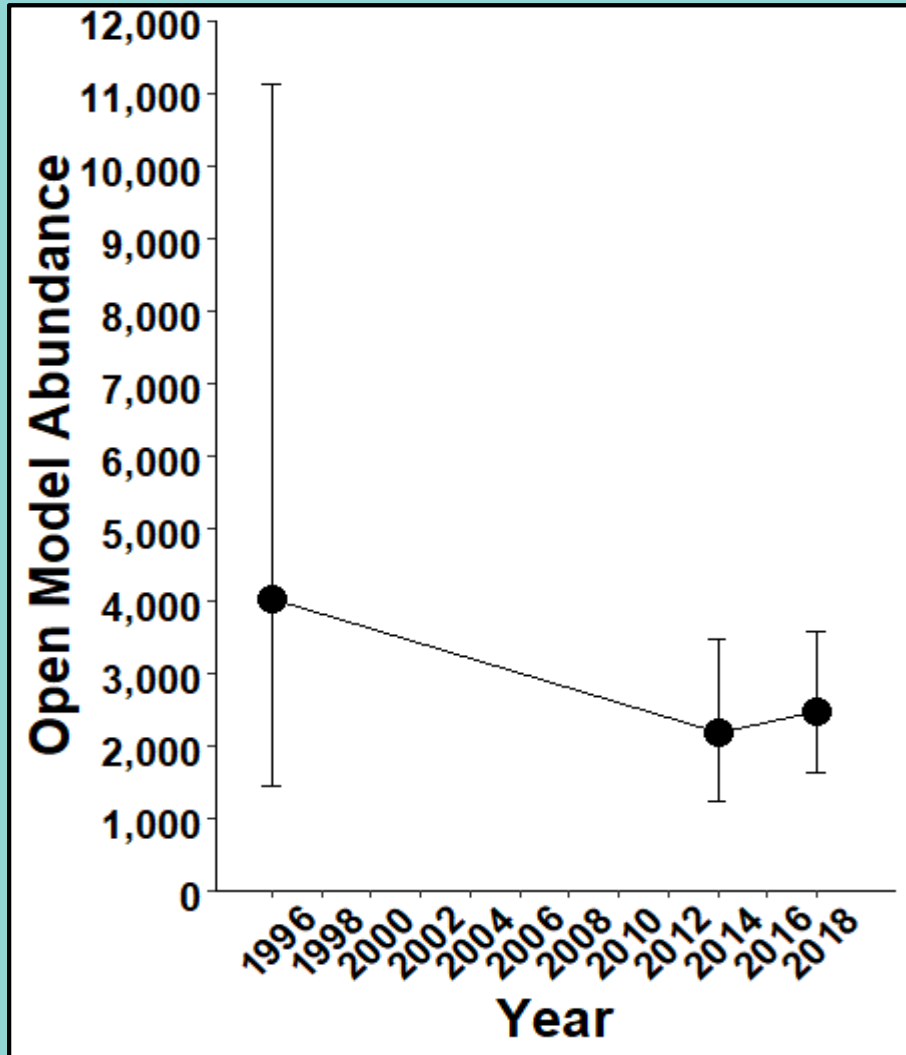
Mark/Recapture Analysis

- Sequential Bayesian analysis (open population model)
- Cormack-Jolly Seber (closed population model)

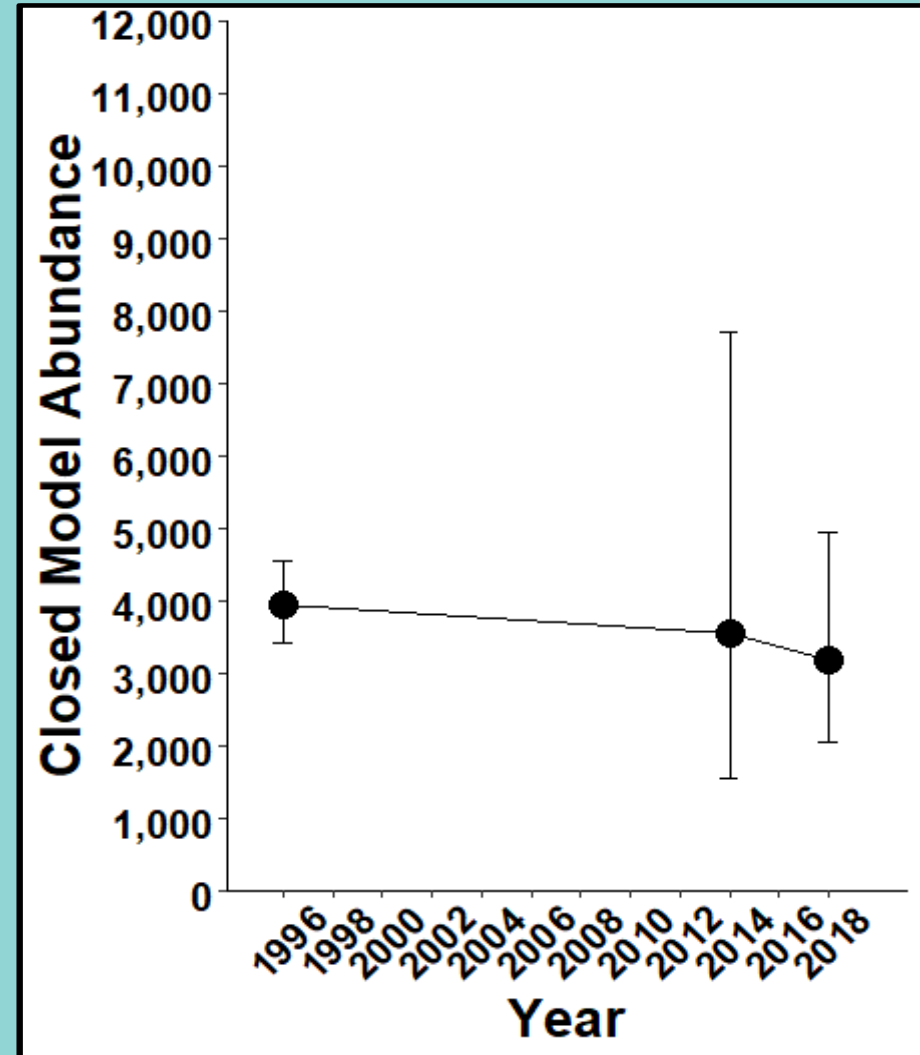


Abundance Estimate

Open Model

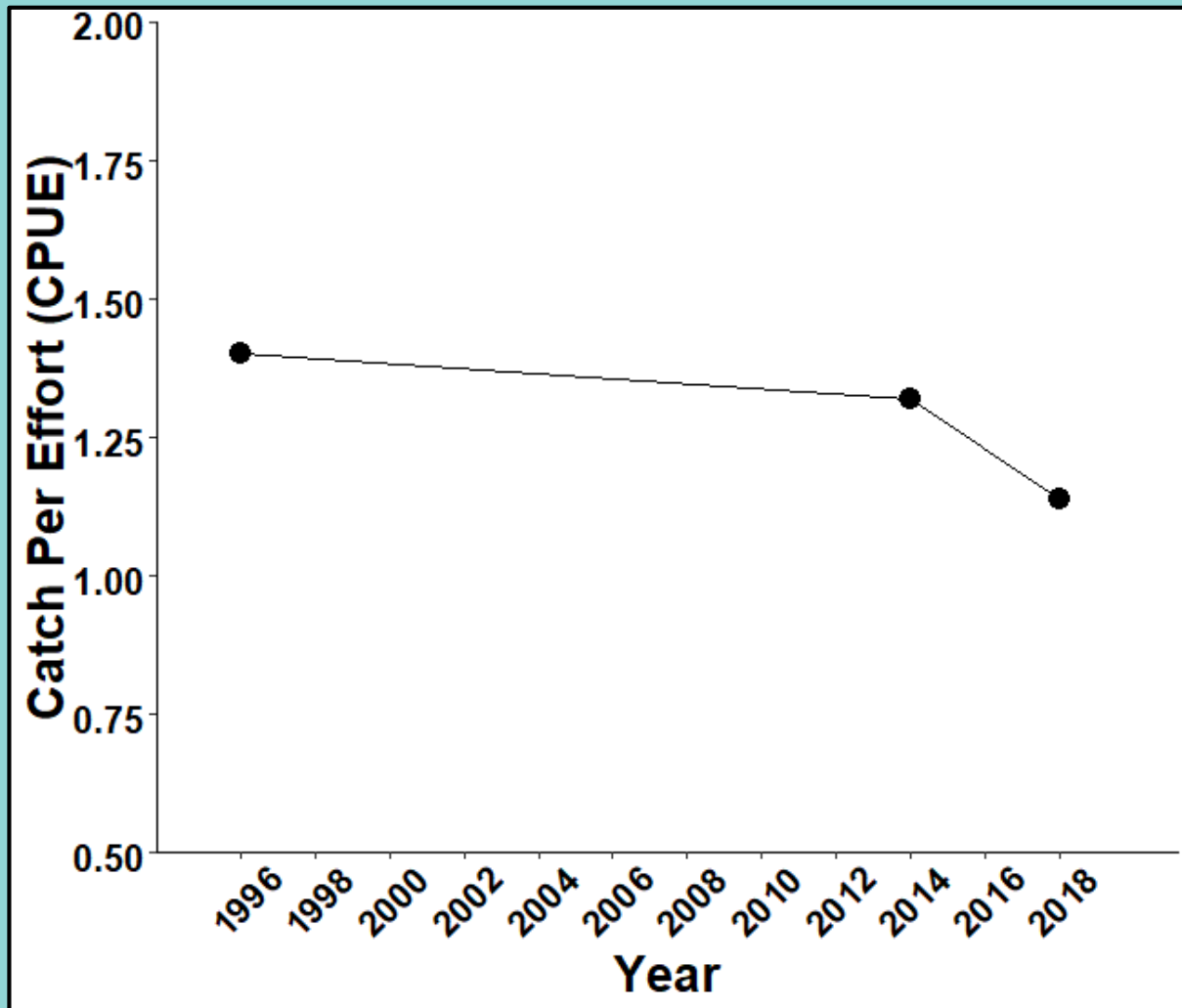


Closed Model

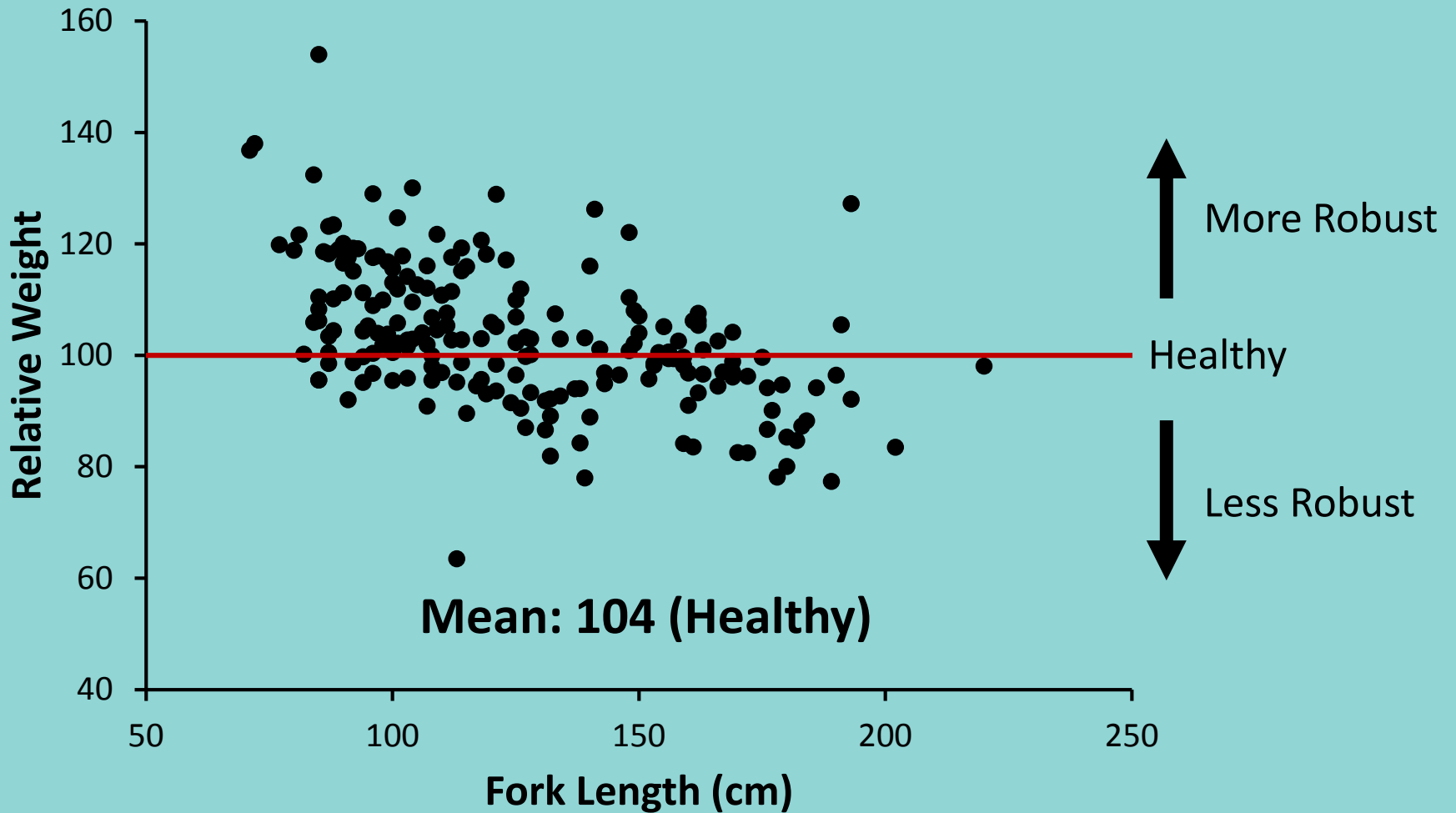


Abundance Estimate

CPUE: Number of sturgeon caught per setline

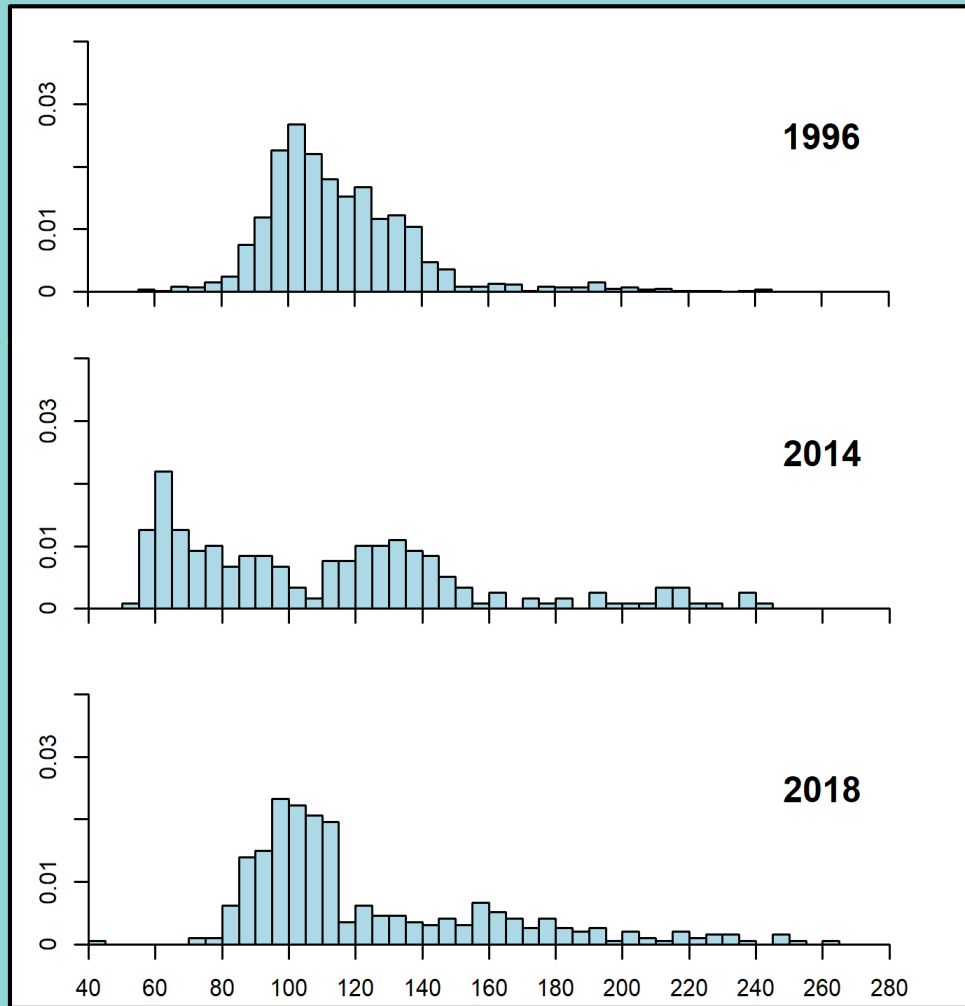


Relative Weight

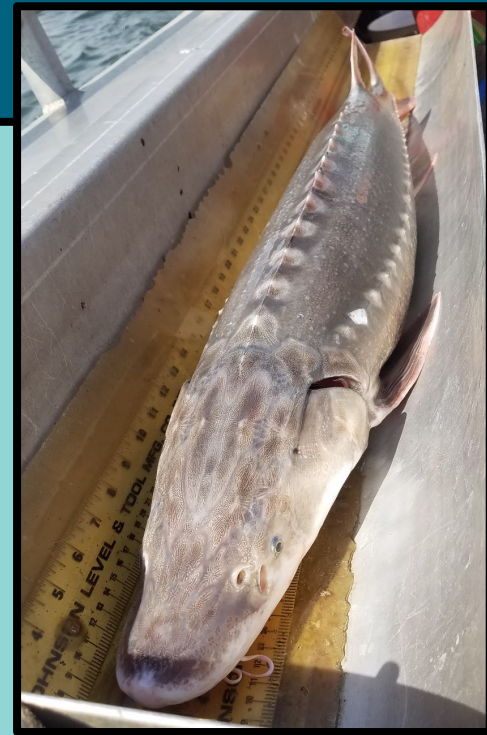


Population Structure

Proportion of Catch



Fork Length (cm)



2018 Catch Data

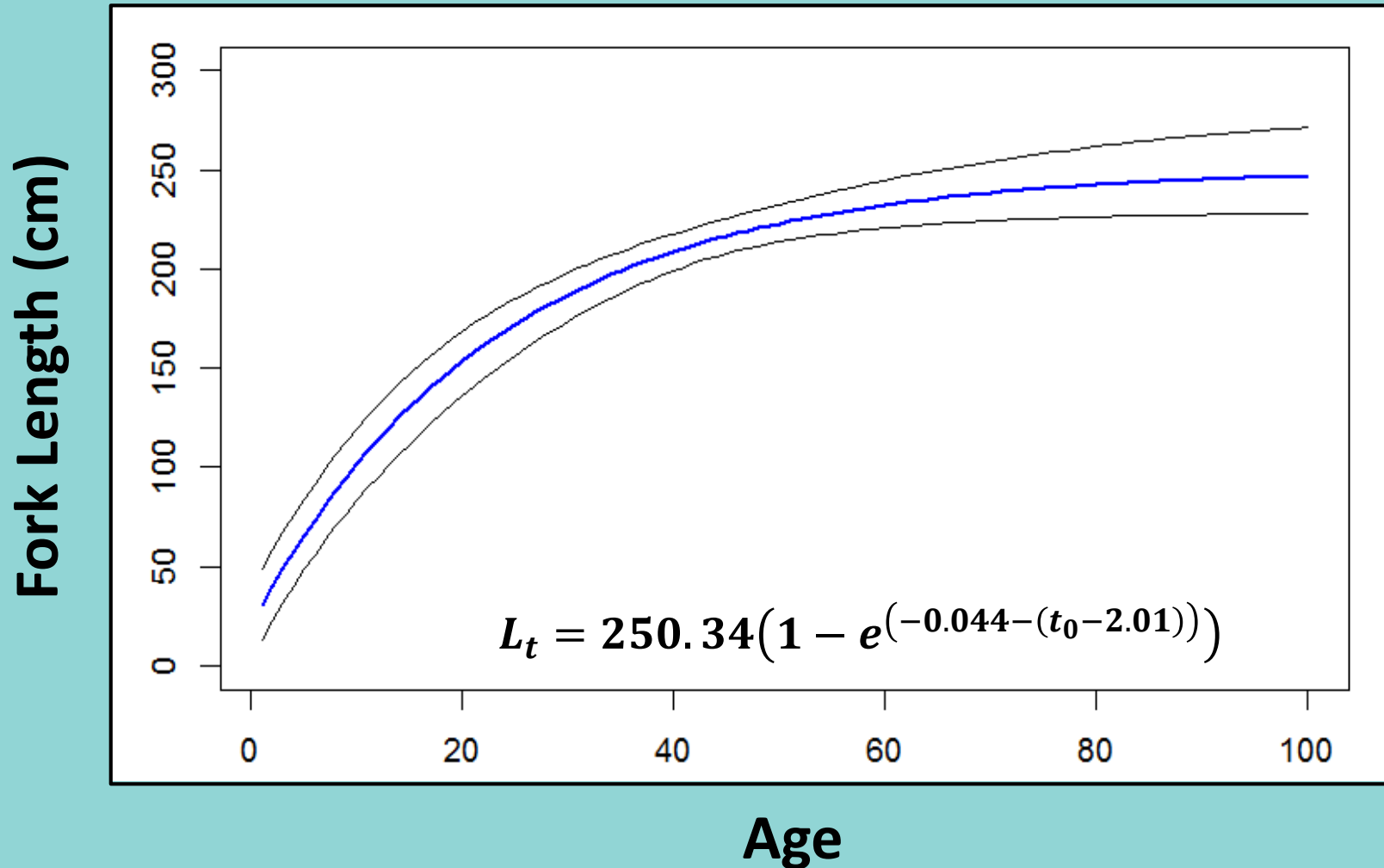
Fork Length:

Range: 42-261 cm FL

Median: 110 cm FL

Age and Growth

Recapture data from 102 sturgeon from 1996-2018

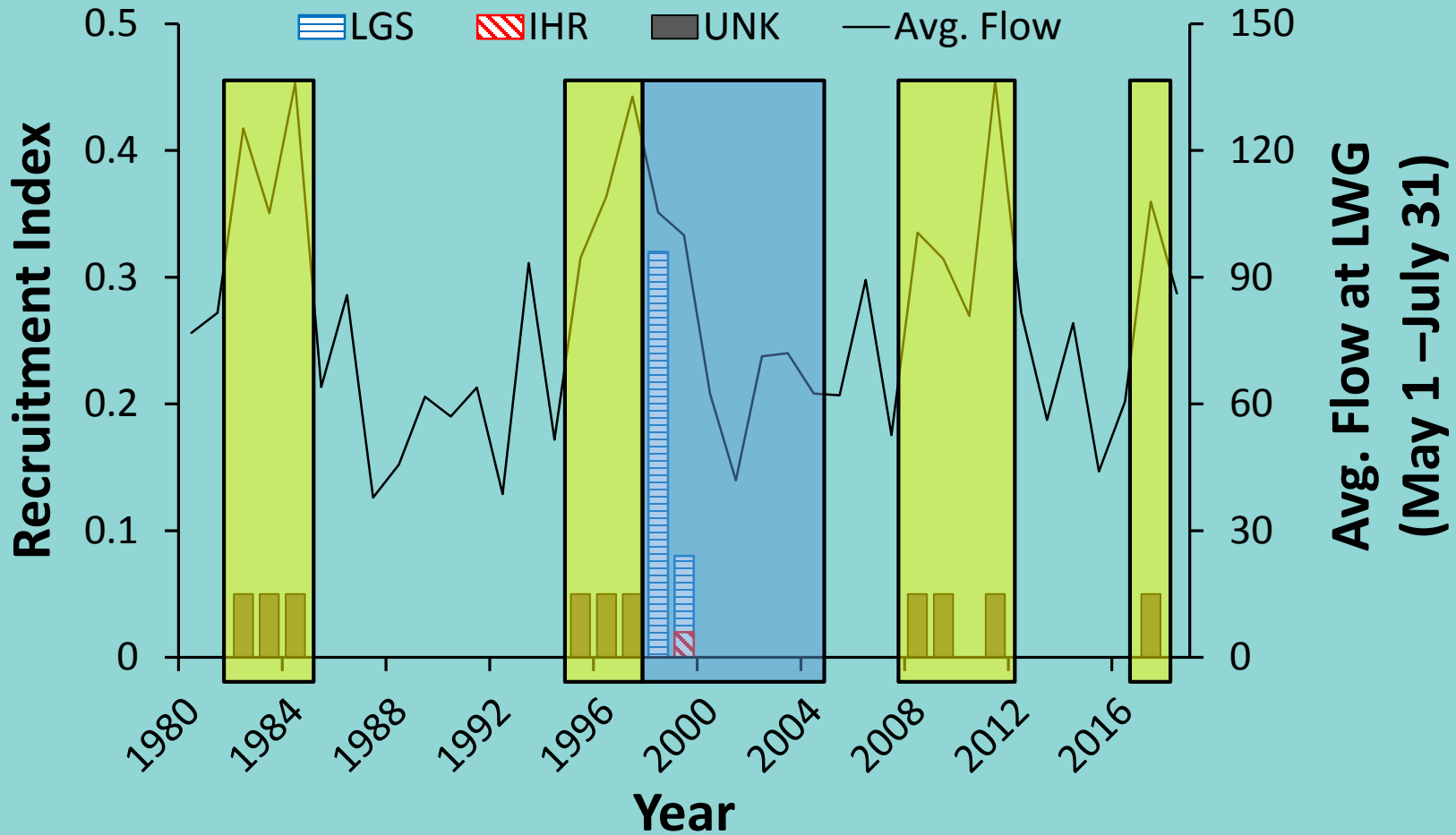


Recruitment



Young of Year
Sampled

Recruitment
Inferred



Conclusions

- Concerns of slow growth and recruitment failure.
- Inconsistent and sparse monitoring.
- Difficulty assessing adaptive management actions.



Next Steps

Sampling Lower Monumental Pool in 2019

To evaluate conservation and management actions, baseline tracking of population structure is needed:

- Monitoring on 3-year rotating basis
- Consistent sampling effort



Thank you!



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

BLAINE L. PARKER

COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

NORTHWEST POWER AND CONSERVATION COUNCIL

FISH AND WILDLIFE COMMITTEE MEETING

APRIL 10, 2019



BACKGROUND ON PROJECT 86-50

- ▶ **BEGAN IN 1985 WITH ODFW AS THE PROJECT LEAD, THE PROJECT STRIVES TO MAINTAIN AND ENHANCE WHITE STURGEON POPULATIONS WITH WDFW AND CRITFC KEY PARTNERS**
- ▶ **TIME SERIES POPULATION MONITORING INVALUABLE FOR TRACKING CHANGES THROUGH TIME AND UNDERSTANDING POPULATION DYNAMICS**
- ▶ **YOUNG OF YEAR SURVEYS IN THE FALL ARE A KEY ELEMENT TO TRACK ANNUAL RECRUITMENT FOR EACH RESERVOIR**
- ▶ **TIME SERIES PAIRED WITH YOUNG OF YEAR MONITORING AND HARVEST DATA HAS ENABLED MANAGEMENT OF THESE POPULATIONS TO A DEGREE NOT FOUND IN OTHER POPULATIONS OUTSIDE THE CRB**
- ▶ **STURGEON RESEARCHERS (PAST AND PRESENT) WITH THIS PROJECT HAVE CONTRIBUTED**

PRESENTATION OVERVIEW

- ▶ DATA PRESENTED TODAY IS A COLLABORATIVE EFFORT BY CRITFC, ODFW AND WDFW – BPA PROJECT 86-50
- ▶ RESERVOIRS POPULATIONS ARE ASSESSED EVERY 3 YEARS
- ▶ ASSESSMENT IS A 2 PART PROCESS- *WINTER TAGGING* BY TRIBAL FISHERS AND TECHNICIANS - *SUMMER TAGGING & RECAPTURE* EFFORT BY ODFW, WDFW, AND YAKAMA NATION STAFF
- ▶ FALL YOUNG OF YEAR RECRUITMENT MONITORING CONDUCTED BY STATE AND YAKAMA NATION CREW IN THE FALL
- ▶ COMMERCIAL, RECREATIONAL AND SUBSISTENCE FISHERIES ARE MONITORED BY TRIBES AND STATES; WDFW PROVIDES FISHERY ANALYSIS, POPULATION ANALYSIS BY ODFW, GENETICS BY CRITFC SCIENTIST'S @ HAGERMAN FISH CULTURE EXPERIMENT STATION – GENETICS LABORATORY

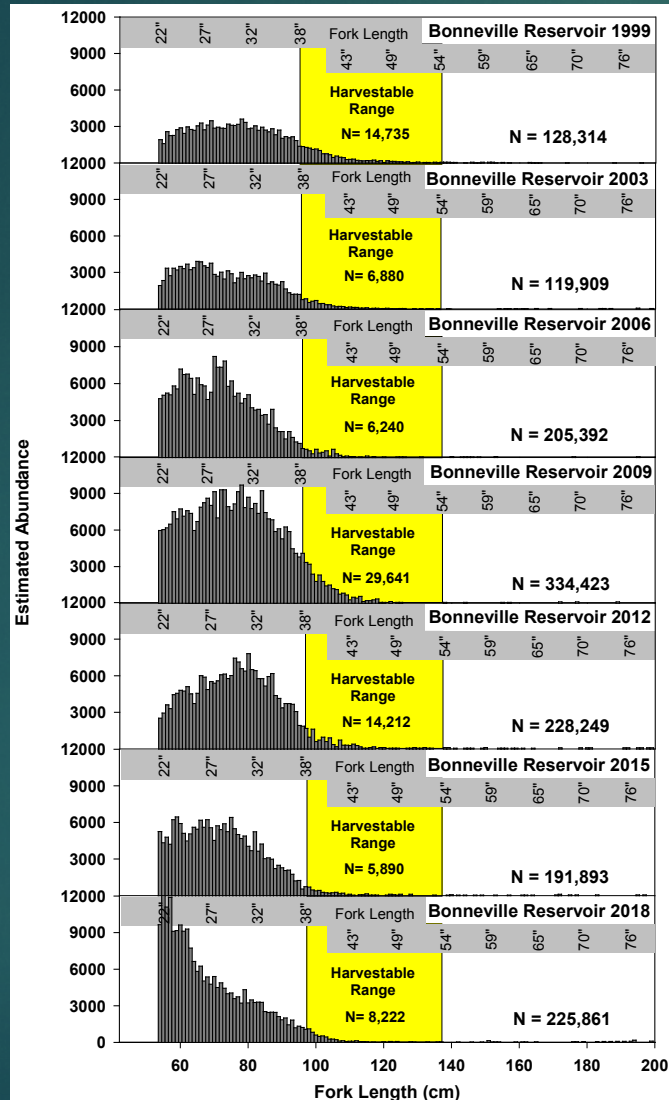
POPULATION TIME SERIES AND KEY POINTS

▶ **BONNEVILLE 1999 - 2018**

▶ **THE DALLES 1997 – 2017**

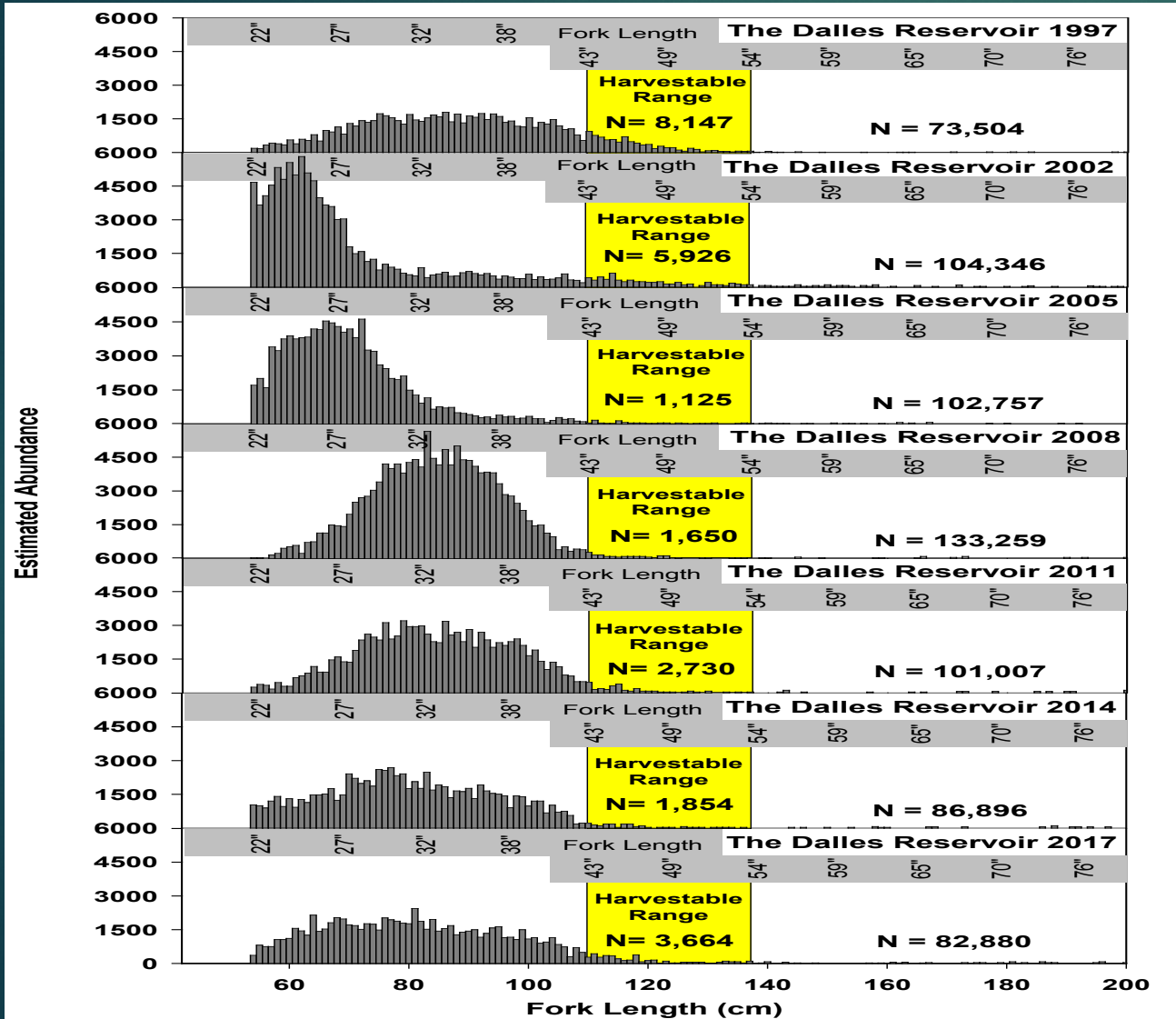
▶ **JOHN DAY 2001 - 2016**

BONNEVILLE RESERVOIR 1999 - 2018



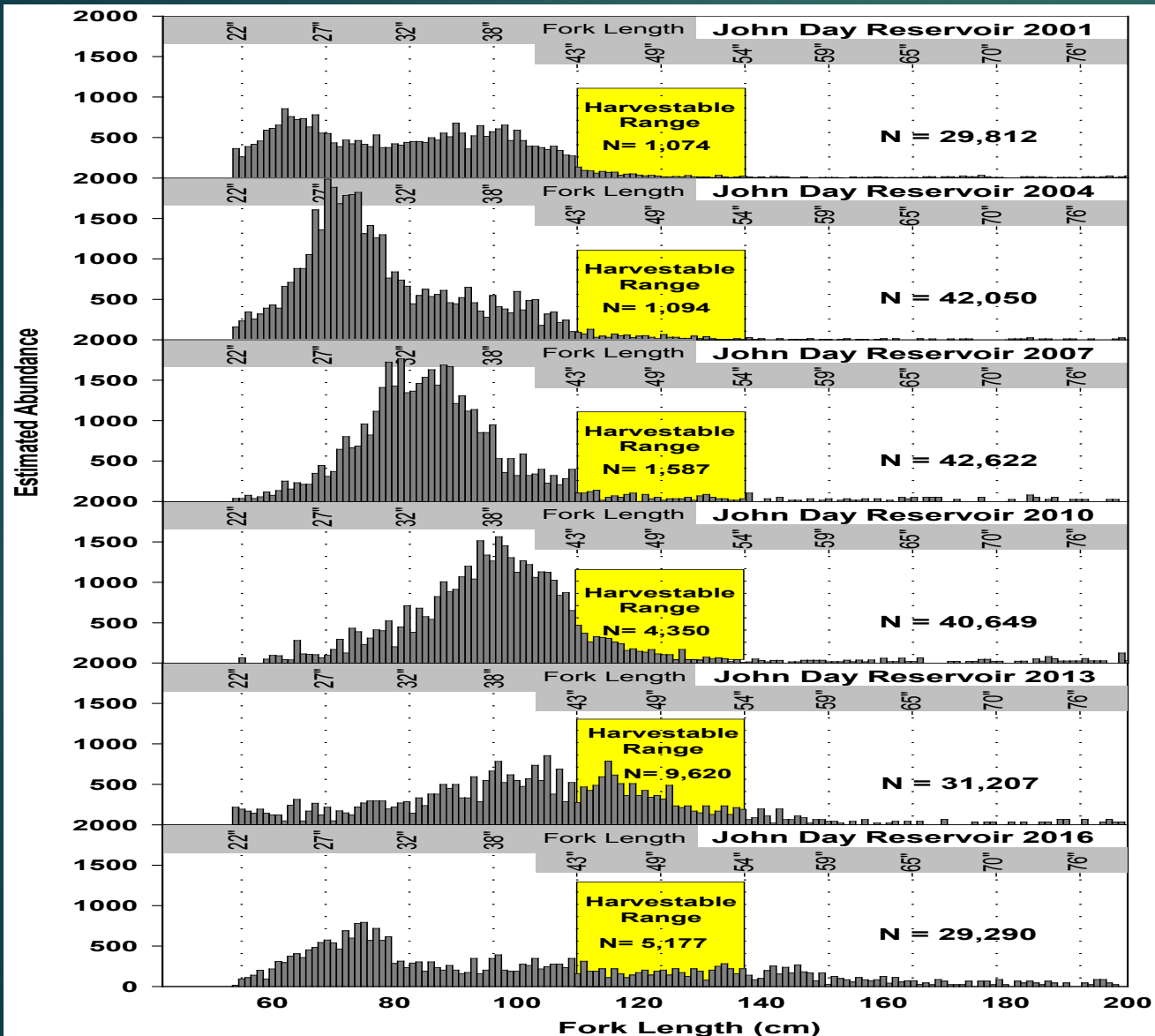
- ▶ TREMENDOUS POPULATIONS SHIFTS
- ▶ HIGH DENSITIES, POOR CONDITION FACTORS CHARACTERIZE THIS PERIOD
- ▶ MOST RECENT SURVEY (2018) MAY SHOW STABILIZATION, GOOD WEIGHTS REPORTED BY FISHERS
- ▶ INCREASED SPECIFIC WEIGHTS AND HIGHER CONDITION FACTORS IN THE LATEST SURVEY
- ▶ **NOTE:** The histogram for 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 RESERVOIR 1997 – 2017



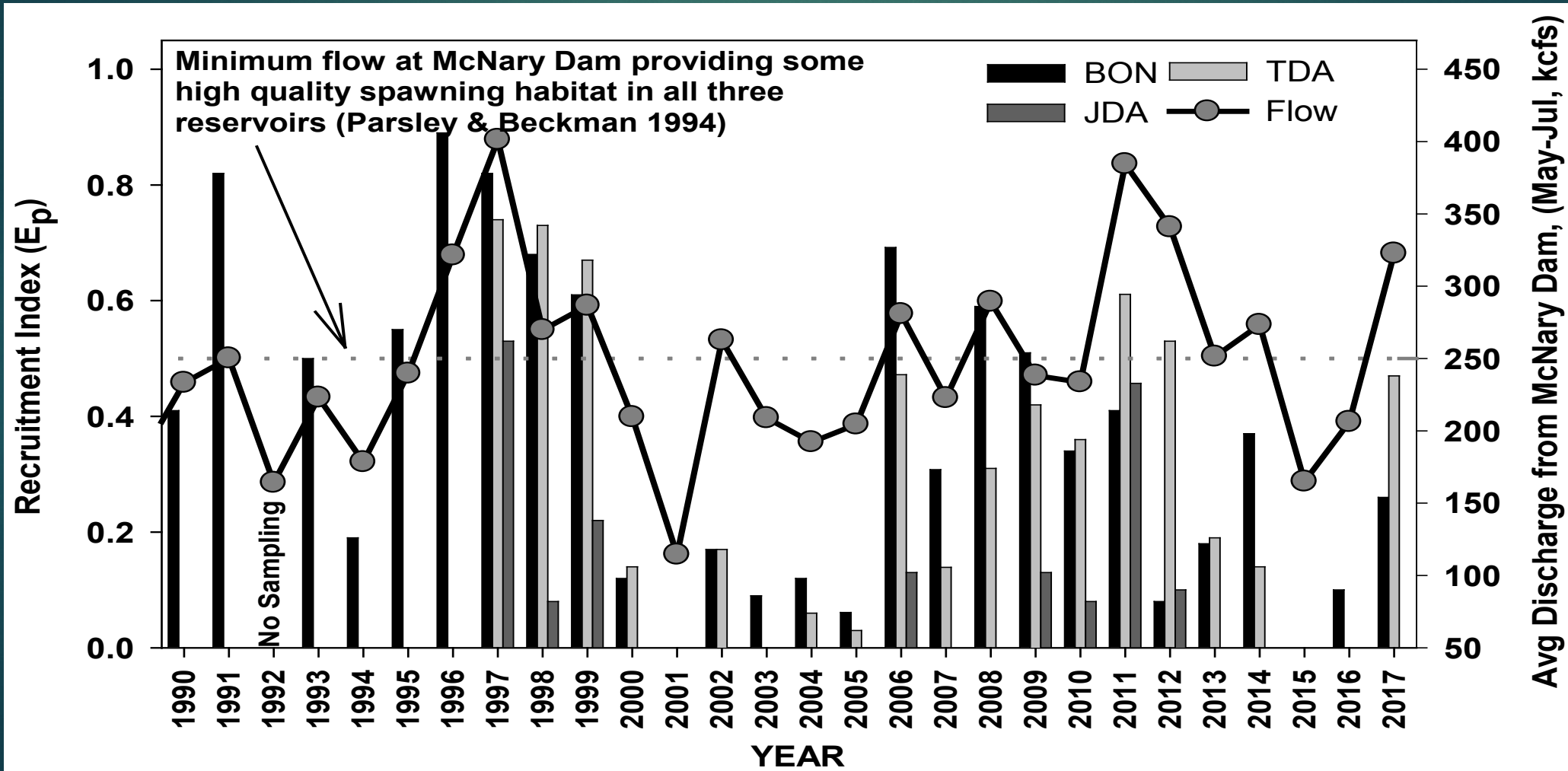
- ▶ POPULATION SURGED UPWARDS IN EARLY 2000'S, SIMILAR TO BN POPULATION
- ▶ TD FISH SLIGHTLY BETTER CONDITION FACTOR AND GROWTH THAN BN FISH
- ▶ DOWNSHIFT SIMILAR TO BN POPULATION
- ▶ POPULATIONS DIFFERENCES BETWEEN 2014 AND 2017 MINOR, STABILIZATION ?

JOHN DAY RESERVOIR 2001 - 2016



- ▶ JOHN DAY POPULATION COMES FULL CIRCLE
- ▶ JD STURGEON 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

SPRING FLOWS PRODUCE JUVENILE STURGEON.....MOST OF THE TIME



RECRUITMENT MONITORING - YOY SURVEYS

Year2	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			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 ²²	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			

FIELD SEASON 2019



- ▶ STOCK ASSESSMENT IN JOHN DAY RESERVOIR
- ▶ FALL YOUNG OF YEAR SURVEYS- BONNEVILLE, THE DALLES, & JOHN DAY RESERVOIRS
- ▶ WINTER TAGGING IN THE DALLES RESERVOIR (YN/TRIBAL FISHERS/CRITFC)

CONCLUSIONS

BONNEVILLE –MAYBE FINDING EQUILIBRIUM WITH AVAILABLE HABITAT AND CURRENT POPULATION SIZE

THE DALLES – UNCERTAIN, WE'LL KNOW MORE STARTING IN THE WINTER OF 2019-2020

JOHN DAY – CONTINUES TO DECLINE AND BASED UPON OUR MONITORING, IT WILL CONTINUE TO DO SO FOR THE NEAR FUTURE (~ 8-10 YEARS) EVEN IF RECRUITMENT IMPROVES; LIKELY DUE TO 14 YEARS OF NO DETECTABLE RECRUITMENT (21 CONSECUTIVE YEARS OF SAMPLING)

JOHN DAY IS A STRONG CANDIDATE FOR SUPPLEMENTATION FROM CRITFC STURGEON SUPPLEMENTATION MASTER PLAN (#200715500), WITH PROGRESS ON STEP 2 SET TO INCREASE THIS YEAR AFTER COMPLETION OF A TRIBAL WATER AGREEMENT, COMPLETION OF SPONTANEOUS AUTOPOLYPLOIDY MGT PLAN & LARVAL COLLECTION FEASIBILITY WHITE PAPER

FUTURE – MONITORING, SUPPLEMENTATION, RESEARCH ARE KEY ELEMENTS TO ENSURING WHITE STURGEON THRIVE IN THE COLUMBIA BASIN FOR THE NEXT 7 GENERATIONS



QUESTIONS...

Upper Columbia White Sturgeon Recovery

Northwest Power and Conservation Council Meeting

Portland, Oregon

April 10, 2017

Jason McLellan

Matt Howell

Colville Confederated Tribes



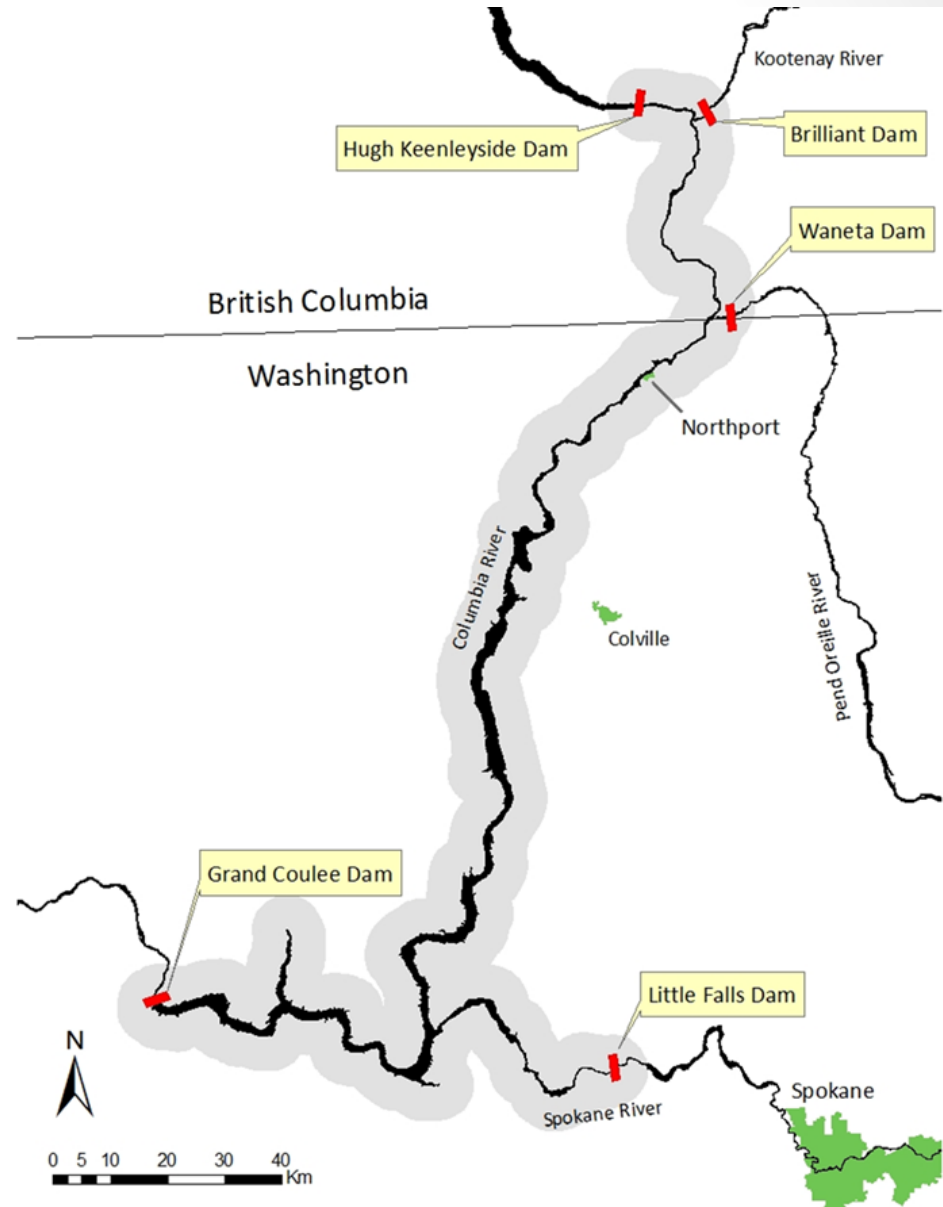
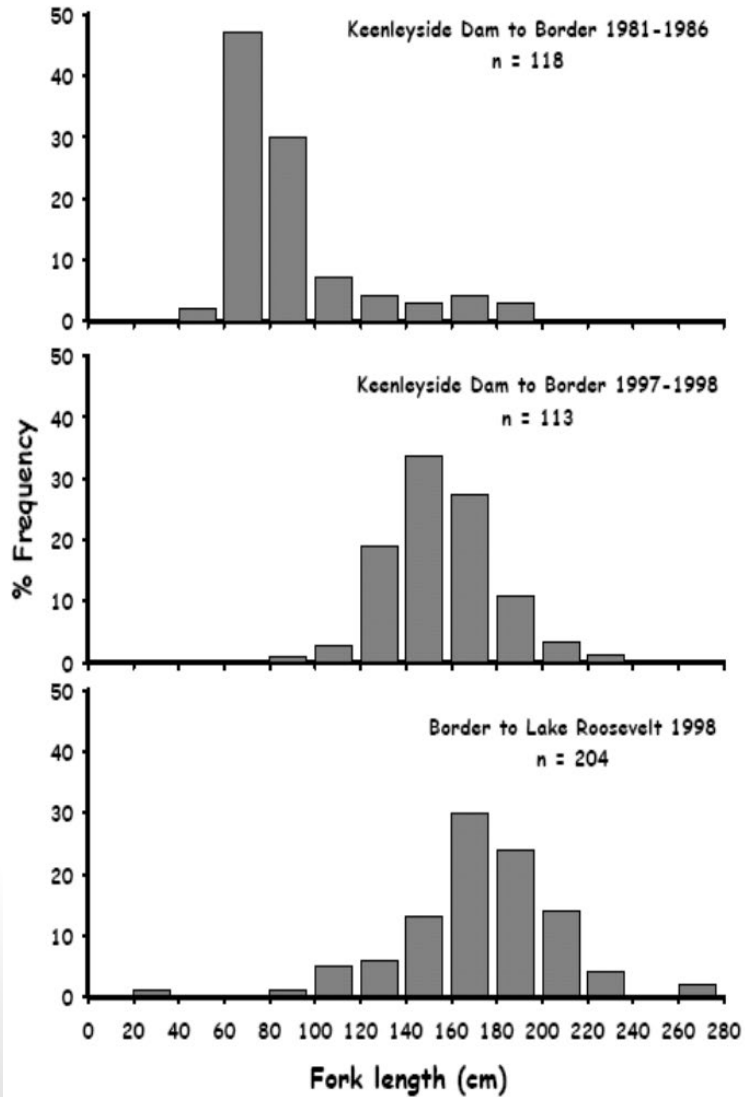
Andy Miller

Brent Nichols

Spokane Tribe of Indians



Persistent Recruitment Failure



Upper Columbia White Sturgeon Recovery Initiative (UCWSRI)

- **GOAL**

“...ensure the persistence and viability of naturally-reproducing populations...”

And

“...restore opportunities for beneficial use if feasible.”

Upper Columbia White Sturgeon
Recovery Plan - 2012 Revision



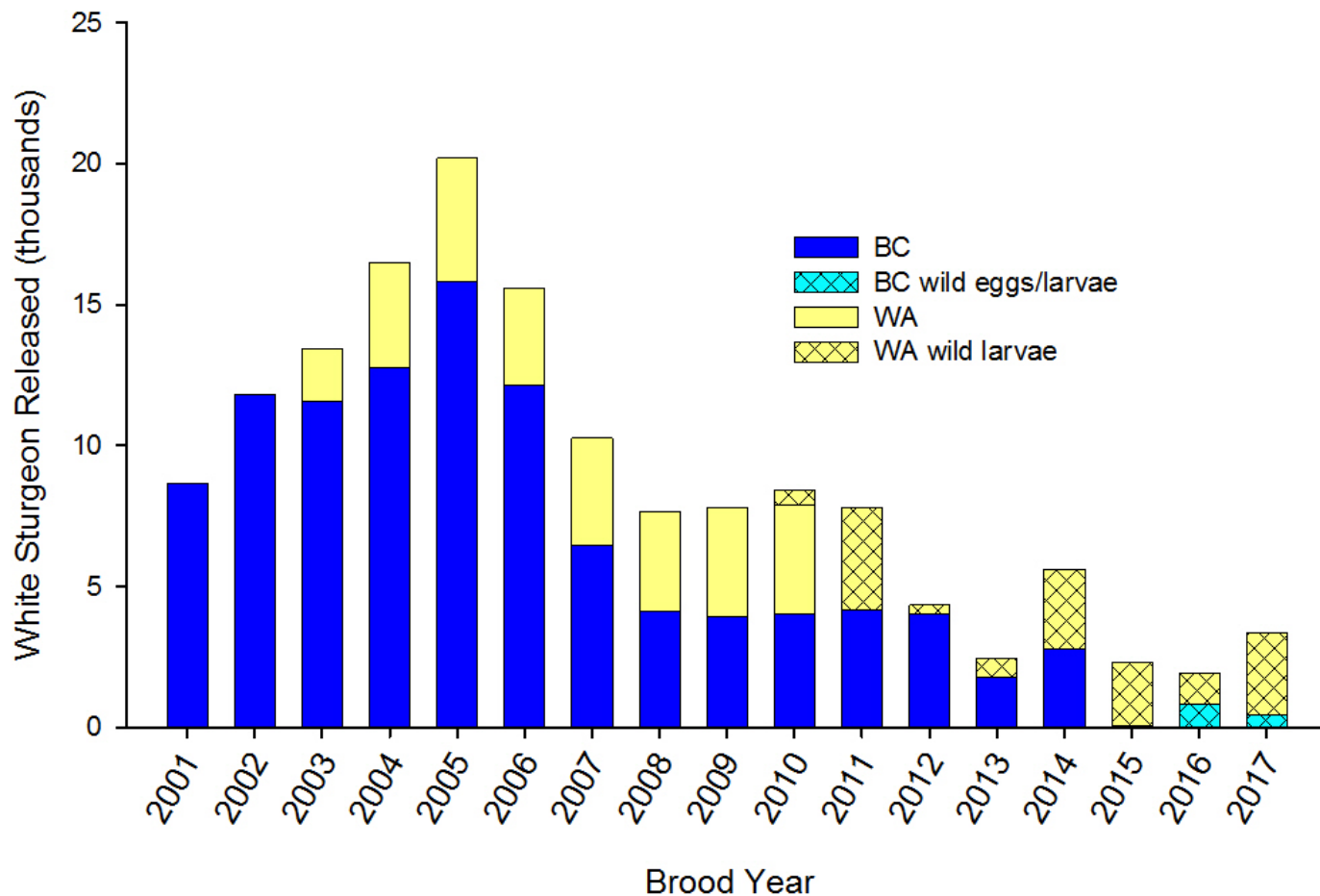
Revised December 2013
(Original November 2002)

Recovery Plan Implementation - WA

- Spokane Tribe of Indians
 - Lake Roosevelt Sturgeon Recovery (1995-027-00)
 - Monitoring Population Demographics
 - Standardized Stock Assessment Survey
 - Conservation Aquaculture Program
 - Recruitment Failure Research
 - Recruitment Monitoring
 - Food Habits and Prey Availability
 - Predation
- Colville Confederated Tribes
 - White Sturgeon Enhancement Project (2008-116-00)
 - Monitoring Population Demographics
 - Standardized Stock Assessment Survey
 - Recruitment Failure Research
 - Recruitment Monitoring
 - Larval Translocation
 - Hydrodynamic Modeling
 - Maturation and Contamination

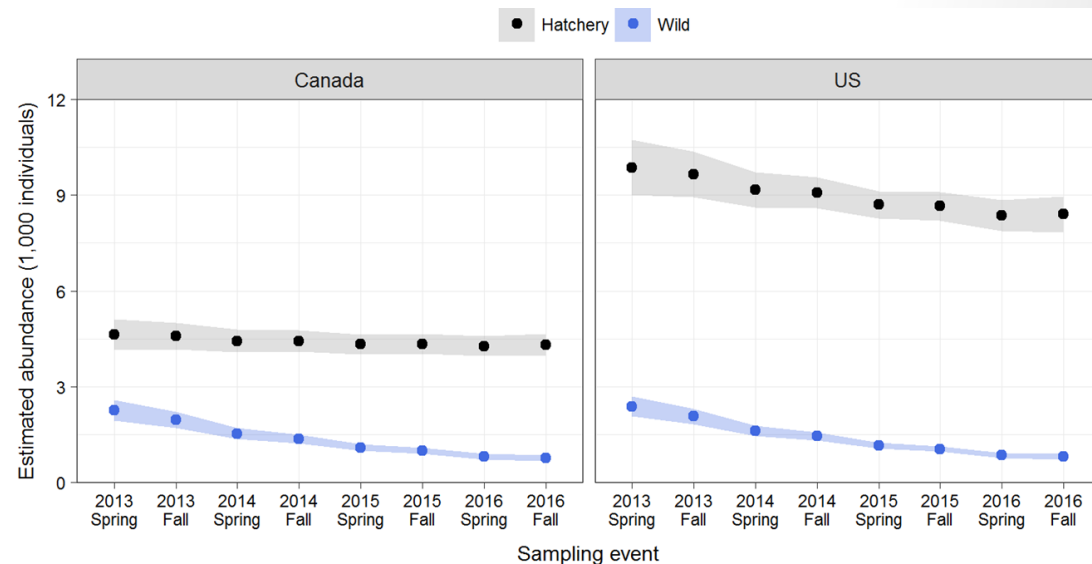
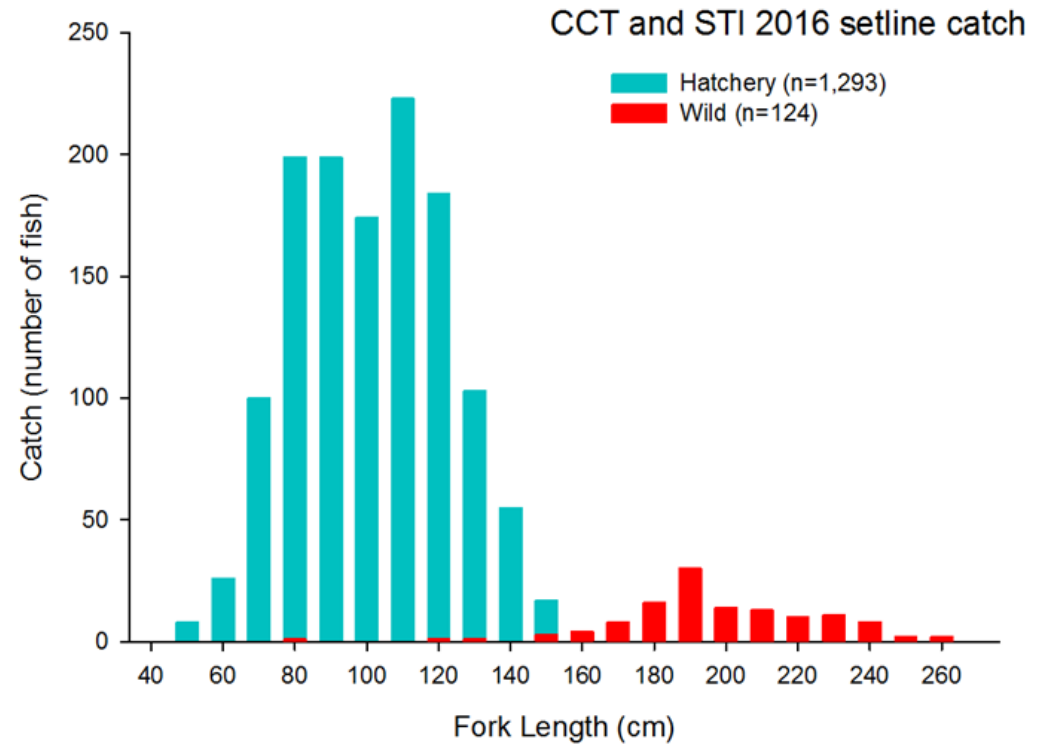
Conservation Aquaculture

- Released \approx 153,000 juveniles since 2002



Stock Assessment

- Wild abundance \approx 2,500 adults
- Continued lack of recruitment
- Hatchery fish survival high
- Hatchery abundance \approx 53,000
- Family over-representation



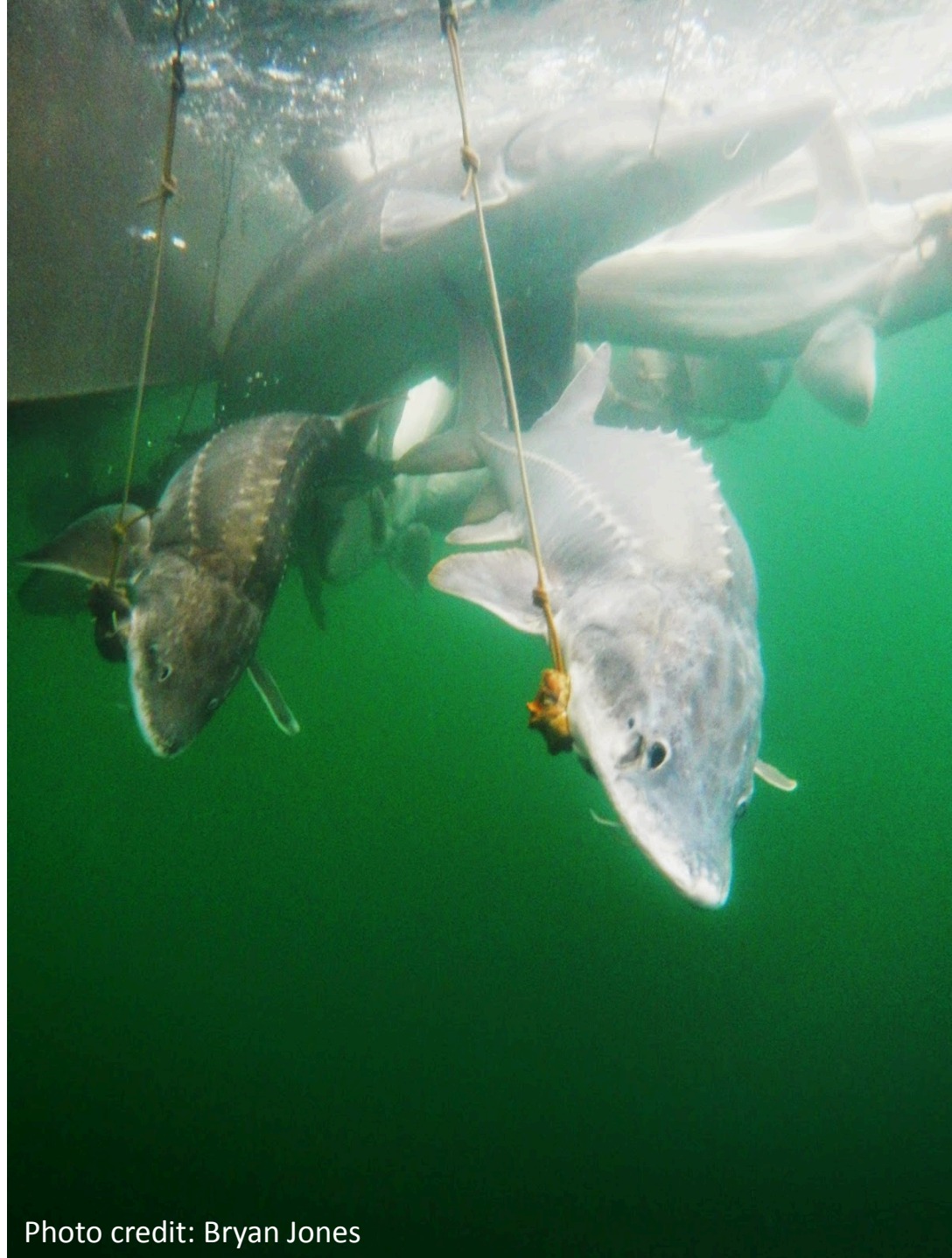
Lake Roosevelt White Sturgeon Fishery

- Purpose: family size equalization
 - Targeting hatchery fish – slot limit
 - Spawning sanctuary
- \approx 3,500 fish harvested in 2017
- \approx 150 fish harvest in 2018
- Tribal Harvest
 - Tribal harvest \approx 200 fish/year
 - \approx 250 harvested during 2018 stock assessment



Summary

- $\approx 2,500$ wild adults – recruitment limited
- Successful aquaculture program
- Fishery established
- Identified recruitment bottleneck
- Investigating causes of recruitment failure



Acknowledgements

- BPA
- BC Hydro
- BC MOE
- FFSBC
- US DOI – NRDA
- NPS
- USGS
- WDOE
- USFWS BFTC
- PNNL
- Sitka
- US EPA
- Golder Associates
- Cramer Fish Sciences
- Teck American Incorporated
- CH2M Hill
- Windward Environmental
- Columbia Navigation
- WDOH
- Douglas PUD
- CCT, WDFW, STI - Field & hatchery crews

KOOTENAI RIVER

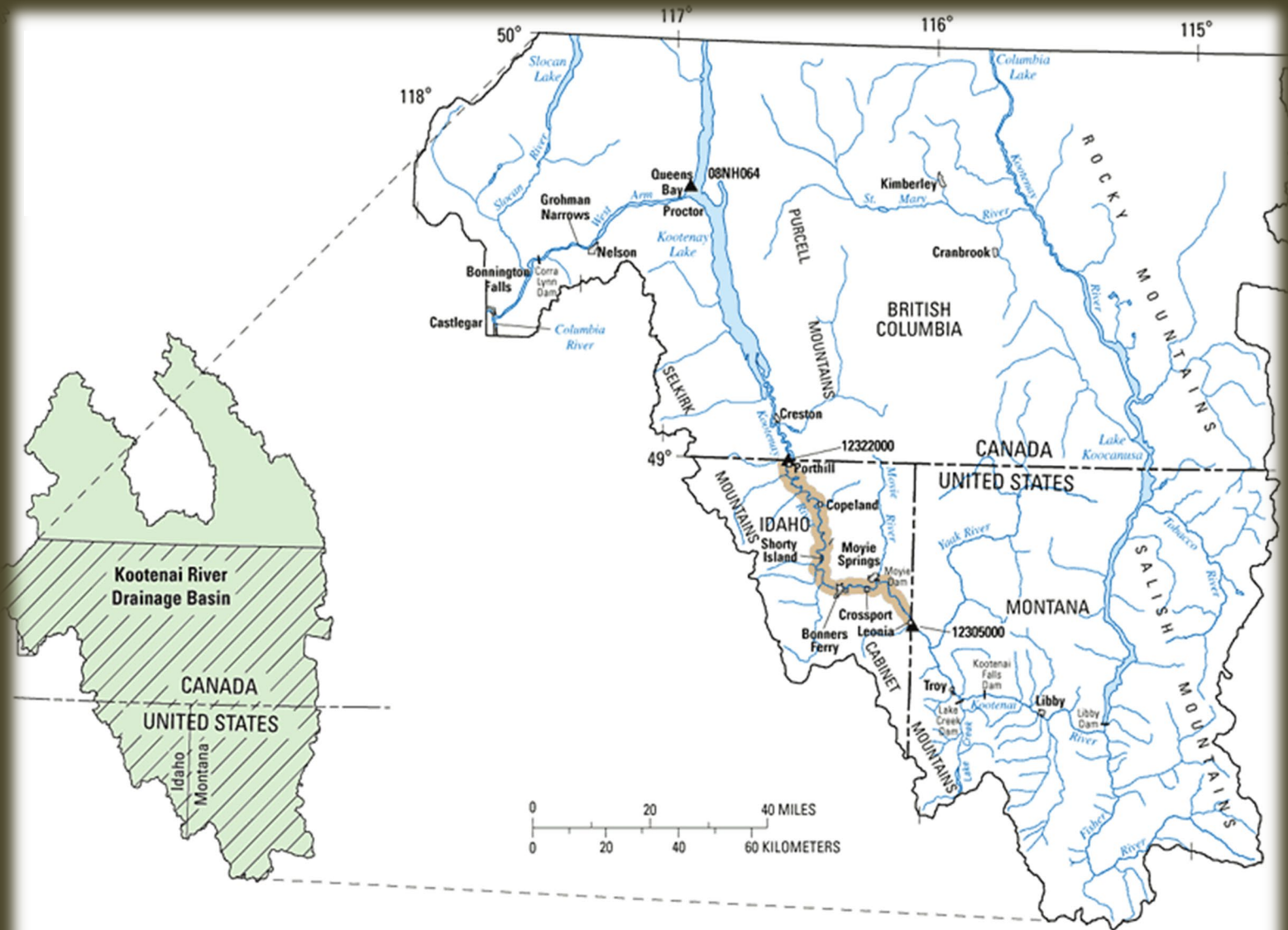
White Sturgeon

Research and Recovery Efforts

Ryan Hardy
Idaho Dept. of Fish and Game



Study Area



Challenges



Recruitment Failure



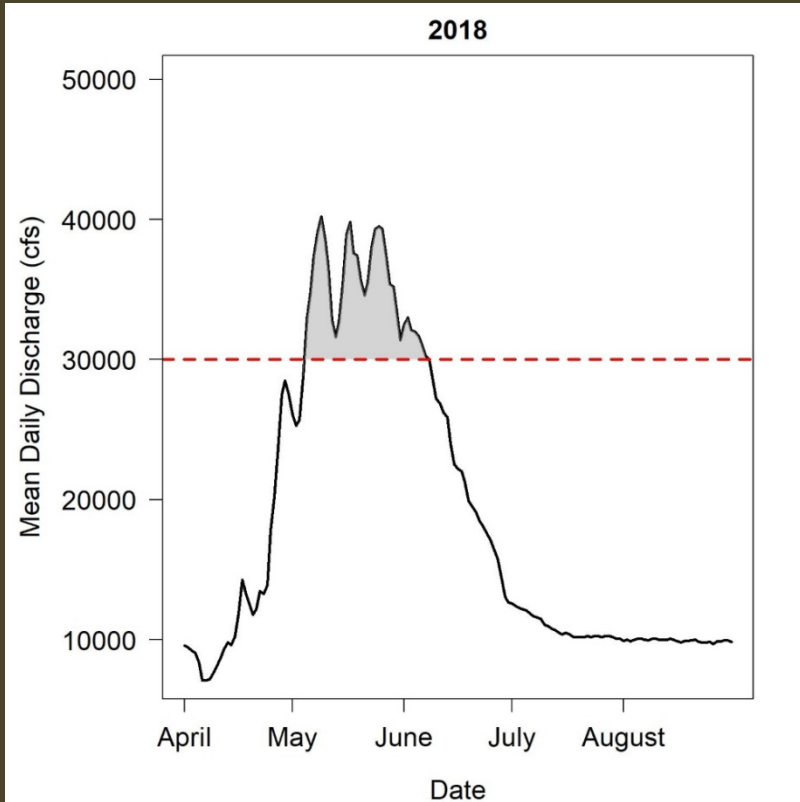
Vital Rate Evaluation



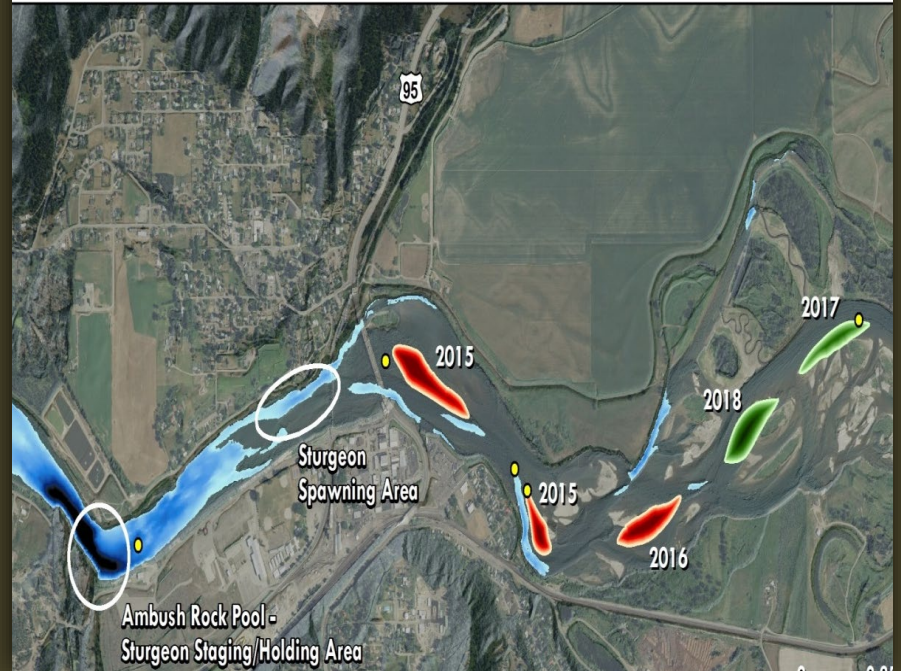
Wild Adult Population



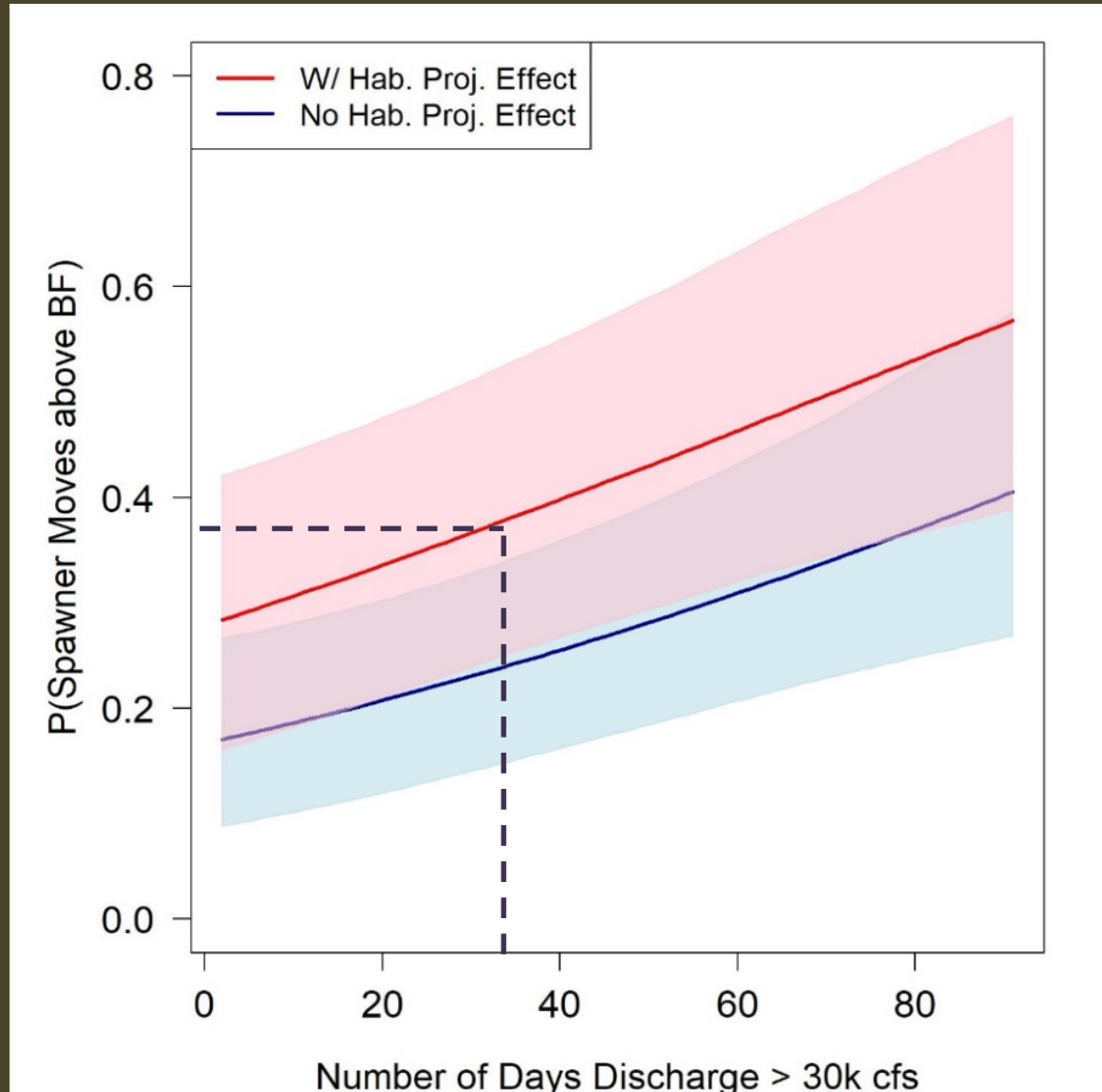
Predicting Spawning



Kootenai River
Habitat Restoration Program



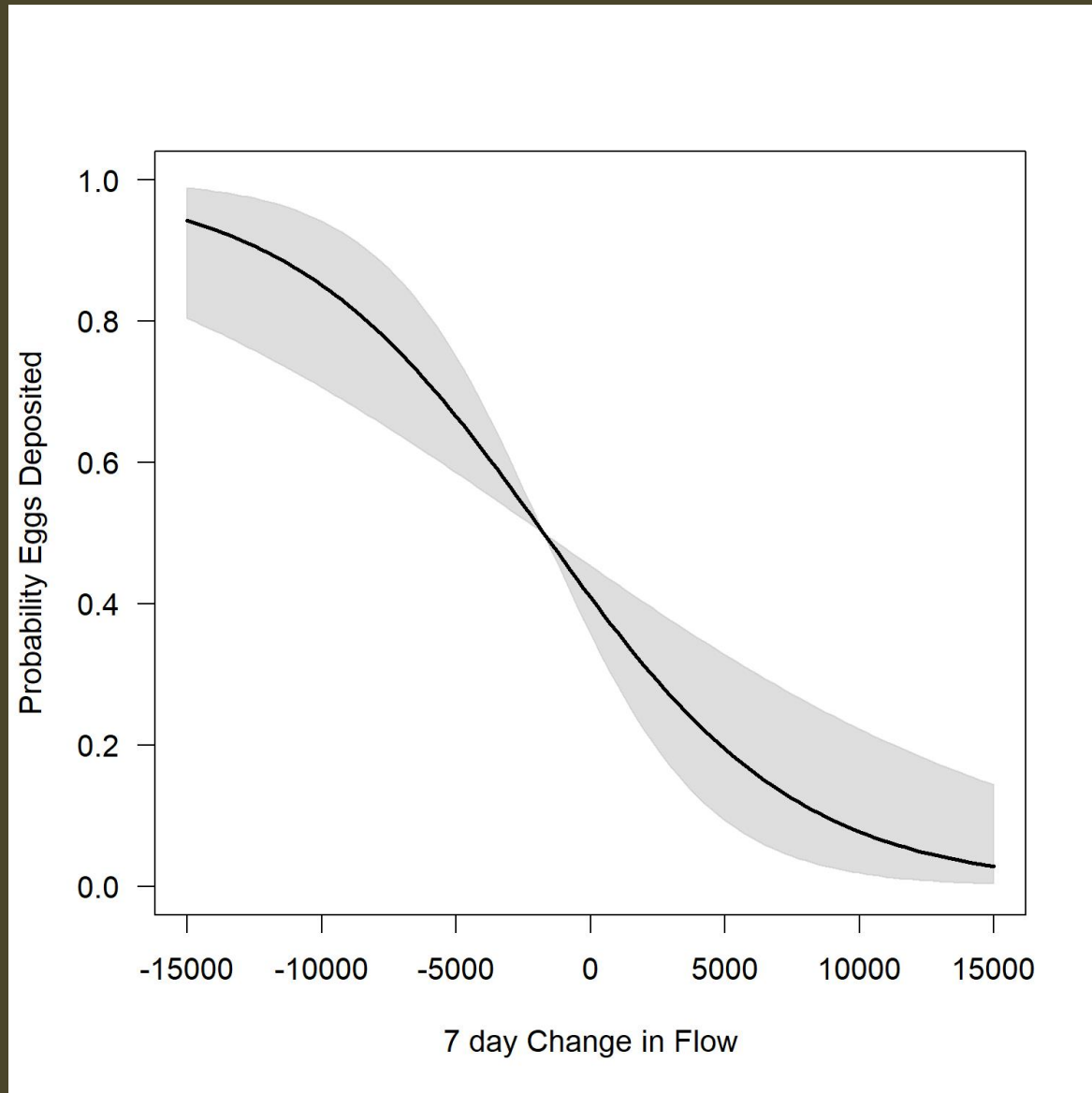
Spawning Movements



Egg Deposition



Egg Deposition







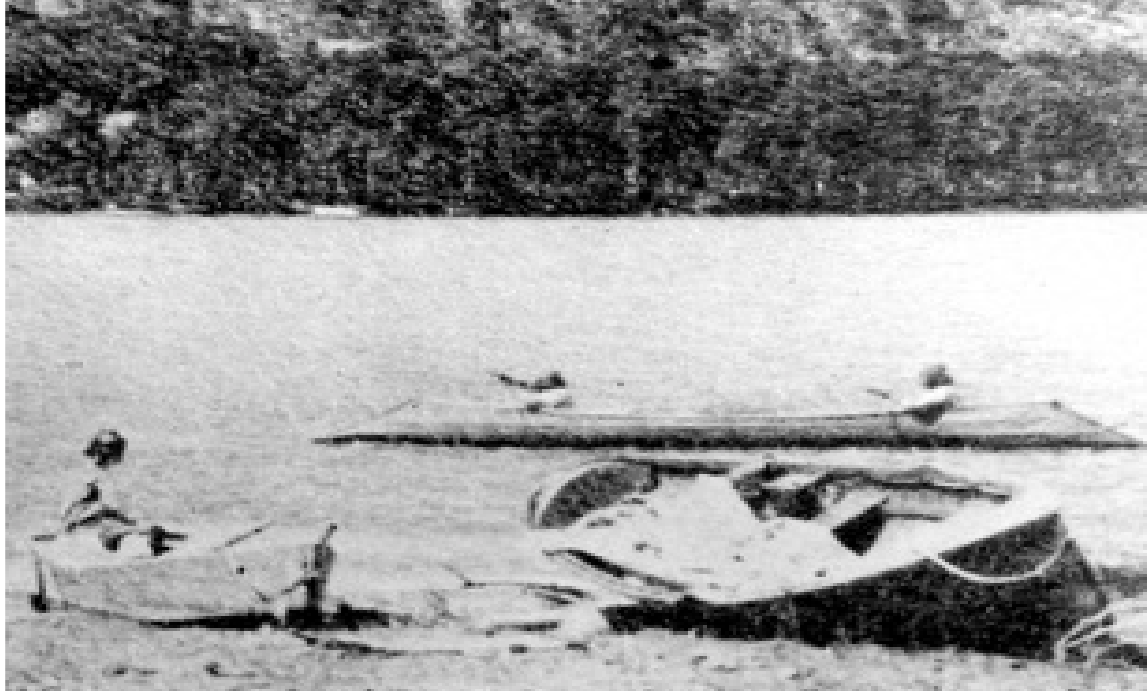
Kootenai River White Sturgeon Conservation Aquaculture Program



Kootenai Tribe of Idaho

April 10, 2019





100+ Years of Changes

Since 1890's.....

- > 100,000 acres of off-channel floodplain disconnected.
- 60,000 acres of wetlands destroyed.



45 Years: Changes + Libby Dam





31 Years!

- ✓ Project began in 1988.
- ✓ KTOI has been rearing KR White Sturgeon since 1990.







Tribal Sturgeon Hatchery

Major mechanical upgrades:

- ✓ New SCADA
- ✓ New Filtration
- ✓ New Boiler(s)
- ✓ Chiller upgrades
- ✓ HVAC upgrades
- ✓ Mechanical reconfiguration



STATUS

Hatchery-reared juvenile sturgeon released to date =
298,000 from 24 year classes

Current hatchery-reared juvenile abundance estimate =
≈ 15,000

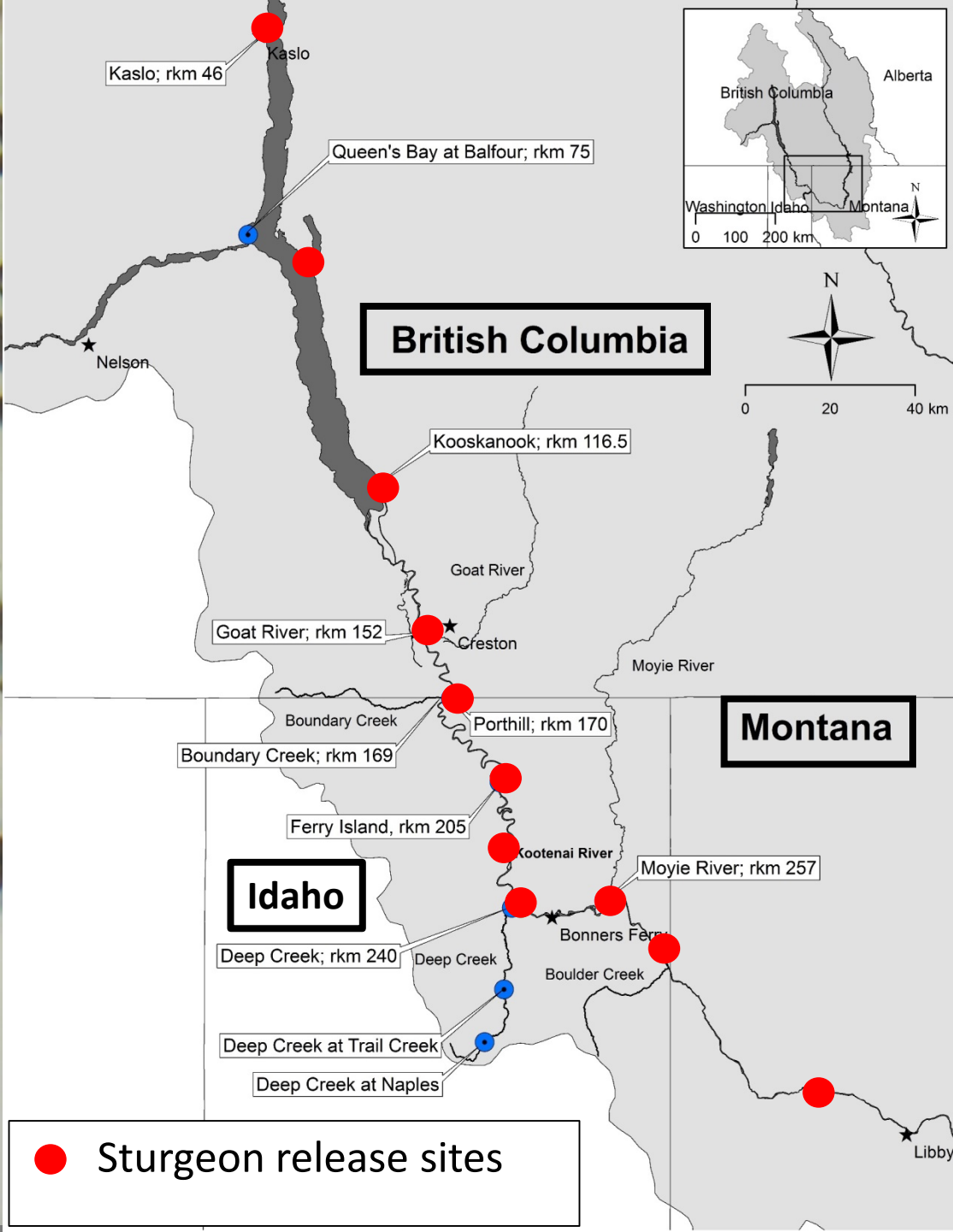
- ✓ > 400 unique families created
- ✓ ~ 56% of families created are represented in river. (Schreier et al.)



(IDFG, McDonnell et al. 2018)
(IDFG, Dinsmore et al. 2015)



BC Ministry Picture



Goals

Short-term:

- ✓ “Ward off extinction”



Goals

Short-term:

- ✓ “Ward off extinction”
- ✓ Balance aquaculture production with genetic management and ecosystem carrying capacity.



Goals

Short-term:

- ✓ “Ward off extinction”
- ✓ Balance aquaculture production with genetic management and ecosystem carrying capacity.

Long-term:

- Restore a self-sustaining sturgeon population in the Kootenai River Ecosystem.



Collaboration / Planning

Annual Coordination Meetings / Program Reviews:

- Sturgeon Aquaculture Annual Program Review
- Kootenai White Sturgeon Recovery Team



Collaboration / Planning

Annual Coordination Meetings / Program Reviews:

- Sturgeon Aquaculture Annual Program Review
- Kootenai White Sturgeon Recovery Team
- Burbot Aquaculture Annual Program Review
- International Kootenai Ecosystem Restoration Team (IKERT)
- Habitat Restoration Team Meetings
- Sturgeon Spawning Flows Technical Team



Agency Roles

SARA Listed - Endangered



ESA Listed - Endangered

Monitoring & Evaluation Results

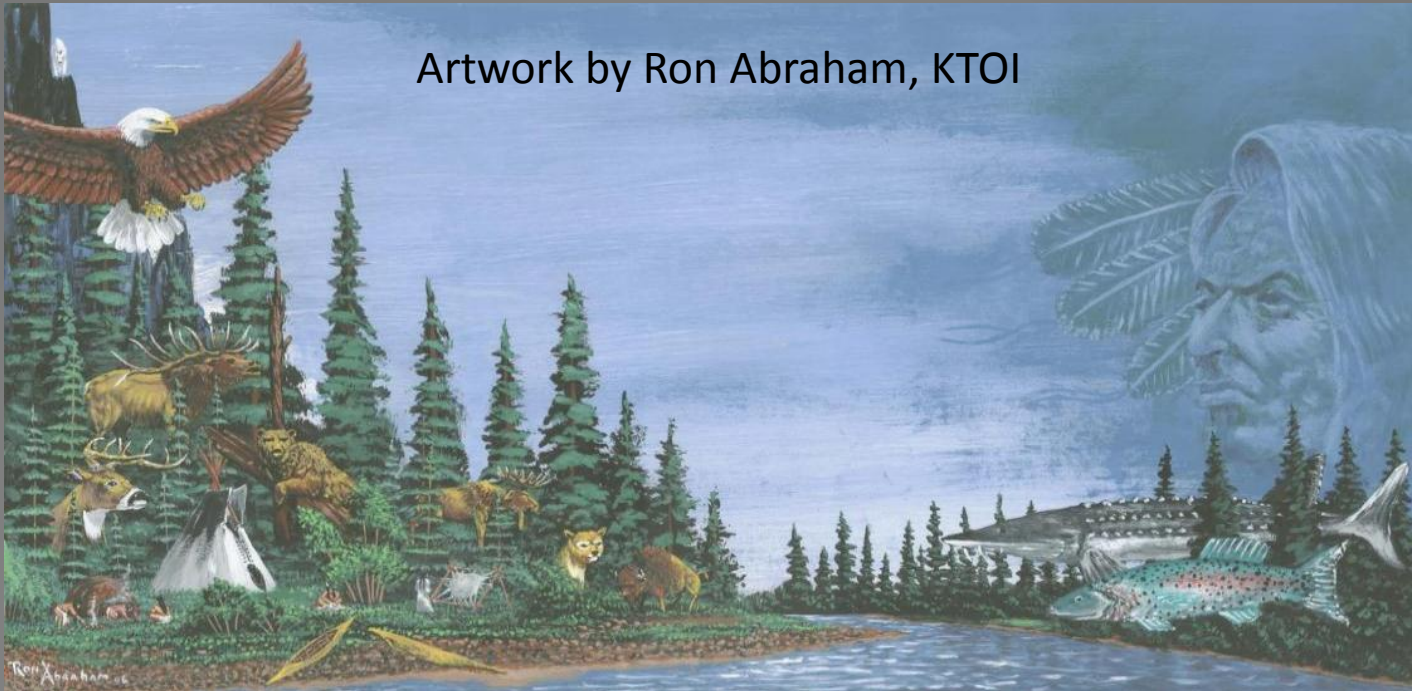
- ✓ Post-release survival
- ✓ Dispersal
- ✓ Population Abundance
- ✓ Population Structure
- ✓ Growth
- ✓ Spawning / Recruitment
- ✓ Genetics
- ✓ Ecosystem Function (Habitat)



IDFG Pictures



Artwork by Ron Abraham, KTOI



KTOI Picture

Habitat, Habitat, Habitat.....



Thank you for your support!

