Priest Rapids Fish Forum

Conference Call

Wednesday, 5 March 2025
9:00 a.m. – 11:00 a.m.

FINAL MINUTES

PRFF Members

Emily Orling, USFWS
Ralph Lampman, Keely Murdoch, YN
Nathan and Clayton Buck, Wanapum
Jason McLellan, Bret Nine, CTCR
Mike Clement, Chris Mott, Grant PUD
Tracy Hillman, Chair
Patrick Verhey, Benjamin Cox, WDFW
Melissa Peterson, Chad Brown, WDOE
Aaron Jackson, Carl Merkle, CTUIR
Steve Lewis, BIA
Pete McHugh, CRITFC

Meeting Attendees

Mike Clement, Grant PUD
Steve Lewis, BIA
Patrick Verhey, WDFW
Laura Heironimus, WDFW
Melissa Peterson, WDOE
Jason McLellan, CTCR
Paul Grutter, WSP
Todd Miller, WDFW
Aaron Jackson, CTUIR
Tracy Hillman, Chair
Ralph Lampman, YN
Emily Orling, USFWS
Tygh Schuster, YN
Joseph LeMoine, Grant PUD
Nate Patterson, YN
Pete McHugh, CRITFC
Corey Wright, LGL ESI
Chris Mott, Grant PUD
Erin Harris, Grant PUD

Action Items:

- Ralph Lampman will update the Upper Columbia Juvenile Source Lamprey Datasheet and send it to Tracy Hillman for distribution to the PRFF.
- Tracy Hillman will schedule a Pacific Lamprey Subgroup meeting in June or July to discuss the possibility of a juvenile Pacific Lamprey study in the project area.

- Ralph Lampman, with help from others, will develop a juvenile Pacific Lamprey survival strategy.

Decision Items:

- None.

I. Welcome and Introductions

Tracy Hillman welcomed everyone to the meeting and identified all attendees.

II. Agenda Review

The PRFF reviewed and approved the March agenda with no additions.

III. Approve February Meeting Notes

The PRFF reviewed and approved the 5 February 2025 meeting minutes.

IV. Review Action Items

The PRFF reviewed the following action item from the November meeting:

- Ralph Lampman will update the Upper Columbia Juvenile Source Lamprey Datasheet and send it to Tracy Hillman for distribution to the PRFF. **Ongoing. Ralph will provide an update during this meeting.**

V. White Sturgeon

Update on White Sturgeon Rearing, Tagging, and Testing – Tygh Schuster reported that fish are growing well at the hatchery. Juveniles currently average 3.59 fish per pound (126.58 grams per fish), making them larger than juveniles measured at this time during the past two years. Tygh added that there are plenty of fish available to meet the stocking target within the project area.

Nate Patterson reported that tagging would take place from 23-28 March. Mike Clement added that the plan is to release the fish into the project area on 9 and 10 April. To accommodate Nate's crew, who will be installing 20-foot tanks, the release date was moved up by one week. After discussions with Paul Grutter, it was agreed that adjusting the timeline would not cause any monitoring issues. Mike Clement invited others to assist with or observe the tagging and testing operation. Laura Heironimus indicated that she plans to be at the hatchery on 26 March to help with or observe the operation.

Draft 2024 White Sturgeon Annual Report and Presentation – Mike Clement indicated that on 29 January 2025, Evelyn Zepeda sent the 2024 Annual White Sturgeon Management Plan Report to PRFF members for a 30-day review. Comments on the draft report are due to Mike by 3 March 2025.

Paul Grutter (WSP) gave a presentation titled "2024 Grant PUD White Sturgeon M&E Program: Final Results (see Attachment 1). Paul provided a brief overview of the presentation and noted that this year they conducted both juvenile and adult index monitoring in the project area. He then gave a brief description of the project area and pointed out that each reservoir (Priest Rapids and Wanapum reservoirs) was divided into three sections (lower, middle, and upper) based on hydraulic and physical characteristics. He also provided information on river flows and temperatures during the 2024 monitoring period.

Paul stated that the 2023 brood year fish were spawned and reared at the Yakama Nation Sturgeon Hatchery. The fish were tested for spontaneous autopolyploidy, measured, and PIT-tagged and marked

on 25-28 March 2024. Testing occurred to determine whether any fish were non-8N (normal). They found five non-8N juvenile sturgeon. These fish were removed from the release group. Paul indicated that 3,227 juvenile sturgeon (all 8N) were released into the project area on 23 April 2024 (1,974 into Wanapum reservoir and 1,253 into Priest Rapids reservoir), which was consistent with the Statement of Agreement. He noted that there was a low percentage of fin deformities (24%), with the pectoral fin being the fin most likely deformed. Fish released in 2024 were on average larger than those released in 2023.

Paul noted that Grant PUD and Blue Leaf Environmental collected brood stock for the 2024 brood year downstream from McNary Dam. Collection of brood stock occurred over a 10-day period from 13-17 May and 20-24 May. The gonads of captured fish were examined to determine whether the fish could be retained as brood stock. Suitable brood stock were then transported to the Yakama Nation Sturgeon Hatchery. Although it was a low-flow year (32% below the 10-year mean of 313 kcfs), they landed 124 sturgeon of which 52 were of mature spawning size (>150 cm FL). Thus, they were able to transport six ripe females and six ripe males to the hatchery. Spawning at the hatchery began on 4 June. Sufficient gametes were obtained to produce 34 genetic families (one female produced too few eggs to produce 36 genetic families).

Paul then talked about the adult indexing work, which is conducted every three years. In 2024, WSP and Blue Leaf conducted the work from 2 August to 6 September. Indexing included two sessions of 96 overnight sets (192 total) distributed between Wanapum (n = 132 overnight sets) and Priest Rapids reservoirs (n = 60 overnight sets). Each set consisted of a 183-m-long mainline with up to 30 gangions (leaders) spaced 4.6 m apart. They used three different sizes of barbed circle hooks (12/0, 14/0, and 16/0) baited with pickled squid.

Adult indexing work in 2024 resulted in the capture of 372 fish (107 in Priest Rapids reservoir and 265 in Wanapum reservoir). Paul showed the contribution of different brood years to the total catch within each reservoir. He noted that they captured five wild sturgeon in 2024 and one captured in Priest Rapids reservoir was a large, spent male (234 cm FL), suggesting that natural spawning is occurring within the reservoir. Paul also showed the distribution of catch and CPUE (Catch Per Unit Effort) among sampling sites within each reservoir and the catch by river mile. He showed the distribution of fork lengths for each brood year within the Priest Rapids and Wanapum reservoirs and noted that in Priest Rapids reservoir, highest numbers of fish were capture just downstream from Wanapum Dam. Lastly, Paul provided population abundance estimates using the POPAN model. They estimated 3,897 adults in Priest Rapids reservoir and 4,322 in Wanapum reservoir. The estimate in Priest Rapids reservoir is higher than the estimate there in 2021, while the estimate in Wanapum reservoir in 2024 is lower than the estimate there in 2021. Paul cautioned that the robustness of the model is likely limited because of the scarcity of data.

Paul said that WSP, Blue Leaf, and Grant PUD conducted juvenile index monitoring from 9-28 September in the project area. Juvenile sampling consisted of 360 random, spatially balanced, overnight sets that were distributed between Wanapum (270 overnight sets) and Priest Rapids (90 overnight sets) reservoirs. A 122-m-long groundline with 30 gangions per line was used to capture juvenile sturgeon. Two different sized circle hooks (4/0 and 12/0) spaced roughly 4 m apart were baited with pickled squid. Lines were set overnight and retrieved the following day. Paul noted that from 2016-2022, sampling gear included 40 gangions per line and 2/0 and 4/0 hooks. Sampling gear used in 2023 to present includes 30 gangions per line and 4/0 and 12/0 hooks. The change in juvenile sampling gear was approved by the PRFF in 2023.

Juvenile indexing resulted in the capture of 586 juvenile sturgeon (179 in Priest Rapids reservoir and 407 in Wanapum reservoir), which was lower than captures in 2023 (778 juveniles total). Paul also showed

the distribution of catch and CPUE among sampling sites within each reservoir and the catch by river mile and reservoir section. The results showed a significant decrease in catch rates in Wanapum reservoir, particularly in the upper section, which may be attributed to low-flow conditions. Catch rates in Priest Rapids remained stable. Paul then showed the distribution of fork lengths for each brood year within the Priest Rapids and Wanapum reservoirs. He briefly described the performance of the juvenile gear and noted that they potentially lost 129 fish based on bent 4/0 hooks. He recommended that the PRFF consider using only 12/0 gangions in the future. Paul said they replaced the Cormack-Jolly-Seber (CJS) model with a multi-state model to estimate juvenile sturgeon population sizes within the two reservoirs. The multi-state model, which accounts for entrained fish unlike the CJS model, estimated 4,215 (3,528-5,109) juveniles in Priest Rapids reservoir and 7,110 (6,308-8,059) in Wanapum reservoir in 2024. Finally, Paul discussed the growth of juvenile sturgeon in the project area. Based on growth modeling, he noted that Priest Rapids has likely reached its carrying capacity (i.e., there is evidence of density-dependent growth), while growth in Wanapum reservoir is beginning to show signs of density dependence. Growth appears to be the highest in the lower section of each reservoir where densities are generally lowest. Relative weights of sturgeon in 2024 were lower than in previous years, possibly due to high water temperatures or other environmental factors.

Paul concluded by noting that while 2024 was a low-flow year, the data collected provide valuable insights into Sturgeon population trends, habitat use, and survival rates. The program successfully released the target number of juveniles into the project area and was able to collect broodstock for a 6x6 spawning matrix resulting in 34 genetic families. Adult indexing showed length-frequency/gear selectivity differences, lower catch rates in Priest Rapids reservoir, and that the POPAN model is sensitive to changes. They also captured fewer fish in the upper section of Wanapum reservoir in 2024, unlike in past years. They replaced the CJS model with the multi-state model because the latter accounts for entrained fish from Wanapum reservoir in the Priest Rapids reservoir estimate. Because of gear selectivity and gear loss, it may be wise for the PRFF to consider using only 12/0 hooks. Size-at-age data indicate density-dependent growth in Priest Rapids reservoir. Relative weight and growth data suggest some evidence of density-dependent growth in age 1-4 sturgeon in both reservoirs, but mostly within Priest Rapids reservoir. Paul said the multi-state modeling approach will continue to be refined in future studies.

Steve Lewis asked about wild adult spawning, specifically whether it occurs in different areas or remains linked to traditional spawning locations. He inquired whether the assessment confirmed spawning in Wanapum reservoir. Paul confirmed that spawning is occurring in Wanapum reservoir and that they intend to deploy D-rings in the reservoir to capture larval sturgeon. This will help to further identify spawning locations.

Ralph Lampman asked how they distinguish spent males from unripe males. Corey Wright explained that the key factor is the time of year when the fish are caught, as sturgeon typically spawn in the spring and are later captured in August. A standardized reference is used to describe their spawning status. Ralph also quested whether males always spawn successfully or if some go through the process without actually spawning. Cory responded that wild juveniles are frequently captured, indicating successful spawning and recruitment.

Ralph asked about the difference between 4/0 and 12/0 hooks. Corey noted that hook size plays a significate role in the size of fish caught; although, there is some overlap in the sizes of fish captured by the different hooks. However, there is no standardized definition for the appropriate hook size among manufacturers.

Ralph inquired whether low-flow conditions impact capture rates. Corey explained that flow reductions can affect the ability to catch sturgeon. Telemetry data indicate that many sturgeon reside near Rock

Island Dam. Under low flow conditions, fishing efforts can extend farther upstream to Rock Island Dam, but during high flow years, it becomes difficult to set lines in certain areas. Corey noted that a significant portion of sturgeon hold near Rock Island Dam and that catchability is likely influenced by the dams flow patterns there.

The PRFF thanked Paul Grutter for his presentation and commended him for compiling the reports.

Other White Sturgeon Items – Laura Heironimus raised a concern about PIT-tag placement in sturgeon. She noted that she received a call from an angry angler who found a tag inside a filet from a sturgeon harvested in John Day Reservoir. The fish was likely from surplus stocking in 2016, or it migrated downstream from the project area. In the lower Columbia River, PIT tags are placed in the head or under the head plate avoiding these issues. The angler reported that the tag was in the middle of the body, where filets are taken.

Jason McLellan noted that PIT-tagged fish have been stocked for over 20 years in the upper Columbia, and outreach has been a regular part of public education. Outreach includes press releases reminding anglers to check their filets for tags. Laura suggested adding signage at boat ramps to better inform anglers. She said she will work with Jason McLellan and Bill Baker to explore outreach options and improvements.

Paul recalled that PIT tagging used to be done closer to the head but was changed due to higher mortality rates. Ralph Lampman asked whether tagging under the head plate is feasible for smaller fish. Jason mentioned the use of food-grade PIT tags as a potential alternative but noted concerns about the longevity of the tags, especially in long-lived species like sturgeon. It was pointed out that inserting tags into cavities is ineffective for sturgeon because of low detection rates. Members present agreed to continue outreach and to evaluate potential changes to PIT-tag placement in the fish. They will also consider the use of food-grade PIT tags as future fisheries management decisions evolve.

VI. Pacific Lamprey

Draft 2024 Pacific Lamprey Annual Report – Mike Clement provided an update on the 2024 Pacific lamprey annual report, noting that comments and edits from Ralph Lampman and Steve Lewis had been incorporated into the final draft. The report was submitted to Ecology on 25 February, and it will be filed with the Federal Energy Regulatory Commission (FERC) after review and approval by Ecology. Ralph Lampman asked whether there were any comments that were not incorporated in the final report. Mike clarified that all comments were reviewed and addressed and responses to all comments were included in a response table in the appendix. He added that once Ecology completes its review, the final report will be shared with stakeholders.

Update on Feasibility of a Juvenile Lamprey Survival Study – Ralph Lampman revisited the juvenile lamprey survival study discussion, emphasizing the need to develop a study plan that aligns with the Pacific Lamprey Management Plan objectives for the Priest Rapids project area. After reviewing the objectives in the management plan, Ralph suggested that Grant PUD develop a formal study plan to evaluate juvenile lamprey impacts and passage effectiveness. He said previous discussions stalled because of questions regarding the scale of the study (e.g., reservoir and concrete or just concrete), fish source, level of precision in the survival estimates, and which model to use to estimate survival. Ralph asked Tracy Hillman how the group should move this forward.

Tracy responded that there are a couple of approaches. First, the Fish Forum could complete the strategy document, which Ralph and RD Nelle were going to develop, but, unfortunately, RD retired, and the strategy has not been completed. The strategy was intended to describe how a juvenile lamprey survival study would be conducted. The second approach would be to develop a formal juvenile lamprey

survival study plan. This would be a plan that addresses all the concerns that the PRFF has discussed over the past few years. However, because the four issues identified by Ralph have not been resolved, the Forum may want to focus on the strategy, which would identify various options for each of the four remaining issues. Tracy added that this may be something that you want the Pacific Lamprey Workgroup to address. The Workgroup could discuss the four issues and identify recommendations for the PRFF to consider.

After discussion, the group agreed to proceed with the development of a strategy document, using a study plan that Ralph developed for a survival study at Rock Island Dam as a starting point. Tracy will identify a meeting date in June or July for the Workgroup meeting. The Workgroup, which will include the ASWG, RRFF, and scientists from PNNL, will try to resolve outstanding issues including scale of the study, fish source, level of precision in the survival estimates, and which model to use to estimate survival.

Ralph said he will turn his Rock Island study plan into a strategy document by April or May 2025. Tracy will schedule a Workgroup meeting in June or July to refine study details. Stakeholder engagement will continue with the Bureau of Reclamation. Both WDFW and BIA indicated that they will offer support in developing the strategy.

VII. Administration

No new administration business was discussed.

VIII. Adjourn

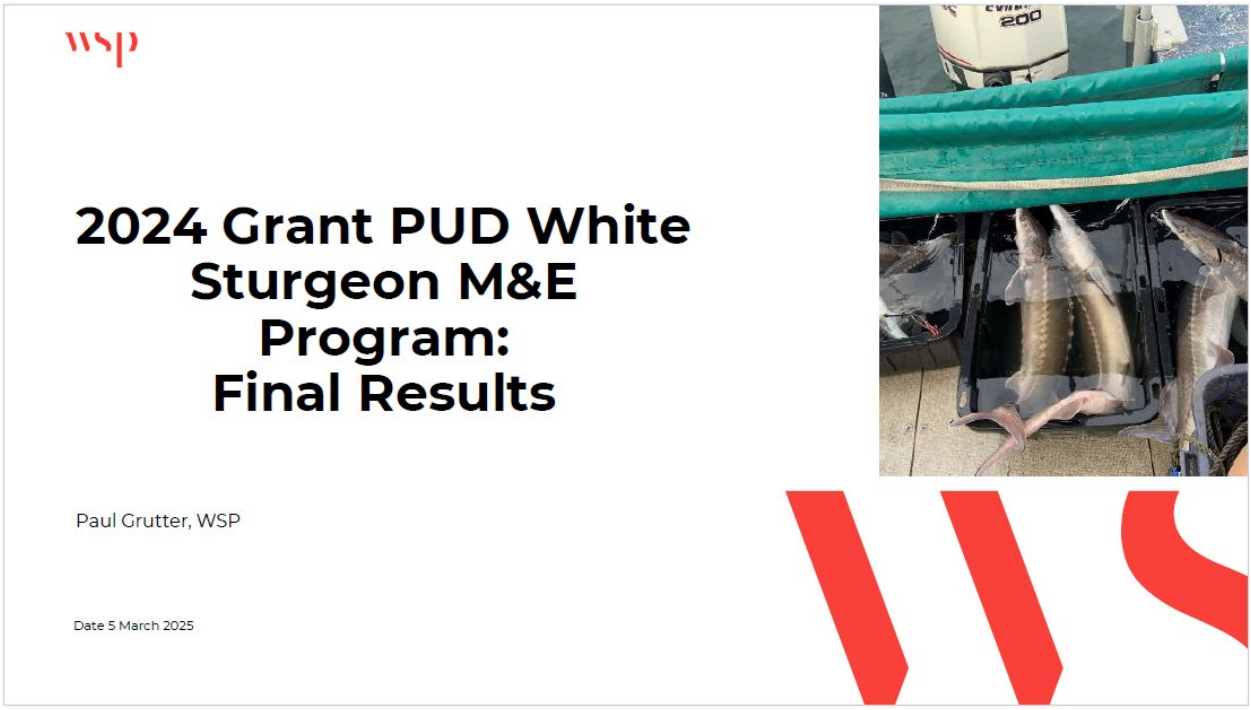
With no additional business to discuss, Tracy Hillman adjourned the meeting at 11:00 am.

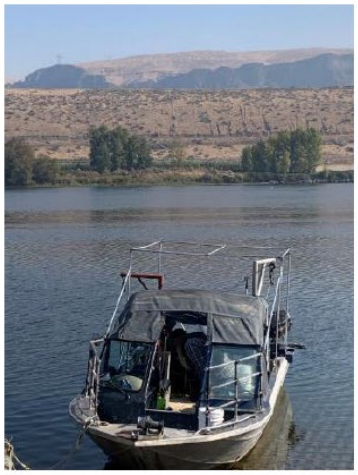
IX. Next Meeting

The next meeting of the PRFF will be on 2 April 2025.

Attachment 1

Presentation by Paul Grutter on the 2024 Grant PUD White Sturgeon M&E Program





Agenda

2024 Grant PUD White Sturgeon M&E Summary

2023BY Tagging and Release

Broodstock Capture

Adult White Sturgeon Indexing

Juvenile White Sturgeon Indexing

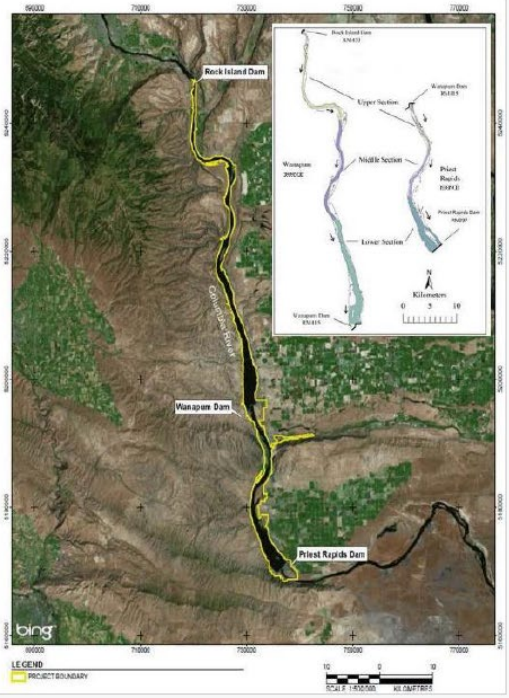
Priest Rapid Project Area

Priest Rapids Dam (Grant PUD; River Mile [RM] 397)

Wanapum Dam (Grant PUD; RM 416)

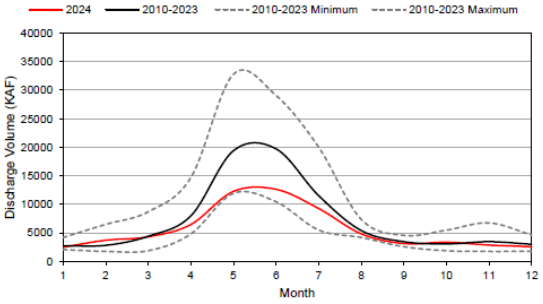
Rock Island Dam (Chelan PUD; RM 453.5)

Each reservoir divided into lower, middle, and upper sections based on hydraulic and physical transitions from riverine to lentic dominant habitats

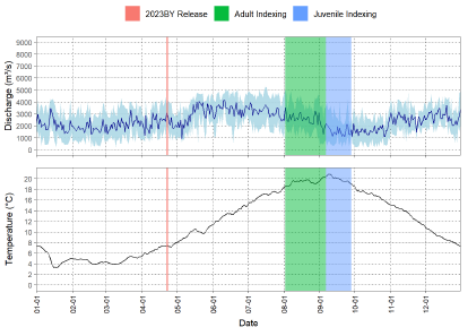


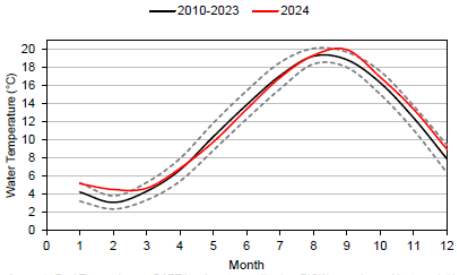
Discharge and Temperature

2024



NOAA. 2024. https://www.nwrfc.noaa.gov/water_supply/ws_normals.cgi?id=RISW1





DART. 2024. Columbia River Data Access in Real Time webpage. DART hourly water quality data RIGW www.cbr.washington.edu/dart/river.html

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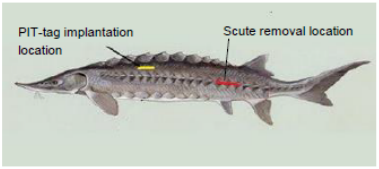
2023BY Tagging and Release, 2024



	2024 White Sturgeon 2023BY Release		
Release Location Reservoir (River Mile)	No. of Fish	Mean FL mm	Mean Weight g
Wanapum (420.6)[1]	1,974	283	143
Priest Rapids (400.3)[2]	1,253	280	137
Total	3,227	282	141

[1] Vantage boat launch [2] Desert Aire boat launch

- 2023BY held at YNSH were tested for spontaneous autopolyploidy (SA), measured, PIT-tagged and marked from March 25 to March 28 (fast!)
- SA testing conducted prior to tagging with a Coulter counter to identify 10N or 12N vs 8N (normal) fish
- 5 fish identified with SA
  - Female 1. 3D9.1C2D6BB1E = 1
  - Female 2. 3D9.1BF2646DE2 = 2
  - Female 3. 3D9.1C2DC94B7A = 2
- 3,227 2023BY released 23 April 2024
- Low prevalence of fin deformities
  24% of the fish processed (n = 773 of the 3,227 fish tagged)
- pectoral fin deformity most common

Summary by brood year of hatchery White Sturgeon juveniles released in the Project area 2024

Year Cross	Number Released	Mean Fork Length (mm)	StDev Fork Length (mm)	Mean Weight (g)	StDev Weight (g)
2010	9,116	294	52	177	99
2012	3,981	291	26	154	44
2013	6,592	275	43	130	63
2014	6,502	313	30	198	56
2015	3,258	303	27	171	46
2016	3,248	272	31	126	45
2017	3,224	285	42	144	58
2018	2,657	267	29	128	43
2019a&b	2,157	443	79	631	323
2021	3,269	289	41	154	62
2022	3,243	257	41	114	54
2023	**3,227**	**281**	**31**	**140**	**44**
	50,474	**305**	**38**	**208**	**76**

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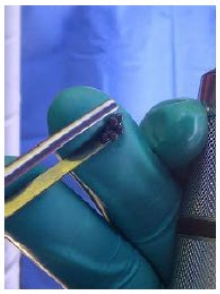
Broodstock Capture

2024 Capture Effort

- Broodstock capture efforts were conducted over ten days from May 13 to 17 and from May 20 to 24
- Angling conducted immediately downstream of McNary Dam
- Involved Grant PUD and Blue Leaf Environment with fishing guide support
- Candidate broodstock identified by surgical inspection of gonads
- Transported to YNSH with the Grant PUD sturgeon transport trailer



GOLDER

Broodstock Capture Results 2024

- Low flow year
  - 32% below the 10 year mean of 313 kcfs
- 124 sturgeon were landed
- 52 individual white sturgeon of mature spawning size (i.e., greater than 150 cm fork length
- 6 ripe females and 6 ripe males were transported to YNSH
- On June 4, a 6x6 spawning matrix was attempted
- Sufficient gametes were obtained to produced 34 genetic families (fewer eggs from 1 female 1Fx4M)

Adult Indexing Study Design

2024

Conducted by WSP and Blue Leaf biologists

Adult white sturgeon population indexing capture and recapture sessions were conducted from August 2 to September 6)

Two sessions of 96 overnight (192 total) sets distributed between Wanapum (n=132 overnight sets) and Priest Rapids reservoirs (n=60 overnight sets)

183 m (600 ft) long nylon mainline, 0.64 cm (3/8") in diameter, anchored at both ends with 16 kg (35 lbs) metal anchors attached to float retrieval lines.

Up to 30 leaders (gangions) were attached to the ground line at 4.6 m (15 ft) intervals.

Three sizes of barbed circle hooks [i.e., small hooks #7 (12/0), medium size hooks #5 (14/0), and large hooks #3 (16/0)]

pulled approximately every 24 hours during sampling.

All gangions were baited with pickled squid.

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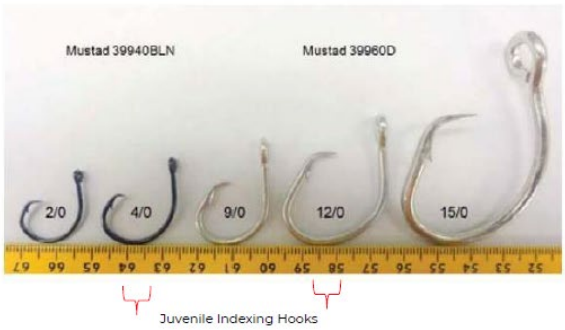
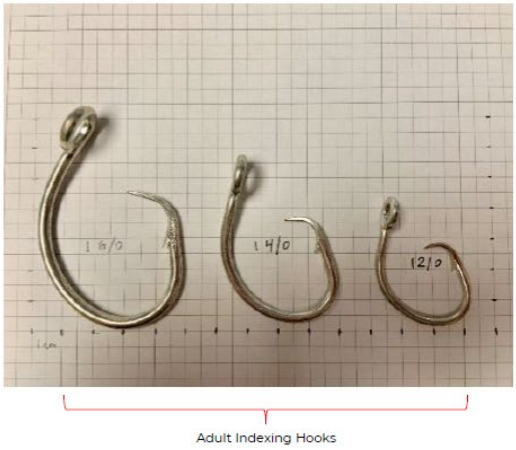
Comparison of Juvenile and Adult White Sturgeon Gear





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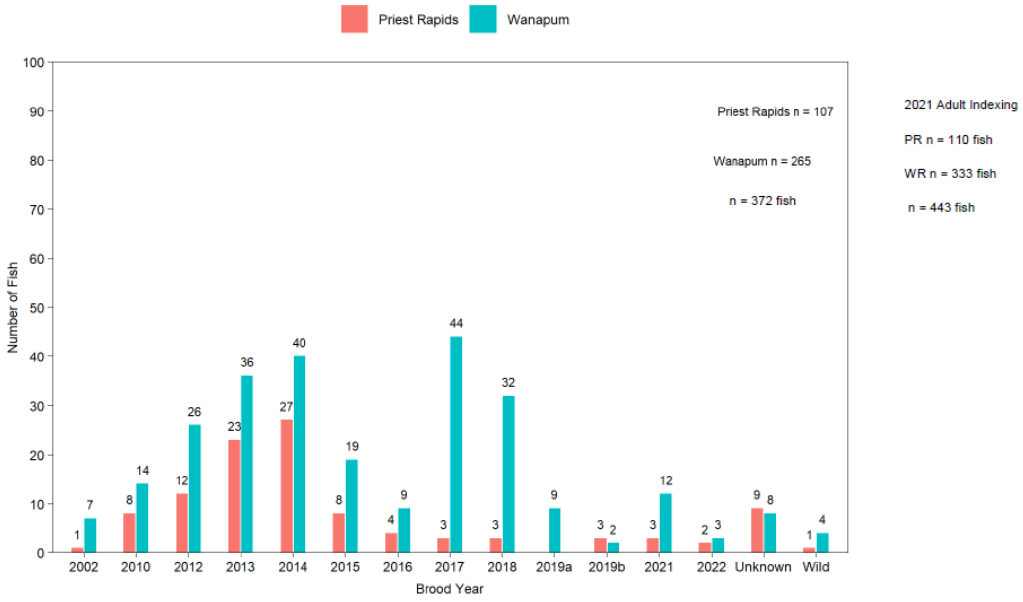
2024 Adult Indexing



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2024 Adult Indexing 2002BY and Wild fish

Adult Indexing Study Year	2002BY All Catch FL (cm)				
	n	mean	SD	min	max
2010	469	103.2	14.9	58.0	132.5
2012[a]	278	114.7	15.6	62.5	144.0
2015	389	137.1	15.7	57.5	170.0
2018	21	134.0	28.3	81.5	178.7
2021	20	155.1	16.4	116.5	184.0
2024	8	151.7	29.7	93.0	195.5

Adult Indexing Study Year	Wild All Catch FL (cm)				
	n	mean	SD	min	max
2010	58	169.6	31.3	116.0	241.0
2012[a]	33	187.8	42.0	60.5	258.0
2015	57	195.3	40.3	65.5	256.0
2018	9	195.9	57.9	57.5	259.0
2021	8	186.1	46.1	98.0	252.0
2024	5	203.5	49.0	119.5	241.0

- Spent male in PR
- Evidence of spawning

Adult Origin	Capture Reservoir	Reproductive Status	n	Fork Length (cm)	Weight (kg)	Ws (kg)	RW(%)
H-123LAD Unknown	Wanapum	F1	1	169.0	36.05	43.4	0.83
Wild	Wanapum	M2	1	218.0	90.00	98.8	0.91
Wild	Priest Rapids	M3	1	234.0	89.79	124.2	0.72

Ws = 2.735 E-6 * FL3.232 (Beamesderfer 1993)

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2024 Adult Indexing: Entrained Fish in Priest Rapids

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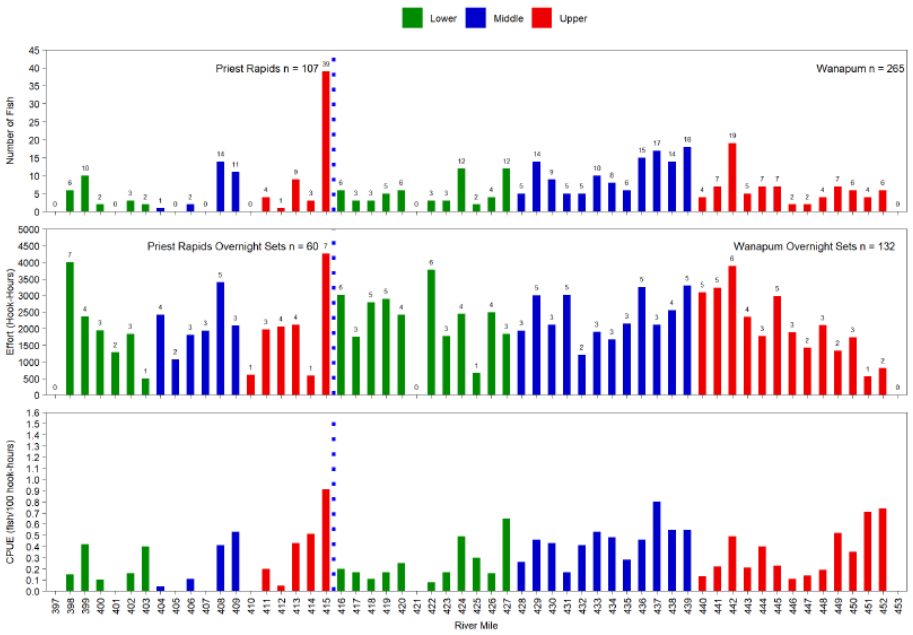
2024 Adult Indexing



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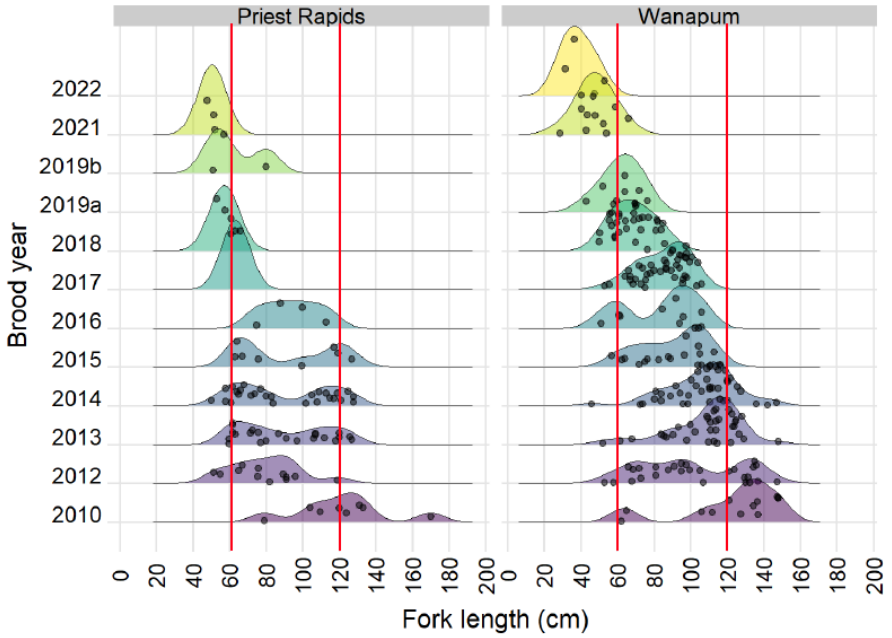
2024 Adult Indexing



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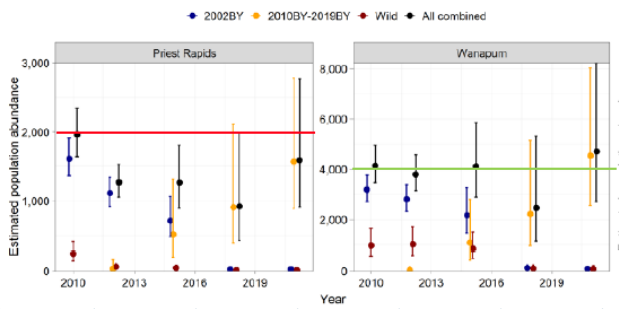
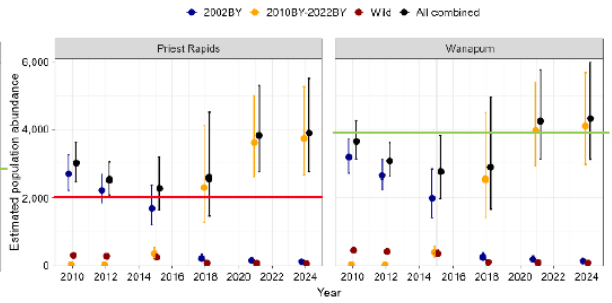
Adult Indexing Population Estimates





Reservoir	Year	2002BY Hatchery	2010BY-2019BY hatchery	Wild	Total
Priest Rapids	2021	22 (10-47)	1,571 (887–2,782)	12 (4-31)	1,591 (912-2,773)
Wanapum	2021	86 (40-187)	4,533 (2,560-8,027)	82 (31-218)	4,714 (2,704-8,219)

Reservoir	Year	2002BY Hatchery	2010BY-2022BY hatchery	Wild	Total
Priest Rapids	2024	116 (72-188)	3,727 (2,636-5,271)	54 (30-94)	3,897 (2,757-5,507)
Wanapum	2024	137 (84-224)	4,106 (2,966-5,683)	79 (44-140)	4,322 (3,120-5,986)

- The robustness of the adult population models is likely limited due to the scarcity of data
- Wild fish in Priest Rapids, where only 23 individual fish were captured and none were recaptured
- 2010BY-2022BY fish in Priest Rapids, where only 11 individuals were captured more than once throughout the program.
- POPAN model sensitive to changes in the specification of model components (i.e., the modeling of survival, recapture, and probability of entry).

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Juvenile Indexing Study Design

2016-2023 40 gangions/line 2/0 & 4/0 2023 – onward 30 gangions/line 4/0 & 12/0

Conducted by WSP and LGL biologists/Grant PUD biologist

Juvenile white sturgeon population indexing 9 September to 28 September

360 random, spatially balanced overnight sets distributed between Wanapum (n=270 overnight sets;) and Priest Rapids reservoirs (n=90 overnight sets)

122 m (400 ft.) 0.25 cm (¼") diameter ground line

30 gangions per line

0.5 m (20") in length and consisted of a swivel snap,

4/0 a 30 cm (12") length of 150# test monofilament

12/0 30 cm (12") 660 # test round braid or three-strand nylon

4/0 or 12/0 sized circle hooks, space ~4m apart, size or random

Set overnight and retrieved following day

All gangions were baited with pickled squid

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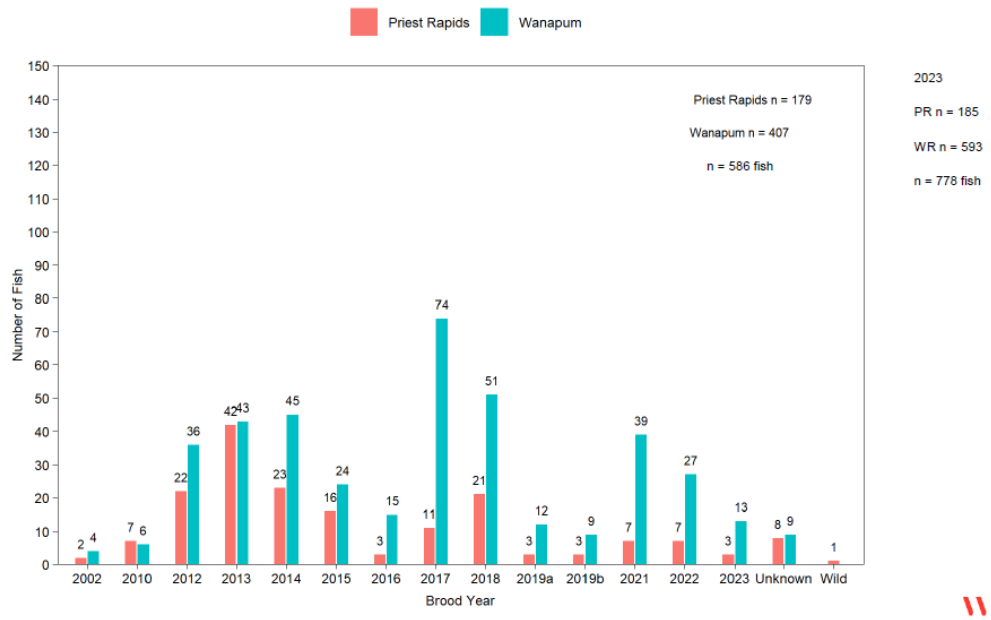
2024 Juvenile Indexing



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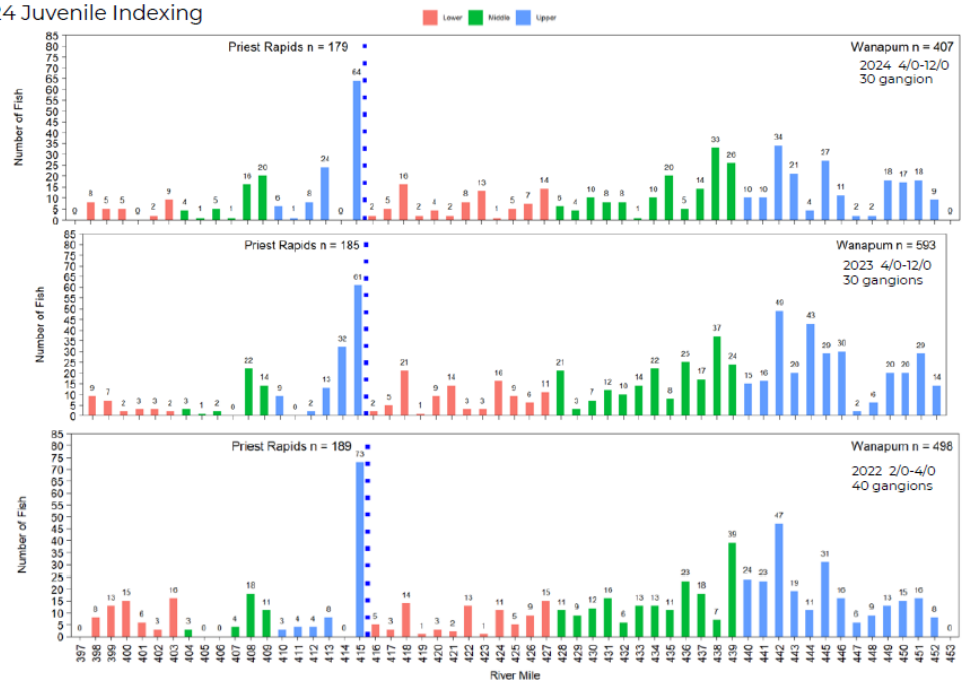
2022 - 2024 Juvenile Indexing



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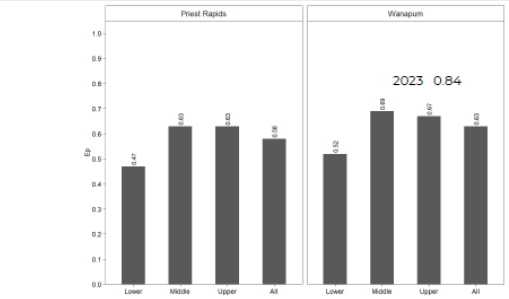
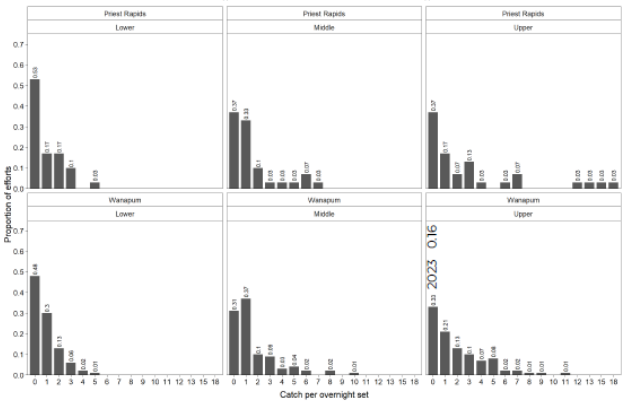
Juvenile Indexing 2024

Sample Effort					
Reservoir	Reservoir Section	(hook-hours)	Total	Wild & Hatchery CPUE (Fish/100 hook-hours)	2023
Wanapum	Lower	57,628	79	0.14	0.17
	Middle	59,308	145	0.24	0.34
	Upper	58,965	183	0.31	0.49
	All	175,901	407	**0.23**	**0.34**
Priest Rapids	Lower	18,148	29	0.16	0.14
	Middle	19,122	47	0.25	0.22
	Upper	18,840	103	0.55	0.60
	All	56,110	179	**0.32**	**0.32**
PRPA	Total	232,011	586	0.25	0.33





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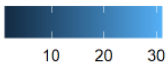
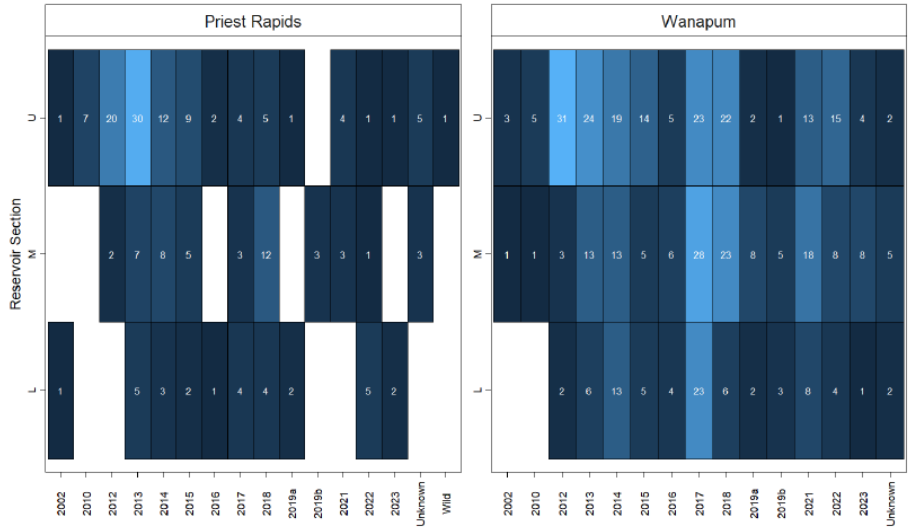
wsp

Juvenile Indexing 2024





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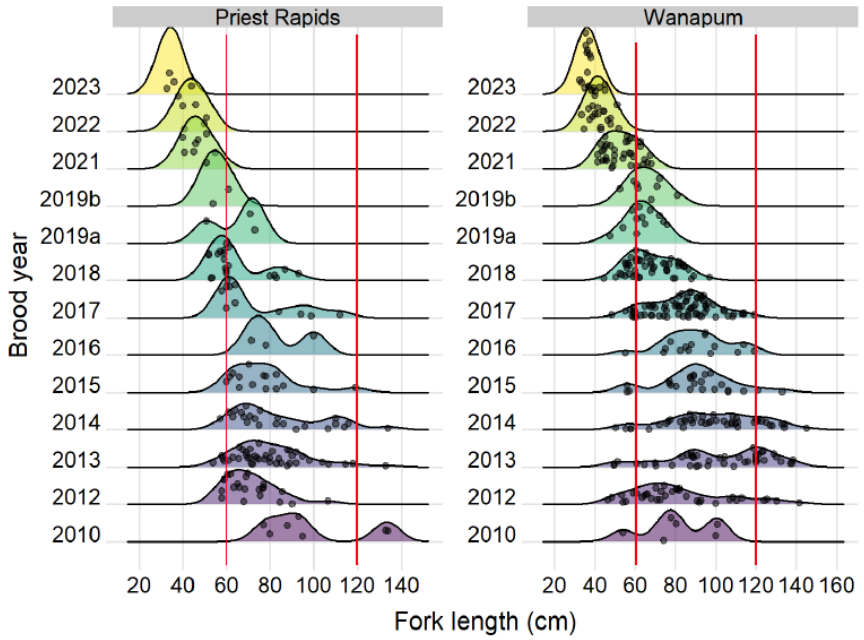

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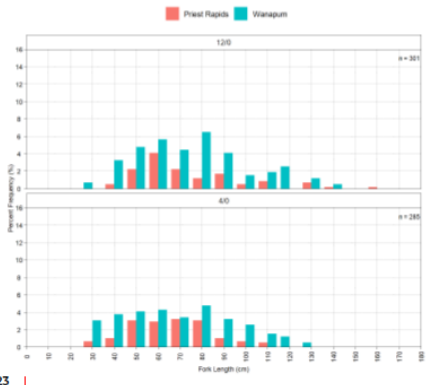
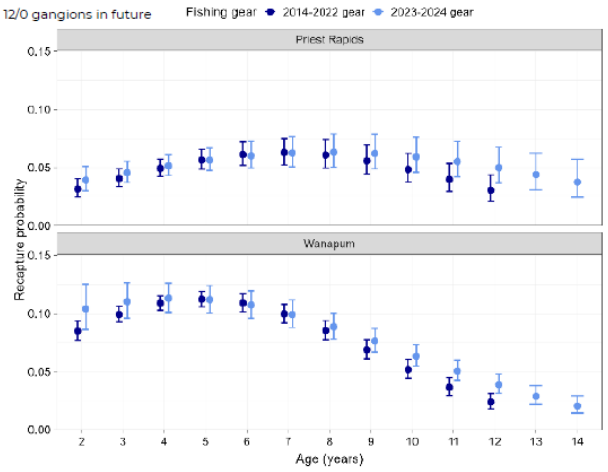
2024 Juvenile Indexing Gear Performance

Reservoir	Hook Size	Hook Fate: Bent n	Lost n	Total n
Priest Rapids	4/0	33	0	33
	12/0	1	0	1
Priest Rapids Total		34	0	34
Wanapum	4/0	95	1	96
	12/0	5	1	6
Wanapum Total		100	2	102
PRPA		134	2	136

Bent 4/0 = potentially lost 129 fish

Consider all 12/0 gangions in future studies





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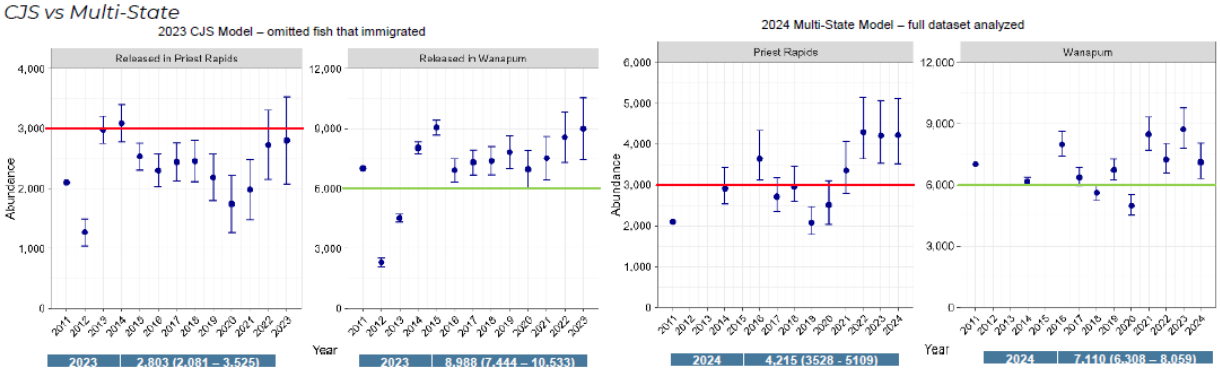
2023 vs 2024 Juvenile Population Estimates

CJS vs Multi-State



2023	2,803 (2,081 – 3,525)	2023	8,988 (7,444 – 10,533)	2024	4,215 (3528 - 5109)	2024	7,110 (6,308 – 8,059)

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Abundance by Brood Year

Pool	BY	Abundance Estimate (95% CI)	Annual Hatchery Release Number	Cumulative Release Number
Wanapum	2010	295 (128 - 678)	7,015	7,015
	2012	926 (632 – 1,358)	2,264	9,279
	2013	850 (608 – 1,189)	5,092	14,371
	2014	710 (518 - 974)	5,007	19,378
	2015	301 (200 - 454)	2,005	21,383
	2016	158 (95 - 262)	1,999	23,382
	2017	736 (575 - 942)	1,983	25,365
	2018	466 (352 - 619)	1,767	27,132
	2019a	107 (63 - 183)	411	27,543
	2019b	Not estimated	936	28,489
	2021	335 (241 - 467)	2,010	30,489
	2022	250 (167 - 374)	1,996	32,485
	2023	1,974	1,974	34,459
Priest Rapids	2010	187 (83 - 419)	2,101	2,101
	2012	441 (267 - 728)	1,717	3,818
	2013	761 (512 – 1,133)	1,500	5,319
	2014	388 (244 - 617)	1,495	6,814
	2015	242 (142 - 413)	1,253	8,067
	2016	48 (17 - 135)	1,249	9,316
	2017	176 (97 - 319)	1,241	10,566
	2018	333 (210 - 526)	890	11,446
	2019a	53 (19 - 150)	261	11,707
	2019b	Not estimated	549	12,256
	2021	154 (75 - 319)	1,259	13,515
	2022	179 (85 - 378)	1,247	14,762
	2023	1,253	1,253	16,015

2024 Multi State Model – full dataset analyzed

Estimates of older brood years more variable due to low catch number with juvenile gear, sensitive to recaptures

2023 CJS Model – omitted fish that immigrated

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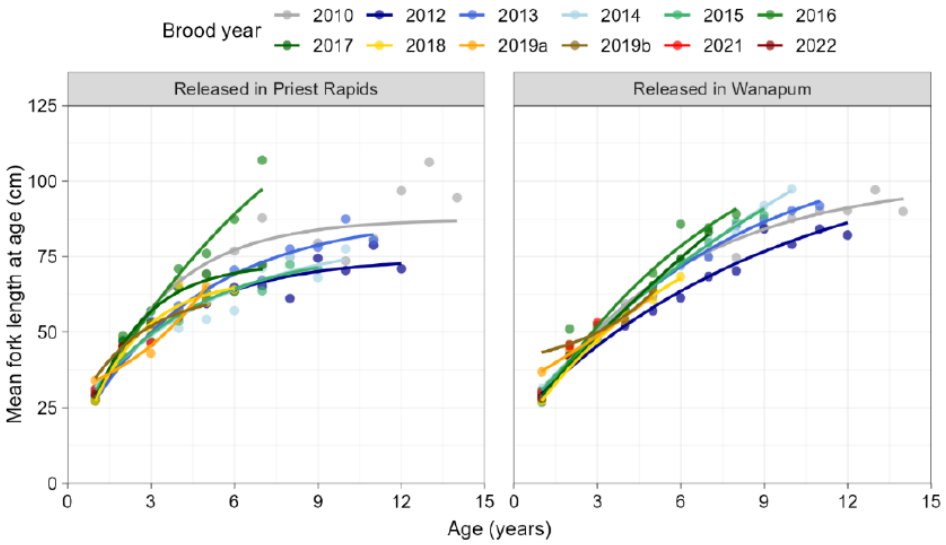
Growth



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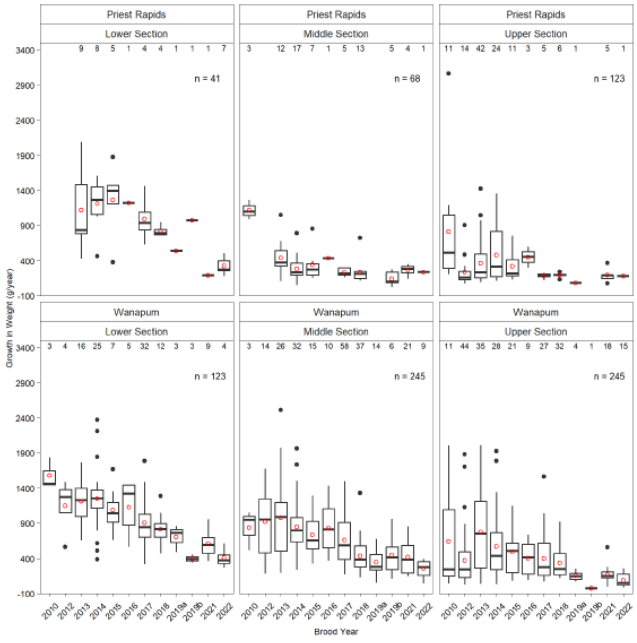
Growth by Reservoir Section :Weight

Higher growth in lower section of each reservoir.

Consistent with findings in Chelan and UC

Energetics, but also competition



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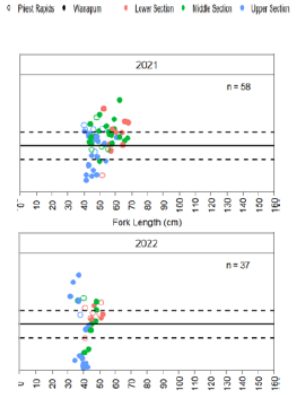
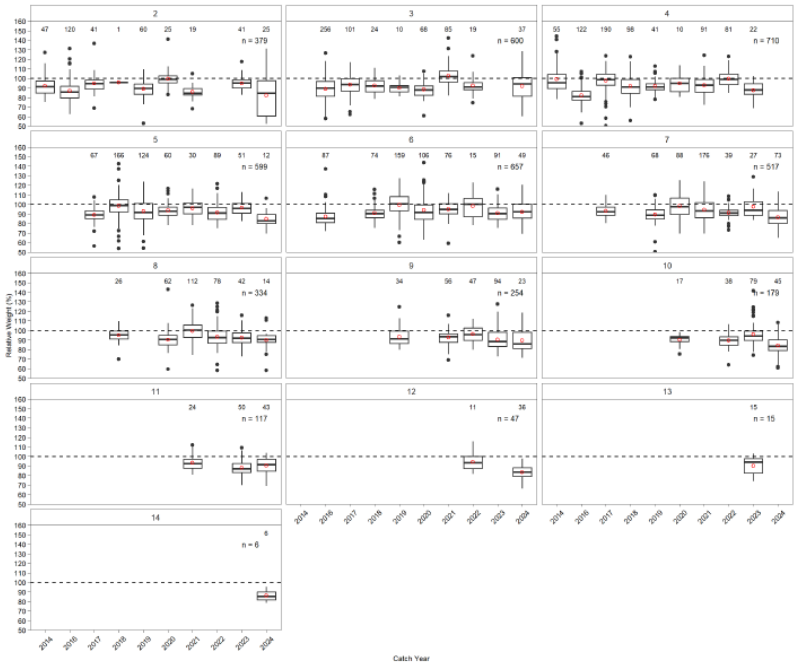
Growth Relative Weight: Wanapum





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Absolute Growth

density-dependent reduction in growth may be occurring for fish aged 1–4

much of this trend was due to the 2019bBY results

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Summary

- *2023BY release successful; low fin deformity;*
  - Good size
- *2024 Brood stock 2024BY*
  - 6x6 spawning matrix; 34 genetic families
- *2024 Adult Indexing and Population Modeling*
  - Length-Freq/Gear selectivity differences
  - POPAN model sensitive to changes
  - Low catch in PR, higher pop est in 2024 compared to 2021
- *2024 Adult and Juvenile Population Modeling*
  - Lower catch in Wanapum upper reservoir section in 2024
  - Multi-State model replaces CJS model population; now includes entrained WR fish in PR estimates
  - Gear selectivity and gear loss, may consider using 12/0 only
- *Growth Modeling*
  - Size at age data (von Bertalanffy) indicate plateauing growth in PR.
  - Relative Wt and Growth data suggest some evidence of density dependent growth in age 1-4 fish in both reservoirs, more so in PR

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