



**Priest Rapids Fish Forum
 Meeting**

**Wednesday, 4 March 2020
 9:00 a.m. – 12:00 p.m.**

MEETING MINUTES

PRFF REPRESENTATIVES

Steve Lewis, USFWS
 Ralph Lampman, YN
 Pat Wyena, Wanapum
 Kirk Truscott, Jason McLellan, CCT
 Mike Clement, Chris Mott, Grant PUD
 Tracy Hillman, Facilitator

Patrick Verhey, Laura Heironimus, WDFW
 Breean Zimmerman, WDOE
 Aaron Jackson, Carl Merkle, CTUIR
 Keith Hatch, BIA
 Tom Skiles, CRITFC/CTUIR
 Erin Harris, Grant PUD

ATTENDEES

Donella Miller, YN (Via Phone)
 Mike Clement, Grant PUD
 Patrick Verhey, WDFW
 Chris Mott, Grant PUD
 Paul Grutter, Golder (Via Phone)
 Bao Le, HEC LLC
 Erin Harris, Grant PUD

RD Nelle, USFWS
 Steve Lewis, USFWS
 Doris Squeochs, Wanapum (Via phone)
 Laura Heironimus, WDFW (Via Phone)
 Breean Zimmerman, WDOE (Via Phone)
 Ralph Lampman, YN (Via Phone)
 Tracy Hillman, Facilitator

Action Items:

- Laura Heironimus will send the ODFW 2018 adult white sturgeon tagging report to the PRFF.
- Tracy Hillman will send the draft white sturgeon autoployploidy guidance document to members for editing and input. Edits and additions are due back to Tracy by Friday, 27 March.
- Mike Clement will send to Tracy Hillman possible dates for a fishway tour.
- Mike Clement will send the final 2019 Bull Trout M&E Plan Annual report to Tracy Hillman, who will then distribute it to the PRFF.

- I. **Welcome and Introductions** - Tracy Hillman welcomed everyone and participants introduced themselves.
- II. **Safety Briefing** – Tracy Hillman provided a safety briefing for meeting participants.
- III. **Agenda Review** – Members reviewed and approved the agenda with no additions.
- IV. **Approve February Meeting Notes** – Draft February Meeting Notes were reviewed and approved with edits.
 - A. **Review Action Items from February Meeting**
 1. Tracy Hillman will speak with Cramer Fish Sciences to see if they can find the draft autopolyploidy guidance document that Paul Anders was drafting for the PRFF and RRFF. **Complete. Cramer Fish Sciences was unable to find the guidance document that Paul was going to prepare; however, they did find his notes, which they shared with Tracy.**
 2. Tracy Hillman will contact Breean Zimmerman to make sure the PRFF's decision regarding the one-year extension of the 2016 White Sturgeon Stocking SOA is consistent with the 401 Certification. **Complete. Breean reviewed the decision and concluded it was consistent with the 401 Certification.**
 3. Members will provide Mike Clement with comments on the 2019 Pacific Lamprey Management Plan Annual Report by 21 February 2020. **Complete. Mike said he received comments from the Yakama Nation and USFWS.**
 4. Mike Clement will send the final 2019 Bull Trout M&E Plan Annual report to Tracy Hillman, who will then distribute it to the PRFF. **Ongoing.**
- V. **White Sturgeon Management Plan**
 - A. **Update on Juvenile Rearing** – Donella Miller said the juvenile sturgeon at the Yakama Nation Sturgeon Hatchery are doing well. Chris Mott reported that they propose to tag/mark juveniles in April. They will also screen the fish for 12N at that time.
 - B. **Update on 2020 Broodstock Collection** – Laura Heironimus noted that ODFW does not have funding for tagging adult sturgeon in John Day pool this year. However, they have left-over tags that they would like to use this year. Therefore, they would like to work with the PUDs during broodstock collection so they can tag additional adult sturgeon this year. PRFF members indicated they would like to see final reports from ODFW's tagging studies. Laura indicated that she will share the 2018 report with the group. She will also share the 2019 report as soon as it is finalized. Chris Mott indicated that Blue Leaf is completing permit applications for broodstock collections in 2020.
 - C. **Guidance Document on Sturgeon Autopolyploidy** – Tracy Hillman reported that Cramer Fish Sciences was unable to find the guidance report that Paul Anders was going to write. They did find some notes written by Paul that they shared with Tracy. Therefore, Tracy began writing the report using some of the notes prepared by Paul. Tracy walked the PRFF through the draft guidance document and identified sections that need input from various members. For example, he would like Chad Jackson and Jason McLellan to describe screening methods used by other entities (e.g., Upper Columbia, Kootenai, and Snake River programs). He also noted that sections 5c and 6c will benefit from the help of Chad and Laura. Chris Mott said he will try to locate the sample sizes for initial screening that were recommended by Andrea Schreier. Tracy said he will share the draft document with the group and identify sections that need input from various members. Tracy asked to receive

input by Friday, 27 March. This will give Tracy time to compile all information into one document and send it to the Fish Forums for review prior to the April meeting.

- D. **2019 White Sturgeon Report** – Chris Mott reported that comments on the draft 2019 white sturgeon annual report are due on 7 March 2020. Ralph Lampman requested that Grant PUD add an Executive Summary to the report.
- E. **White Sturgeon Monitoring Presentation** – Paul Grutter with Golder provided a presentation titled, “Grant County White Sturgeon Monitoring & Evaluation Program: 2019 Summary” (see Attachment 1). Paul started by presenting an outline for his presentation and then described the brood year 2018 juvenile sturgeon tagging and release efforts, including release locations and size (length and weight) at release. He also described the flows and temperatures of the river during the time of release and indicated the level of fin deformities of released fish. About 31% of the fish released in 2019 had deformed fins. Percent fin deformities in the past have ranged from 17-79%. Paul noted that it is unclear what effect fin deformity has on sturgeon growth and survival. He noted that they catch large sturgeon with deformed fins (see slide number 8).

Paul then described briefly the capture of broodstock for the 2019 brood year. He also identified the locations of telemetry interrogation stations and described the movements of tagged adult sturgeon in the project area. There were clear seasonal movement patterns of adults among habitat types within the project area, with only a minor interruption in movements among habitat types during the 2014 emergency drawdown. Consistent seasonal movements reestablished following the drawdown.

Paul described the juvenile index sampling design and monitoring efforts conducted in 2019. In general, the design was similar to past years (2014, 2016, 2017, and 2018). Sampling in 2019 occurred from 28 August to 26 September. Paul identified the sampling gear (and gear lost and damaged during sampling), described flows and temperatures during sampling, and noted the number of overnight sets within each reservoir. He then described the catch and proportion of positive catch (Ep) of juvenile sturgeon by brood year, reservoir, and section within the reservoirs. He also showed the catch by river mile for the index periods 2016-2019. He then showed the length frequency by brood year of fish captured during index monitoring.

Paul showed juvenile sturgeon abundance and survival estimates, including the assumptions of the model used to estimate abundance. He showed survival by brood year for age-1 sturgeon and age-1+ sturgeon. In general, survival of more recent brood years was lower than earlier brood years. Abundance estimates in both reservoirs appeared to increase rapidly over time and then reached an asymptote around 10,000-11,000 in Wanapum Reservoir and about 3,000-3,500 in Priest Rapids Reservoir. Since 2015, numbers in both reservoirs have not increased as much as they did during 2012-2015. Indeed, abundances have steadily declined since 2015. Lastly, Paul showed the relationship between sturgeon size (fork length) and age. He noted that the change in length for all brood years was greater during the 2018-2019 indexing periods than during previous indexing periods.

Paul concluded with the following summary:

- 2018 BY fin deformity rate was lower than most previous BYs.
- Over nine years of adult white sturgeon telemetry data show consistent seasonal movements between habitat types.
- Juvenile population model indicated slowly decreasing abundances in both reservoirs.

- Starting in 2016 when release numbers decreased.
- Decreased survival in more recent releases (2016 BY).
- Older brood years eventually will be less susceptible to the juvenile indexing gear.
- Future modeling will likely need to include the hatchery catch encountered during the adult indexing program.
- Higher growth rates recorded in 2019.
 - Could be attributed to lower energetic requirements or better feeding opportunities due to lower than average flows in 2019.

Tracy Hillman asked about the apparent mirror image of survival estimates for juvenile sturgeon in Priest Rapids and Wanapum reservoirs. Tracy thought the survival estimates should be lower in Priest Rapids Reservoir than in Wanapum Reservoir, or the confidence intervals on survival estimates in Priest Rapids Reservoir should be considerably larger than those for sturgeon in Wanapum Reservoir given the low recapture rates in Priest Rapids Reservoir. Paul agreed that the survival rates appeared to be mirror images and believes the survival estimates are project wide (meaning data from both Wanapum and Priest Rapids were pooled to estimate survival rates). Tracy then asked if there is any evidence of density dependence in the project area. Paul said no, there is no clear evidence of density dependence. The lack of density dependence was most apparent in growth rates, which increased during the last indexing period.

Steve Lewis asked about the decline in juvenile fish abundance over time. Mike Clement explained as fish age and grow, they recruit away from the gear. That is, the fish grow to a size where they are no longer susceptible to capture by the fishing gear. Laura Heironimus noted that the stocking rate does not appear to be keeping up with the mortality/emigration rate. Paul responded that they are not seeing high emigration rates. Most emigrants were from only a few brood years. The brood year with the highest emigration rate were progeny from downriver fish (Abernathy). Donella Miller said the captive brood from Abernathy where spawned about two or three months sooner than wild fish. This may be another reason why that brood year had a high emigration rate. Steve Lewis asked for the actual abundance estimates for each brood year. Paul indicated that those can be found on page 57 in the annual report.

Tracy thanked Paul for the presentation and update, and noted that if anyone has additional questions, please send them directly to Paul, Mike, and Chris.

- F. **Other White Sturgeon Items** – Chris Mott reported that Grant PUD approved the purchase of a Coulter Counter. The Counter has been ordered and is expected to ship on 9 March. Joel Van Eenennaam (UC Davis) and a tech from the manufacturer will train PUD staff on 6 April. Chris will need to obtain blood samples from fish for the training. Chris will coordinate with Donella Miller on collecting blood samples. Chris said Joel believes they will be able to process over 500 fish per day.

VI. Pacific Lamprey Management Plan

- A. **2019 Pacific Lamprey Management Plan Annual Report** – Mike Clement reported that comments were due by 21 February 2020. He said they received comments from the Yakama Nation and USFWS. Mike said he made editorial changes recommended by Ralph Lampman. Mike added that one of the key comments was to reduce the length of the report. Bao Le responded that the majority of the content contained within the report is included specifically to meet the requirements of the 401 Certification; thus, there are only a couple of options that can be considered to reduce the size of the report. He said the Activity

Description/Results content of Table 5 can sometimes be long summaries and could be reduced but he advised against that because the tables provide a convenient history on lamprey activities within the project area and Columbia Basin. He also noted that these summaries are often provided by the lamprey researchers so would prefer to leave this input as is. Only in cases where results begin to include too many previous years of summary information have annual report authors reduced this information. Members present indicated that they appreciate the information in the tables and do not want them reduced or eliminated. Ralph clarified that he is not asking to reduce the table size – instead, he was wondering if the document could be reformatted so that important new information and the summary are discussed upfront and not at the very end of the ~200 page document. He also asked if the background section is a requirement of the 401 Certification. Mike responded that it is not. Bao concurred and added that if reports include both existing and current information, that it's appropriate for existing information to be presented first. Additional options would be to remove the existing/background information because it is not a requirement of the report or to move the information into an appendix at the end of the report. Steve Lewis said the background section is valuable to the reader and he would like it retained in the report. Members present agreed to pull the background section from the main body of the report and attach it as an appendix to the report. Thus, the information would not change, only the layout of the information would change. Mike indicated that next year's report (2020) would follow this new format.

- B. Pacific Lamprey Presentation** – Bao Le gave a presentation on the Pacific Lamprey Management Plan (PLMP) 2019 Comprehensive Annual Report (see Attachment 2). After providing a brief outline for the presentation, Bao talked about the origins of the report, requirements of the report, and the organization of the report. He then described background and existing information, updated information, and report content development. He described the format of the tables, which identify Pacific lamprey activities within the Columbia River basin. This included definitions of evaluation elements within the tables. Importantly, the tables indicate whether actions taken at Wanapum and Priest Rapids dams are similar to actions taken at other projects, whether actions taken at other projects would be appropriate at Priest Rapids and Wanapum dams, and whether the actions would be cost effective.

Boa summarized some of the results noting that the number of Pacific lamprey activities basin-wide increased from 2009 to 2014 and then held fairly steady since 2014. In general, implementation of activities in the project area is on schedule and consistent with the PLMP. In addition, where appropriate, PLMP activities are consistent in scope and scale to basin-wide activities. Bao then talked about trends in activities associated general biology and ecology, adult migration, adult passage, juvenile passage, and policy of Pacific lamprey. Here, he summarized the studies under each category during 2009, 2014, and 2019. He concluded this discussion by noting the following:

- There has been an evolution from basic monitoring (D&A, habitat, counts, surveys) to status and trends, restoration actions (propagation, translocation, BMPs), more complex technology (eDNA, genetic analysis), and expanded geographic scope.
- Adult passage seems to have peaked and activity is now concentrated on monitoring and evaluation and systemic patterns/performance.
- Juvenile tagging has made progress recently and may set the stage for future research.
- Increased organizational interest in lamprey research and management (e.g., Information Exchange, etc.).

Finally, Bao identified and summarized Pacific lamprey activities conducted in the project area. This included a description of ladder improvements for adult passage, monitoring and evaluation studies at the dams and within the reservoirs, passage efficiency studies, tag contributions to downstream studies, and trap-and-haul to support the NNI agreement and regional activities upstream from the project area. He ended the presentation by listing activities scheduled for 2020.

Steve Lewis asked why plating was not installed on all the gratings at Priest Rapids Dam. Mike Clement responded that all diffusors were plated except those in collection channels where a two-foot-wide concrete base on both sides of the fishway floor provides adequate attachment points for adult lamprey.

- C. **Adult Trapping in 2020** – Mike Clement reported that they will collect adult lamprey this summer for their trap-and-haul NNI agreement and also for regional activities (i.e., Douglas PUD program). Mike noted that Douglas PUD has not yet reached out to him regarding collection of adult lamprey for the Douglas PUD program.

- D. **Other Pacific Lamprey Items** – None.

VII. **Bull Trout Management Plan**

- A. **Update on Winter Bull Trout Monitoring** – Mike Clement reported that since 15 November, no bull trout have been observed moving through open (watered) fishways at Priest Rapids or Wanapum dams. Winter monitoring for bull trout will continue until 15 April. Steve Lewis said Chelan PUD has seen a few bull trout passing Rocky Reach Dam this winter.

- B. **Other Bull Trout Items** – None.

VIII. **Next Meeting:** If necessary, the next meeting of the PRFF will be on Wednesday, 1 April 2020 at the Grant PUD Natural Resources Office in Wenatchee.

Attachment 1

Presentation by Paul Grutter on Grant County White Sturgeon Monitoring & Evaluation Program: 2019 Summary

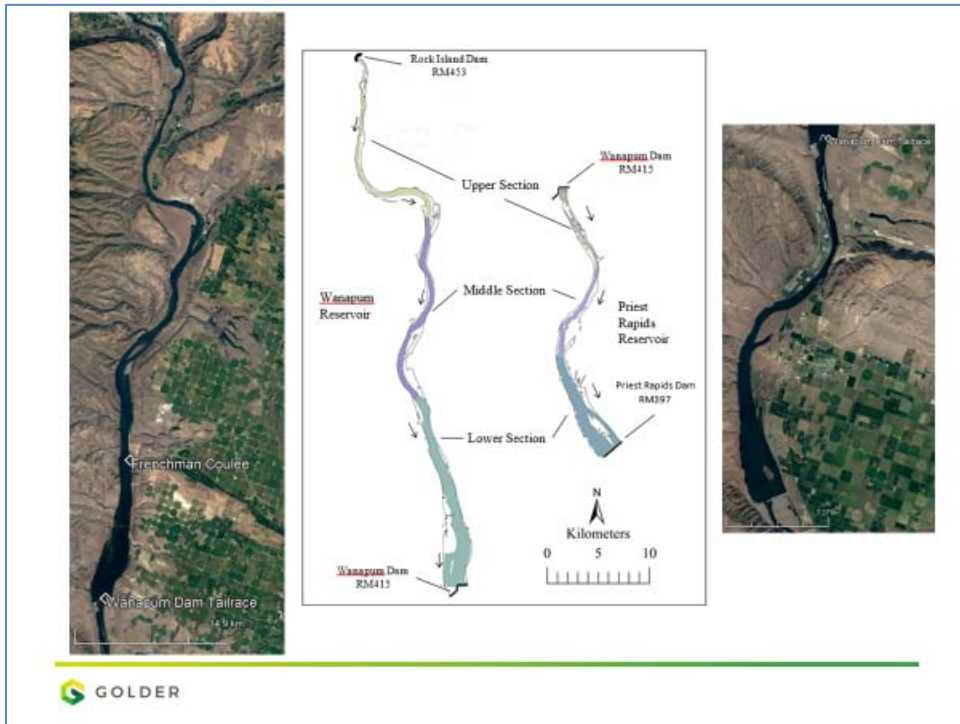


Presentation Outline

MONITORING & EVALUATION PROGRAM: 2019 SUMMARY



- 2018BY Juvenile Marking and Release
- VR2W Telemetry Station Servicing
- Adult Movement Summary 2010 - 2019
- Juvenile White Sturgeon Indexing



2018BY White Sturgeon Juvenile Tagging and Release MONITORING & EVALUATION PROGRAM: 2019 SUMMARY



- 2018 broodstock capture efforts resulted in 5Fx5M spawning matrix; 25 genetic crosses (5 unique crosses; 20 half-sib crosses). Maternal families kept separated.
 - Broodstock were tested for polyploidy – tests were negative (all 8N)
 - Genetic testing of brood (April 2019): spontaneous autopolyploidy detected in brood in 2 of 5 maternal families (56% F1 brood; 24% F5 brood)
- 2018BY release consisted of progeny of 15 genetic crosses from 3 remaining maternal families
- 2,657 fish PIT-tagged and scute marked over two days from April 9 to 10, 2019 - no acoustic tags
 - 2017BY (3Fx6M), 18 genetic crosses (culled 2 maternal families due to polyploidy)
 - 2016BY (6Fx6M), 36 genetic crosses
 - 2015BY (9Fx10M), 85 genetic crosses

2018BY White Sturgeon Juvenile Tagging and Release

RELEASE LOCATION, LENGTH AND WEIGHT

- Released May 7 2019, 2018BY release by reservoir:
Wanapum (62%); Priest Rapids (38%)
SOA (March 11, 2016)

2019 White Sturgeon 2018BY Release			
Release Location Reservoir (River Mile)	No. of Fish	Mean FL (± SD) mm	Mean Weight (± SD) g
Wanapum (424.5)	1,767	269 (30)	130 (44)
Priest Rapids (415.6)	890	265 (28)	124 (40)
Total	2,657	267 (29)	128 (43)
2017BY	3,224 (32)	285 (43)	144 (58)
2016BY	3,248 (32)	272 (31)	126 (45)
2015BY	3,258 (32)	303 (26)	171 (46)



2018BY Primary Fin Deformity	Fin Deformity Sub-type	No. of fish with Primary Deformity	No. of fish with Sub-type Deformity
Caudal deformity only		42	
	Deformed, curled, or damaged		42
Both caudal and pectoral deformity		31	
	Two deformed, curled, or damaged fins		20
	One deformed, curled, or damaged fin; one missing fin		1
	Three deformed, curled, or damaged fins		8
	Two deformed, curled, or damaged fins; one missing fin	2	
Pectoral deformity only		758	
	One deformed, curled, or damaged fin		581
	One missing fin		48
	Two deformed, curled, or damaged fins		82
	One deformed, curled, or damaged fin; one missing fin		39
	Two missing fins	8	
Other deformities		0	
	Deformed rostrum, operculum, other fins		0
Total fish with fin deformities		831 (31%)	
Total fish without fin deformity		1,826 (69%)	
Total 2018BY Release		2,657	

Past fin deformity rates: 2017BY (43%); 2016BY (42%); 2015BY (14%); 2014BY (78.5%)



 GOLDER

2019 Broodstock Capture for 2019BY brood

CAPTURE EFFORT AND CATCH

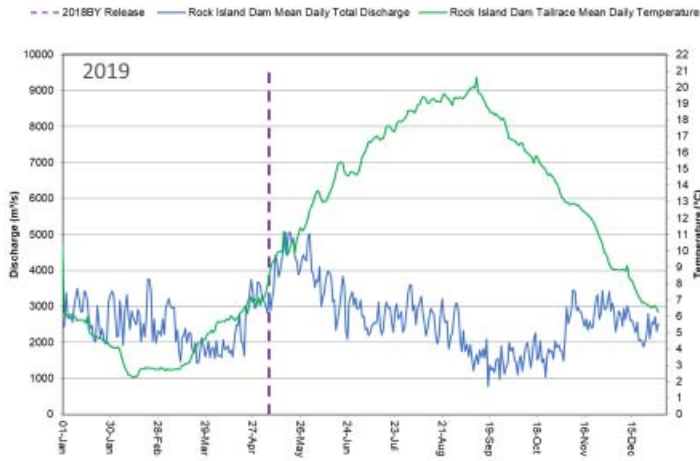
- Angling for White Sturgeon broodstock took place over 14 days from May 15 to 24 and from May 31 to June 3
- 147 individual White Sturgeon were captured, with 7 fish captured twice for a total of 156 White Sturgeon landings
- June 14, a 4F_x5M spawning matrix combined with a partial 1F_x3M resulted in 5 maternal families of 2019BY consisting ~24 genetic crosses

 GOLDER

9

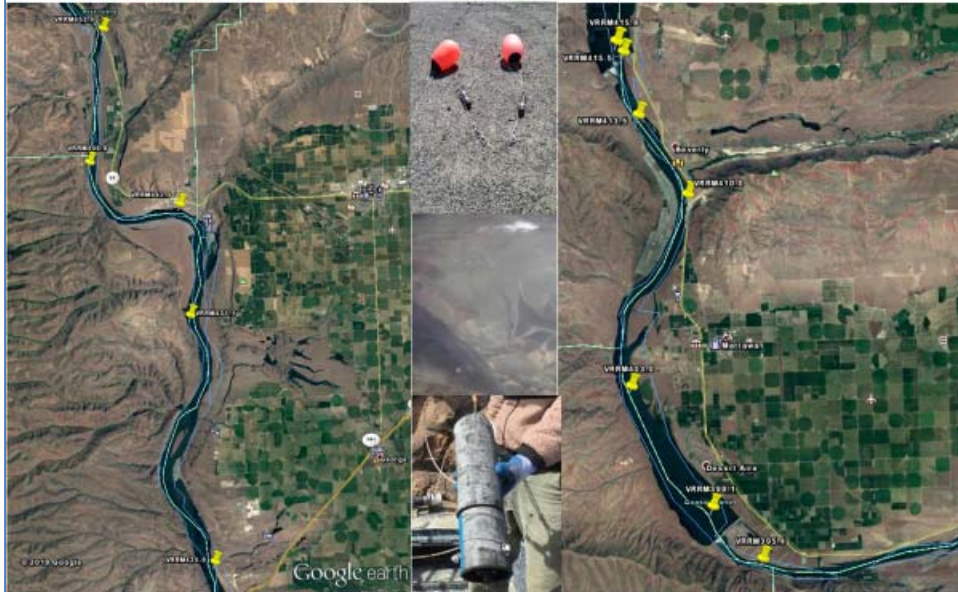
Discharge and Temperature

ROCK ISLAND DISCHARGE AND TEMPERATURE



VR2W Telemetry Station Servicing and Adult Movement Summary

TELEMETRY STATION LOCATIONS



Acoustic Telemetry and Adult Movement

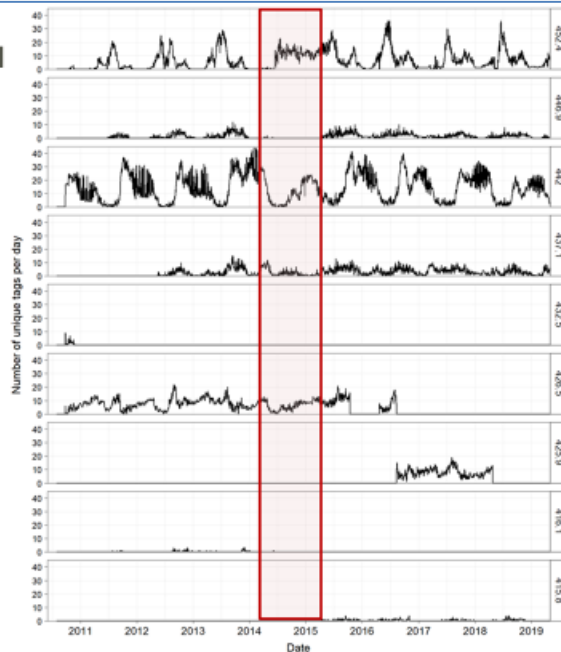
WANAPUM AND PRIEST RAPIDS RESERVOIRS

- From 2010 to 2015, adult White Sturgeon were implanted with acoustic tags to monitor movements during the spawning season and movements to overwintering areas
- V16 3,650 day battery life; High Power; Random Delay: 110 to 250 sec (V13 similar, lower battery life)
 - V9 912 day battery life; Low Power; 170 to 310 second delay
- ~70% of all tag detections (~7m of 10 million) were from adult fish
- High power tags likely reduced detection of V9 juvenile tags

Acoustic Telemetry and Adult Movement

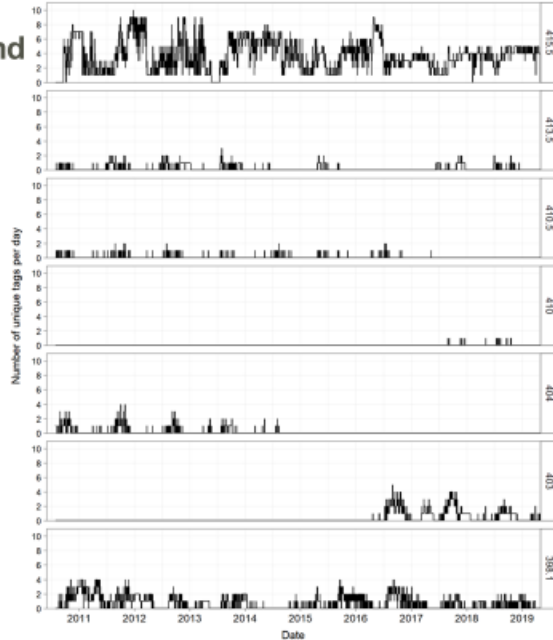
WANAPUM RESERVOIR

- 72 adult fish tagged
- Consistent pattern of seasonal movement
- Pattern resumed after 2014 emergency drawdown



Acoustic Telemetry and Adult Movement PRIEST R. RESERVOIR

- 11 tags deployed in "adults"
- 2 tags deployed in large CRITFC hatchery fish
- Seasonal movements were less evident

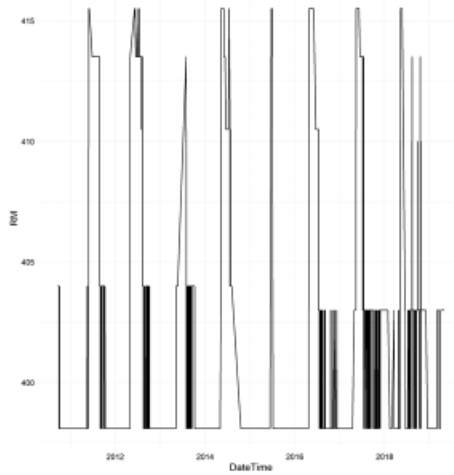


14

Query1

Reservoir	PITNumber	TagType	TagNumber	HorW	ForkLength	SexMat
Priest Rapids	411021200E	Sonic	48713	W	202.50	M1

48713 Grant County Priest Rapids Project Area



2019 Juvenile Indexing

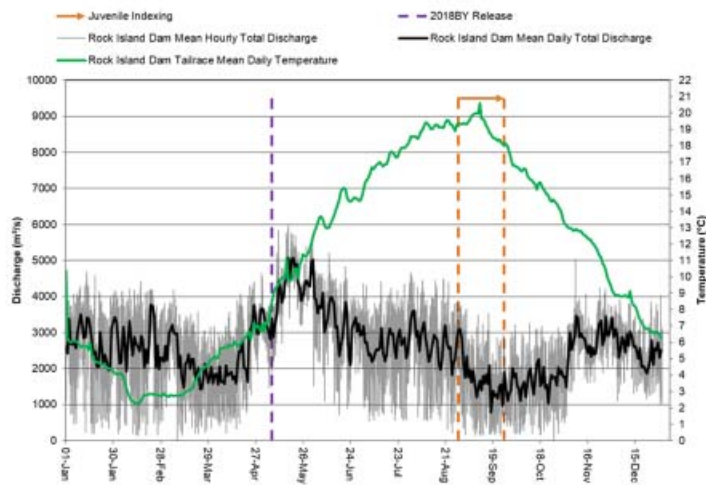
SAMPLING DESIGN AND EFFORT

- 2019 Sample Design was similar to the 2014, 2016, 2017, and 2018 approaches
- Unstratified, Unequal Probability GRTS Survey Design,
 - Wanapum Reservoir partitioned into three sample areas (three multidensity categories) defined as the Upper, Middle, and Lower Reservoir sections
 - Allocate more catch effort/unit area to the upper and middle portions of each reservoir suspected of moderate to high use by White Sturgeon
- August 28 to September 26, 2019



2019 Hydrograph

ROCK ISLAND DISCHARGE AND TEMPERATURE



2019 Juvenile Indexing

SAMPLING DESIGN AND EFFORT

	Reservoir							
	Wanapum (15m Bathymetric Contour)				Priest Rapids (6 m Bathymetric Contour)			
	Lower	Middle	Upper	All	Lower	Middle	Upper	All
Number of GRTS sites sampled	90	90	90	270	30	30	30	90
Sampling area (Ha)	1,664	727	308	2,699	1,369	346	213	1,928
Samples/100Ha	5	12.4	29.2	10	2	8.7	14.1	5
Sample depths (m)								
mean	20.7	20.2	18.1	19.7	13.4	11.2	9.5	11.3
min	10.7	1.3	8	1.3	7	4.3	5	4.3
max	39	39	35	39	23	21	21	23

- 270 overnight sets in Wanapum - 2 crews, Golder and BLE
- 90 overnight sets in Priest Rapids - 1 crew, Grant PUD biologists
- All fish scanned for a PIT-tag, measured for Fork Length & Weight, and assessed for fin deformities
- All data directly entered in the Juvenile Indexing Database

2019 Juvenile Indexing

SAMPLING GEAR



Assembled by Grant PUD staff

Line Length: 400 ft (122m), ¼" Everson Aqua tarred line - 3 strand nylon - soft lay

40 hooks per line, attached at marked intervals ~ 9 ft (3 m) apart

2/0 and 4/0 Mustad Demon Circle Perfect 2X Strong. Twenty of each size hook per line

Jinkai (or similar) monofilament leaders; 150lb test, 12" in length excluding hook and clip

Stainless snaps sized for main line being used with attached swivels.

Gilmore Pickled Squid

Juvenile Indexing

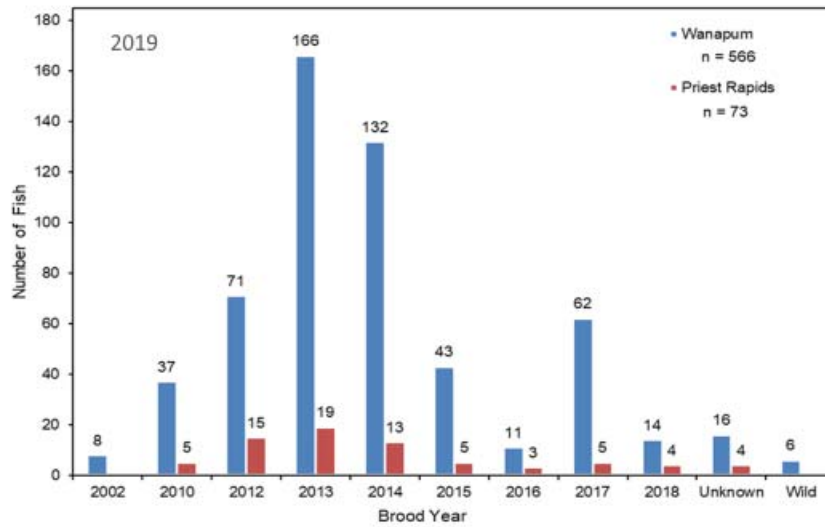
GEAR LOST/DAMAGE



Reservoir	Hook Size	Ganglions		Hook/Ganglion Fate					
		Set #	Gear Inventory	Bent	Lost	Total	Proportion of Set Ganglions with Lost or Damaged Hooks	Proportion of Ganglion Inventory with Lost or Damaged Hooks	
		n	n	n	n	n	%	%	
Wanapum	2/0	5,398	400	61	3	64	1.2	16.0	
	4/0	5,401	400	68	4	72	1.3	18.0	
Total		10,799	800	129	7	136	1.3	17.0	
Priest Rapids	2/0	1,800	200	18	3	21	1.2	10.5	
	4/0	1,800	200	22	1	23	1.3	11.5	
Total		3,600	400	40	4	44	1.2	11.0	
2019		14,399	1200	169	11	180	1.3	15.0	
PRPA									
2018								13.3	
2017								12.0	
2016								32%	

Juvenile Indexing

JUVENILE INDEXING CATCH BY BROOD YEAR



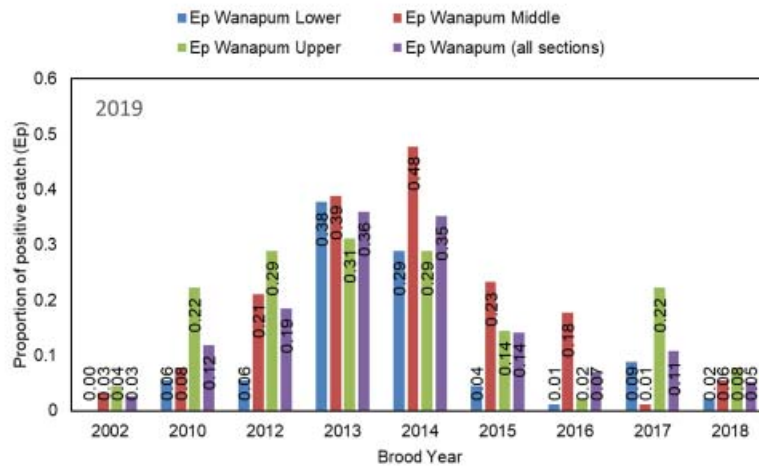
Juvenile Indexing

BROOD SOURCE, RELEASE SITE, RELEASE TIMING

Wanapum Reservoir: Juvenile Indexing Catch										
BY	Release Reservoir	Release Location	Brood source	Date	Number Released	2016	2017	2018	2019	Total
H1: Suspected genetic or behavioral difference between UCW and MCW compared to LCC origin fish resulted in greater emigration of LCC from Wanapum Reservoir.										
2010	Wanapum	Columbia Siding	UCW ¹	26-Apr-11	2,020	39	23	17	24	103
			MCW ²	29-Apr-11	2,996	42	22	8	10	82
			LCC ³	27-29-Apr-11	2,000	9	3	1	1	14
H2: Survival (reduced avian predation) of fish released in deep water habitat (Columbia Cliffs), further downstream from Cormorant rookeries was higher compared to fish released shallow water habitat (Columbia Siding) upstream nearer the rookeries										
2012	Wanapum	Columbia Siding	MCW	14-May-12	1,135	33	22	15	19	89
		Columbia Cliffs	MCW	14-May-12	1,129	95	48	61	52	256
H3: Survival of fish released in spring (May) is higher compared to fall (September) releases										
2013	Wanapum	Rocky Coulee	MCW	06-May-14	3,331	228	165	136	137	666
			MCW	18-Sep-14	1,762	41	35	35	35	146

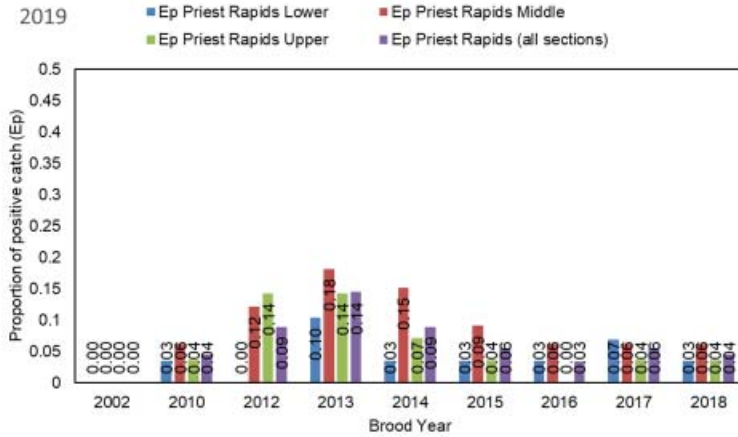
Juvenile Indexing

Ep BY WANAPUM RESERVOIR SECTIONS



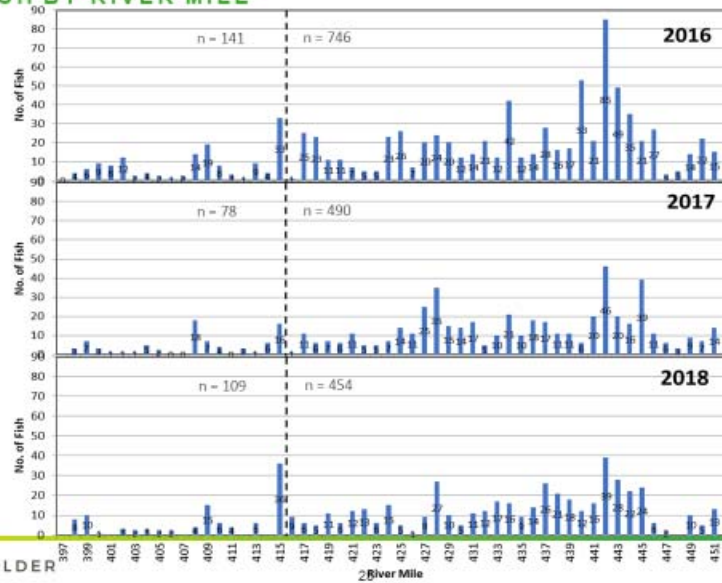
Juvenile Indexing

EP BY PRIEST RAPIDS RESERVOIR SECTIONS



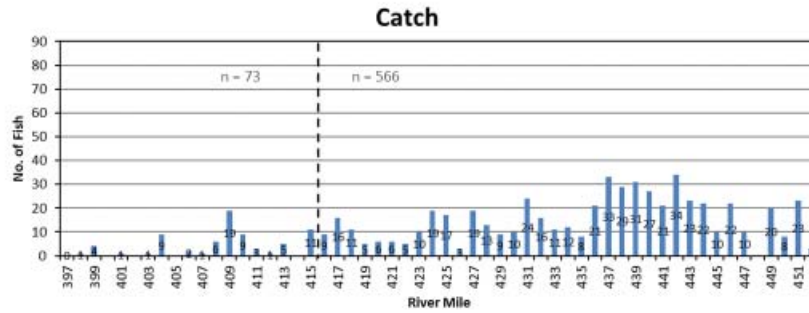
2016-2018 Juvenile Indexing

CATCH BY RIVER MILE



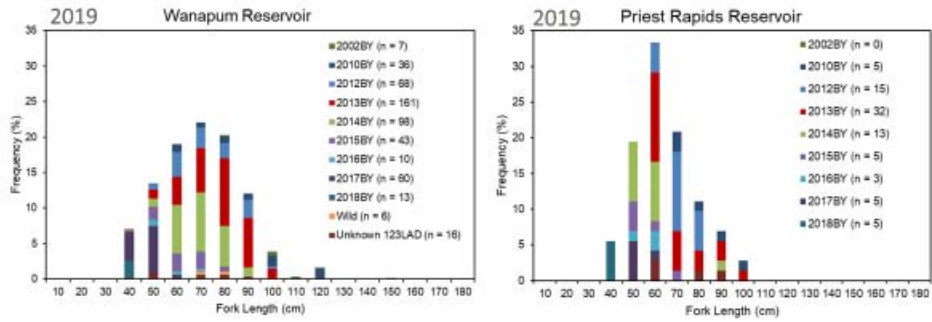
2019 Juvenile Indexing

CATCH BY RIVER MILE



Juvenile Indexing

LENGTH FREQUENCY BY BROOD YEAR



Juvenile Indexing

R MARK ABUNDANCE ESTIMATE ASSUMPTIONS

2019 Model – Sufficient data to year 1 survival and all subsequent years; by reservoir, by brood year

Models were constructed using all combinations of the following survival and recapture specifications:

Survival:

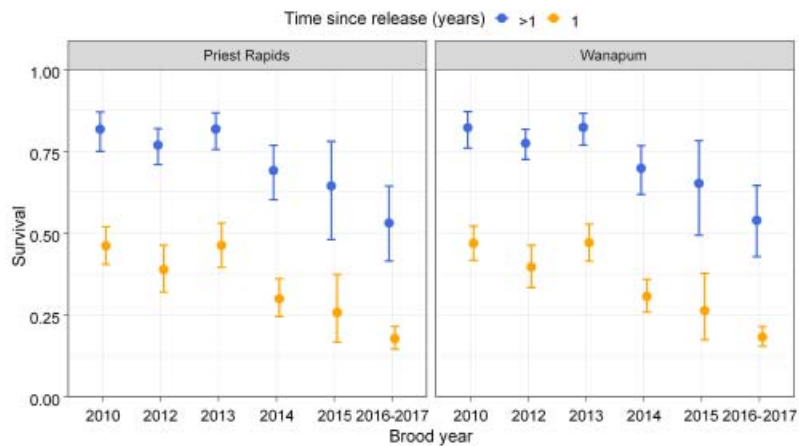
- a. as an additive function of brood year and first year post-release and all subsequent years
- b. as an additive function of release reservoir, brood year, and whether the period was in the first year post release or in all subsequent years

Recapture:

- a. as multiplicative function of release reservoir and age
- b. as multiplicative function of brood year and age, with an additive effect of release reservoir
- c. as multiplicative function of brood year and sampling occasion, with an additive effect of release reservoir
- d. as multiplicative function of release reservoir, brood year, and sampling occasion

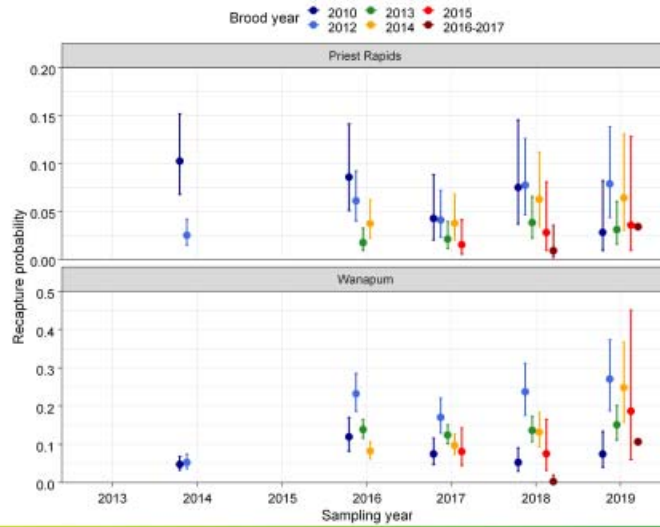
Juvenile Indexing

R MARK SURVIVAL BY BROOD YEAR



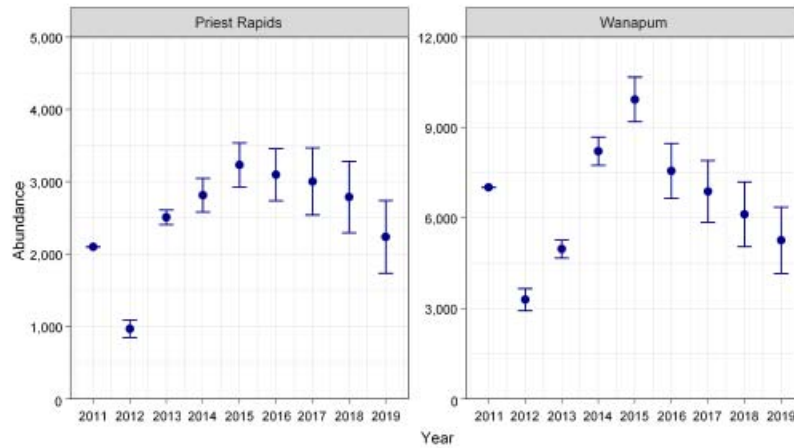
Juvenile Indexing

R MARK RECAPTURE BY BROOD YEAR



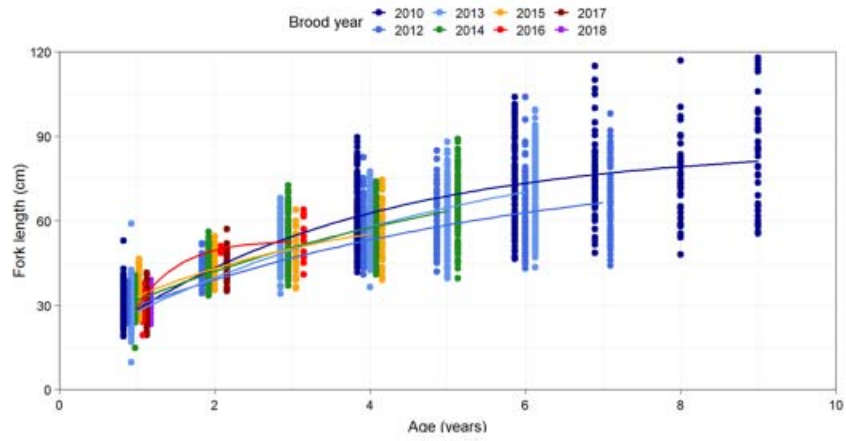
Juvenile Indexing

ABUNDANCE ESTIMATES OF HATCHERY FISH BY RESERVOIR



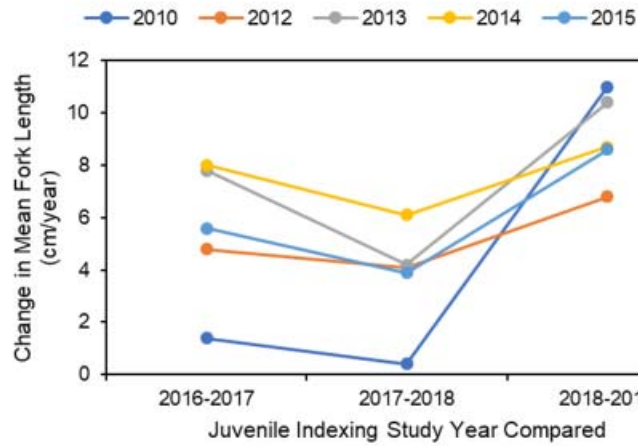
Juvenile Indexing

GROWTH



Juvenile Indexing

GROWTH



Grant PUD White Sturgeon Monitoring & Evaluation Program

2019 SUMMARY

- 2018BY fin deformity rate lower than most previous BY
- 9+ years of adult White Sturgeon telemetry data show consistent seasonal movements between habitat types
- Juvenile population model indicated slowly decreasing abundances in both reservoirs
 - starting in 2016, when release numbers decreased
 - decreased survival in more recent releases (2016BY)
 - older brood years eventually will be less susceptible to the juvenile indexing gear
 - future modeling will likely need to include the hatchery catch encountered during the adult indexing program
- Higher growth rates recorded in 2019
 - could be attributed to lower energetic requirements or better feeding opportunities due to lower than average flows in 2019



Attachment 2

Presentation by Bao Le on Pacific Lamprey Management Plan 2019 Comprehensive Annual Report

Pacific Lamprey Management Plan (PLMP) 2019 Comprehensive Annual Report



**Presentation to the
Priest Rapids Fish
Forum**

March 4, 2020

*Bao Le
HEC LLC
Portland, OR*

Presentation Outline

PLMP Comprehensive Annual Report

- Origins and Requirements of the Report
- Report Organization and Content Development
- 2019 observations and trends over time
- PLMP past activities summary and 2020 activities

1

Origins of the Reporting Requirement

- WA State 401 Water Quality Certification (401) (4/3/07; amended 3/6/08)
 - Appendix C – Pacific Lamprey
 - Implementation Measure #1 - Reporting
- PLMP (filed 2/19/09)
 - Identifies Biological Objectives and defines implementation actions
 - Comprehensive Annual Report (a component of Objective 1)
- FERC Order Approving PLMP (5/1/09)

2

Requirements of the Report

- “... provide an annual report summarizing activities undertaken to identify and address impacts of the Priest Rapids Project (PRP) on Pacific Lamprey ...” (401, Appendix C)
- To include:
 - Columbia River Basin lamprey passage, behavioral, and survival investigations;
 - PRP PLMP activities and results of activities for past year;
 - Evaluation of whether PRP investigations/measures are:
 - Consistent with similar measures taken at other projects;
 - Appropriate to implement at the PRP; and
 - Cost effective to implement at the PRP

3

Report Organization

- **Section 1.0:** Introduction
- **Section 2.0:** Columbia River Basin Activities
- **Section 3.0:** Status of PRP lamprey activities
- **Section 4.0:** An evaluation of whether recent Columbia River Basin activities should be considered for the PRP.
- **Section 5.0:** Summary and Upcoming Actions

4

Report Content Development

Knowledge Base (§2.0)

- **Background and existing information (§2.1)**
 - Start with 2018 report; supplement w/ other relevant recent literature from 2019
 - Significant update to background per Yakama Nation review
 - Organization by biological topics
 - Summary narrative format
- **Updated information (§2.2)**
 - Table format, organized by topics (i.e., general biology/ecology, migration in rivers, adult passage, juvenile passage, artificial propagation, etc.)
 - Activity level reporting

5

Report Content Development

2019 Pacific lamprey activities in the Basin (§2.2, Table 5)

Activity	Hydroelectric Project	River	Results / Description of Activity	Lead Entity(ies)	Source
General Biology, Ecology and Population Status					
Spawning habitat and timing, rearing habitat, and over-wintering habitat	No associated hydro project		In 2009, habitat use and timing through radio telemetry was conducted. Information was used for development of a habitat model. Preliminary results not yet available.	Warm Springs Tribe	Personal communication with Jennifer Graham, Warm Springs Tribe (10/27/09)
Lamprey Migration in Rivers					
Adult Passage at Hydroelectric Facilities					
<i>Structural and Operational Fishway Modifications</i>					
<i>Project Passage Effectiveness</i>					
<i>Lamprey Counts at Dams</i>					
<i>Predation</i>					
Juvenile Passage at Hydroelectric Facilities					
<i>Structural and Operational Fishway Modifications</i>					
<i>Project Passage Effectiveness</i>					
<i>Predation</i>					
Policy/Recovery Activities					

6

Report Content Development

Schedule/status of PRP lamprey activities (§3.0, Table 6)

Implementation Measure	Evaluation Timeframe	Relevant to Current Reporting Period	Action Taken in 2009	Variation from Schedule (if applicable)
Objective 1: Identify, address, and fully mitigate Project effects to the extent reasonable and feasible to achieve NNI				
Provide an annual report summarizing activities undertaken to identify and address Project impacts. <i>[PLMP, Section 4.1]</i>	Annually (by March 31), starting 2010	Yes	Yes, report will be filed on or before March 31, 2010.	No
Objective 2: Provide safe, effective, and timely volitional passage for adult upstream and downstream migration				
Maintain adult fishways. <i>[PLMP, Section 4.2.1]</i>	Annually for the period 2009-2015	Yes	Grant PUD continues to maintain fishways at the Priest Rapids Project in accordance with the NOAA Fisheries Fishway Operations and Criteria Guidelines for salmon (NOAA Fisheries 2008). The plan includes operational criteria for dewatering and the recovery of all fish.	No
Objective 3: Provide safe, effective and timely volitional passage for juvenile migration				
Objective 4: Avoid and mitigate Project impacts on rearing habitat				

7

Report Content Development

Evaluating application of Basin activities to PRP (§4.0)

- Table format
- Definition of evaluation elements:
 - “Consistent with similar measures taken at other projects”
 - “Yes” = activity that has been implemented by a hydroelectric facility operator in a hydroelectric project area other than the PRP.
 - “Appropriate to implement at the PRP”
 - “Yes” = activity that is a requirement of the PLMP or is an activity subsequently agreed to by Grant PUD as a result of implementation of the PLMP.
 - “Cost-effective to implement at the PRP”
 - “Yes” = If a measure is considered “appropriate to implement”; the specific action being taken by Grant PUD is described. In addition, pertains to an activity where resource benefits are commensurate with the level of effort and cost to implement, and in a manner not inconsistent with anadromous fish passage criteria and habitat requirements.
 - “N/A” = if a measure is considered not “appropriate to implement”.

8

Report Content Development

Evaluating application of Basin activities to PRP (§4.0, Table 7)

Activity in Basin (Proposed, Planned or Implemented)	Project where Implemented = I Planned = P ¹ or Proposed = PR ²	River(s)	Table 3 Cross-Reference	Consistent with Measures Taken at Other Projects	Appropriate to Implement at Priest Rapids Project	Cost Effective for Priest Rapids Project
General Biology, Ecology and Population Status						
Develop measures to protect spawning habitat	Wells (P) Rocky Reach (P)		N/A ³ N/A ⁴	No.	No. This activity is not required by Grant PUD's PLMP.	N/A
Assess impacts of irrigation water withdrawal structures with the items for adult and juvenile passage/habitat	PR	N/A	N/A	No.	No. This activity is not required by the PLMP. Assessing the impacts of irrigation water withdrawal are not objectives, goals, or measures outlined in the PLMP.	N/A
Lamprey Migration in Rivers						
Adult Passage at Hydroelectric Facilities						
<i>Structural and Operational Fishway Modifications</i>						
Install/evaluate slotted “keyhole” fishway entrances	Bonneville (I) Priest Rapids (I) Wanapum (I) (P) McNary (P)		#20 #21 #21 N/A ⁴ N/A ⁷	Yes.	Yes. Keyhole entrances are currently utilized at both Wanapum and Priest Rapids dams.	Yes. See adjacent response.
<i>Project Passage Effectiveness</i>						
<i>Lamprey Counts at Dams</i>						
<i>Predation</i>						
Juvenile Passage at Hydroelectric Facilities						
<i>Structural and Operational Fishway Modifications</i>						
<i>Project Passage Effectiveness</i>						
<i>Predation</i>						
Policy and Recovery Activities						

2019 Reporting Observations

- Basin-Wide Activities (Table 5):
 - Total of 97 line items (101 in 2018)
 - Adult Passage (35 [39]), General Bio (31 [30]), Juvenile Passage (15 [15]), Policy/Recovery (9 [10]), Migration in Rivers (7 [7])
- Implementation at the PRP is generally on-schedule and consistent with the PLMP
- Where appropriate, PRP PLMP activities are consistent in scope/scale to basin activities

10

Trends Over Time Table 5 Reporting

Activity Categories	2009	2014	2019
General Biology and Ecology	12	25	31
River Migration	4	8	7
Adult Passage	25	44	35
Juvenile Passage	9	16	15
Policy/Recovery Activities	7	7	9
Total	57	100	97

11

Trends Over Time - 2009

- General Biology/Ecology
 - D&A, spawning/escapement, monitoring, habitat surveys
 - Translocation (Nez Perce, Umatilla)
- Adult Migration in Rivers
 - Lower Columbia and Willamette focus
- Adult Passage
 - Structural and operational modifications
 - Modification testing (LPS and entrances)
- Juvenile Passage
 - Operations and salvage
 - Protocol and criteria development for tagging
- Policy
 - Plan implementation, LTWG, Conservation Initiative

11

Trends Over Time - 2014

- General Biology/Ecology
 - Larval recolonization/reintroduction evaluations
 - Mercury/toxins/physiological investigations
 - Estuarine research
 - Artificial propagation
 - Status & Trends
- Migration in Rivers (expanded to include juveniles)
 - System migration patterns, large scale fate assessments
 - Diversion screening, Dewatering
 - Juvenile lamprey data synthesis

11

Trends Over Time – 2014 cont..

- **Adult Passage**
 - Expansion of and research on new modifications
 - Application of technologies in tributaries
 - Expansion of analysis techniques (e.g., network theory, etc.)
 - Expansion of assessment technology (U/W video, DIDSON, etc.)
- **Juvenile Passage**
 - JSAT development
 - Structural evaluations (JBS, juvenile collection facilities)
 - Regional data analyses (FPC smolt monitoring program)
- **Policy/Recovery**
 - Increase in LTWG activities (4 additional subgroups)

11

Trends Over Time - 2019

- **General Biology/Ecology**
 - Thermal tolerance research
 - Artificial propagation/pathogen research
 - Genetics/eDNA
 - Marine ecology
 - ID/Terminology
 - Increase in translocation activities (YN, Nez Perce, Umatilla, Colville, PUD's, more....)
- **Adult Migration in Rivers**
 - Expansion of system migration monitoring (PIT data sharing and regional expanded detection areas)
 - Dewatering research
 - Juvenile outmigration monitoring

11

Trends Over Time - 2019

- **Adult Passage**
 - Design improvements and assessments
 - Expand focus to other areas of fishway (serpentine weirs)
- **Juvenile Passage**
 - Screen testing
 - Juvenile movement using JSATs
- **Policy**
 - LTWG (additional subgroup activity)
 - Conservation Initiative and Annual Information Exchange

11

Trends Over Time

- Evolution from basic monitoring (D&A, habitat, counts, surveys) to status and trends, restoration actions (propagation, translocation, BMPs) more complex technology (eDNA, genetic analysis), expanded geographic scope, etc.
- Adult passage seems to have peaked and activity concentrated on monitoring and evaluation and systemic patterns/performance.
- Juvenile tagging has made progress recently and may set stage for future research.
- Increased organizational interest in lamprey research and management expanding (e.g., Info Exchange, etc.)

11

PRP Activities Summary

- Extensive ladder improvements 2009-2010
 - Plating, ramps and crowders at count stations
- Monitoring infrastructure installations 2010-20
- Gatewell Exclusion Screen and Escapement Evaluation 2010
- Passage and Behavior Ongoing Evaluation
 - 2010-2019, about 1,300 HDX-PIT tagged fish evaluated
- Reservoir Evaluations 2012-2014
 - Low numbers of juveniles observed
- Interim Passage Measures – Wanapum Fracture
 - Trap and Haul 2014 – 2,263 fish
 - Fish Exit System installed in Wanapum fishway 2014

12

PRP Activities Summary

- Modifications to evaluate OLAFT 2015-2016
- Project wide passage efficiency 2015-2017
 - Acoustic/FDX tagged – 300 fish (100/year)
- HDX-PIT contributions to lower river programs to increase regional database 2016-2019
- Trap and Haul to support regional activities, NNI Agreement 2017-2019
 - 2017 provided 300 to Chelan PUD, 316 to YN
 - 2018 transported 171 above RI Dam, 674 to Douglas PUD
 - 2019 transported 111 above RI Dam, 152 to Douglas PUD

12

2020 Activities

- Continue Project-wide passage efficiency monitoring and calculations at Priest Rapids and Wanapum dams (HDX-PIT)
- Complete refurbishment of HDX readers at Priest Rapids and Wanapum dams
- Continue HDX-PIT contributions to lower river programs to increase regional database 2016-2020 and regional understanding
- Continue Trap and Transportation to support regional activities (GPUD/DPUD), NNI Agreement 2017-2020

Page 21

Discussion / Questions



14