



Grant County
PUBLIC UTILITY DISTRICT
Excellence in Service and Leadership

Fall Chinook Work Group

Tuesday, 7 October 2014

Grant PUD (USBOR Building)

Ephrata, WA

Technical members

Paul Wagner, NMFS
Jeff Fryer, CRITFC
Holly Harwood, BPA
Keith Truscott, CPUD
Bill Tweit, WDFW
Patrick McGuire, WDOE
Peter Graf, GCPUD
Steve Hemstrom, CPUD

Joe Skalicky/Don Anglin, USFWS
Paul Ward/Bob Rose, YN
Brett Swift, American Rivers
Tom Kahler, DPUD
Paul Hoffarth, WDFW
John Clark, ADFG
Todd Pearsons, GCPUD

Attendees: (*Denotes Technical member)

Peter Graf, GCPUD*
Paul Hoffarth, WDFW* (Phone)
John Clark, ADFG* (Phone)
Scott Bettin, BPA (Phone)
Todd Pearsons, GCPUD
Tom Dresser, GCPUD (Phone)

Russell Langshaw, Ecosystem Insights
Jeff Fryer, CRITFC* (Phone)
Paul Wagner, NMFS* (Phone)
Ryan Harnish, Battelle (Phone)
Geoff McMichael, Mainstem Fish Res (Phone)
Tracy Hillman, Facilitator

Action Items:

1. Grant PUD will prepare the draft Final Report and Implementation Feasibility Study/Implementation Feasibility Plan.
2. Grant PUD will provide the FCWG with the 2013-14 Hanford Reach Fall Chinook Protection Program Draft Report by Friday, 10 October 2014.

Meeting Minutes

I. **Welcome and Introductions** – Tracy Hillman welcomed attendees to the meeting. Attendees introduced themselves.

II. **Agenda Review** – The agenda was reviewed and approved.

III. **Approval of Meeting Minutes**

- The September Meeting Minutes were reviewed and approved.

IV. **Review of Action Items** - Action items identified during the September meeting were discussed.

- As part of the final report, Russell Langshaw will prepare recommendations for assessing density dependence in the Hanford Reach. **Complete.**
- As part of the final report, Russell Langshaw will conduct retrospective analysis on historical stranding and entrapment work. **Complete.**
- Grant PUD will begin drafting the Final Report and Implementation Feasibility Study/Implementation Feasibility Plan. **Ongoing. The draft report will be available for review in November.**

V. **Update on Wanapum Dam Issues**

Tom Dresser provided a PowerPoint presentation on the current status of Wanapum Dam issues (see Attachment 1). Tom noted that aquatic vegetation and other debris continues to collect on the pump screens. Because of the frequency of aquatic vegetation build up on the screens, Grant PUD splashes divers every other day to clean the screens. More vegetation collects on the left-bank pump screens than on the right-bank screen.

Tom reported that 2,463 adult lamprey were trapped at Priest Rapids and Wanapum dams and transported upstream from Rock Island Dam. He noted that 7,253 adult lamprey were counted with the video count system at Priest Rapids Dam. Tom said that they are no longer counting fish at the flumes. Rather, they are inspecting the flumes for passage issues. There have been no issues with the flumes.

Tom then described the status of the drilling for the installation of the tendons in the monolith piers. The engineers first drill 4-inch diameter holes, then enlarge them to 10 inches, and finally to 16 inches. So far they have completed the drilling of 29 of the 37 required 4-inch holes. Eleven of the 37 16-inch holes have been drilled. Tom also noted that six of the 37 tendons have been installed and tensioned. Tom then described the six-step process for installing and tensioning the tendons.

Tom described the proposal for the intermediate pool raise. He indicated that FERC is requiring the installation of 15 tendons before the pool can be raised. The original plan was to have 13 tendons installed before raising the pool. The original proposal was to raise the pool at a rate of about three feet per day with three stop-and-evaluate set points during the refilling period. FERC has indicated that the three stop-and-evaluate set points may not be necessary. That is, Grant PUD may be able to do steady refill with monitoring occurring during the refill period. The plan is to fill the pool to an intermediate elevation of 558 to 562 feet. Refilling will likely occur later this year. After all 37 tendons have been installed, the pool will be raised to its normal elevation. This will likely occur by late April or early May.

VI. Final Report and Implementation Feasibility Study/Implementation Feasibility Plan

Stranding and Entrapment Retrospective Analysis – Russell Langshaw gave a PowerPoint presentation on factors related to the stranding and entrapment of fall Chinook in the Hanford Reach (see Attachment 2). Russell began the presentation by stating that stranding and entrapment will be described in the final report under the section titled, Annotated Bibliography and Recent Studies. He then gave a brief accounting of the stranding and entrapment studies conducted in the Hanford Reach, including a description of the sampling design (two-stage stratified random sampling design) and the fact that most (90%) entrapments do not have fish. In addition, Russell pointed out that entrapments, which number over 13,000 in the Reach, contained anywhere from 0 to over 15,000 juvenile Chinook.

Russell showed the stranding and entrapment estimates over the sampling years. When placed in context with total fall Chinook production within the Reach, the estimated numbers of stranded and entrapped fish are relatively small. Russell described the statistical approaches he used to evaluate entrapment data collected in 2007 and 2011-2013. Those methods included the use of zero-inflation models and hurdle models. He included location, season, fish size, dewatered area, timing, flow dynamics, and other factors as descriptive (independent variables) in his analyses. The goal was to determine if these descriptive factors explained the occurrence of fish entrapment and the number of fish entrapped.

After running the different models, Russell found that both models identified similar factors affecting the occurrence and number of fish entrapped, but the overall performance of the models was poor (i.e., they explained only a small percentage (<20%) of the total variation in the data). Significant factors included change in top width and thalweg depth, mean discharge, Julian date, mean water velocity, and size of the entrapment.

Members discussed why the models performed poorly and suggested that the poor performance may be related to the assumption that juvenile Chinook are available to colonize all areas where entrapments would be created. That is, some entrapments may have had no entrapped Chinook because there were no Chinook in the area at the time the entrapment was formed. Thus, the availability or presence/absence of juvenile Chinook may have affected the probability of a fish being entrapped.

Russell concluded his presentation by identifying the M&E and mitigation work that Grant PUD will continue to do. M&E includes annual flow monitoring and reporting, and productivity assessment. Mitigation includes managing flows under the HRF CPPA and the annual production of one million fall Chinook fry at the Priest Rapids Hatchery.

Russell asked the group if they had any questions or concerns about the stranding and entrapment work and analyses. Members indicated that they understood and accepted the results from the stranding and entrapment work and acknowledged the difficulty in trying to model or predict the effects of stranding and entrapment on juvenile Chinook. Paul Hoffarth indicated that productivity in the Reach is high, adult returns are meeting or exceeding escapement goals, the group has done their best to understand stranding and entrapment effects, and the effects of stranding and entrapment appear to be minimal.

Russell indicated that he will include his modeling work in the draft final report, which will be available to the FCWG for review in November.

Density Dependence – Last month, Russell Langshaw gave a presentation on density dependence and limiting factors for fall Chinook in the Hanford Reach. The FCWG asked if they could think about the work that Russell presented and provide comments or feedback during the October meeting. Tracy Hillman asked if anyone had comments on the density dependence work or on the outline for the final report. No one had comments on the outline or the density dependence work. It was pointed out that the Independent Scientific Advisory Board will release their report on density dependence in fish in the Columbia River basin early to mid-2015.

Peter Graf said that if anyone has concerns with the outline, density dependence, or stranding and entrapment, they need to provide those concerns as soon as possible. Peter described the timeline for the completion of the final report:

- November—Fall Chinook monitoring and evaluation plan and draft final report and IFS/IFP to FCWG (begin 90-day review)
- December-January—Targeted discussion on report topics

- February—Comments on draft final report are due
- March—Report revisions and responses to comments
- April—Final report and IFS/IFP due to Ecology and FERC

VII. HRWG Activities

Hanford Reach Annual Report – Peter Graf indicated that the monitoring team has reviewed the Hanford Reach Annual Report. The report is currently going through internal review. It should be available to the FCWG/HRWG for their review by the end of the week.

Hatchery Operations - Todd Pearsons said that they are adjusting their monitoring efforts to accommodate the large number of returning fall Chinook. He also noted that broodstock collection is on target. Paul Hoffarth said that he is seeking volunteers to help collect untagged fall Chinook from the Hanford Reach on 24, 25, and 26 October. They will use hook-and-line to catch Chinook. The goal is to collect 500 untagged fish for the hatchery program. As a final note, Todd said that the 2013 Hatchery M&E Report is in final draft and will be shared with the FCWG/HRWG when it is available.

Last month, Paul Hoffarth shared with the Group that the New Zealand Mudsnail (an invasive exotic species) has been identified in the Ringold Hatchery. Paul stated that it will be very difficult to eradicate it from the hatchery, because the mudsnail is in the springs that feed the hatchery.

Hanford Reach Tours – Tracy Hillman asked the group if they wanted a tour of the Reach this year during peak spawning. The group indicated that they did not want a tour this year. Paul Hoffarth said that if anyone wants to see the Reach, they can volunteer to help collect untagged fall Chinook on 24, 25, and 26 October. They will be able to see the Reach and collect fall Chinook with hook-and-line. People can also attend the Vernita Bar spawning ground surveys on Sundays.

CRITFC and Battelle Presentations – Tracy Hillman asked the group if they would like to see presentations from CRITFC on their 2014 tagging studies and from Battelle on their predation studies. The group indicated that they would like to have CRITFC and Battelle provide presentations. Because of other pressing agenda items in November, the presentations will be given during the December meeting.

VIII. 2014 Return-Year Studies and Funding Opportunities

High-Escapement, Density-Dependence Studies – Geoff McMichael reported that he received funding from the Alaska Department of Fish and Game to use standardized snorkel surveys and photographs to evaluate egg loss due to redd superimposition. Geoff also noted that his proposal to assess spawning density and emergence of fall


Chinook in the Hanford Reach made it through the first round of the Northern Fund Process. He will now submit a full proposal to them.

Russell Langshaw said that the proposals he submitted to the Northern Boundary and Transboundary Rivers Restoration and Enhancement Fund and to the National Science Foundation will not receive funding. He intends to submit a proposal to the LOA Process. Russell commented that the Mission Support Alliance has purchased a camera and likely has funds to take photos during the aerial surveys. At this time Russell did not know how many photos they plan to take and whether they will be processed or archived.

- IX. Next Meeting:** Tuesday morning, 4 November 2014 at Grant PUD in Ephrata, WA.


Attachment 1

Presentation by Tom Dresser on Wanapum Dam Issues



**PRCC-HCP
Briefing**

October 6, 2014



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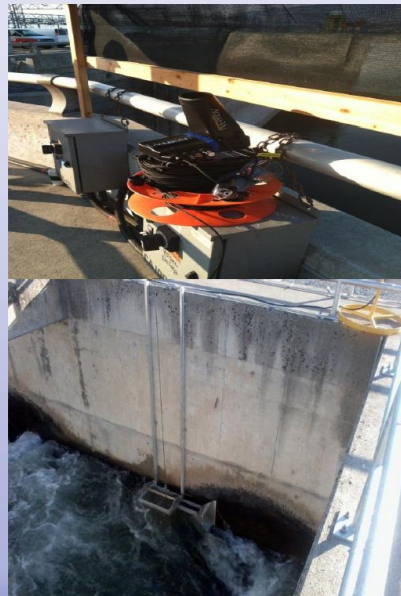
Wanapum Fishway Exit Passage System Debris/Aquatic Vegetation

Maintenance dives on left and right bank fish ladder exit pump screens are continuing - LB cleaning is occurring every other day. Multiple cleaning dives/day has also been necessary



Adult Pacific Lamprey - Passage

- A total of **7,253** adult lamprey have been documented via the video count system passing through Priest Rapids Dam (**9/30/14**);
- **2,463** adult lamprey were transported upstream and released above Rock Island Dam (**9/30/14**);
- Approximately ~34% of the adult lamprey migration was trapped-n-transported upstream of Rock Island Dam.
- To date a total of **4,831** adult lamprey have either volitionally passed through the PR Project or have been trapped and transported upstream of Rock Island.
- At this time, ~66.6% of the adult lamprey migration has either volitionally migrated or has been trap-n-transported upstream of Rock Island Dam

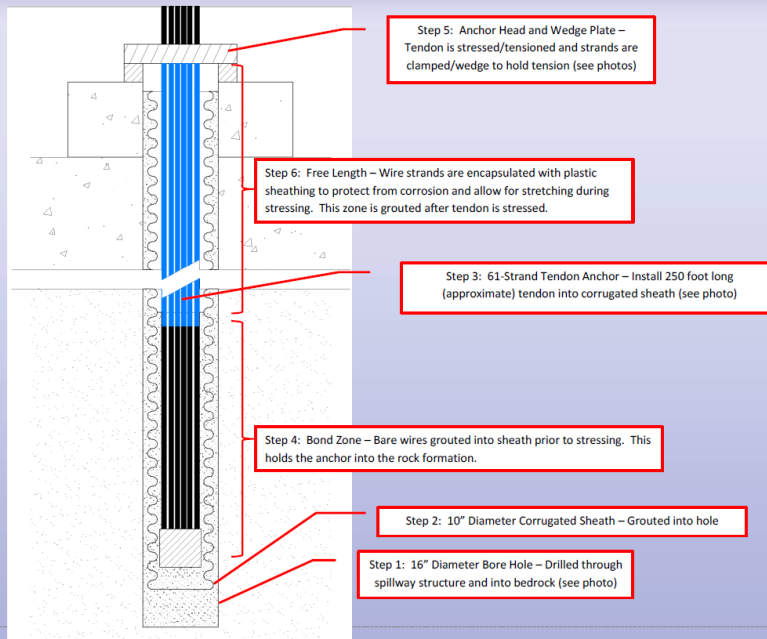


Construction status

- 29 of 37 required 4" pilot holes completed;
- 11 of 37 16" full sized holes completed (5 in progress);
- 7 of 37 10" sheaths installed and grouted;
- 6 of 37 tendon installation and tensioning;



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5

Drilling 16" Diameter Bore Hole



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Inserting tendon anchor



Stress the Anchor



“Locking Off” the Anchor Head



11

Intermediate Pool Raise

- Still expected in the end of Q4 2014
- After more construction, refined timeline



Refill Plan

- As of 10/3/2014, Grant PUD has drilled 12 of the original 13 tendon holes required for the pool raise to the full diameter and the full depth. The last one of the original 13 holes was drilled out to full depth at the 10" diameter as of 10/3/2014.
- However, FERC has required Grant PUD to drill 2 additional holes (1 Monolith 1 & 13). These are the half Monoliths on each end of the spillway.
- As a result of the meeting on September 35-26 a re-draft of the refill plan will be required.
- Key elements of the plan remain
 - Refill elevation 558'-562'
 - Total refill ~17' at maximum of 3'/day
 - Data collection and analysis collected along the way
 - Pending start date (late 4th quarter - likely, 2 to 3 weeks to reach 561.5')
- Potential change in refill plan
 - May not need 3 set and hold points
 - May be able to do steady refill with monitoring along way

Attachment 2

Presentation by Russell Langshaw on Factors Related to Stranding and Entrapment of Fall Chinook in the Hanford Reach



Final Report Outline

IFS/IFP and Future Monitoring

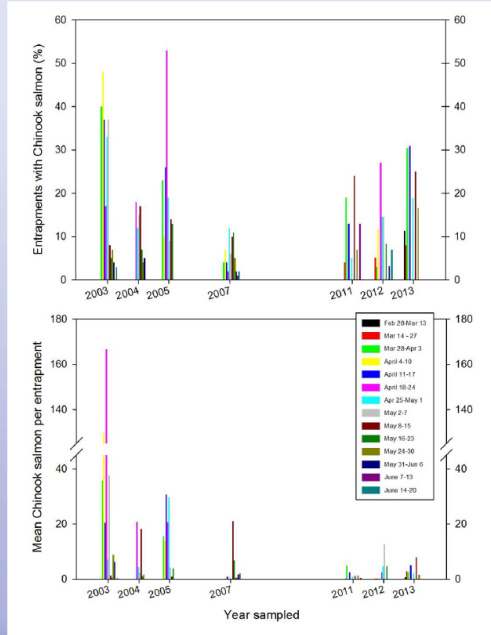
- 1. Introduction**
- 2. Conceptual Framework for the study plan**
- 3. Flow Conditions in the Hanford Reach**
- 4. Productivity Assessment and Related Studies**
- 5. Annotated Bibliography and Recent Studies**
- 6. Synthesis of mechanisms for high productivity**
- 7. Adaptive management, future monitoring, and the HRF CPPA**

Stranding and entrapment in the Hanford Reach

- Studies began in late 1990's
 - Some level of sampling during 12 years
- Concern intensified in 2001
- Reach-wide sampling began in 2003
- HRF CPPA required monitoring 2011-13
 - Based on methods from 2007 study

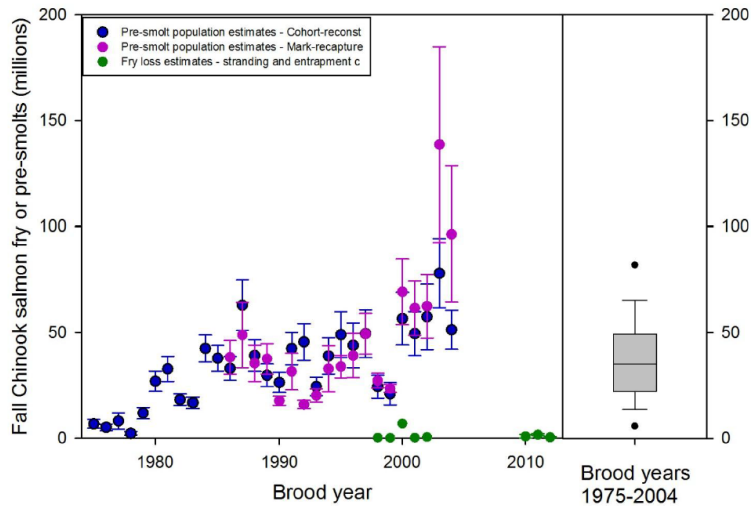
Difficult study conditions

- Sampling logistics
 - 90 kilometers
 - 13,118 known entrapments
- Not normally distributed
 - Approximately 90% don't have fish
 - Abundance 0-15,270
- Two-stage stratified random sampling design



Stranding and entrapment estimates

Pre-smolt population and fry loss estimates with one SD error bars



Conclusions

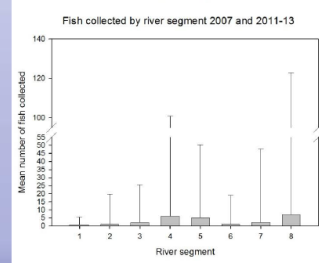
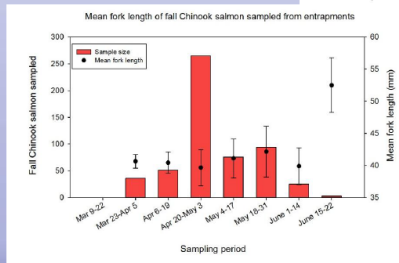
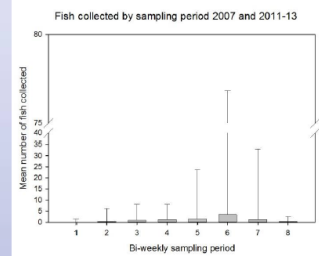
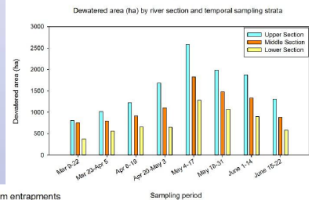
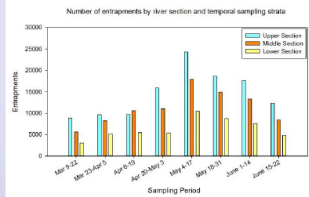
- **Context for loss was critical**
 - Relatively small percentage of total production
 - Consistent with fry mitigation requirement in SSSA
- **Refined sampling design was more robust**
- **Variables related to stranding/entrapment not correlated with productivity**
- **Produced rich datasets**
 - Data mining could provide additional insight

Data mining approach

- **Use existing datasets 2007 and 2011-13**
 - Sampled entrapments and juveniles collected
 - Location and timing
 - Flow conditions and dynamics
- **Statistical techniques appropriate for data structure**
 - Zero-inflated models
 - Hurdle models

Factors for stranding and entrapment

- Location
- Season
- Fish size
- Dewatered area
- Others?



Data mining variables

- **Entrapment**
 - Size, location, and timing
 - Juvenile presence and abundance
- **Conditions at quadrant**
 - Entrapment clusters
 - Mean discharge, velocity, river depth
 - Flow dynamics
 - Duration wet and dry
 - Magnitude of change before and after

Statistical methods

- **Hurdle model**
 - Two stage process and can have different mechanisms
 - One factor can affect being entrapped
 - Second factor can affect the number of fish in an entrapment
- **Conceptual example**
 - First factor may be location
 - Entrapments more likely to contain fish in primary rearing areas
 - Second factor may be size
 - Large entrapments more likely to contain greater numbers of fish

Statistical methods

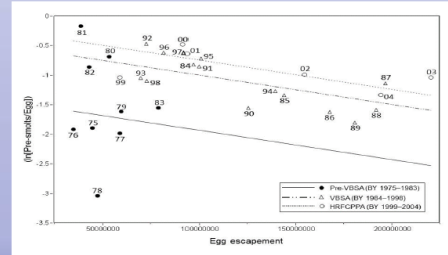
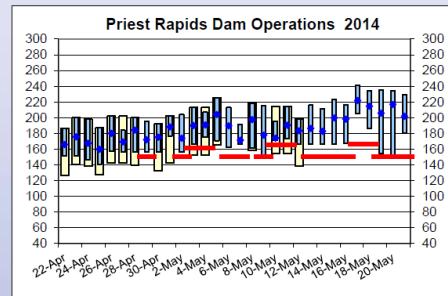
- **Zero-inflated models**
 - Two stage process to account for “excess” zeros
 - One factor can affect opportunity to be entrapped
 - Second factor can affect the number of fish in an entrapment
- **Conceptual example**
 - Inflation factor may be timing
 - Some zeros are because fish few are present during some times
 - Second factor may be size
 - Large entrapments more likely to have more fish

Results from Data Mining & Modeling

- **Both approaches identify similar factors**
 - Change in top width and thalweg depth – combinations of channel morphology and stage change
 - Mean discharge – combination of timing and number of entrapments created
 - Julian date – timing of susceptibility
 - Mean velocity – Combination of channel morphology and timing
 - Size
- **Predictive performance is poor**
- **Methods and results to be summarized in draft IFS/IFP report**

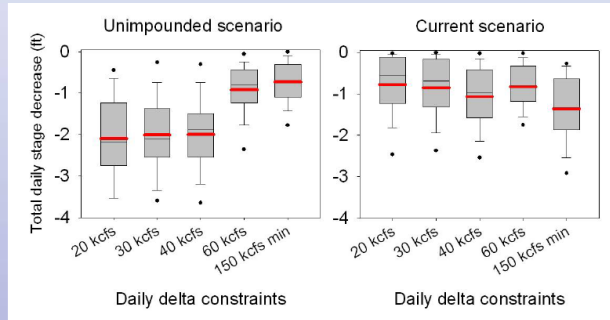
Stranding and Entrapment Monitoring & Evaluation

- **Annual flow monitoring and reporting**
- **Productivity Assessment**



Stranding and Entrapment Management & Mitigation

- **Flow management**



- **1 million PRH fry**
– **Converted to 275k smolts**

Timeline

Month	Report Review and Discussion Topic
August	<ul style="list-style-type: none"> • Outline of Final Report and IFS/IFP
September	<ul style="list-style-type: none"> • Density dependence review
October	<ul style="list-style-type: none"> • Stranding and entrapment summary
November	<ul style="list-style-type: none"> • Fall Chinook monitoring and evaluation plan • Draft Final Report and IFS/IFP to FCWG <ul style="list-style-type: none"> • 90 day review
December-January	<ul style="list-style-type: none"> • Targeted discussion on report topics, TBD.
February 2015	<ul style="list-style-type: none"> • Comments due
March 2015	<ul style="list-style-type: none"> • Report revisions, response to comments
April 2015	<ul style="list-style-type: none"> • Final Report and IFS/IFP due to Washington DOE and FERC