

FINAL - Meeting Summary Notes
Lewis River License Implementation
Engineering Subgroup
December 19, 2007
Fish Passage Meeting Notes

Subgroup Participants Present: (14)

Will Shallenberger, PacifiCorp
Todd Olson, PacifiCorp
Arnold Adams, PacifiCorp
Frank Shrier, PacifiCorp
Bryan Nordlund, NOAA Fisheries (NMFS)
Jim Stow, USFWS
Eric Kinne, WDFW (Merwin portion of meeting)
Dana Postlewait, R2 Resource Consultants
Peter Christensen, R2 Resource Consultants
Suzanne Picard, R2 Resource Consultants
Ken Bates, Kozmo
Monty Nigus, Black & Veatch
Brian Friesz, Black & Veatch
Dennis Anderson, Black & Veatch (Via phone & Net Meeting, Merwin portion of meeting)

ADMINISTRATIVE

Welcomed attendees and reviewed agenda. Todd Olson updated the group on the status of the FERC licenses. There have been no changes to the license schedule since the previous meeting. For planning purposes, the tentative issuance date is still April 1st. All four Lewis River project licenses will be issued separately, but on the same date.

Bryan Nordlund brought a copy of Smith and Carpenter's "Salmonid Fry Swimming Stamina Data" to the meeting. PDF copies were distributed to all interested parties, and the original returned to Bryan. Additional PDF copies will be available from PacifiCorp via email request to Kim McCune.

Two future meeting dates were rescheduled due to conflicts. The April meeting is now scheduled for April 24th, 2008 (moved from April 23rd). The August meeting is now scheduled for August 28th, 2008 (moved from August 27th).

The group will meet at NHC's Sea-Tac facility to view the physical model on January 24th, 2008 [Post meeting note as of 12/20/07 – a request was made to move this meeting date to January 25th].

General Meeting Handouts:

Distributed via email on 12/12/2007 by Kim McCune:

- Meeting agenda for 12/19/2007 subgroup meeting
- Copies of the draft 11/02/2007 subgroup meeting notes

Distributed at meeting 12/19/2007 (paper copies):

- Meeting Agenda for 12/19/2007 meeting
- Copies of the 11/02/2007 subgroup meeting notes

FUTURE MEETING DATES

Future meeting dates were presented to the group for review, as follows:

- January 30, 2008
- March 14, 2008
- April 24, 2008 (new date!)
- June 4, 2008
- July 16, 2008
- August 28, 2008 (new date!)

OTHER ADMINISTRATIVE ITEMS

- None.

MERWIN TRAP PROJECT

Handouts

- Merwin Upstream Trap – Draft Study Plan, September 2007
- Figure 2 – Merwin Fish Run Timing
- Figure 1 – Daily Average Flow Below Merwin Project 1959-2006
- Merwin Trap Entrance – Submerged Weir Calculations
- Merwin Trap – Velocity Profile Through Pool 1
- Merwin Trap – Overall Plan View of the Pump Room and Pump Bay Entrance
- Merwin Trap – Pump Room – Plan View – With Gates Set to Low Tailwater
- Merwin Trap – Alt PR-3 and PB-3 Profile (hand sketch and calculations)
- Merwin Trap – Trap Closure Procedures – ACC-ES Discussion Draft
- Merwin Trap – Model Layout Drawings from Northwest Hydraulic Consultants
- Merwin Trap – Underwater Study (updated bathymetry)
- Merwin Trap – Sorting Facility Ground Floor Plan
- Merwin Trap – Sorting Table Layout and Fish Tube Optimization Calculation Package (to Shrier and Kinne only)

Presentations

- None.

Review of Previous Meetings' Merwin Action Items: See status summary table below.

No.	SUMMARY OF PENDING MERWIN ACTION ITEMS (remaining from previous Meetings)	STATUS
M40	PacifiCorp/B&V/R2 (Adams, Nigus, Postlewait) Continue development of trap and water supply options.	Remove from list, will be addressed in 30% submittal.
M45	Black & Veatch/R2 (Nigus/Postlewait) Continue analysis of a construction staging schedule following further design development. The outage window has been defined.	Remove from list, will be addressed in 30% submittal.
M57	Black & Veatch/R2 (Nigus/Postlewait) Provide updated flow diagram based on completed water analysis spreadsheet.	Remove from list, will be addressed in 30% submittal.

M58	Black & Veatch/R2 (Nigus/Postlewait) Provide update design concepts for attraction flow pump station intake and bar rack.	Remove from list, will be addressed in 30% submittal.
M60	NMFS (Nordlund) Provide a copy of “Smith & Carpenter, 1987” to Frank and Dana.	Done.
M61	PacifiCorp (Adams) Coordinate a second survey effort to fill in the gaps in the bathymetry.	Done.
M62	R2 (Postlewait) Determine the range of entrance angles to be evaluated by the physical model. Provide this information to Northwest Hydraulic Consultants.	Pending.
M63	R2 (Postlewait) Provide hydraulic velocity profile through entrance pool to Jim Stow and team to address concerns about how flow will enter through diffusers into the entrance pool.	Done today.
M64	R2/Black&Veatch (Postlewait/Nigus) Review model dimensions and provide feedback to NHC by Thursday, November 6, 2007.	Done.
M65	NHC (Hughes/Larson) Begin construction of the physical model.	Done.
M66	PacifiCorp (Shrier) Review past meeting notes to clarify the agreed-to target Adult Trap Efficiency.	Done, see Note 1 below.
M67	PacifiCorp (Shrier) Provide a copy of the Quinn report 2005 to Eric Kinne and Bryan Nordlund.	Done.
M68	PacifiCorp/R2 (Shrier/Keefe) Add definition section to Draft Tailrace Study Plan.	Done.
M69	WDFW (Kinne) Eric will provide a summary of recommended truck disinfection protocols at the next subgroup meeting.	Done, see Note 2 below.
M70	WDFW (Kinne) Provide input to the vee-detector location with the sorting table.	Done today.
M71	R2/B&V (Postlewait/Nigus) Brainstorm means to short cut the path of fish destined for the small tanks and coordinate with Eric Kinne.	Done today.

Note 1 – This action item has technically been addressed insofar as the previous meetings’ minutes have been reviewed. However, the notes did not reflect an agreed-upon ATE. The ACC indicated that for current design purposes the Engineering subgroup should use a 95% ATE, provided the subgroup indicated that they could design to that goal. An official design target ATE has not yet been identified. This issue is not critical, since the subgroup agrees that a slight difference in goal ATE will not affect any design issues. Regardless of design target ATE, the group’s goal is to use its combined expertise to provide the best, most effective fish facility reasonably possible. Shrier needs to circle back with the ACC to discuss this and obtain consensus.

Note 2 – Instead of having Eric Kinne provide a summary of recommended truck disinfection protocols to the group, R2/PacifiCorp have agreed to draft a protocol for WDFW review. This action item will be removed from the list and a new action item, M72, will be added to the list to reflect this change.

Additional Comments on Last Meeting’s Merwin Notes:

- o Page 7 – Strike the phrase “(Note in the draft document – this is a guideline)” from the second bullet under the heading ‘Merwin Upstream Trap – Draft Study Plan.
- o Page 7 – Delete the comment: “This is out of place – not an additional comment I provided, per the lead in language preceding these bullets.
- o Page 8 – Delete the bullet that reads: “Egg viability with electro-anesthesia: Frank will provide a copy of the Quinn study to Eric Kinne.”

With the above changes, the last meeting notes can be published as final.

MERWIN TRAP AGENDA TOPICS

Discuss Tailrace Study Plan Comments

Frank Shrier presented his findings of his additional analysis of the hydrology fish collection numbers based on past project data. The following points were noted and discussed.

- o Merwin Flows are less than 6,000 cfs, 68% of the time.
- o According to Frank’s analysis, 90% of the fish that are currently captured at the trap are captured when flows are below 6,000 cfs, with only the existing 33 cfs attraction flow.
- o Currently, the fish trap is not operated during high flow events. There are two reasons the trap is closed during high flows: (1) water levels in the tailrace are above the maximum elevation of the fyke and weir, so flow can spill over the top, and (2) high water levels in the trap make it unsafe to remove fish and maintain operations.
- o There were two conclusions drawn from this analysis and discussion:
 - The draft Tailrace study plan shall remain a “draft” so it can be tailored to reflect what the group learns during the physical model tests and design phase.
 - The plan will define the ACC agreed upon ATE, how the ATE will be measured, and what other metrics to use to evaluate trap success. Attraction flow values will remain flexible pending results of the physical model tests.
- o The draft Monitoring and Evaluation (M&E) plan will include a placeholder for the draft Tailrace Study Plan. The plan will not be included in the M&E plan until it is finalized.
- o Frank and Todd will add this topic to the next ACC meeting to continue the discussion. The Engineering Subgroup will continue to work with the ACC to provide input as necessary.

Trap Entrance/Tailrace Physical Hydraulic Model

- o Dana handed out copies of the trap entrance submerged weir calculations to the group. The calculations show predicted submergence for a variety of tailwater and flow conditions. For example, depending on whether the drop across the entrance weir is 1.0 or 1.5 ft, the entrance weir will see either 11.6 or 11.8 ft of submergence at 400 cfs, with a weir width of 6 ft.
- o The maximum entrance weir width, without significant rock excavation, is 6 feet. With a ladder flow of 600 cfs and a 1.5 ft drop across the entrance pool, the calculated submergence on the entrance weir is 16.7 ft at high tailwater.
- o The latest conceptual design of the ladder is shown with 15" slots and a 5-ft wide entrance weir.
- o Adding orifices to the bottom of the ladder weirs may help move fish through the ladder when the ladder is being drained.
- o Adding an adjustable sill to Slot 2 may further help to attract fish out of the entrance pool.
- o The group expressed interest in lengthening the entrance pool diffuser from what is currently shown in order to get a higher velocity near Slot 2.
- o Bryan would like to see calculated entrance pool velocities in excess of 1.5 fps since the entrance pool will act more as a transport channel. The calculated velocity can be either based on cross-section and flow, or continuation of the Slot 2 jet. Other ladder pools shall be designed to vertical slot ladder criteria. Slot 2 shall be configured to propagate the 3 fps jet a good distance into the entrance pool.
- o Jim would not like to see baffles in the ladder, as they would provide resting areas and may delay fish movement through the ladder.
- o Energy Dissipation: Pool volume is not the only tool available to dissipate energy behind the entrance pool diffuser screens. Energy can be dissipated either by burning head through a valve, directing the flow downward into a box, and/or submerging the inlet. It is most important to avoid air entrainment and to distribute flow as evenly as possible through the baffles behind the entrance pool diffusers.
- o The general ladder configuration is on the right track, and comments discussed will be helpful to move the design forward. The next steps will be to use the model as a design tool to refine the entrance pool configuration, then the steps from the entrance pool to the fish loading pool (P4) can be fine tuned.

Physical Hydraulic Model

- o The model construction is progressing on schedule.
- o The initial goal of the physical hydraulic model is to assist in configuring the entrance pool design. After the entrance pool configuration has been set, more detail will be added to the other ladder pools. The physical hydraulic model will initially model the entrance weir at 5 feet, but NHC will be able to make any width weir we like during the Phase 1 testing and design effort.
- o More bathymetry has been collected since the last meeting. Unfortunately, a few gaps in data still exist in the tailrace. The gaps have been filled in with a combination of

information from existing construction drawings and photos. The group is satisfied that the resulting bathymetry is sufficient for use in the physical hydraulic model. The physical model is being built to reflect the most recent bathymetry.

- o The model will be able to model from 100 – 1,200 cfs at either trap entrance.
- o The group looked at photos from the physical model construction. The photos showed a good amount of detail. Roughness has been added to the concrete used in building the model to better reflect actual conditions.
- o The arch under the powerhouse was not fabricated in to the model, as no flow would typically flow under the powerhouse except when the tailwater elevation is changing. It will be “routed in” when the powerhouse model is complete so we have a reference of where the arch is located.
- o Dana and Monty will visit the model on Dec 20th to review the next steps with NHC and provide input to the model before it is finished and watered up.
- o Jim noted that R2/B&V should spot check the bathymetry with the model to confirm it was constructed per the plans.
- o The Phase 1 design effort will be performed during the 2nd and 3rd week in January. An agency review meeting is scheduled for January 24th [Note: meeting changed to January 25th pending confirmation].

Trap Closure Procedures

- o There are two types of trap closures identified: (a) planned maintenance shutdown, and (b) emergency shut-down due to either hopper or fish elevator malfunction.
- o Dana reviewed the draft procedures with the group. The handout titled “Merwin Trap – Trap Closure Procedures” shows the draft procedures. Key discussion topics include:
 - The planned maintenance will allow total dewatering of all four pools to provide personnel access to the entire facility.
 - The emergency shut-down will provide dewatering for pools P2 – P4. The entrance pool (P1), would remain flooded, and fish would have free access to enter or leave P1 until the ladder was restarted.
 - The ladder flow will be reduced to 4 cfs during closure procedures. Possible sources of this 4 cfs include hatchery effluent, a pumped source, the Deluge valve, or a tap off the penstock. The subgroup confirmed that the hatchery effluent is an acceptable water source for the emergency closure or shutdown scenarios.
 - Fish that do not move out of the ladder during draining procedures will need to be manually removed, or crowded down to P1.
 - Staff safety is a key issue. A bulkhead may be needed at Slot 2 to provide an additional layer of protection. Space constraints in the ladder will make adding this bulkhead a challenge. One idea is to float the bulkhead in and then sink it into place by filling it with water. The concept is valid, bulkhead or gate details must provide “clean” hydraulics in the ladder for fish passage.
 - An airtight hatch may provide additional flood protection to the control room during very high flow events and application of this will be examined.

Sorting Facility Update

- o The group reviewed the most recent design updates in the sorting facility design. Changes/updates since the last meeting include:
 - The sorting table design has been changed to address Eric Kinne’s comments from the last meeting, and to provide a more efficient use of space. Moving the hinged portion of the table into the NW corner and eliminating the 2’ wide sloped slide section will help reduce the table’s footprint even more.
 - Dana mapped out the predicted fish handling activities based on the protocols and projected runs. The sorting tubes located closest to the anesthesia baskets will be the most-used. This analysis shows that there is one more tank than the number of tanks required at the peak run. This added capacity provides future flexibility.
 - Eric Kinne and Frank Shrier will review this analysis and coordinate their review with Dana prior to the 30% report.

30% Report Update

- o The 30% Design Report will be provided in January. The purpose of this report is to document the state of the design at that time.

No.	SUMMARY OF PENDING MERWIN ACTION ITEMS (remaining from previous Meetings)	STATUS
M62	R2 (Postlewait) Determine the range of entrance angles to be evaluated by the physical model. Provide this information to Northwest Hydraulic Consultants.	Pending.
No.	SUMMARY OF NEW MERWIN ACTION ITEMS (from December 19, 2007 Meeting)	STATUS
M72	R2 (Postlewait) Develop a draft truck disinfection protocol for WDFW review.	Pending.
M73	R2 (Postlewait) Develop and bring copies of calculated velocity profiles through the entrance pool for a variety of relevant flow conditions to the January 24 th meeting at the NHC facility in Sea-Tac.	Pending.
M74	R2 (Postlewait) Check ladder slot width against anticipated ladder flows.	Pending.
M75	PacifiCorp (Adams) Check capacity of Deluge Valve as possible source of ladder flow.	Pending.
M76	R2 (Postlewait) Verify that the physical hydraulic model correctly reflects the best available topography.	Pending.
M77	WDFW (Kinne) Provide feedback on the revised sorting table layout to R2 by the end of the first week of January so that this feedback can be incorporated into the design prior to the next subgroup meeting and for the 30% report.	Pending.

SWIFT DOWNSTREAM PASSAGE PROJECT

Handouts

- FSC and Guide Net Layout Draft Plan and Sections
- Swift FSC Guide Net Arrangements, CFD model results and evaluation.

Presentations

- Guidance System PowerPoint Presentation by Will Shallenberger.
- Debris Handling PowerPoint Presentation by Will Shallenberger

Review of Previous Meetings' Swift Action Items: See status summary table below (note that Swift was not on the last meeting's agenda and the action items below are from the previous September 27, 2007 meeting).

No.	SUMMARY OF PENDING SWIFT ACTION ITEMS (remaining from previous Meetings)	STATUS
S34	NMFS, WDFW, USFWS (Nordlund, Leigh, Klavas, Kinne, Stow) Provide feedback on the net/curtain arrangements presented on September 27 th , 2007 for discussion at the December meeting.	Done today.
S38	PacifiCorp (Shallenberger) Send the concept net layout drawings that were first distributed at the July 10, 2007 meeting to Jim Stow and Bryan Nordlund via email or a link to the PacifiCorp website.	Done.
S39	PacifiCorp (Shallenberger) Distribute the results of the CFD model run with north-only discharge and wind effects to the subgroup members via email or a link to the PacifiCorp web site.	Still Pending. This model run has not been completed.

Additional Comments on Last Meeting's Swift Notes:

None – Swift was not discussed at the last meeting. The notes can be made final.

SWIFT DOWNSTREAM AGENDA TOPICS

Review Net Comments Discussed at November 2nd Subgroup Meeting

Net Evaluation Objectives

- The term “Guidance System” is meant to include all factors relating to the nets, solid panels, collection enhancement structure, flow patterns, and maintenance procedures meant to support fish guidance into the FSC structure.
- There is some uncertainty in the Guidance System design. However, the overall effect feels positive.

- o Guidance System uncertainty:
 - Fish Behavior – There’s no way to know exactly how fish will react to the guidance system.
 - Debris/Wind – The effects of debris and wind on the effectiveness of the guidance system are fairly unpredictable.
- o Due to this uncertainty, the initial FSC installation will act as a tool to be used to adjust the overall guidance system. The initial FSC design should maintain utmost flexibility to maximize the power of this tool.
- o The purpose of the M&E plan is to evaluate the effectiveness of the FSC. The group is to identify the performance factors (hydraulic and biological) needed to measure the FSC’s effectiveness.
- o There are three main categories of performance factors:
 - Fish Behavior – Including Tracking (How do fish move along the net or curtain?), Diving behavior (Do fish go under the net and if so how soon and where?), Movement (how do fish approach the guidance system and how do they move upon encountering it?), Rejection or Attraction patterns?, Collection time to capture? Etc...
 - Reservoir Flow Patterns – The FSC will not have much influence over reservoir flow patterns. Moreover, reservoir flow velocities are so low that physical measurement is impractical (if not impossible). Flow patterns will need to be evaluated qualitatively, possibly with the use of drogues.
 - Guidance System Integrity – This category includes debris collection, wear and abrasion, net deformation, and net inspection procedures.
- o Possible tools for evaluating performance factors:
 - Radiotags, acoustic tags, debris sampling, regular net inspection, drogues, and Didson cameras, among others.
- o Jim Stow feels that acoustic tags are better suited for this application than radio tags if a partial depth guide net is installed.

Debris Management

- o Will presented an overview of existing debris management practices.
- o Existing debris management practices are very labor intensive. This year, debris management efforts went on for 8 weeks and pulled 700 tons of debris from the reservoir. This accounts for only about half of the debris from the reservoir.
- o Debris is mostly smaller woody debris, though logs as large as 55 inches in diameter are possible. Large pieces of wood are used for restoration projects.
- o Debris is collected from the water’s surface using log booms (“bags”) dragged along between a tug and a skiff. The debris is then pulled onto the bank with the use of a backhoe.
- o Future debris handling:

- In addition to maintaining the current goals of recreation protection and habitat enhancement, the new management practices will need to collect enough debris to allow proper functioning of the fish guidance system, protect the FSC from damage, and minimize problems associated with the fish counters.
- Additional log booms will be necessary. If these booms are located further upstream in the reservoir, then recreational boat access will be an issue. Pass-throughs will be required. The new booms will need to be designed to be effective for more parts of the year than the current boom is. Will showed a few potential locations for booms at the upper reaches of the reservoir, around Devil's Backbone, and at the head of the Swift arm of the reservoir.

Net Discussion/Orientation

- o Coho and bull trout are already spawning naturally in Swift Creek. Consequently, it is important not to cut off Swift Creek Arm from the rest of the reservoir with nets.
- o Jim would like to see exclusionary nets installed first. In his mind, guidance nets are more of a "fine tuning" process.
 - The risk with installing exclusionary nets is that fish which inadvertently make it past the exclusionary nets will become permanently trapped behind the nets. However, some loss of fish may be acceptable as the nets cannot guarantee total fish exclusion.
 - If exclusionary nets are used, they should be located in safe low velocity areas and lead to the closest possible bank location.
- o Another line of reasoning is that guidance nets may teach us more than exclusionary nets, therefore it may be a better plan to install guidance nets first.
- o The team needs to spend more time deciding on the best first step. The possibility of making either guidance or exclusionary nets deployable at will seemed attractive regardless of which type of net was installed first.
- o The maximum design net approach velocity is approximately 0.1 fps, which is even more critical for exclusionary nets. The CFD model results will help determine the final net alignments.
- o A question was raised as to the terminology difference between a Net Transition Structure (NTS) and a Collection Enhancement Structure (CES). Peter explained that in the early design stages it was planned that the initial FSC facility would be installed without nets, and although the design team felt there were still possible collection efficiency benefits associated with a large deep low-velocity entrance it would be silly to call it a net transition structure if there were no nets. That said, there was a different thought process going into the design:
 - NTS – Velocities at the mouth of the NTS that was designed for the Upper Baker FSC were generally equal to or very slightly above the ambient reservoir velocity (approximately 0.1 fps, the velocity going through the net). Flow gradients are not a key attraction characteristic for the NTS in this case, rather as fish are guided along the net in a downstream direction they would simply encounter the opening at the mouth of the NTS.

- CES – Since the CES for Swift was originally sized to operate without nets it was felt that the CES itself needed to attract fish. Therefore, the velocity at the mouth of a CES was set to approximately 0.5 fps, higher than ambient reservoir flow velocities, and much higher than design velocities through a net. The flow gradient was intended to make the FSC “more visible” to migrating fish.
- o Will expressed concern that if the CES entrance velocity is higher than the through velocity of the adjacent net sections the facility will draw water in from the back side of the nets, wasting potential attraction flow. Given that nets are now being considered it may be necessary to redesign the CES geometry, or at least consider some impermeable sections for the closest portions of the net layouts.
- o In response to the statement above concerning the potential for “wasting” potential attraction flow, Ken Bates pointed out that the intake flow to the FSC has very little (no) impact on the overall reservoir flow patterns, and that the flow may not be wasted. In fact, the FSC discharge might be more effective in creating the attraction conditions in the reservoir than the flow intake at the FSC entrance. Consequently, much care should be taken in choosing outlet locations.
- o Peter reiterated that the system he used to rate different net alignments was very subjective and was meant to be a starting point for discussion and comparison of multiple alternatives, not the final word. Regardless, the net rating system would need to be revised if the nets to be evaluated were exclusionary instead of guidance nets.

Sorting Area Layout and Equipment Discussion

- o Peter and Dana presented a computer-generated 3D image of the sorting area to the group. Peter explained the smolt and fry separators as well as the sorting gates and dewatering flume sections.
- o Dana presented two main sorting gate options:
 - Switch Gate – hydraulically operated 2-way gates with either single or double gate surfaces, hinged at the upstream end or downstream end.
 - Flexible Pipe Gate – a mechanically operated flexible pipe gate that shifts the outlet of the pipe to either two or three adjacent flumes. Therefore this can be used for either a 2-way or 3-way gate. This gate may present a more efficient use of space and may allow for faster, more effective switching. Operators with experience with this type of gate also have claimed it is better at passing debris without problems.

No.	SUMMARY OF PENDING SWIFT ACTION ITEMS (remaining from previous Meetings)	STATUS
S39	PacifiCorp (Shallenberger) Distribute the results of the CFD model run with north-only discharge and wind effects to the subgroup members via email or a link to the PacifiCorp web site.	Pending.
No.	SUMMARY OF NEW SWIFT ACTION ITEMS (from December 19, 2007 Meeting)	STATUS
S40	NMFS/USFWS (Nordlund, Stow) Provide additional feedback on the first iteration on net alignments.	Pending.

Meeting adjourned at 3:00 PM.