

**FINAL - Meeting Summary Notes
Lewis River License Implementation
Engineering Subgroup
March 13, 2007
Fish Passage Meeting Notes**

Subgroup Participants Present: (14)

Will Shallenberger, PacifiCorp
Sean Flak, PacifiCorp (for morning portion of meeting only)
Frank Shrier, PacifiCorp
Todd Olson, PacifiCorp
Pat Klavas, WDFW (via phone/web conference, for Merwin portion of meeting only)
Bryan Nordlund, NOAA Fisheries (NMFS)
Jim Stow, USFWS
Peter Christensen, R2 Resource Consultants
Dana Postlewait, R2 Resource Consultants
Suzanne Picard, R2 Resource Consultants
Monty Nigus, Black & Veatch
Brian Friesz, Black & Veatch (via phone/web conference for Swift portion of meeting only)
Lisa Larson, NHC (via phone/web conference for CFD portion Swift Meeting only)
Brian Hughes, NHC (via phone/web conference for CFD portion Swift Meeting only)

ADMINISTRATIVE

Welcome of attendees and review agenda. Frank Shrier said that NMFS is still working on the Biological Opinion (BiOp) for the Lewis River Implementation, and that the latest goal allowing for review time is to get the BiOp to FERC within the next three to six weeks. Allowing 60 to 90 days for FERC review, he is now anticipating that the license issuance is unlikely before the end of July, 2007. Todd Olson will meet with FERC in Washington DC this coming week to provide an overall status report.

General Meeting Handouts:

Distributed via email on 2/9/2007 by Kim McCune:

- Draft review version of 1/30/2007 subgroup meeting notes. Note that this email distribution inadvertently omitted Bryan Nordlund.

Distributed via email on 3/9/2007 by Kim McCune:

- Meeting agenda for 03/13/2007 subgroup meeting

Distributed at meeting 03/13/2007 (paper copies):

- Draft review version of the 1/30/2007 subgroup meeting notes. 8 pages.
- Action list section of the 12/12/2006 subgroup meeting.
- Meeting Agenda for 03/13/2007 meeting

NEXT MEETINGS

The next meetings are scheduled for:

- Thursday, April 26th 2007 – 9:00 am - 4:00 pm, location to be determined.
- Thursday, May 24th 2007 – 9:00 am to 4:00 pm, Merwin Hydro Facility.

UPPER RELEASE CHANNEL PROJECT

Upper Release Channel Handouts

None.

Review of Previous Meetings' Upper Release Channel Project Action Items: See status summary table below.

No.	SUMMARY OF PENDING UPPER RELEASE CHANNEL ACTION ITEMS (remaining from previous Meetings)	STATUS
UR5	WDFW (Leigh) Collect and provide comments on the draft upper release channel design to PacifiCorp.	Pending

Additional Comments on Last Meeting's Action Item List:

- None.

UPPER RELEASE CHANNEL AGENDA TOPICS

Update and General Discussions

- The ACC provided comments on the design and the comments are currently being incorporated into the design for permitting.

No.	SUMMARY OF PENDING UPPER RELEASE CHANNEL ACTION ITEMS (remaining from previous Meetings)	STATUS
UR5	WDFW (Leigh) Collect and provide comments on the draft upper release channel design to PacifiCorp.	Pending
	NEW ACTION ITEMS (From March 13th Meeting):	STATUS:
UR6	WDFW (Klavas) Pat will forward his comments on the Upper Channel Design to Kim McCune.	Pending

MERWIN TRAP PROJECT

Handouts

Distributed at meeting 3/13/2007:

- None.

Presentations

- Sean Flak gave a PowerPoint presentation summarizing recent trap design developments for the group.

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

No.	SUMMARY OF PENDING MERWIN ACTION ITEMS (remaining from previous Meetings)	STATUS
M18	R2/BV/WDFW (Postlewait/Nigus/Kinne) Provide more detail on the fish sorting facility design concepts. Logic diagram for the Sorting Facility to be completed by December 19 th , 2006.	Done
M23	R2 (Postlewait) Develop more detail on the adjustable vertical slot weir entrance alternative at the existing trap entrance. Details to be presented at the next meeting.	Done
M24	R2/B&V/WDFW/USFW/NMFS (Postlewait/Nigus/Klavas/Stow/Nordlund) Conference call on January 9 th to discuss progress on adjustable vertical slot weir entrance alternative and other entrance alternatives prior to the next subgroup meeting.	Done
M25	B&V/R2 (Nigus/Postlewait) Work up more detail on elevator basket/fish loading to be presented at next meeting.	Done (agenda item for this meeting)

Additional Comments on Last Meeting's Merwin Notes:

Bryan Nordlund was inadvertently omitted from the email distribution list for last meeting's notes. He was provided a paper copy of the notes at this meeting. Meeting record will be finalized after Bryan has had an opportunity to review the notes.

MERWIN TRAP AGENDA TOPICS

Fish Trap Concept Development

Development work and a series of meetings (both collaborative with agency representatives and internal) have taken place since the last subgroup meeting. Sean Flak gave a PowerPoint presentation summarizing the results of the meetings and design efforts, and PacifiCorp's preferred approach to the trap development. High points of the presentation include:

- Three main trap options have been developed and confirmed to be feasible since the last meeting:
 - Alt PR1 (Pump Room 1) – Build a fishway entrance at the existing pump room intake (below the control room), with a fish ladder leading to the existing hopper system in the space currently occupied by the pump room and adjacent areas. Fishway would have a deep slot entrance, oriented perpendicular to the turbine discharge.
 - Alt CE1 (Corner Entrance 1) – Modify the existing entrance above the Unit 1 draft tube to accommodate a higher flow entrance. This option could work alone, or could tie into the fish ladder with Alt PR1.
 - Alt PB1 (Pump Bay 1) – Build a new deep slot entrance in the pump bay down along the dam. This option could work alone, or could tie into the fish ladder with Alt PR1.
- Project Limitations of the existing facility have been identified for the various options:
 - Station service capacity is currently limited. There are 800kVA available with the existing station service system (generation, distribution, etc.) for pumping attraction water without a major upgrade to the system.
 - Physical space for pipes and diffusers is limited to some extent for all options.
 - Physical space for pumps is limited.
 - These limitations are not insurmountable, but were considered to help form the basis of building blocks for a phased approach to developing the entrance.
- PacifiCorp has identified Alt PR1 as their preferred option to best meet the trap performance goals in consideration of both trap performance and infrastructure limitations.
 - Construct Alt PR1 with an initial entrance attraction flow capacity of 240 cfs. The flow is based on the 800 kVA station service capacity.
 - Ladder flow leading to the hopper would be about 40 cfs.
 - This option is operable within design criteria for a range of tailwater elevations from minimum tailwater to the 5% exceedance flow in December. The trap could also function above the 5% exceedance flow level (project would be spilling) but in a submerged condition.

- Attraction water would be pumped from new pumps located in the Bay 4 area of the tailrace, and would be routed along the downstream face of the powerhouse in a large pipe.
- Following construction, perform a biological evaluation of the trap performance to determine if the trap will meet the performance goals (details for this evaluation would be developed as part of the Monitoring and Evaluation Plan).
- If biological performance goals are not met, it would be important to determine what the limiting factors appear to be as this option would allow a high degree of flexibility for upgrades, including:
 - Add additional attraction flow to the entrance. Flow up to about 400 cfs could be provided at the PR1 entrance by adding additional power capacity to run the pumps, and avoiding excavation under the control room. Flow up to 600 cfs could be provided with more power capacity and excavation under the control room.
 - Either of the Alts CE1 or PB1 could be added, which may be beneficial if fish are seen to be holding or searching for a passage route away from the PR1 area (towards the Bay 4 area).
 - Flow could be distributed between an alternate entrance and the PR1 entrance in 100 cfs or so increments.
- PacifiCorp would commit to a study plan development, and a design and construction schedule to be ready to move to additional development agreed to by the Engineering Subgroup and ACC.

Following Sean's presentation, Bryan Nordlund expressed the following initial concerns with PacifiCorp's proposal:

- He would prefer to be given a drawing set of the proposal that he could study, rather than try to follow a presentation on the screen. Drawings should include a layout, flows and dimensions, and a profile through the system.
- He is disappointed in the proposed 240 cfs initial flow, as he is concerned this may not be enough flow to adequately attract the fish. He would like to better understand the system limitations, and explore options to overcome these limitations.
- He is concerned about having a phased approach to the trap development and implementation at Merwin. The Settlement Agreement is structured around a phased approach for the entire river system and the Merwin trap improvements are the first step at the mouth of the system. A phased approach at Merwin, if not timed correctly, could have mid- to long-term repercussions for the performance of the upstream projects.
- Bryan noted that the orientation of the 240 cfs attraction jet and its influence on the hydraulic interaction between the turbine discharge at various plant flows and turbine settings would be important to develop further. He suggested consideration of a physical hydraulic model to help put these flows into perspective and to design the best orientation to promote fish attraction.

- The key species of concern is the ability to improve the trap performance for spring chinook, which the previous study shown had moderate to poor performance entering the existing trap.

Following some initial group discussion on the above points, Bryan, Jim Stow, and Pat Klavas requested time for a caucus between the agency representatives. Following their meeting, the agencies presented the following observations.

- They generally liked the idea of flexibility with the options discussed.
- The Agencies would like to see an analysis of what it would take to provide 600 cfs to option PR1.
- While the agencies will not agree at this time to any phased approach before they've had time to thoroughly review Alt PR1, they may look favorably upon a stepped approach involving the following phases:
 - Phase 1 – Build Alt PR1 with 600 cfs capacity.
 - Phase 2 – Adding a second fishway entrance and splitting a total 600 cfs between the two entrances.
 - Phase 3 – Adding flow in excess of 600 cfs to either of the 2 entrances. Jim noted that Phase 3 would not be needed if the project was successful at either Phase 1 or Phase 2.

The group also discussed alternatives to the power supply limitations.

- Jim Stow suggested the team look into the use of turbine-pumps, or hydraulically driven pumps that could provide the attraction flow without the need for electrical system upgrades. Goal would be to use a high head, low flow turbine to drive a high flow, low head pump to provide the attraction flow. Wells Dam on the Columbia River uses this technology.
- Jim also suggested using water from the forebay, with a cone valve or other means to dissipate the energy to provide the flow.

Expectations for flow redundancy were discussed for any of the water supply alternatives.

- Full redundancy for the fishladder and hopper flow is desired.
- Redundancy for the attraction flow should be discussed in the future when options for a firm entrance and attraction flow proposal are better defined.

Todd Olson noted that there is a time window available prior to full upriver production that may accommodate time for a study and adjustments to the proposed trap before the first supplementation fish return as adults. It may be possible to use this window to jump-start a phased approach without impacting the supplementation run. Points discussed with this topic included:

- Bryan noted that his primary concern with a phased approach is the time it takes to implement studies and the potential impact on the overall implementation phase of the upper basin restoration.
- Bryan stated that he would be more comfortable with moving up the schedule to accommodate evaluation of a 240 cfs entrance, and be able to ramp up flows if necessary prior to year 4.5 so any time delay won't impact the supplementation fish.
- Bryan would like any phase approach to eliminate uncertainty with the schedule.
- Todd noted that the SA was built on a realistic time schedule, and he acknowledged that there is not much if any float in the schedule. He would prefer to focus on the life cycle timing of the fish when considering a phased approach to the entrance development, and would be an advocate of examining the schedule needs closer if the phased implementation would be considered.
- PacifiCorp discussed the possibility of adding a phase prior to the Phase 1 suggested by the Agencies. This phase would entail constructing PR1 at 240 cfs with the capability to go to 600 cfs by upgrading the power supply pumps in a timely manner.
- Ken Bates noted that he would recommend block testing of the entrance during the first year of operation, to enable a rapid evaluation and eliminate uncertainty with the many variables to consider. A solid evaluation plan with a well defined schedule and goals would need to be an integral part of a phased development approach.
- Frank Shrier provided a good summary of the acclimation fish program so the group better understood the ACC's goals with this program.

Jim Stow summarized the following action plan for consideration:

- Provide details on Alt PR1 to show how 600 cfs could be achieved. This analysis should illustrate how 240 cfs could be tested early, and expanded to 600 cfs.
- Investigate use of a turbine driven pump to help reduce the impacts to the electrical system with the existing station service.
- Outline a plan for an early implementation test of the 240 cfs proposal.
- Look into use of existing redundancy of the station service limitations.
- Further develop diffuser options to introduce flow to the PR1 entrance pool.
- Consider design details and development for the attraction jet.
- The agencies would be more comfortable with an initial design value of 600 cfs, with the ability to throttle the flow back if performance tests indicate this is acceptable.

The following design details were also discussed.

- NMFS diffuser criteria are 0.5 ft/s for floor diffusers and 1.0 ft/s for wall diffusers, provided the wall diffusers are aimed in a way to enhance fish navigation to the bypass route. Ken Bates questioned whether this criteria was reversed. Bryan indicated that it was not.
- Bryan stated that diffuser velocities of up to 1.0 ft/s could be used at this site given that the flow would be coarse screened (to smaller than the diffuser opening size), as long as the top of the diffusers was submerged.
- The orientation of the attraction jet and its interaction with the turbine discharge at various plant settings is an important design consideration. A physical model of the tailrace and trap entrance would be a helpful tool to design the trap configuration and diffuser layout. For example, there may be an optimal design consideration between flow amount and the attraction jet's entrance angle.
- Agencies would need compelling information to support initial development based on non-conventional criteria (such as lower attraction flow than the NMFS guidelines). A physical hydraulic model would be one means to provide this type of information which NMFS could support.
- It was discussed that a study of similar fish traps in the region may provide insight on the effectiveness of attraction flow as a percentage of peak design flow.

Todd Olson thanked the group for their input, and noted that this is the type of information and discussion PacifiCorp had hoped to get from this meeting.

The meeting then shifted to other design details with the upstream facility.

Fish Lift and Crowder

Dana Postlewait gave an overview of the fish crowder system envisioned for the PR1 ladder and fish hopper loading system. The group reviewed a plan and profile of the system.

- The goals of the loading system are to operate the hopper in an automated, 24 hours/7 days a week mode that will supply the pre-sorting pond sized to accommodate one-half day of a peak run.
- Available buffers to accommodate peak loading include:
 - Holding fish in the pre-sorting pond.
 - Holding fish in the fishway ladder and loading pool.
 - Closing the trap entrance and holding fish in the tailrace.
- Details of a crowder that would load the fish into the hopper were described. The crowder would either move up and down, and back and forth to load the fish as shown on the drawings, or as Ken Bates suggested could have a closing v-trap section that would

eliminate the need to move up and down. The group agreed that the v-trap option is the most preferred and should be developed further.

- A fully redundant crowder and fish lift option was examined by splitting the existing hopper volume and fish loading system into two lifts (in the existing space). An 8-minute load cycle would be necessary for each of the two hoppers.
- Dana asked the group their opinion on whether a dual-basket lift would be desirable with a narrower (3-foot wide) entrance channel, as compared to a wider (6.5-foot wide) entrance channel with a single hopper basket. Full redundancy would not be possible with a single hopper, but critical spare parts could be maintained on-site to accommodate quick repairs should the system break down.
- The group agreed that a wider entrance channel with a single hopper would be better, as fish may get spooked in a narrow channel.
- Dana also provided a sketch of the hopper to transport flume/pipe transition. The group agreed with the concept shown, that is intended to more slowly introduce fish volitionally into the pipe as the hopper (with a sloped floor) slowly rises the last couple of feet to transfer fish into the flume/pipe.
- Given the general approval of the crowder concept, Dana noted that the need to have a fixed water surface elevation in the hopper loading pool is likely not necessary. This may eliminate the need for two of the fishway pools, and could provide more space for diffusers in the fishway section of the trap entrance (to avoid excavation under the control room).

Sorting Facility

- Design on the sorting facility is temporarily on hold until the Lewis River Hatchery Pond 15 sorting facility design is further along. The two sorting areas have similar issues and configurations so much can be learned from the Lewis River design.

PENDING ACTION ITEMS

The following table provides a summary of all pending action items for the Merwin project.

Merwin: Meeting Action Item Summary

No.	SUMMARY OF PENDING MERWIN ACTION ITEMS (remaining from previous meetings)	STATUS
-	None	-
	NEW ACTION ITEMS (from March 13 th Meeting)	Status
M26	PacifiCorp (Flak) Provide Agencies with hard copies of PacifiCorp's preferred alternative (PR1) for review and comment. Package is to include general layout drawings and flow distribution	Pending
M27	PacifiCorp/R2/BV (Flak/Postlewait/Nigus) Move forward on option PR1 designed for 600 cfs, showing diffuser details to allow various attraction flows.	Pending

M28	PacifiCorp/BV/R2 (Flak/Nigus/Postlewait) Look at the possibility of using a hydraulically-powered pump to supply attraction water to the fish trap.	Pending
M29	PacifiCorp (Shrier/Flak) Look at what early implementation testing could be done at the PR1 entrance to move through a phased approach most effectively.	Pending
M30	PacifiCorp/R2/BV (Flak/Postlewait/Nigus) Look at different diffuser configurations, including locating diffusers in pool 2 or other pools of the fish ladder to avoid excavation under the control room.	Pending
M31	PacifiCorp (Flak) Refine the overall trap development proposal and provide supporting information for a new trap development proposal.	Pending

SWIFT DOWNSTREAM PASSAGE PROJECT

Swift Downstream Passage Handouts

- Graph titled Swift Reservoir Elevations 1993-2006, 1 page, 8 ½ x 11.
- Swift Dam Downstream Passage On-Board Fish Sorting & Holding Preliminary Sorting Layout Plan, dated March, 8, 2007. 4 pages, 11 x 17.
- Swift Downstream Fish Passage – Fish Handling Process Diagram (with markups), dated March 13, 2007. 1 page, 8 ½ x 11.

Presentations

- Will Shallenberger ran through a PowerPoint presentation showing recent CFD model runs and findings.

SUMMARY OF PENDING SWIFT ACTION ITEMS (Remaining from Previous Meetings):		STATUS:
S21	WDFW/USFWS/Kozmo/R2 (Klavas, Weinheimer, Stow) Review the holding volume calculations provided at the January 30, 2007 meeting. Provide comments to R2.	Done.
S23	Subgroup (all) Provide feedback on FSC Design Criteria as presented in the document “Biological and Hydraulic Facility Design Criteria – Draft” distributed at the December 12, 2006 meeting. Please provide comments to Peter Christensen.	Done.
S26	PacifiCorp/NOAA (Shrier/Day) Frank to discuss with Michelle what the ultimate destination of fry caught in the FSC should be.	Pending completion of Biological Opinion.
S27	WDFW (Kinne) Eric to forward email on catchable size fish and required grating gaps to group.	Pending
S29	PacifiCorp (Shallenberger) FSC Design Criteria and Evaluation Table: Combine the “Initial Adjustments” and “Secondary Adjustments” categories into one category labeled “Potential Facility Adjustments”. Distribute updated table to the group for comments.	Done
S30	PacifiCorp (Shallenberger) Send a file copy of the CFD model presentation on a CD to Curt Leigh and Bryan Nordlund for their review.	Done
S31	All (Subgroup) Provide comments and feedback on CFD model result to Lisa Larson to help guide future model runs.	Pending, discussion will be ongoing until 30% submittal.
S32	R2 (Christensen) Provide a copy of the biological evaluation of the Hidrostal pump at A-Canal to Bryan Nordlund.	Done

Additional Comments on Last Meeting's Action Items List: None.

SWIFT DOWNSTREAM AGENDA TOPICS

Review 1/30/2007 Meeting Notes

- Bryan Nordlund was inadvertently omitted from the email distribution list for last meeting's notes. He was provided a copy of the notes at today's meeting. Meeting record will be finalized after Bryan has had the opportunity to review the notes.

CFD Model

- Two new CFD model runs have been completed since the last subgroup meeting.
 - New Run #1: Powerhouse off, reservoir surface elevation 900 ft, all discharge gates on the north side of the FSC.
 - Results: Gyre in north arm of reservoir is maintained and the FSC entrance is barely visible.
 - New Run #2: Powerhouse on at flow of 8115 cfs, reservoir surface elevation 900 ft, discharge gates on both the north and rear of the FSC.
 - Results: Approach channel surface velocities are high at greater than 1.5 ft/s, gyre is not as clearly visible.
- Will noted that these runs represent an extreme lower bound for the reservoir elevation, pointing out that since the change of operations at Merwin in 1993 the Swift reservoir has never been down to Elevation 900 ft (see handout of Swift Reservoir Elevations 1993-2006).

FSC Access and Location

- Two main access options:
 - Marine Railway
 - Presents significant operation and access complications and is currently not PacifiCorp's preferred choice.
 - Trestle and Dock
 - Currently under constructability review with contractors.
 - Piles would be greater 100' tall and founded into rock
 - This is currently PacifiCorp's preferred method for supporting and accessing the FSC (pending the contractor reviews) as it greatly simplifies the operation and maintenance.

- Since the Trestle and dock option is the preferred option, sorting options have been developed based on that option.

Sorting and Transfer

- Active Separators have been modeled after the Cowlitz Falls installation.
- The design as shown in the drawings handed out can be amended to eliminate one of the smolt gates by combining the subsampling control gate with the coded wire tag gate.
- Coded Wire Tag Detectors:
 - There is a concern that debris may get caught in the CWT detector due to the constriction at its entrance.
 - Design needs to provide access to all components to mitigate debris issues.
 - CWT detector may be moved downstream of the subsample gate to reduce the amount of debris it encounters, but this would then require that a second gate and return flume dedicated to the CWT be reinserted into the system (see first sub bullet above).
- Current design provides twice as much fry holding capacity as needed. Amend design to cross-connect smolt flumes to fry tanks to take advantage of this added space for smolt storage. Also, it was suggested that possibly the fry and smolt tanks could be the same size for flexibility of operations.
- Add a second-level deck to the current design to provide space for sampling activities at the top of FSC deck elevation.
- Smolt tanks are currently sized for long-term holding of the same number of fish as can be placed in an 1800 gallon truck. There are two sets of these tanks to allow for continuous collection of fish. There is sufficient capacity to hold 2 truckloads of fish on board. The peak design day is the equivalent of 7 truckloads of smolt.
- The walls on the fish separator are currently high to provide flood protection inside the FSC in the event of a power failure resulting in shutdown of the primary and secondary dewatering pumps. The walls may need to be moved out to allow access to the fish separator for debris management and maintenance.
- The fish handling process diagram has been updated to reflect changes in design since the last subgroup meeting.
- Future studies at the FSC may include acoustic tag studies, radiotag studies, biological assessment, and hydraulic evaluation. The Monitoring and Evaluation Plan will reflect this.

30% Submittal Package

- The 90% submittal will be due 1 year after FERC license issuance.

- The 30% Submittal is currently targeted for around the time of the next subgroup meeting and will include the following components:
 - Criteria Documents with a table of potential adjustments and modifications, etc.
 - Summary of hydraulic model runs (with actual model runs included in appendix)
 - Collector Drawings including:
 - Basic layout of facilities
 - Hydraulics of fish channel
 - Brief text discussion documenting design decisions and operations

PENDING ACTION ITEMS FOR SWIFT

The following table provides a summary of all pending action items for the Swift Project.

No.	SUMMARY OF PENDING ACTION ITEMS FOR SWIFT (remaining from previous meetings)	STATUS
S26	PacifiCorp/NOAA (Shrier/Day) Frank to discuss with Michelle what the ultimate destination of fry caught in the FSC should be.	Pending completion of Biological Opinion.
S27	WDFW (Kinne) Eric to forward email on catchable size fish and required grating gaps to group.	Pending
S31	All (Subgroup) Provide comments and feedback on CFD model result to Lisa Larson to help guide future model runs.	Pending, discussion will be ongoing until 30% submittal.
No.	SUMMARY OF NEW ACTION ITEMS (from March 13th, 2007 meeting)	STATUS
	None	

ADJOURN

Meeting was adjourned at ~3:15 pm.