

**FINAL - Meeting Summary Notes**  
**Lewis River License Implementation**  
**Engineering Subgroup**  
**October 31, 2006**  
**Fish Passage Meeting Notes**

**Subgroup Participants Present: (15)**

Sean Flak, PacifiCorp  
Todd Olson, PacifiCorp  
Arnold Adams, PacifiCorp (late arrival, 11:20)  
Will Shallenberger, PacifiCorp (late arrival, 11:00)  
Eric Kinne, WDFW  
Jim Stow, USFWS  
Monty Nigus, Black & Veatch  
Brian Friesz, Black & Veatch  
Ken Bates, Kozmo  
Dana Postlewait, R2 Resource Consultants  
Peter Christensen, R2 Resource Consultants  
Suzanne Picard, R2 Resource Consultants (late arrival, 9:30)  
Curt Leigh, WDFW (via phone/web conference)  
Bryan Nordlund, NOAA Fisheries (NMFS)  
Lisa Larson, Northwest Hydraulic Consultants

**ADMINISTRATIVE**

Welcome of attendees and review agenda.

**FERC License Schedule Update** - The Washington Department of Ecology's 401 certificates for the Lewis Hydroelectric Projects was distributed two weeks ago, and is undergoing final review by all parties. The NOAA BIOP is the last outstanding document which needs to be completed for the FERC license. It will be released in about 2 weeks and FERC will need 60 days to review. Tentatively, the license should be completed in mid-January.

**NEXT MEETING**

- The next meeting is scheduled for Tuesday, 9:00 am - 4:00 pm, December 12th, at the Merwin Hydro Facility. Kim will confirm this date via email communication.

**FUTURE MEETING DATES**

As a reminder, future meeting dates to be held at the Merwin Hydro Facility were set for:

- Tuesday, January 23, 2007 – 9:00 AM to 4:00 PM
- Tuesday, March 6, 2007 – 9:00 AM to 4:00 PM
- Tuesday, April 17, 2007 – 9:30 AM to 4:30 PM (note late start)
- Tuesday, May 29, 2007 – 9:00 AM to 4:00 PM

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**MERWIN TRAP PROJECT**

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**Merwin Handouts**

Distributed via email on 10/26/2006 by Kim McCune:

- Draft review version of 9/25/06 meeting notes with comments received prior to this meeting incorporated.
- Meeting agenda for 10/31/06 subgroup meeting.

Distributed at meeting 10/31/2006 (paper copies):

- Merwin Fish Trap Improvements Entrance Concept drawings. 3 pages, 11x17 dated 10/30/2006.
- Merwin Trap and Sorting Facility Schedule and Goals. 1 page, 8 ½ x 11 dated 10/31/2006.

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

**Merwin: Meeting Action Item Summary**

No.	SUMMARY OF PENDING MERWIN ACTION ITEMS (remaining from previous Meetings)	STATUS
M1	PacifiCorp/B&V/WDFW: Upper Release and Constructed Channel Design Input and Details. See information in review of the April 12 <sup>th</sup> meeting's action items. Waiting for final flow distribution and clarification of goals for the constructed channel.	Done. Discussed at this meeting.
M2	PacifiCorp (Shrier/Flak): Investigate the need for a minor amendment to the SA to address interim safety improvements to the fish trap. PacifiCorp will address in the future, in coordination with the ACC.	Pending – future item. Plan is to wait and compile any other SA amendments if applicable.
M5	PacifiCorp (Shrier): Draft recommendation to the ACC to present the tank configuration recommended by the Engineering Subgroup (four 3,000 gallon tanks, four 250 gallon tanks, and one 400 gallon fish trailer for the sorting facility). Note that design is OK to move ahead while Frank updates the ACC.	Done, week of Oct 23 <sup>rd</sup> .
M9	PacifiCorp (Flak) Consider bringing Ken Bates into the conversation on ATE Standards at Merwin.	Done. Ken will be brought into team.

M14	PacifiCorp (Shrier). Send depth profile below the bridge to design team.	Done. McCune emailed to Subgroup on 10/4/2006.
M15	Design team (Postlewait/Nigus). Review hydraulics under bridge at 21,000 cfs to determine if velocity is a barrier to upstream migrants.	Done – discussed at this meeting.
M16	PacifiCorp (Shrier). Try to track down more anecdotal information on the weir that used to be at the entrance to the fish elevator.	Pending
M17	R2 (Postlewait). Provide sketches of alternate fishway entrance designs.	Pending – update at this meeting.
M18	R2/BV (Postlewait/Nigus) Provide more detail on the fish sorting facility design concepts. Examine options for pump bay control room, pump inlets along powerhouse, and maybe at the blockouts for Unit 4, in addition to the existing fishway channel options.	Pending – update at this meeting.

#### **Additional Comments on Last Meeting’s Merwin Meeting Notes:**

1. Bryan Nordlund requested that we address the 9/25 meeting notes regarding Cramer’s population model (Pg 5, 1<sup>st</sup> paragraph). He asked for an update on the status of his request to do a model run with the 98% ATE. An action item has been added to address this item at the next subgroup meeting.
2. Curt Leigh questioned the statement on Pg 6, bullet 3 under Objective 4, which read “Fish only spend a few hours in the tailrace, on average”. Curt noted that he doesn’t believe this statement is true for Chinook, and noted that he read the study to say that half of the Chinook spent more than 40 hours, and two spent 182 and 195 hours in the tailrace. Curt would like the notes to clarify that the different species behaved differently. An action item has been added to address this request at the next subgroup meeting.
3. Curt Leigh also questioned the statement on Pg 6, bullet 1 under Tailrace Behavior Study Conclusion that read “there was no evidence that operation treatment caused any delay in fish passage”. He provided the following quote from the study: “Chinook showed a strong treatment effect of reduced trap efficiency when unit one was operating” (Page 5-6). An action item has been added to address this request at the next subgroup meeting.

#### **MERWIN TRAP AGENDA TOPICS**

##### **Tailrace/Entrance Goals**

- Sean Flak introduced this topic, and noted that this meeting will be used as a progress review for the subgroup as the concepts identified to be explored are not yet fully developed for

review as originally planned for this meeting. PacifiCorp and the design team believe this preliminary review process will be helpful, as the work to date helps to identify system constraints and will help to spark discussion to assist with developing the details of all options.

- Dana noted that the design team is working on six possible alternatives for the Fishway entrance design, and for today's review only one of these concepts has been sketched out with enough detail for a review. This alternative illustrates operational and spatial constraints within the existing fish trap gallery. Further work on this alternative and the others will be developed for the next meeting.

### **Fishway Entrance Design – Alt A: False Weir (status update)**

- Dana handed out 3 pages of drawings showing preliminary concepts for Fishway Entrance Alternative A – the False Weir concept. This approach is intended to uncouple the tailwater flow from the existing transport channel along the face of the powerhouse leading to the fish elevator, to obtain a controllable attraction flow throughout the entire length of the transport channel to guide fish into the fish elevator. Features of this alternative include:
  - Three entrances would be provided along the powerhouse face, in the original fish trap entrance location.
  - By uncoupling the tailwater from the transport channel flow, this approach can accommodate the high fish passage flow (5% exceedance flow).
  - False weirs would be provided at the fishway entrance, and at an entrance to the fish channel.
  - The false weir leading to the tailrace would operate from 100 cfs to 30 cfs (each). Partitions within each weir would divide the weir into three sections that could operate independently of each other. The weir would be designed for the overflow section to simulate a submerged weir optimized with a total head of 1.5 feet, and would also be designed to operate from 0.5 feet to 2.0 feet.
  - The false weir leading to the transport channel would be designed as a submerged weir also, with a flow of 10 cfs.
  - A transport velocity would be provided in the transport channel that ranged from a maximum of 3.5 fps at the low transport channel water elevation (for low tailwater flows), to a minimum of 1.5 fps at high transport channel water elevation (for high tailwater flows). This flow would help to guide fish into the fish elevator section, where a volitional loading is envisioned through an entrance to the fish elevator.
  - As previously discussed, the fish elevator basket would be divided into two hoppers, so one could always be “fishing” (operating to collect fish), while the other is cycling to the fish transport flume leading to the sorting facility.
  - As shown at this phase of development, the alternative would require a series of telescoping gates to accommodate the full range of flows. This is not ideal, and other variations of this concept (such as at the pump bay locations), will be developed to address this design to reduce operational concerns.
  - A closure gate above the false weir is shown that would be deployed during extreme high tailwater to prevent debris from entering the fishway.

- Limitations of this alternative discussed by the subgroup include:
  - Gate leaves could be problematic. Telescoping gates may bind or seize, and would require careful detailing and fabrication if this approach is recommended. Operation and maintenance concerns are great as shown, and means to mitigate these concerns should be explored.
  - Attraction water piping will need to be developed further as this concept is developed, to introduce flow to the false weir at all elevations.
  - The concrete corner of the conduit tunnel inside the dam is close to the fish entrance. Fish may be injured on this corner, especially when jumping into the entrance at high flows. Shrinking the cable tunnel or chamfering the corner would be desirable. Moving the weir downstream of this limiting feature would be desirable to gain more space to accommodate fish jumping at high flows.
  - The drop shown between the false weir and the entrance pool at high flows is about six feet. It would be desirable to reduce this drop.
  - Chamber between false weirs requires pumped drainage, and piping is rather complicated for this concept.
  - Jim Stow noted that he has identified 13 “cons” to this concept during the discussion, and that he would prefer to see other alternatives researched (see discussion section, below).
  
- Possible improvements discussed for this concept include:
  - Moving the gates outside of the dam, eliminating the need for the telescoping function.
  - Step fish up through pump bays left-to-right to increase water surface in collection channel.
  - Hybrid design idea: use existing entrance for low flow conditions and develop a new entrance at the pump bay for high flow conditions.
  - Using a mechanical crowder inside the collection channel and a flow-through weir with an orifice.

**Discussion:**

Alternative A prompted several discussion items regarding the approach to the fish trap improvements, a brief caucus between the agency representatives, and ultimately led to the proposal to hold another subgroup meeting to brainstorm the list of options for ongoing development and consideration. Discussion points included:

- Bryan noted that he is concerned that the proposed 100 cfs attraction flow with the powerhouse trap entrance concepts may prove to be inadequate to meet the 95% ATE standard recommended by the ACC. He would like to see well thought-out contingency ideas for trap improvements, should the final design fall short of meeting the ATE Standards. Based on the SA language, the group must consider what would be defined as a modification to the design, and when it would be implemented.
- Jim stated that he would prefer to see a more “normal” fishway entrance style, with swim-through access, likely located in the corner between the left bank and the powerhouse. He

also noted that the agencies may be more amenable to sharing risk of ultimate trap performance with a more “conventional” fishway entrance design. He’s uncomfortable with the dual false weir concept.

- Bryan noted that the engineering subgroup should be developing concepts: (1) based on NMFS criteria, or other criteria agreed to by the entire subgroup specific to this site; (2) with the goal of meeting the ATE standard this trap will be held to as negotiated by the ACC with input from the engineering subgroup.
- Contingency ideas: The design team will need to consider what improvements could be made to the final recommended trap improvements should the trap fall short in meeting its designated ATE standard. The required level of completion of these ideas will depend on the level of comfort the Agencies have with the final trap design. Jim noted that if the Agencies are very comfortable with the proposed trap design, they would likely be more willing to accept some of the risk in meeting (or failing to meet) the prescribed ATE standard.
- The Agencies are more concerned with accommodating Fall Chinook, as their spawning success is the most likely to be affected by a trap design that caused delay.
- There is concern about the effectiveness of the volitional entrance to the fish elevator; consideration of a crowder for this step should not be eliminated at this time.
- The complexity of the limitations and possible solutions for the trap improvements calls for a preliminary alternatives analysis. The group agreed to a brainstorming session to come up with an updated list of viable alternatives. The meeting is scheduled for Friday, Nov 3<sup>rd</sup> in Olympia and will be attended by Jim Stow, Bryan Nordlund, Dana Postlewait, Monty Nigus, Curt Leigh, Sean Flak, and Ken Bates. The list of alternatives and plan for ongoing development will be presented to the subgroup at the Dec 12<sup>th</sup> Subgroup meeting.
- An additional preliminary meeting time to review the design alternatives was scheduled for the morning of Nov 22<sup>nd</sup>, which will be confirmed or a new plan proposed at the Nov 3<sup>rd</sup> meeting. The design team will receive comments on the alternatives prior to presenting them at the Dec 12<sup>th</sup> Subgroup meeting.
- The goals for the Dec 12<sup>th</sup> meeting will be to have concepts identified with rough sketches as necessary, and a list of pro’s and con’s to help the group discuss and reach agreement on a preferred alternative.

(Break at 11:00 AM)

### **Sorting Facility**

- Monty presented the preliminary layout for the Sorting Facility at Merwin fish trap. This design is also still under development, and the review is intended as an update to help guide ongoing design.

- Primary Siting issues:
  - Drive-through access
  - Space for trap personnel needs, parking, etc.
  - Staging area for operations and powerhouse maintenance needs
- Access restrictions will determine the final locations for the 10 tanks (four 3,000 gallon tanks, four 250 gallon tanks, one 400 gallon tank, and one bull trout tank).  
The current preliminary layout shows a 2-level elevated sorting facility. The large turning radii of the fish sorting pipes necessitate the second platform, the team is working to amend the site configuration to eliminate one of the platforms. Jim would like to see a single direct fish bypass line which could be used to route fish directly to the sorting tanks (bypassing the anesthesia). The bypass line may need to be outfitted with a coded wire tag detector and/or a pit tag detector. Adding a visual sorting section was briefly discussed, but dropped based on previous analysis.
- Monty noted that the design team would provide more detail at the next meeting.

### **Velocity Analysis Under Bridge during High Flows**

- To address Action Item M15, Monty reported that he has reviewed the flow/bathymetric data provided by PacifiCorp, and that it does not appear that velocities in the river will impede adult fish passage under the bridge at flows of 21,000 cfs. An average velocity of about 2.5 fps was calculated, based on dividing the total flow by the available area.
- There may be some higher velocity zones within this cross section (especially considering momentum from the spillway), but on average there would also be lower velocity zones along the river margins that will accommodate fish passage.

### **Schedule**

- Sean handed out and reviewed an updated version of the project design schedule.
- Jim questioned whether the schedule allowed enough time to accommodate the brainstorming and development of the fish trap entrances.
- The group discussed that the overall goal is to have the 30% design completed and reviewed by April, 2007, and that there is time to accommodate the entrance development work. The goal is to have all key features identified to a level sufficient to reduce risk of a potential design-build type contracting method by the specified date.

(Lunch 12:20-12:30)

### **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
M2	PacifiCorp (Shrier/Flak): Investigate the need for a minor amendment to the SA to address interim safety improvements to the fish trap. PacifiCorp will address in the future, in coordination with the ACC.	Pending – future item. Plan is to wait and compile any other SA amendments if applicable.
M16	PacifiCorp (Shrier). Try to track down more anecdotal information on the weir that used to be at the entrance to the fish elevator.	Pending
M17	R2 (Postlewait). Provide sketches of alternate fishway entrance designs. Examine options for existing pump inlet below control room, pump inlets along powerhouse, and maybe at the blockouts for Unit 4, in addition to the existing fishway channel options.	Pending – to be discussed further at Nov 3 <sup>rd</sup> and Dec 12 <sup>th</sup> meetings.
M18	R2/BV (Postlewait/Nigus) Provide more detail on the fish sorting facility design concepts.	Pending – to be discussed further at the Dec 12 <sup>th</sup> meeting.
<b>NEW ACTION ITEMS (From October 31<sup>st</sup> Meeting):</b>		<b>STATUS:</b>
M19	R2/BV/PacifiCorp (Picard/Postlewait/Nigus/Shrier) Address comments to the Merwin Meeting notes from 9/25/2006. Discuss these comments at 12/12 meeting.	Pending
M20	R2/B&V, USFWS, NMFS, WDFW PacifiCorp (Postlewait/ Nigus/ Stow/ Nordlund/ Leigh/ Flak/ Bates) Meet on Nov 3 <sup>rd</sup> to brainstorm a list of possible design alternatives for the Merwin Trap Entrance. Alternatives to be presented at Dec 12 <sup>th</sup> subgroup meeting.	Done (at date of meeting note distribution)
M21	PacifiCorp (McCune) Verify headcount for Dec 12 <sup>th</sup> Subgroup meeting. Reschedule meeting if necessary.	Done – 11/12/06
M22	B&V (Nigus) Email next iteration of sorting facility sketches out to the subgroup for comments prior to Dec 12 <sup>th</sup> meeting.	Pending



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**SWIFT DOWNSTREAM PASSAGE PROJECT**

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**Handouts**

Distributed via email on 10/26/2006:

- Agenda and meeting notes as described for Merwin.

Distributed at meeting 9/25/2006:

- Draft Memo- Lewis River Downstream Fish Passage Swift Floating Surface Collector CFD Simulations-Model Verifications and Baselines. Northwest Hydraulic Consultants. 20 pages, 8 ½ x 11, bound.
- FSC Alternative 1 Layout Drawing showing layout of potential 900 cfs FSC. 1 page, 11 x 17.
- Swift FCS Design Criteria as Compared to Other Related Facilities. 6 pages, 11 x 17.
- FSC Alternative 1 Layout Drawings showing layout of 600 cfs FSC. 7 pages, 11 x 17.

**Presentations**

- PowerPoint presentation by Lisa Larson summarizing the CFD work to date.
- PowerPoint presentation titled “Swift FSC Escape Analysis” by Ken Bates covering his preliminary findings on fish capture velocities.

<b>SUMMARY OF PENDING SWIFT ACTION ITEMS (Remaining from Previous Meetings):</b>		<b>STATUS:</b>
S1	PacifiCorp (Shrier) Develop more formal presentation of fish tracking study results (AQU 14A and AQU 14B) for presentation to the ACC (Sept 14 <sup>th</sup> ) and the Engineering Subgroup (Sept 25 <sup>th</sup> ). Frank will distribute the figures prior to the next meeting.	Done. Kim posted figures with fish tracks on PacifiCorp web site.
S2	PacifiCorp (Shrier) Look into means to test passive separator concept.	Pending. Considering active in-line separation now so this action item may be dropped. (see sorting and transfer notes)
S4	PacifiCorp (Shrier) Discuss desired fry separation goal with Michelle Day (i.e. what percentage of fry separation is acceptable).	Pending
S8	R2/PacifiCorp (Shrier/Christensen) Use results from CFD model to evaluate FSC entrance geometry and entrance flow rate.	Pending. CFD Phase 1 is complete. Presentation to

		follow.
S9	PacifiCorp (Shrier) Begin work on FSC M&E Plan and begin discussion on how to evaluate the FSC capture efficiency.	Pending. In progress.
S10	NMFS/R2 (Nordlund, Christensen) Provide sketches and information from the Rocky Reach Bypass System geometry.	Pending. PacifiCorp has requested information from Chelan, but not yet received. Bryan Nordlund will bring what info he has to the next meeting.
S12	R2 (Christensen) Put together a short summary memo on the Rocky Reach site visit. Include photos, any available drawings and key points relevant to Swift.	Done. PacifiCorp will post to website.
S13	WDFW (Kinne, Weinheimer) Provide available size and likely abundance information on the hatchery rainbow trout in the reservoir. Provide length, weight, and girth information. Also provide likely number of fish that may try to move out of the system by comparison to Cowlitz Falls and Mayfield.	Pending
S14	R2 (Christensen) Peter Christensen will research whether PGE captures hatchery rainbow trout in the collector at North Fork Dam on the Clackamas River.	Done. See Note 1 at end of table.
S15	R2 (Christensen) Call PGE for more information on the passive fish separator at Pelton Round Butte, including the size of the fish they are designing to separate.	Done. Dana, Peter, and Ken got a debriefing of the separator modeling at ENSR.
S16	NHC (Larson) Lisa to revise the CFD model output plots to more appropriately differentiate the higher velocities in the approach channel area.	Done
S17	R2 (Christensen) Change the terminology for the “secondary” and “tertiary” screens to be “pre-capture” and “post-capture” screens.	Pending
S18	NMFS (Nordlund) Bryan will review his files on the Rocky Reach project, to see if he can determine what the velocity profiles were before and after modifications to the system. The goal is to determine where the velocity dip was observed in the system where fish rejected the entrance.	Pending
S19	R2 (Postlewait/Christensen) In the handout showing updated figures and tables of design criteria: Add new columns to Table 4. The first new column should show the existing proposed design value, and the other new columns should show the design values for similar projects (Baker, Rocky Reach, Round Butte, Cowlitz	Pending

	Falls, etc.) projects.	
S20	WDFW and NMFS (Kinne, Nordlund) Review Table 5 from the handout providing holding, sorting, and handling design criteria and provide comments to the design team ASAP.	Pending
S21	WDFW/USFWS/Kozmo/R2 (Klavas, Weinheimer, Stow, Bates, Keefe) Review the holding pond sizing calculations by October 6, 2006. Provide comments to the design team.	Pending
S22	PacifiCorp/USFWS/NMFS (Shallenberger, Stow, Nordlund) Do additional research on capture velocity for the species in question. Issues around capture velocity need to be resolved for the FSC design to proceed.	Pending. Ken Bates' presentation on his fish escape model follows.

Note 1. Concerning S14, Peter Christensen noted that he had contacted Doug Cramer at PGE concerning the capture of stocked rainbow trout in the downstream collector at North Fork Dam. Doug reported that 20,000 - 24,000 catchable rainbows are stocked each year above the North Fork. They used to stock during the week prior to the third weekend in April and PGE would catch a few hundred to a maximum of about 1,000 in any given year in their collector. The catch was mostly in late April and May, and dropped off after that. In the last few years, they have switched to stocking prior to the third weekend in May and the catch of rainbows at the trap has been greatly diminished. Doug Cramer also noted that the stocking at North Fork occurs at 3 locations between one and two miles upstream of the dam, and suggested that a large, deep lake like the Swift Reservoir should result in a smaller percentage catch of rainbows than the run-of-river conditions at North Fork.

#### **Additional Comments on Last Meeting's Swift Meeting Notes:**

(none)

### **SWIFT DOWNSTREAM AGENDA TOPICS**

#### **CFD Model Update**

- Lisa Larson presented a PowerPoint presentation highlighting the CFD model validation and baseline runs. Copies of the presentation can be obtained from Lisa.
- Presentation highlights:
  - The CFD model for the baseline reservoir conditions is complete. At this stage, the model does not yet include the FSC.
  - The model was used to simulate hydraulic characteristics for 3 reservoir conditions. (The flow rates represent the maximum powerhouse capacity at the corresponding reservoir water surface elevation.):
    - Condition 1: normal maximum pool (WS = 1,000 ft, Q = 9,400 cfs)
    - Condition 2: 85% exceedance (WS = 960 ft, Q = 8,960 cfs)

- Condition 3: extreme low pool (WS = 900 ft, Q = 8,115 cfs)
- Model assumptions and simplifications:
  - 5% of reservoir flow comes from Swift Creek, 95% of reservoir flow comes from the main stem of the river.
  - The effects of temperature stratification have not been incorporated into the model. NHC will consider potential effects of stratification separately to assess possible impacts.
  - Uniform velocity distribution at the model boundaries.
  - Steady-state flow (i.e. reservoir inflow = reservoir outflow)
- Within the limits of the field equipment, the ADCP data collected in July supports the CFD model predictions.
- There is a significant flow deflection off Devil's Backbone. Consequently, flow in the approach channel is biased toward the south for all modeled conditions.
- CFD Model Results:
  - Condition 1: Velocities at the beginning of the approach channel were predicted from 0.15-0.2 ft/s. (Note: velocities at the Baker FSC are anticipated at approx 0.1 ft/s)
  - Condition 2: Velocities at the beginning of the approach channel were predicted from 0.2 – 0.3 ft/s.
  - Condition 3: Velocities at the beginning of the approach channel were predicted from 1.0 – 1.2 ft/s.
- CFD Model Conclusions and Considerations:
  - The FSC could be oriented to line up with the higher velocity flow lines closer to the south side of the approach channel.
  - The proposed FSC location 2 (at the face of the dam) may not be hydraulically favorable for attracting fish.
  - A guide wall along the north side of the approach channel may be helpful. It may be worthwhile to add a guide wall into the model to investigate its effects.
  - There are large, very slow eddies in the north arm (Swift Creek Arm) of the reservoir. Velocities in these eddies are so low that their effects are likely negligible.
- General Discussion following presentation:
  - Ken Bates noted that velocities in the Baker project were more favorable than the predicted velocities for the Swift reservoir. Additionally, there are guidenets in the Baker FSC design. It will be important to maximize other factors influencing fish attraction.
  - Group discussed possible configurations for adding guidenets, both exclusionary and non-exclusionary. This issue will need to be revisited as design progresses.

## Preliminary FSC Layout Update

- Peter Christensen handed out copies of an updated FSC layout drawing showing a module which could be added to the 600 cfs FSC to create a 900 cfs FSC option, as requested at the last meeting.
- Key characteristics of the module include:
  - 6 pumps
  - 27 ft length
  - Screen cleaner modifications to accommodate the added length/depth.
  - Modified collection enhancement structure.
- Art Anderson Associates (marine architects) calculated the amount of list the floating structure is expected to experience when the pumps are turned off. The list created by shutting down the pumps is expected to be on the order of 8-12 inches over the length of the FSC.

## Criteria Discussion

- Peter Christensen handed out copies of the FSC Design Criteria tables showing a comparison between the Swift FSC and other related facilities. Group is to provide feedback on these criteria by the next meeting.
- Transport velocities calculated based on the current preliminary FSC configuration show a velocity in excess of 6 ft/s for a total length of 31 ft and a velocity in excess of 7 ft/s for a length of 8 ft. There is a dip in velocities in the post-capture screens.
- Ken Bates delivered a PowerPoint presentation titled “Swift FSC Escape Analysis” outlining his efforts in defining an adequate fish capture velocity for the FSC. Copies of the presentation are available from Ken. Highlights include:
  - Calculations are based on the assumption that a fish uses a fraction of its energy equal to the time it swims at a given speed divided by the time it can swim at that speed. This is a common assumption in fish energetics.
  - Fish swim speeds and the related time to exhaustion are calculated using the equation:
    - $V = a L^b t^c$  (Hunter & Mayor, 1986), where  $V$  = swim speed in meters/sec,  $L$  = fish length in meters, and  $t$  = time in seconds.
    - Coefficients for this equation vary by fish species and age. So far, Ken has had only limited success in finding appropriate coefficients for this application.
  - Model assumptions:
    - Swim speed equations and fish size assumptions are reasonable.
    - Fish swim at burst speed.
    - Fish swims at a constant speed relative to the ground until it either escapes or fatigues. No burst and rest.
    - Uniform velocity throughout the channel cross section.

## Sorting and Transfer

- Sorting and transfer facilities will be designed to hold ½ to ¾ of the peak daily fish runs. Tanks will need to be large to accommodate that many fish.
- An automated gate will be used to switch between the two holding tanks overnight.
- An active/wetted separator with spraybars or other means to handle debris is the current preferred option for separating fry and smolts. Debris has been shown to be the only significant cause of fish injury with these type systems. Also, an active separator has a smaller footprint than a passive system.
- It is expected that there will be 3-7 truck trips per day for smolts and 1 truck trip per day each for fry and adults.

## 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
S2	PacifiCorp (Shrier) Look into means to test passive separator concept.	Pending. Considering active in-line separation now so this action item may be dropped. (see sorting and transfer notes)
S4	PacifiCorp (Shrier) Discuss desired fry separation goal with Michelle Day (i.e. what percentage of fry separation is acceptable).	Pending
S8	R2/PacifiCorp (Shrier/Christensen) Use results from CFD model to evaluate FSC entrance geometry and entrance flow rate.	Pending. CFD Phase 1 is complete. See CFD presentation description in notes.
S9	PacifiCorp (Shrier) Begin work on FSC M&E Plan and begin discussion on how to evaluate the FSC capture efficiency.	Pending. In progress.

S10	NMFS (Nordlund, Christensen) Provide sketches and information from the Rocky Reach Bypass System geometry.	Pending. PacifiCorp has requested information from Chelan, but not yet received. Bryan Nordlund will bring what info he has to the next meeting.
S13	WDFW (Kinne, Weinheimer) Provide available size and likely abundance information on the hatchery rainbow trout in the reservoir. Provide length, weight, and girth information. Also provide likely number of fish that may try to move out of the system by comparison to Cowlitz Falls and Mayfield.	Pending
S18	NMFS (Nordlund) Bryan will review his files on the Rocky Reach project, to see if he can determine what the velocity profiles were before and after modifications to the system. The goal is to determine where the velocity dip was observed in the system where fish rejected the entrance.	Pending
S20	WDFW and NMFS (Kinne, Nordlund) Review Table 5 from the handout showing updated figures and tables on design criteria and provide comments to R2 ASAP.	Pending
S21	WDFW/USFWS/Kozmo/R2 (Klavas, Weinheimer, Stow, Bates, Keefe) Review the holding pond sizing calculations by October 6, 2006. Provide comments to R2	Pending
S22	PacifiCorp/USFWS/NMFS (Shallenberger, Stow, Nordlund) Do additional research on capture velocity for the species in question. Issues around capture velocity need to be resolved for the FSC design to proceed.	Pending. Ken Bates presented his escape model approach at the 10/31/2006 meeting.
<b>No.</b>	<b>NEW ACTION ITEMS (from October 31<sup>st</sup> meeting)</b>	<b>STATUS</b>
S23	Subgroup (all) Provide feedback on FSC Design Criteria as shown in the handout labeled "Swift FSC Design Criteria as Compared to Other Related Facilities". Please provide comments to Peter Christensen.	Pending
S24	R2 (Christensen) Update table named "Swift FSC Design Criteria as Compared to Other Related Facilities" with the Rocky Reach info received from Bryan Nordlund. Rocky Reach has profile bar screens with a 0.4 ft/s design approach velocity.	Pending
S25	Kozmo (Bates) Ken to complete the fish escape analysis and will present his findings at the Dec 12 <sup>th</sup> meeting.	Pending

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## UPPER RELEASE/CONSTRUCTED CHANNEL DESIGN TOPICS

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### Presentations

- PowerPoint presentation by Will Shallenberger, summarizing the upper release/constructed channel design work to date.

### Update and General Discussions

- Will Shallenberger presented a PowerPoint presentation highlighting the upper release/constructed channel design work performed to date.
- The presentation highlights included NOAA velocity barrier criteria, the initial design concept, evaluation of the initial design concept including design flows from the 401 certification, and the proposed arrangement to meet the NOAA criteria.
- The upper release/constructed channel design is moving ahead. The design is on target to be operational by summer of 2008.
- The upper release discharge structure will include a 3.5 ft high weir and a 16H to 1V sloped downstream apron slab in accordance with NOAA velocity barrier criteria to prevent fish from entering the Swift No. 2 power canal through the upper release facility. The elevation of the downstream end of the apron slab will also be greater than the tailwater surface in the downstream channel. The weir length of the discharge structure will be reduced to at least 12 feet or less to achieve maximum allowable head over the weir per the criteria. The proposed arrangement will provide conditions to achieve a flow depth of less than 6 inches and a target velocity of 16 ft/s for all design discharges on the apron slab, except for the low discharge condition, where the resulting velocity on the apron may be slightly less than 16 ft/s. **It was agreed by the subgroup that this proposed arrangement and design approach could move forward for detailed/final design.**
- The 401 certification requires:
  - Flow releases to the bypass reach from 76-51 cfs at various times throughout the year.
  - Spawning-size gravel in the channel.
- Other items concerning the design work mentioned during the discussion included:
  - Boulders will be placed in the channel to provide fish refuge and breakup the flow.
  - Average velocity in the channel will be 1.5 ft/s with an average depth of 1.5 ft at 76 cfs.
- Curt Leigh advised that Ecology had previously presented a meandering S-shaped channel layout to provide spawning habitat at the upper release barrier. PacifiCorp will obtain a copy of this layout and will provide it to the design team for incorporation into the design, as applicable.

### PENDING ACTION ITEMS FOR UPPER RELEASE/CONSTRUCTED CHANNEL



The following table provides a summary of all pending action items for the Upper Release/Constructed Channel.

<b>No.</b>	<b>NEW PENDING ACTION ITEMS FOR UPPER RELEASE/CONSTRUCTED CHANNEL</b>	<b>STATUS</b>
UR1	WDFW (Olson/Leigh) Provide a copy of the WDFW specifications for spawning gravel for use with the constructed channel.	Pending
UR2	PacifiCorp (Shrier) Provide a copy of the constructed channel layout proposed by Ecology as part of the 401 to Will Shallenberger.	Pending

**ADJOURN**

Meeting was adjourned at ~3:00 pm.