BAKER RIVER PROJECT RELICENSE

Aquatic Resources Working Group
Technical Sub-committee on Instream Flows
Technical Sub-group

July 8, 2002
9:00 a.m. – 2:00 p.m.

R2 Resource Consultants
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(425/556-1288)

DRAFT MEETING NOTES

Fish Team Leader: Arnie Aspelund, 425-462-3442, aaspel@puget.com

PRESENT: Arnie Aspelund (PSE), Bob Barnes (PSE), Thom Hardy (Watershed Systems Group), Hal Beecher (WDFW), Brad Caldwell (DOE), Phil Hilgert (R2), Mike Ramey (R2), Stuart Beck (R2) and Stan Walsh (SSC)

Note: If unable to attend meetings, please notify Arnie or Phil.

FUTURE DATES AND LOCATIONS: No future date set until after the July 11th Aquatics Working Group meeting.

AGENDA
July 8, 2002
9:00 a.m. – 2:00 p.m.
R2 Resource Consultants, Inc., Redmond, WA

0900 – 09:10	Review meeting objectives and agenda
0910 – 0930	Receive comments on April 22 and May 13 meeting records, and discuss June 17 status report
0930 – 0945	Describe general instream flow study approach
0945 – 1000	Study Reach and transect selection
1000 – 1030	Hydrologic Routing / unsteady flow model
1035 – 1045	**Break**
1045 - 1145	Varial zone modeling
1145 – 1200	**Working Lunch**

1200 – 1230	Side channel analysis
1230 – 1315	Salmonid spawning analysis
1315 – 1345	Rearing habitat analysis
1345 – 1400	Schedule and set agenda for next meeting

MEETING HANDOUTS

- Meeting Agenda
- Middle Skagit River Instream Flow Study Approach – 5-page Draft Outline (attached)
- 2-Page Map of Middle Skagit River (Baker River confluence to Sedro Woolley) digitized from 1999 Skagit County aerial photos (attached)
- Lots of M&M peanut candies (already eaten)
- Hardcopy of PowerPoint Presentation on Varial Zone Analyses

MEETING OBJECTIVES

To review proposed instream flow study approach prepared by R2 Resource Consultants.

PRIOR MEETING RECORDS

Meeting participants had previously received copies of the April 22 and May 13 meeting records, but were not prepared to comment on the documents. A status report had been e-mailed to meeting participants on June 17th; the status report included descriptions of differences between steady and unsteady flow models and the distinction between hydrologic and hydraulic routing models. Mike Ramey reviewed the definitions of the various terms. Phil then referred the group to the 5-page draft outline of the instream flow study approach (*the attached draft study outline provides additional detail on various aspects of the study approach*).

CHARLES HOWARD – BAKER HYDROPS MODEL

Phil provided an account of the June 12 Charles Howard workshop, and the Baker HYDROPS model. The HYDROPS model is designed to evaluate the effects of alternate operating scenarios on reservoir pool levels, power production, flood control, recreation and reservoir and downstream natural resources in an integrated fashion. The Baker HYDROPS model contains a hydrologic routing component that integrates flow fluctuations from the Upper Skagit, Sauk and Baker rivers using the USGS Skagit River gage near Concrete as a downstream control point. A hydrologic routing model, similar to the routing component of the HYDROPS model will be developed by R2 to evaluate the effects of Lower Baker Project releases on middle Skagit River habitats. The R2 modeling efforts are intended to function independent of the HYDROPS model during the early data analyses phase of the instream flow study. Potential operating scenarios will then be provided to operators of the HYDROPS model, along with calibration details (celerity, diffusivity and scaling factor), to allow use of HYDROPS model for optimization runs integrating both Lower and Upper Baker Developments.

INSTREAM FLOW MODELING APPROACH

Phil described the general approach that combines a hydrologic routing model to describe unsteady flow conditions and hydraulic modeling to describe habitat quality and availability

under steady flow conditions. As described in the outline, transects will be located at important river features to fulfill hydrologic data needs. Additional transects will be located to describe and model biologically relevant channel features such as the streambed varial zone, secondary and off-channel areas, and mainstem spawning, incubation and rearing habitats. The approach presents a balance between intensive measurement of a short critical reach and collecting fairly rudimentary measurements over a very long reach. The approach will consist of a series of transects in the middle Skagit River between the Baker River confluence (RM 56.5) and the pipeline crossing at Sedro Woolley (RM 24.5). Cross-sectional profile, velocity and stage measurements will be taken at flows of approximately 7,000 cfs, 14,000 cfs and 21,000 cfs to model flow conditions between 4,000 cfs and approximately 50,000 cfs.

Transect Selection

Transect selection will be accomplished by delineating major channel types on the reach maps that were digitized from the 1999 Skagit County photos. The frequency of each channel type will then be calculated using GIS software. Transects will then be tentatively located to describe major channel types and fulfill hydrologic data needs. Transects will also be located to describe biologically important areas, such as gravel bars that annually support high densities of salmonid redds or backwater habitats that typically support high densities of juvenile salmonids. Brad and Hal recommended that that state and tribal biologists be contacted to help identify key biological areas and if possible, agency and tribal biologists that are familiar with the site should participate in transect selection field trips.

Varial Zone

Phil described the biological evaluation of the varial zone. The intent is to quantify the area of streambed exposed during flow fluctuations associated with operation of the Baker Project. Stuart reviewed the varial zone analyses and presented example hydrographs to illustrate flow fluctuations associated with the Baker Project and the surface area of the varial zone. As noted in the study outline, Phil emphasized that the definition of baseline conditions will have to be identified at the start of the data analysis task.

Brad and Hal expressed concern that PSE will need additional operational flexibility to implement opportunities for resource protection that may be identified during the study. Increased operational flexibility will probably involve adding one or more smaller turbines at the Lower Baker Powerhouse. Bob responded that PSE recognizes that additional project flexibility, associated with additional generation units is a likely possibility. Although Bob acknowledged that there was no absolute commitment to install additional units, he noted that the HYDROPS model, and the results of the various biological and habitat modeling efforts, will help PSE identify the size and range of additional units at the lower Baker Project. Thom noted that unless the USFS and their contractors have access to the HYDROPS model, the USFS may invest in an alternative model, called RiverWare, to evaluate project economics.

Side Channel Connectivity

Off Channel Habitats

The proposed approach will consist of a survey of all off-channel inlet and outlet elevations at one mainstem river flow to identify the range and variability of off-channel connectivity. A study site, (10-14 channel widths in length), will then be selected in at least three off-channel habitats to describe off-channel conditions. The study sites will be located approximately 300-feet downstream from the off channel inlet to allow sufficient opportunity for accretion of intragravel flows. Approximately 14 transects will be measured at each of the study sites to describe the relationship between flow and the availability and quality of off-channel habitats. Cross-section and velocity profiles, stage measurements will be collected at each site at mainstem river flows of approximately 7,000, 14,000 and 21,000 cfs. In addition to the off-channel study sites, mainstem transects will be located at the inlet to the off channel water courses to identify mainstem stage:discharge relationships specific to the inlet.

The discussion by the group centered on how many off-channel study sites should be established, the number of off channel and mainstem transects, and are the off-channel study sites intended to describe representative features or biologically key sections of off channel habitats? Brad noted that based on the maps, there appeared to be more than three off-channel areas with mainstem transects established at their inlets. Phil agreed and noted that mainstem transects will be located where they provide double or triple duty, such as mainstem transects located to provide hydrologic data, but that also describe secondary or spawning habitat features. This provides additional data on off channel connectivity, but does not provide an assessment of the quality and availability of habitats with the off channel areas downstream of the inlets. The group recommended that the results of the off-channel inlet survey be used to define the number of off-channel study sites. Off channel habitat types should be stratified and then a study site selected to describe each of the major types. The group envisioned that three to five sites off-channel study sites would be required to describe off-channel habitats.

Thom was uncertain whether measurement of off channel inlets at one mainstem flow would yield enough information to establish the variability of off channel habitats. Thom indicated that he was comfortable with the overall approach, but wanted several days to consider the need for measuring off channel inlets at additional mainstem flow levels. Brad commented that the maps showing example transect locations should be modified to show the expected lateral extent of the transect boundaries. Some of the transects on the figures appeared to extend well beyond the mainstem channel and crossed off channel watercourses well away from the mainstem channel. He questioned whether the intent was to continue the transects across the entire floodplain. Phil acknowledged that the transects would extend laterally only up to the 50,000 cfs flow level. Rather than try to cut brush clear across vegetated islands and riparian areas, they would establish essentially separate transects for each channel. The maps will be revised to identify the lateral extent of the transect boundaries

Secondary Channels

Referencing the outline, Phil reviewed the proposed approach for describing secondary channels. The participants were satisfied with the proposed transect selection and data collection procedures, but data analysis procedures will have to be reviewed once the data are available.

Spawning Habitats
Phil described that transects would be located at known areas of concentrated spawning activity and measured at flows of 7,000, 14,000 and 21,000 cfs. Measurements at each transect will include cross-section profile, velocity, substrate, stage and surface profiles. A steady state hydraulic model, such as the IFG4 PHABSIM program, will be used to model habitat condition over a range of flows. All parties agreed that the hydraulic modeling must be supported by biological survey data to validate the predictions. The hydraulic models must be able to track the location of areas supporting potential or utilized spawning habitats to evaluate the effects of flow fluctuations during the subsequent incubation period. Analyses of potential spawning habitats will also evaluate the risk of scour at spawning areas, but all parties recognized that similar basic hydraulic modeling efforts on other river systems have not been particularly effective. Scour predictions would be improved with the use of physical scour monitors, extensive sediment sampling and velocity measurements collected during near-flood flow conditions, but the scope of such an effort is beyond that envisioned under relicensing. The ratio of substrate size to mean column depth on the Skagit River may be conducive to a hydraulic modeling effort and it was agreed that basic hydraulic modeling would be a useful task.

Rearing Habitats
Phil described the proposed approach that combines hydrologic and hydraulic models to identify quality and quantity of habitats over a range of flows at transects across areas consistently containing high concentrations of rearing salmonids. Phil indicated that by the time transects are identified for varial zone, off-channel, secondary, and spawning habitats, we should have enough transect information to use portions of transects to describe rearing habitats. Stan requested that backwater channel types be included when evaluating rearing habitats. Stan also requested that cover and the distribution of woody debris be recorded for each transect.

NEXT STEPS
Phil asked the group whether the approach satisfies their needs. The group responded that the proposed data collection efforts will provide the necessary field information, but that some data analysis details still need to be worked out. Brad emphasized that agency and tribal staff that are familiar with the middle Skagit area should participate in the transect selection process.

Phil will revise the draft outline based on today's comments and present it at the next Aquatics working group meeting. The meeting record and revised study outline will allow an opportunity for additional comment. Meanwhile, R2 will proceed with mainstem habitat delineation, off channel inlet survey and preliminary transect selection. Phil will schedule the next technical subgroup meeting during the final transect selection phase.

Meeting adjourned.