

## Fish Technical Working Group – Instream Flow Habitat Modeling Subgroup

### Pebble Project

May 12, 2008

Minutes Recorded by Charlotte MacCay/Pebble Partnership (PLP)

#### PRESENT:

Joe Klein/ADF&G

Jason Mouw/ADF&G

Leslie Tose/USACE

Dan Young/NPS via teleconference

Dudley Reiser/R2 Resource Consultants (R2) [PLP Consultant]

Randy Bailey/Bailey Environmental (Bailey Environmental) [PLP Consultant]

Dennis Deans/PLP

Charlotte MacCay/PLP

#### ADMINISTRATIVE ISSUES

1. As with all Technical Working Group (TWG) Meetings, the minutes reflect discussion of suggestions and concerns raised by individuals. Discussion does not reflect any decision making or consensus from the group (with the exception of electing a lead).
2. Scheduling of this meeting initially focused on the availability of the presenting consultants, and Fish TWG members, who had expressed particular interest in the topic of Instream Flow Habitat Modeling. However, the invitation to attend the meeting and the 2008 Instream Flow Study Plan was sent to all members of the Fish TWG.
3. There was some agency concern that the attendance to this meeting was limited. A message had been sent with the meeting announcement for members to inform Charlotte MacCay if there are other members of the TWG with a particular interest in Instream Flow Habitat Modeling. There was only one more Fish TWG member who stated an interest, but a lack of availability to attend this meeting. Future scheduling will involve consultation of this member's availability.
4. Minutes and presentation materials from the meeting will be distributed to all Fish TWG members as well as meeting attendees.
5. No lead was chosen for this group as the group was very small and involved in a structured presentation which did not require facilitation. The agenda was set by the presenting consultant.

6. Most of the meeting focused on a power-point presentation developed and presented by Dudley Reiser a consultant of R2.

## DATA INTERESTS

### PLP OR ITS CONSULTANTS TO PROVIDE AS AVAILABLE

1. Habitat Mapping : There is some mapping that might be of value. PLP will be conducting a new aerial photo run at a scale of 1:5000 to support the habitat mapping project. While agencies normally use a scale of 1:2000, PLP experience suggests that the 1:5000 scale will work for these streams.
2. Spatial and temporal fish distribution data for various species (maps are not ready yet – are being produced for the EBD)
  - a. Spawning areas
  - b. Overwintering areas
3. PLP will provide more information on past transect selection methods.
4. It was noted that the agencies felt they could not make any suggestions about the plan unless they had the data they are asking for (i.e. specifically the above two items).
5. Habitat Utilization Information: PLP is collecting this data but is not organized at this time. Habitat Suitability Information for Salmon. PLP is working on developing either preference curves or suitability curves for this data.
6. Summary of suitability data to date (i.e. redd measurements etc...)
7. % coverage by habitat type per stream length mile (computed from habitat mapping)
8. Information and maps of gaining and losing reaches, and other upwelling or down-welling sites, including temperature data and peizometer readings
9. Information about flows into and out of the off –channel habitat
10. A basin wide hydrologic model once the project is defined A meeting where the fish, groundwater, hydrology, and instream flow habitat modeling consultants all present and discuss their disciplines in relation to each other. This meeting is being planned for presentation to the full Fish TWG.
11. Because of the extent of the project study area and the variety of components involved in the flow study, it may be useful to develop a flow chart that depicts model interrelationships and linkages with other fish and aquatics studies.

### ADF&G TO PROVIDE

1. ADF&G to have other ADF&G biologists review the list of target species as listed in Dudley Reiser's presentation and suggest any other species they would like to see included.

## GENERAL COMMENTS

1. (R2 Consultant) Information provided to date has been at the annual agency meetings
2. (Agency) It was reiterated that complete study plans with objectives and study designs are needed to provide valuable input on studies.
3. (All) There is a need for definition and consistent usage of terms that will be used for the instream flow – habitat study since there is currently dual usage of the term segment between the instream flow work and the regular fish work, with each group using the term to mean completely different geographic scales. The instream flow study will list and define their terms and the fish group will adjust their terminology to avoid confusion and overlap in terms.
4. (All) Terminology for transects and sites needs to be clarified; i.e. a site is equivalent to a single transect location.
5. (Agency) The fish team and the instream flow habitat modeling team need to be well coordinated.

## MEETING DISCUSSION POINTS

### METHODOLOGY AS PRESENTED IN THE POWER POINT DOCUMENT

1. (R2 Consultant) HDR completed some habitat mapping of portions of the instream flow study reaches that included the following habitat types: riffle, pool, run, island complex. However, habitat mapping has not been completed for the entirety of the study streams (i.e. North Fork Koktuli River, South Fork Koktuli River, and Upper Talarik Creek).
2. (BE Consultant) Agency presentations in 2005/2006 listed the number of habitat types represented by the individual transects in each reach of the three streams
3. (R2 Consultant) HDR calculated the overall percentage of each habitat type represented by the individual transects within a given instream flow study area, but overall percentage of each habitat type for each stream has not been calculated.
4. (Agency) Noted that the usual thought process and approach in conducting instream flow studies is to:
  - a. Identify Problem
  - b. Identify Species and Life stages influenced by flow regulation
  - c. Define the study area
  - d. Compile Fish Distribution Data
    - i. Spawning
    - ii. Overwintering
  - e. Assess the Habitat Mapping to help decide where transects should be located.
  - f. Determine how best to approach data collection and modeling. (The Pebble Study design may be just fine. It still needs to be reviewed. The agencies may already have some of the necessary data from which to evaluate the proposed study approach. However, the materials including the recently provided study plan need to be reviewed to determine what additional data may be needed.)

---

## MODEL TYPES

1. (R2 Consultants) Provided a general overview of instream flow assessment methods including the Tennant Method, Wetted Perimeter, and 1-dimensional and 2-dimensional PHABSIM modeling. The applicability of the methods for use on the Pebble Project was discussed noting that the first two were focused on flow standard setting and hence not the most appropriate for the project.
2. (R2 Consultants) The 1- dimensional PHABSIM Model was chosen for this project because it can analyze incremental changes in flow for different fish species and life stages. The model can accommodate changes in project design that may result in changes to hydrology. (R2 Consultant) 2-dimensional PHABSIM modeling has been used on some projects for defining habitat – flow characteristics based on channel topography/bathymetry. 2-d modeling provides a means to visually display spatial and temporal changes in habitat resulting from flow alteration. It produces maps, usually based on GPS, that illustrate how habitats change with incremental changes in flow. It is not proposed for this project at this time, but may be considered in the future for areas of special interest, such as important spawning habitats.
3. (Agency) The agencies reminded PLP that PHABSIM could not be used for measuring changes in total salmon/fish production.
4. (R2 Consultants) 2-dimensional PHABSIM modeling has been used on some projects for defining habitat-flow characteristics based on channel topography/bathymetry. 2-d modeling provides a means to visually display spatial and temporal changes in habitat resulting from flow alteration. It produces maps, usually based on GPS, that illustrate how habitats change with incremental changes in flow. It is not proposed for this project at this time, but may be considered in the future for areas of special interest, such as important spawning habitats.
5. Agencies identified up-welling and down-welling as important habitat features to be incorporated into a model.
6. PLP stated they could not do 2D modeling because they did not have the correct data. PLP stated that 1D modeling could be done.
7. (BE Consultant) Noted during a discussion on documenting channel morphology that the USDA Forest Service has been evaluating “green” Lidar which can be used in clear water streams to map stream bottom profiles very accurately. Preliminary results from the Salmon River in Idaho have been impressive.
8. (Agency) There is some interesting recent work reported in the literature that utilizes green Lidar .
9. (Agency) An interest was stated in the ability to tie transects together for GMag2 modeling . PLP was uncertain that Gmag2 modeling could be done with the data, but will discuss this further with the agencies on the upcoming field trip to the site.

---

## DISTRIBUTION OF STUDY TRANSECTS

1. (PLP) A study area map was presented in response to a query regarding the study boundaries.
2. (R2 Consultants) The density of transects within the study streams ranges from 0.75 to 1.5 transects/mile. Additional transects are being considered based on a review of the past program, site visits, and TWG input.

3. PLP emphasized a desire for TWG input on new transect locations.
4. (Agency) Not as concerned about the overall distribution of transects as in representing key habitats. Data will help the agencies determine if key habitats are being studied.
5. (Agency) There is no set criterion of the percentage coverage for study transects in an Instream Flow Habitat study. The number of study transects required is determined on a project by project basis and relies on consultation with the biologists.
6. (Agency) It is a personal preference to group transects in representative habitats for the stream. Multiple transects within the same habitat type in some instances may better capture aspects such as overhanging vegetation, log presence etc. Single transects up and down the stream, even if composited by habitat type, may miss some of these elements. Something to consider if it is decided to add more transects.
7. (R2 Consultant) Initial transects (2004 studies) were selected using professional judgment to be representative of different habitat features. Subsequent transects have been selected based in part on a stratified random sampling approach. R2 stated that they use the same techniques.
8. (Agency) Stratified random selection has the potential for minimizing bias. A better understanding of the past transect selection methodology is needed. but they wanted a better understanding/description of the selection process he used.
9. PLP will provide more information on past transect selection methods.
10. (BE Consultants) There were originally 10 transects located in the mainstem Koktuli River downstream of the confluence of the North and South Forks. Based on a preliminary hydrologic assessment that the location at which there would be less than a 10% change in flow was determined. Agency personnel had previously commented that after the influence of change to flow rate is less than 10% downstream, the study area does not need to extend any further. Based on an updated flow change analysis, 5 of the downstream transects were eliminated from the study program leaving 5 transects downstream of the confluence of the North Fork Koktuli and South Fork Koktuli.
11. (Agency) Confirmation that the agencies use the 10% impact to flow threshold as a rule of thumb.
12. (Agency) When HDR presented their original approach to siting transects it sounded intriguing, but it has not been fully reviewed yet.
13. (Agency) Random selection also allows statistics to be calculated that could not be calculated if a non-random approach was used to select the transects
14. (R2 Consultant) The current review of existing transects includes evaluating locations and noting sections of study streams that do not contain any transects. These areas will be evaluated closely for possible transect placement. Agency personnel are encouraged to participate in the site visit when the new transects will be selected.
15. (R2 Consultant) There are also study transects in off-channel habitat areas.
16. (BE Consultant) It is often assumed that the North Fork Koktuli (NFK) comes out of Big Wiggle Lake and extends no further. This is not true. The NFK turns and extends further upstream. This is important to note because there are coho, Chinook, and sockeye that actively spawn in this upper reach, yet there are no study transects there. In reviewing the program, this is a lack of coverage that has been noted. It will be addressed in the 2008 program.
17. (Agency) It is important to consider both fish distributions and transect distributions. It may be more important to focus in on fish use areas such as spawning rather than on habitat type. Overwintering areas are also important.
18. (R2 Consultants) Agreed.

19. (R2 Consultants) There are some areas that are 2- 3 miles in length without any transects. When the habitat mapping is completed for each of the streams, it will be possible to determine the extent to which the existing transects represent the habitat types within each system. It was noted that areas like the NFK have a low gradient and exhibit little diversity of habitat and are pretty barren of fish.
20. (Agency) There seems to be more studies in the SFK than the NFK. They have an interest in reviewing the NFK for adequate coverage.
21. (PLP) An analysis of the X-sectional changes is being done.

---

## OFF-CHANNEL STUDIES

1. (PLP) PHABSIM will not be used to model off-channel habitat. Lateral connectivity may be one way to assess off-channel utilization.
2. (Agency) It was acknowledged that lateral connectivity is one way to assess off-channel habitat utilization.
3. (Agency) There was an interest stated in ground water studies associated with the off-channel habitat.

---

## OTHER INSTREAM FLOW CONSIDERATIONS

1. (PLP) It was recognized that target flows are an integral part of the instream flow modeling, but that those flows could not be determined until a project description has been finalized.
2. (PLP) In response to questions from the agencies regarding whether PLP studies were being carried out at low, medium, and high flows, it was stated that PLP was trying to capture a range of flows, but due to Health and Safety considerations for the workers, the study could not be conducted at peak high flows. Accordingly, the high flows, while not at the peak, are at the level required by the modeling procedure.
3. (Agencies) It was not yet decided by the agencies which system they would be using for doing their analysis.
4. (Agencies) There was an interest in knowing if a WSP analysis could be done for any of the pools.
5. (PLP) PLP will look into the possibility and the value of this modeling.
6. (Agency) There is an interest in information on the percentage of pools in the streams. PLP does not have that data at this time.
7. (PLP) Winter Utilization work has included sampling all juveniles in open water. Sampling is conducted during the periods of the lowest flows and coldest water temperatures which are in March and April instead of during the middle of winter.
8. (Agencies) It is important to include fry in the studies to determine if fry use unique habitat. If fry do use unique habitat it is important to study those habitats. Agencies will provide additional guidance on the type of information they are interested after discussion with their biologists.
9. (Agency) It will be critical that habitat suitability curves used in the PHABSIM models are based on measures taken from streams in the project area (Upper Talarik, North and South Fork Koktuli, and any important tributaries). It was stated that the range of suitable habitats may be quite great. The importance of each habitat parameter used to model habitat (weighted useable area [WUA]) must be shown in order for the output to be credible. The influence of ground water on distributions of fish in the South Fork Koktuli was used as an example of how assessing habitat suitability with depth, velocity, and substrate alone may not provide the full picture.
10. (PLP Consultant) It was also noted that some species and/or life stage curves May need to be modified from other locations or taken from literature.
11. (PLP) PLP stated that they currently have red surveys for Chinook only, but are working to include surveys for Sockeye also.

12. (Agency) It was strongly stated that Sockeye data is important to gather as there are so many sockeye in these river systems.
13. (Agency) Suitability curves for Coho could be a problem in that they spawn along the banks of streams and in very small water ways.

---

## UPWELLING AND DOWN-WELLING

1. (Agency) Also important to look at upwelling and down-welling areas.
2. (R2 Consultants) The gaining and losing stretches of the streams are being mapped. However, not all of the upwelling and down-welling locations have been noted to date.
3. (BE Consultants) Other areas of interest; there is a seven-mile length of the South Fork Koktuli (ephemeral reach) that probably goes dry every winter and in most summers. Above this point in the stream, only an occasional spawning salmon has been seen and less than 20 juvenile salmon captured. Downstream of the ephemeral reach, there is a 4 – 5 mile reach where groundwater pushes back up in the vicinity of the confluence of the mainstem SFK and tributary SFK 1.190 . This reach is very productive for sockeye and Chinook spawning. There is also a groundwater connection between SFK and Upper Talarik Tributary 1.190(UT).
4. (Agency) There is an interest in determining how much the surface water/groundwater exchange between basins or sites, for both upwelling and down-welling, is driving areas of fish use.
5. PLP explained that there appears to be inter-basin transfer of water near the headwaters of all three major drainages, but the contributions are most likely not measureable. There is an inter-basin transfer of approximately 20-25 cfs between the SFK and UT1.190 on a year-round basis.
6. (BE Consultants) An evaluation of the overwinter trapping sites could possibly be used to see if it gives an indication of upwelling locations, or of flow from the sides, banks, etc. However, we do not have a map of all upwelling locations.
7. (Agency) Peizometers were suggested as a possible method for studying the gaining and losing reaches. There is literature on the topic that the agencies may provide.
8. (Agency) For such a large study, PLP may want to concentrate on spawning areas, and gaining, and losing reaches.

---

## TARGET SPECIES

1. (R2 Consultant) There are currently 7 candidate target species (see slide in presentation) for consideration. Others can be added as determined by the TWG. Discussion mentioned the presence of sculpins, pike and whitefish, but no specific suggestions emerged from the discussion. Agencies will discuss this further and may contribute suggestions at a future date.
2. (R2 Consultant) Assuming the target species are good choices; some species may be indicator species that could be used to analyze habitat suitability for other species as well, and reduce the overall amount of data collection.

---

## CURRENT METERS

1. (R2 Consultant) To date, velocity data have been collected using Swiffer current meters. It is acknowledged that there has been some concern in the literature about the use of these meters under

low velocity conditions. R2 used these meters on several other Alaska projects and calibrated them with Price AAs.

2. (Agency) Provided the meters are properly calibrated and QA/QC checked, they (Swoffer) would probably be fine. However, the state generally stands by USGS methods including the Price AA and more recently acoustic Doppler profilers.
3. (Agency) National Park Service also prefers USGS methods.
4. (R2 Consultant) R2 is proposing to use Price AA meters as primary meter with Swoffers as backups. Will also rely on Marsh McBirney for the Off-channel work. Acoustic Doppler units will not be used because they are reportedly relatively fragile and may not endure the harsh field conditions.

---

## PERIOD OF FLOW RECORD

1. (R2 Consultant) There are currently three years of USGS flow records from the studies.
2. (Agency) There are no reliable stations out there to extend the record. The Newhalen station has older data that only covered 10-15 years. Agencies like 20+ years of record from which to base hydrologic and instream flow analysis. It is unfortunate for this type and size of project to be limited to a 4-year time series for running an instream flow habitat model. ADF&G indicated that they had gauged Lower Talarik Creek for five years.
3. (Agencies) This is indicative of the general lack of hydrologic data in the state of Alaska.
4. (R2 Consultant) The Main-Channel Flow team will be working closely with hydrologists to establish low, mid and high flows within the year. Also, it may be possible to synthetically extend the time period.
5. (R2 Consultant) Reference sites may be one way to evaluate project versus natural changes in hydrology, habitat, etc. to compensate for the short term hydrology time series.

## SITE VISIT

1. (Agency) Although there have been some site visits, it has been hard to get the big picture without maps of fish distribution, or upwelling areas.
2. (Agency) The upcoming Fish TWG meeting will give some context for the next site visit.
3. (R2 Consultants) Will be completing site reconnaissance during the week of May 19<sup>th</sup>. ADF&G indicated it would check on schedules to determine if they could make a site visit to select transects during the following week (week of May 26<sup>th</sup>). Other agencies are also invited.

## CLOSING ITEMS

1. PLP will provide an explanation of the transect distribution criteria to the Instream Flow Habitat Group .