

Technical Working Group - Freshwater Fish

Pebble Project

June 12-13, 2008

Atwood Building Room 1270

Minutes Recorded by Charlotte MacCay/Pebble Partnership (PLP)

I. PRESENT:

Andrea Meyer (ADNR),

Charlotte MacCay/PLP

Jeff Estensen (ADF&G)

Phil North (EPA)

Randy Bailey (Bailey Environmental)

Dennis Deans (PLP Environmental Consultant)

Gene Sandone (R2 Resource Consultants)

Jason Mouw (ADF&G)

Mark Fink (ADF&G)

Jean Zodrow (EPA) – via teleconference

Mary Louise Keefe (R2 Resource Consultants)

Jane Whitsett (PLP)

Dudley Reiser (R2 Resource Consultants) - via teleconference

Brain Lance (NOAA/NMFS)

Lowell Fair (ADF&G)

Public:

Andrew DeValpine (Bristol Bay Resource Service Area (BRSA))

Carol Ann Woody (Fisheries Research and Consulting (FRC))

II. PROPOSED AGENDA

8:00: Comments from PLP on response to information requests

8:15-10:30: Presentation of information on past studies as requested by the TWG. This will be a limited discussion, open to further elaboration at future meetings if necessary. The intent for presenting this information at this meeting is to set forth the basis upon which some of the 2008 protocol decisions were made.

10:45 – 12:00: Presentation and discussion of the 2008 protocols so that the Pebble Partnership can consider agency suggestions and adapt the 2008 field program accordingly. Discussion of the 2008 protocol will proceed in the following prioritized order as determined by the fish consultants:

- Fish Population and Abundance
- Tier 3 Habitat

12:00 Lunch

12:30 – 2:00: Review of 2008 Study Protocols

- North Fork Koktuli Off-channel Habitat Use
- Upper Talarik Creek Habitat and Fish Population

2:15 – 3:30: Review of 2008 Study Protocols continued

- Transportation Corridor
- Salmon Escapement

Break

3:45 – 5:00: Review of 2008 Study Protocols continued

- Ephemeral Reach
- Upper Talarik Creek Rainbow Trout Radio-telemetry

Friday June 13

8:00 – 11:30:

- Presentation of the proposed Segment Analysis approach for presenting fish data that will be technical reports attached to the Environmental Baseline Document.

III. ADMINISTRATIVE ISSUES

Agencies reviewed the agenda (see above), and requested that the presentation of the 2004 – 2007 fish study program be handled very briefly or not at all so maximum time could be spent discussing the proposed 2008 field sampling protocols. Most members felt they would already be familiar with the information that would likely be in the 2004 – 2007 presentation.

PLP felt it would be best to proceed quickly through the 2004-2007 fish studies power point as it would set the stage for understanding the protocols that were to be the focus of the rest of the meeting. In addition they emphasized that there was still time to incorporate agreed changes to the 2008 protocol.

IV. INFORMATION REQUESTS

A. DISTRIBUTION OF PREVIOUSLY REQUESTED DATA

- (PLP) Information was provided in response to the information requests from the last TWG meeting. Much of the requested information is already available through the fish resource permit reports filed each year with ADF&G. A table of previously distributed material (attached) and where it can be located was also handed out. Additional data was distributed prior to his meeting. The requested 2008 sampling protocols were distributed 3 weeks prior to the meeting to accommodate agency review, but the rest of the data was not ready for distribution till a few days prior to the meeting, PLP is continuing to improve its ability to distribute informational material in a timely fashion.
- (PLP) Formal responses to ADF&G's comments on the 2007 study plan and their comments on the 2006 Agency Presentations are still forthcoming.
- (Agency) Agencies need more time to review study protocols and plans and suggested a 60 day time frame in the future.

B. AVAILABILITY OF ADDITIONAL DATA

- (Agency) Most raw data is available and appreciated, but data summaries based on PLP's analysis would be more useful and save the agencies' review time. Is there a timeline for summarized reports? • (PLP) Summarized information will be provided in the Environmental Baseline Document. [It is uncertain what was stated regarding the expected release date of the EBD. PLP is supplementing the minutes with a post-meeting note that the EBD will be released concurrent with the permit applications]
- (Bailey) Fish collection reports are submitted at the end of the year, based on the information required by the fish resources permit. Pebble determined that writing technical reports on individual studies would not fully integrate information or necessarily include all associated data collected. The new segment analysis approach will integrate all or most related data in to a stream segment by stream segment and mainstem (NFK, SFK, UT) tributary watershed approach.
- (PLP in response to Agency) The EBD is being prepared to characterize the environment, and will be the end of official baseline data collection, but we can still add more data collection in subsequent years and revise the document as necessary.
- (Agency) It's easy to get caught up in terminology. It doesn't matter when you apply for permits, you can still use additional data, and additional data collection is likely to be a permit requirement.

V. 2004 – 2007 FISH STUDIES

- (Agency) The presentation discusses the groundwater exchange between the South Fork Koktuli watershed and the Upper Talarik (into tributary UT190) watershed. Are there any other known groundwater exchanges between watersheds?

- (PLP) There appears to be some groundwater exchange at the headwaters of the North Fork Koktuli and the Upper Talarik, but it is not measurable. There is also evidence, visual and not measurable of groundwater exchange from the North Fork Koktuli into Upper Talarik Creek. [PLP inserts the following post-meeting comment: The latest thinking is that the springs in the upper end of Upper Talarik Creek are fed by infiltration from within the watershed. This is based, at least in part on examination of the surface hydrology map and in consideration of the local landform. If there is any contribution from North Fork Koktuli, the current thinking is that it is very minor.]
- (Agency) Fish sampling is being conducted in the late fall and early spring to document where the fish are located at that time and infer where they are during the winter. This may not be reliable. On the Kenai, fish work suggested fish movement during winter. PLP should take caution that late fall/early spring data may not tell you what is happening during the winter.
 - (Bailey) Understood, the approach has been to sample at lowest flows and water temperatures, which means late March or early April. Since sampling is only occurring in open water areas, we have avoided the mid-winter time period. In general, we consider winter sampling not feasible.
 - (Agency) Understood that winter sampling may not be feasible.
 - (Buell) Winter, as characterized by lowest flow, comes significantly later at the Pebble site than it does on the Kenai. Lowest flows occur at Pebble in March or early April.
 - (Bailey) Winter sampling under ice is not feasible, but sampling in open water areas can be done. However, the number and geographic locations of open water sampling sites vary from year to year for this particular sampling program.
- (Bailey) In 2007 there were more fish captured due to sampling off-channel habitat. That is one reason why you will see more off-channel habitat work proposed in 2008.
- (Bailey) Data on escapement is provisional. Observer efficiency is being reviewed in more detail.
 - Index species monitoring was originally set up in 2004 with Pebble West in mind, Pebble East was not yet a consideration. This now-discontinued sampling consisted of a set of parameters (hydrology, macroinvertebrates, water quality, fish) being collected at specific locations (fish tissues sample sites) over time. The discovery of Pebble East required a new look at this type of sampling.
 - Both qualitative, fish density, and fish population estimates were completed for a variety of areas in 2004 and 2005. The fish density and population estimates were attempted for specific habitat types, with the intent of expanding these habitat unit specific estimates to a longer stream area.
- (Agency) The presentation mentions that 38 radio-telemetry tags were inserted in Upper Talarik rainbow trout of the fall feeding aggregation, of which 33 were tracked. What was the rationale for tagging 38 fish?
 - (Bailey) Originally there was a target of installing 80 tags, but there were only 38 fish caught. The number 80 was chosen as a large number of tags, there was no analysis done to determine a statistical relationship, just professional judgment. Additional tags are being added because Pebble and its fish consultants did not think 38 were sufficient to meet the study objectives. Sixty additional tags have been permitted for 2008.

- (Bailey) Some fish tagged last fall gave mortality signals during the winter, but were sending alive signals in spring.
- (Bailey) There are two programs that you have not seen any information on in this presentation: the flow-habitat or instream flow program, and the aquatic habitat mapping program. These are programs that do not require information being submitted under the fish resources permit. However, these programs are related to each other and of importance to fish. We anticipate that this information will be available at a later date. There is an instream flow subgroup of the Fish TWG that has been established to facilitate the instream flow study.
- (Bailey) All raw data for fish collected is in the fish resources permit reports previously submitted to the Alaska Department of Fish and Game. There are over 200 pages of data with individual fish lengths, the type of sampling being conducted, GPS coordinates, gear types, species captured, and in 2005 even snorkel counts were included in the report.
- (Agency) Were comparisons made between first pass electrofishing and total to get the efficiency of the method? It would give useful information on the level of effort required to get good data.
 - (Bailey) Results are mixed due to the complexity of habitat and water conditions. The new electrofishing equipment is less powerful and less effective for capture of smaller fish. Data from the early 90's was collected with older, more powerful equipment. The recent work used newer, less powerful equipment.
 - (Bailey) We don't always see substantial depletion. In fact, under certain conditions we did not get depletion between the first and second pass. Last year the effort was intensified using more gear and larger netting crews in order to obtain the appropriate depletions. This was accomplished on a bigger channel than past years. Some past years were good and some showed no depletion (a very flat line if graphed).

● VI. AGENCY REVIEW PROCESS FOR STUDY PROTOCOLS

- (Bailey) We reviewed the existing data to determine what else we need to know. We looked at the geographic distribution, quantity, and quality of existing data, and other questions that have arisen since last year and these are the factors that contributed to the development of the 2008 proposed program we are going to talk about now.
- (Bailey) If the agencies see an information gap, or have a concern please raise the issue and we will take it back to the client (PLP) for consideration. Please back up concerns or requests with a reason or justification, such as what monitoring protocol or permitting decisions require these data. Please be specific so the consultants can write a scope of work.
- (Agency) Prefer to discuss issues that can be changed for this season, otherwise the discussion should be deferred until next fall for the best use of our time today.
- (Agency) It would be preferable to discuss lessons learned in the fall, then meet in March to implement changes.
- (Agency) Two weeks prior to start up of the field season is inadequate – this process needs to start much earlier in the year. It may not be worth meeting to discuss this next year if the study plans are not available earlier in the year.
- (Agency) There is a lack of opportunity to review data far enough in advance. Everyone has experienced limitations in methodologies. We need to recognize limitations of data collected to better respond on how to fill the gaps.

- (PLP) As the Technical Working Groups are evolving, we are trying to be more proactive at distributing data and receiving input. For 2009, PLP would like to change the approach to gain input from the agencies prior to writing study designs, rather than asking for reactions to the draft study plans. There simply is not adequate time to prepare study plans far enough in advance to meet the agencies' desire for a long review period. It was proposed at the last Steering Committee meeting that PLP will try to structure the fall agency meetings (usually held in November) such that break-out TWG meetings can be held at the same time in order to solicit input to the upcoming studies.

VI COMMENTS ON THE 2008 PROTOCOLS

A. FISH PRESENCE (SNORKELING, ELECTROFISHING, AND MINNOW TRAPPING)

- (Agency) Does PLP know where the data gaps are?
 - Yes, that is why we are proposing to study the areas we have identified and we are also gathering additional information in areas already studied.
- (Agency) Are the electrofishing units all backpacks? Are only wade-able surveys being conducted?
 - (Bailey) Water is usually less than 2 feet deep. No boats are being used. There is a special study for the lower portion of the Upper Talarik Creek which is discussed separately.
 - (R2) We are also doing density estimates.
- (Agency) Are there any statistics on how well single pass electrofishing works as a measure of relative abundance? It can be a good index, but that's about it.
 - (Bailey) We use it for relative abundance and species composition, with the understanding that it is not precise.
 - (R2) Snorkeling is going to be our most useful method on relative abundance based on data review. A calibrated snorkeling survey is the primary method for fish abundance, supplement with electrofishing.
 - (Bailey) We tie the snorkeling to habitat units and use electrofishing to calibrate the snorkel surveys.
 - (R2) Snorkeling efficiency varies with habitat, we calibrate in habitats in proportion to occurrence of habitat types.
 - (R2) Units are generally block netted prior to sampling, calibration units are flagged to indicate they need to be block netted prior to sampling.
 - (R2) Efficiency rates are variable by habitat and conductivity.
- (Agency) Standardized power could be used as a means to reduce variability.

- (Buell) It is not true that a consistent power setting will yield consistent results. Some habitat types need more power applied to electrofishing to affect the fish. Boulder streams need more power than fine gravel. This means a consistent power setting would be inappropriate because it would not have the desired outcome.
 - (Agency) Sometimes a backpack unit is not the proper tool – if you aren't getting appropriate amperage to stun the fish. If you are chasing the fish, and it is herding them, you can cause more damage to fish than you might with higher amperage – it depends on the depth and substrate.
 - (R2 in response to Agency) Existing data has not been analyzed to determine variability by habitat. It is not in the present plan to calibrate previous data. There was some calibration done in the past that has not yet been reviewed.
- (Agency) How confident are the consultants with the database in its finality? Baseline data is the groundwork for an effect on fish population. If there is no confidence in the data, then there is no confidence in predicting the impacts.
 - (R2) We are confident the data are good. The goal is to document baseline conditions using a combination of: fish abundance, density, population estimates, habitat descriptions, and geographic distribution.
- (Agency) Define fish abundance.
 - (R2) Fish abundance means a quantitative estimate using an appropriate sampling procedure and mathematical treatment of data.
- (Agency) You are not sampling the entire drainage, and should consider some expansion of your sampling program
 - (R2) We are looking to provide abundance estimates for habitat types – there may be some sub-sampling.
 - (Bailey) As a point of clarification, we are quantitatively sampling all of North Fork Koktuli 190, but not all of the North Fork. We are also quantitatively sampling all of South Fork Koktuli 190, but not all of the South Fork itself. We will be sampling all tributaries to these specific streams for adults, juveniles and all species. The reason for this is that there is a higher likelihood of direct project impacts in the quantitatively sampled areas than in other tributaries that are not quantitatively sampled.
- (Agency) It is suggested that you stay away from the term “quantitative population estimate” when talking about relative abundance, as it can lead to some confusion regarding expectations.
- (Agency) Is the overall goal of this information only to describe the site to meet NEPA requirements or does it include methodology for monitoring for impacts?
 - (Bailey) This data is not intended for monitoring purposes. It is meant to be descriptive, to list particular habitat types, and to get an idea of relative abundance of what is in the streams. By having some relative abundance or quantitative abundance estimate data by habitat type, we can relate potential habitat loss to project impacts. Project impacts and mitigation obligations are usually habitat-based.”
- (Agency) A more robust approach is preferred where PLP collects data in a manner which can speak to impact analysis; something along a BACI design. Proponents of the project are making statements about using the best technology available

to protect the environment. Studies using the BACI design could detect impacts and allow for actions to be taken to minimize impacts. Descriptive data will not serve that purpose.

- (PLP) There are plans to create a Monitoring Technical Working Group to address collection of data for monitoring purposes. Use of a BACI design would be discussed within the Monitoring TWG.
- (Agency) A lot of time and effort are being spent on data of limited use.
- (Agency) When calibrating electrofishing, if you are snorkeling and come across adults what do you do?
 - (R2) We do not electrofish if adults are in the area. We make sure to calibrate prior to the arrival of adults, or go places where the adults don't go. We are not inclined to remove adults, but would instead find a different spot.
 - (Agency) Could be any species of adult, not just salmon. Permits shouldn't allow shocking adult fish of any type.
 - (R2) We of course do not shock adult salmon, and will clarify if the permit disallows shocking of any anadromous fish or of all adult fish. If we can't shock when Dolly Varden are in the area, then we wouldn't ever be allowed to shock.
 - (Agency) Large rainbow trout are especially susceptible. There is kinder, gentler, new technology designed to be adult rainbow trout friendly.
 - (Buell) Even with that (lower power) technology, studies still cannot be conducted in a reckless manner that might harm fish unduly.
 - (Agency) So, it's not your intent to make any inferences about adult fish from the electrofishing surveys?
 - (R2) Our intent is to not sample a stream unit in the presence of any adults. Adults are not used for determining relative abundance, but we do note presence of adults as distribution data.
- ○ (R2) A minimum of three electrofishing passes is part of the protocol.
 - (Agency) Two-pass depletion estimations do exist – if you get 80% depletion then the two passes are considered acceptable.
- (R2) We have not settled on what the trigger will be to do mark-recapture instead of electrofishing.
 - (Agency) Mark-recapture could be used in habitats where you can't get strong depletion.
 - (R2) Conducting mark-recapture prior to electrofishing may indicate that the area is not worth electrofishing. We don't want too low of an efficiency rate. We are just shifting to mark-recapture and this may not bring additional confidence in the estimate.
 - (Agency) The potential of using a salt block was mentioned.
 - (R2) We approached ADF&G and were told that using a salt block was not desirable from a permitting perspective and would also require ADEC permitting for a discharge to water. Not likely this year.

- (Agency) If the agencies find a trigger to start mark-recapture then how long a time period between initial capture and marked recapture?
- (Agency) There is some concern that if you came back the next day you will lose your net due to debris and freshets in the evening.
- (Agency) There is concern if nets are set to be “fish tight”.
- (R2) Literally in the protocol we picked a number and put in that two hours was adequate time for mixing (fish redistribution after tagging). We were looking for input, what is a reasonable time for mixing vs. ensuring the net stays “fish tight”? Could we assume a loss/gain in some proportion?
- (R2) It depends on the use to which the data are put.
- (Agency) Another option is to do open population estimation using a longer stretch of stream over a longer period of time.
- (Bailey) Mark-recapture is a secondary choice because it is not practical from a logistical viewpoint. We can cover more ground using snorkeling.
- (Agency) You could use mark-recapture to calibrate snorkeling.
- (R2) May have to look at seining instead of electrofishing for mark-recapture.
- (Agency) Depending on the timing of out-migration of age-classes over a 24 hour period, if you block off the whole stream what effect does that have on the data set, and what effect on the fish trying to get out; particularly if you differentially leave at night and block all the next day? There is no perfect method. If mark-recapture is not practical in 24 hours, maybe you could do a recapture in the evening.
- (Buell) There is no sampling during out-migration.

- (Agency) Calibration should be during a similar time period as when you collected the data, or you won't get a good inference towards when you were originally there.

- (Agency) If you haven't seen spawners, still need to look for juveniles.
 - (Agency) With respect to salmon, it's important to get smolt enumeration out of the tributaries to get an estimate for the season –using incline plane traps.
 - (Agency) You won't know the precision until you try.

 - (R2) The focus is on juvenile anadromous fish.

- (Agency) Previous documents show relative abundance for much of the area, there are some gaps. We know that Coho and Dolly Varden use habitat as long as the habitat exists – does PLP intend to survey to document upstream limits of fish presence?
 - (Bailey) Yes, in NFK 190 and SFK 190. ADF&G went further in some areas that weren't covered in 2004 and found some fish upstream of UT 350 – some streams have not been surveyed by anyone but Jim Buell and have not been looked at since 1991.

- (Agency) How much effort do you put out looking for fish upstream before you are confident you are not missing any species present?
 - (Bailey) Sometimes until the stream peters out.

 - (Buell) Sometimes professional judgment tells you. You work until you are convinced nothing else is there and have exhausted all possibilities.

- (Agency) It would be nice if you could set some minimal amount of effort per site before concluding the fish aren't there.
- (Agency) 40X channel width and not less than 150 meters is one criteria used. But, there is some on the fly decision making, looking for barriers, a fork in the channel that has little habitat, etc.
- (R2) Generally look for Coho and Dolly. We collect otoliths to document if the fish are anadromous or not.
- (Bailey) If there are no fish we generally drop downstream until a qualitative change in habitat indicates potential fish presence. We prefer to go in August when fish are maximally distributed through the watershed.
- (Agency) If fish exhibit spawning behavior take location information to document that activity.
- (Agency) Have to be really careful in judging if a channel is too small – sometimes the channel will re-emerge upstream and there will be fish there – particularly in flat wetland areas.

B. AQUATIC HABITAT INVENTORY

- (Agency) What will Tier III be used for? We have a concern that 'replication' is very difficult to achieve using this Forest Service Protocol. →○
 - (Bailey) TIER III level habitats are also sampled for relative fish abundance to get density estimates. We will map the habitat and go back for density estimates.
 - (R2) The work is to be conducted under low flow (Growing season low flow)
 - (Buell) Our objective is to be as close to base flow during the growing season as reasonably practical.
 - (R2) We watch the hydrograph before going out and we stop during periods of rainfall – but everything has to happen in the second week of August. We do habitat first, then go in August for distributional studies and document the flow by the data collected by the hydrology and instream habitat modeling groups that are also collecting flow data.
 - (Agency) As long as not trying to infer a statistical amount of habitat types, because between observers the variability can be high. USFS has backed off using their protocol to make determination to changes, alterations of habitat and flow regimes.
 - (R2) We will probably go into SFK 1.240 also. (This was not in the power point presentation)
- (Agency) Are all sites in the project footprint or are there reference sites as well?
 - (R2) All sites are within a 10 mile study-area. Because we do not have a project footprint yet, we don't have any reference sites.

- (Agency) Some of the watersheds being studied could be in the project footprint according to some design options that were presented in the past.
- (Agency) In permitting, the level of required detail may be more detailed than NEPA. The areas proposed to be eliminated will likely need detailed information on what's being lost i.e. a map of habitat to exact size – a GIS rendering.
 - (R2) Tier III will provide that. It's not just a list, but the quality and quantity of habitat with lots of pictures as well.
 - (Agency) Geomorphology measurements at 3X/reach or for a longer reach every 170 m take a cross section measurement
 - (Agency) Are you collecting at consistent geomorphic points? The head of every riffle or stratified?
 - (R2) At the beginning, at the end, and we pick a place in the middle. All channel morphology data is collected over riffles. Special features are noted, anything unusual, a cascade etc is noted and photographed. Fast water habitat is calibrated every 5th unit.
- (Agency) How do you coordinate between observers? Any repeat surveys for observer variability?
 - (R2) Two observers work together. There is very extensive training for every project, everyone calibrates together. We go through the unit together for calibration. There is a QA/QC program where expert habitat surveyors go with the teams weekly rotating with each team (these are the same experts who were used as trainers.)
 - (Agency) Those are good best management practices. Unless you do repeat surveys, you don't really know observer variability. It is suggested that you do some repeat surveys on a small sub-sample.
 - (R2) What do you do with that variability once it is measured – and if that variability data varies also?
 - (Agency) It gives an indication of the magnitude of the variability.
 - (Agency) It depends what you repeat. Need variation to detect small changes it's not needed for description level surveys.
 - (Agency) The amount of variability lends some context.
 - (Buell) Knowing the amount of variability provides:
 1. Comfort Factor – confidence in the output of work
 2. Depending on the use to which data are put – knowing variability helps measure changes that need more precision and accuracy: i.e. riffle/pool ratio vs. exact square meters of riffles a certain size, etc.

C. NFK OFF-CHANNEL HABITAT (OCH) STUDIES

- (Bailey) This work was proposed as a direct result of the OCH work done on the SFK, because of the amount of fish use and diversity of habitat in that area. The Instream Flow Habitat sub- TWG group had a discussion about connectivity and how fish get in to these off channel sites – some may be only spring –fed, or only connected at very high flow.
- (Agency) Does the USFS protocol approach address more lake-like channels than stream-like channels?
 - (Bailey) USFS protocols do address multiple channels.
 - (R2) For consistency we collect the same information - meso-scale (20 X feature width) information describes the habitat.
 - (Agency) You might want to add ox-bow as a characteristic – acts more like a pond with inflow and outflow than a stream.
 - (Agency) Is PLP considering use of using remote sensing for mapping
 - (R2) We are looking at what it will take to get new ortho-photo coverage.
 - (R2) We asked to cover the entire floodplain with ortho-photos at 1:2000 scale to capture off-channel habitat [PLP adds as a post-meeting note that the proposal to collect ortho-photography has since been approved].
 - (Agency) This will be good ground- truth data.
 - (Bailey) Electrofishing is used as a back-up to snorkeling. Water quality parameters such as visibility, DO, conductivity, secchi disc readings are collected.
 - (R2) We collect data for similar features in the OCH and adjacent mainstem. If no similar mainstem habitat to the OCH habitat then we may need to go up and or downstream within a suitable distance.
 - (R2) There are areas in the North Fork with concentrated beaver activity that have not been studied in the same way similar areas of the South Fork Koktuli have been studied.
 - (Buell) We will be looking to determine the water source (springs or groundwater versus direct main stem connection to beaver workings) and what fish are supported. This is important because fish habitat areas directly connected to the stream may or may not be stage-sensitive, while areas fed by springs and/or groundwater probably will not be stage sensitive.
 - (R2) We will need to subsample, based on the extent of beaver activity here. There is no effective way to sample the whole area. Not intended to get a set number of 10 beaver ponds, but a representative sample of ponds, ox-bows, etc... We will have to qualify data due to subsets. The goal is to identify fish associated with OCH. Captured fish will be enumerated by species and life stage. Data may be limited, but may still be good information. We will be able to determine catch per unit effort, relative fish abundance between OCH and mainstem habitats over all, and relative abundance between specific habitat types located in the mainstem and OCH areas.

- (R2) (Buell) Access – need to determine if fish access is limited by stream stage. Many of these sites are on the same transects as instream flow habitat mapping studies. We can go back and walk the unit to determine connectivity such as springbrooks. We will need to determine the relative importance of OCH to determine project-induced flow impacts and the potential relative value of created OCH areas for compensation
- (R2) We can look at cross-sections to evaluate frequency of connection in relation to range of flows in instream flow studies.
- (Agency) An OCH to mainstem use comparison may be better served – make more sense to aggregate OCH and mainstem by habitat type – do by reach – set reach length
 - (R2) We don't have a program in the mainstem except in association with OCH – but could apply it instead of the proposed adjacent habitat protocol. Instead of similar habitat in OCH/Mainstem we could just select a reach in an area of pre-determined size or characteristic to use for the comparison of fish use, species assemblage and maybe relative abundance. How does OCH affect fish assemblage/abundance within the reach?
 - (Agency) Not a hard comparison to expand to elsewhere – different habitats/different methods.
 - (Buell) The approach of considering which uses to which data are being put:
 1. Describe environmental setting (including fish use)
 2. Assess what happens if project induced flow patterns change access/use?
 3. What can we learn about mitigation opportunities for future consideration?
- (Agency) At what flow are OCH accessible to the fish?
 - (Bailey) The instream flow model will measure and allow extrapolation to determine accessibility at different flows.
 - (R2) In addition to 3 visits per transect, we are considering using peizometers to collect additional connectivity information.
 - (Buell) There are multiple continuous recording discharge readings for all streams with good correlation between model discharge and spot checks.

D. UPPER TALARIK (UT) CREEK HABITAT AND POPULATION STUDY

- (Bailey) There is a stretch of stream not previously studied with any detail in the downstream section of UT. It's Alaska Peninsula Corporation (APC) land. They are cooperating with PLP to conduct habitat surveys and a float survey. The studies are limited to "whose home?" Water is high and deep with abundant rainbow trout. The presence of adult rainbow trout limits the ability to use electroshocking survey methods. There are also logistical issues with APC. Snorkeling will be conducted, but calibrating is a challenge.

- (Agency) Would like to get quantitative data, not just verified quantitative. We are glad PLP is still doing surveys, at least there will be presence/absence data even if can't be calibrated. In the past we have divided streams by section and crawl up lines as a means to survey.
- (Buell) Studies are conducted in a downstream direction by boat; foot surveys are conducted in an upstream direction.
 - (Agency) You may make different measurements going downstream than upstream.
 - (R2) We do measurements in each unit using range finders instead of ocular calibrations. Foot surveyors do estimates and calibrate consistently. The information will come back in a database but will be easily convertible with GPS and hip chain data to a map.
 - (R2) We will float and snorkel downstream.
 - (Bailey) Will make a reasonable effort to look at cross-section of channel morphology, along with snorkeling and maybe some beach seining. We hope to get presence/absence documentation.
 - (R2) We will also get habitat survey data and understand what habitat is like and to some extent quality.
 - (Bailey) New aerial photos will also help determine habitat types.

E. TRANSPORTATION CORRIDOR

- (Bailey) The existing data is a lot of information based on 2004/2005 proposed road alignment. Not all of that proposed alignment is necessarily current. Changes to the road alignment are under consideration. The new route would have fewer stream crossings, but across the same watersheds. Stream crossings are being targeted for better locations,
- (Agency) The number of crossings is arbitrary. It's not fewer stream systems.
 - (Agency) If the road crosses the mouth of the stream, it potentially affects every fish that's going upstream.
 - (Bailey) Jim Buell is taking the GPS and going back to some previous sites to give us location information on where we need to go to get additional information. There are also some new locations that need more information. We are still writing up road alternatives for NEPA and need data to support discussion on alternatives. The study objective is still to collect data at approximately 150 sites for fish presence, habitat surveys as necessary, and noting any fish migration barriers encountered. The road corridor data base being put together is treated differently from the segment analysis being done for the mine study area.
- (Agency) Road crossings typically have an adverse effect on fish. Culverts impact fish movement.
- (Agency) EPA will want to see alternative road routes.
 - (Bailey) Some sites don't need full USFS Surveys beyond Tier III. Tier I and II surveys are not needed until a transportation corridor is selected. Keeping the 2008 study consistent with 2004/2005 methods. Once

crossings are identified to a centerline of the road, we will further characterize the habitat and activity along the route.

- (Agency) For NEPA, the road crossings with potential to impact hydraulics will require upstream and downstream morphology for some length from crossings (once determined). Long profile, cross-section and lateral profile will all be required. Length will relate to channel size
 - (Buell) It could depend on the site, i.e. high bedrock crossings may not require as much information as low gradient crossings.

F. EPHEMERAL REACH

- (Bailey) This study will look at the ephemeral reach in the South Fork Koktuli River. It will describe the magnitude, timing and duration of the dewatering period, document fish kills and changes in habitat. The ephemeral reach is a major determinant in salmon distribution. Salmon generally don't go above this area. Some snorkeling has been done in this area.
- (PLP) It is of interest to note that near the center of the ephemeral reach it doesn't always go dry, but either side of the center always goes dry in the winter and almost always in the summer.
- (Bailey) Sometimes there are pockets of water temporarily left behind in the stream, but they go dry as well, trapping fish. We are looking for a better understanding of what is happening there. This is an area where we may be able to offer mitigation through flow control. Groundwater consultants are directed to determine and explain how this works. We are interested in the relationship between groundwater in the basin and surface flow. We want to look at the number of species and life stages so we can summarize hydrology data in respect to fish habitat. We are looking for presence/absence, characterization of pool habitat, document dead fish, and look at the number counted per area. This stretch is one major feature that determines the character of the South Fork Koktuli.

G. UPPER TALARIK RAINBOW TROUT TELEMETRY STUDY

- (Bailey) This study has been underway since last fall. It looks at the dispersion of feeding aggregations in the Upper Talarik. There were 33 tags active tags last fall and we are adding 59 tags in 2008 (45 were added last week; more will be added the first week of June; Note: all 59 tags were successfully implanted). Standard surgery implantation was conducted by an expert (Fred DeCicco). There are two fixed telemetry stations. We will continue the study until the tags quit functioning which should be in the spring of 2010. Fish are being caught by fixed-line instead of by seine to reduce handling stress per ADF&G recommendation.
- (Bailey) The fish were spotted by air to improve the efficiency of capture. The towers are taken down during the winter to avoid equipment damage.
 - (R2) The survey route includes the entire Iliamna Lake area, plus the upper Kvichak River and significant Iliamna Lake tributaries. Last year helicopters were used on the northwest side of the lake. We changed to using a 206 fixed wing survey all around Lake Iliamna plus a few extended surveys and are finding fish at greater distances. We are going up the tributaries as far as best professional judgment suggests fish might go. There is good range on the tags. The targeted fish are over 40 cm. Instrumentation on the towers are downloading data every week. Batteries are changed every 10 days. . Tags have mortality sensors. They were tracking weekly in the summer, but slow down during the winter.

- (Agency) Have you documented what the fish are doing at these sites?
 - (Bailey) No, we have not documented what fish are doing at sites along the Lake or in tributaries near the Lake,
- (R2) During the winter, fish were tracked along the edge of the Lake. Ice and depth do affect our ability to detect fish. Ice is especially a problem if there are layers of ice. In general, they are found along the edge of the lake. With each survey we may not see all of them, but cumulatively can generally find them all. We can account for 33 of the 38 last year. Thirteen are still active. When it's very cold it's also hard to detect. One day, at -30 degrees F., there was too much static to track fish, it was determined later to have been caused by static discharge from the helicopter rotor.
- There were some handling mortalities this spring. These fish had quick surgeries (<3 minutes) and the necropsies showed some infestations, we believe cause of death was from a variety of factors and cannot attribute death specifically to surgery.
- (Agency) Are there any control tags to test if detection was working? Are you using a control tag in a boat to make sure the tower was working?
 - (R2) No haven't done that. No problems occurring. We have had good tag detection so far. Tons of records to date, with over 1.4 million detections
- (Agency) Will telemetry study results be in the 2008 EBD?
 - (R2) There is some discussion about doing a separate report from the EBD – not sure of the EBD schedule.

H. SALMON ESCAPEMENT

Throughout the Salmon Escapement session, there was much discussion on the intent and definition of baseline data in relation to salmon escapement studies. PLP asserts that baseline data is collected for the use as descriptive data to be included in the NEPA EIS process, with pre-operational monitoring data collection to be addressed in the future in a specific monitoring technical working group for collection at a future date. Some agencies' TWG members at this meeting generally expect baseline data to measure fish productivity and serve as the pre-operational data for monitoring of project impacts. The difference in baseline definition and the consequent use of the data leads to differences in expectations for data precision and preferred methodologies. These basic differences were raised repeatedly throughout the meeting leading to very circuitous discussions. For clarity of documenting the different points being made by the TWG members, the discussion has been sorted out by topic.

1. PROJECT DESCRIPTION

- (Bailey) This is a continuation of the 2004 aerial survey program. One difference is that R2 added a protocol for more rigorous observer efficiency estimates. We are continuing to discuss survey life or residence time issues. Rationale for using aerial surveys:
 - Historically what has been done
 - Fits the need of an environmental baseline document
 - Mitigation is habitat based.
 - It is not recommended by consultants that permit conditions be based on adult return data due to there being so many outside contributing factors, such as:

- Harvest influences
 - Ocean conditions,
 - Natural intra-basin run strength variability
- (Agency) While it may be true that adult returns are highly variable, this is why understanding juvenile production is so important. Smolt and fry information allow insight into freshwater versus marine production and variability. Additionally, harvest influences on adult returns can now be assessed using genetic stock identification, a standard procedure for Bristol Bay sockeye salmon catches.

2. BASELINE VS. MONITORING DATA

- (PLP) We acknowledge the agencies have concerns over the use of aerial surveys as a basis for monitoring and views that discussion as part of the long term monitoring plans that are to be addressed later on in a monitoring technical working group. The escapement data being collected now is meant to meet the needs of the NEPA process. Given that the current studies are for the purpose of establishing baseline characterization, how precise do these estimates need to be? Why are precise numbers needed – how will they be used?
- (Agency) Accurate and precise estimates of escapement may be needed for mitigation purposes. Our point is that for a similar cost to aerial surveys, much higher quality (more accurate and precise) information could be collected. Counting towers are an established method of assessing escapement in Bristol Bay for over 50 years. The method is reliable and cost effective.
- (Agency) Baseline level of precision – Our agency sees baseline as information to detect changes and these data need to be very precise during project monitoring. Changes in habitat are easier to predict than production of fish.
- (Agency) We don't understand why PLP is looking at baseline data for NEPA differently from monitoring for change. How can we monitor if there are not enough years of pre-operational data? Monitoring will require 3 – 5 years of pre-operational data?
 - (R2) PLP is only focusing on baseline for permitting – The monitoring TWG will focus on whether other methods are needed for monitoring.
 - (Bailey) The Chinook data collected so far has a variability factor of 10. We have escapement estimates – how much precision is required?
 - (Agency) PLP has not suggested productivity estimates except catch/unit effort snorkeling
 - (PLP) Mitigation and compensation will best focus on instream flow modeling and habitat suitability.
- (Agency) Collective wisdom is to put out a study to collect data in the best way possible. Use the best available science – not get hamstrung from the start.
- (Agency) It's taken 50 years of studies in Bristol Bay to understand the processes that drive fish production.
 - (PLP) Those 50 years of study are being used to manage the fishery, not to measure project effects.

- (Agency) It would be good to have 4-5 years of pre-operational data.
- (PLP) There are no current plans to curtail escapement estimates, but we do need an endpoint to the 'baseline' data in order to complete the EBD. Studies will continue beyond production of the EBD. As we stated earlier, however, data collection for monitoring is a subject for a different TWG
- (Agency) The intent is to identify data gaps – so we offer suggestions. It will help permits go smoother and faster if we have data on adult returns.
- (Agency) Hate to pass up a methodology to collect more precise data when it is still unknown what impacts may be of concern.
- (Agency) It will be a stronger data base if we move to a more accurate and precise escapement estimate methodology now.
- (Agency) Regardless of NEPA, more robust data will be needed for monitoring.
- (Agency) There is a perception that the sockeye are not being adequately studied.
 - (Buell) Sockeye is a high profile species for the project.
 - (Agency) All the more reason to adequately document sockeye salmon escapement.

3. MONITORING APPROACHES

- (Buell) There is a terminology issue: PLP baseline for EBD purposes is equal to descriptive data – not necessarily for use in monitoring. Agencies are now discussing pre-operational data for comparison purposes later on.
- (Buell) We have escapement estimates for adults and water quality and hydrology. So here's the question: Is it the agencies plan to use escapement data as a monitoring tool to assess project impacts?
 - (Agency) We haven't thought about or discussed that internally.
 - (Agency) Our agency does not believe it would be appropriate to use fish as a monitoring indicator.
 - (Agency) An integrated approach is more powerful.
 - (PLP) There will be a monitoring TWG created to specifically address monitoring issues.
 - (Agency) Would not suggest the use of fish escapement as a sole monitoring tool.
 - (Buell) Potential for interfering factors in adult escapement; it's an imprecise tool. There are so many factors around adult enumeration that have nothing to do with the potential effects of a mine, but do have to do with the black box of what happens in the ocean. Is it good to get highly precise data even if we can't use that we can't use that data precisely?
- (Buell) There is a 5 stage hierarchal monitoring approach that the project envisions, in keeping with guidance from Habitat and consistent with monitoring programs at other large mines throughout the state:
 - Water quality – direct, immediate measurements of aquatic impact
 - Chlorophyll A - sensitive indicator, shows impact over a short (days or weeks) time period

- Invertebrates – sensitive indicator species show impact over intermediate (weeks or months) time period
- Juvenile fish assemblage – Ecological integrator; includes resources species (salmonids); responds to water quality, invertebrates; intermediate (weeks, months or annual) time period
- Fish tissue -Impacts on adult fish will not become apparent for several years; the above monitoring tools will have determined any impact much sooner.
- (Agency) If water quality, Chlorophyll A, or invertebrate levels change, people will ask how that affects the salmon. Since the Bristol Bay economy is largely driven by salmon, any measurable change in the freshwater salmon environment will prompt questions about how these changes affect salmon. It all comes back to salmon.
- (Agency) To study effects we need pre-impact data, reference site and a BACI design.
 - (PLP) No project definition is determined at this time as needed to design a BACI system. If we design a BACI system around project designs that were proposed in 2005 it won't be meaningful since design plans are changing in response to ongoing mineral discoveries.

4. TOWER COUNTS

There was general discussion of agencies wanting PLP to conduct tower counts instead of continuing with aerial surveys for adult escapement. PLP was stating that aerial surveys are more practicable and provide adequate precision for the purposes of NEPA. Some agencies were questioning if a more precise estimate of adult escapement is needed that could be used to monitor changes to fish population numbers.

- (Agency) It is disappointing that PLP is continuing with aerial surveys instead of tower counts.
 - (R2) Can't get effective tower counts for one tower with what is being spent on this whole system.
 - (Agency) The cost to the agencies to install is \$30,000/tower/month .
 - (Agency) About the same cost to set up towers as it is to conduct aerial surveys to get the same data.
 - (PLP) It's not the same costs.
- (Agency) Precision around tower counts is <2%. Aerial surveys with good observation efficiency have a 20-40% precision.
 - (Agency) The argument is about precision. If you want to increase precision why improve on aerial survey studies, why not go to counting towers. A correction factor can improve past data – can't do that with present plans.
- (PLP) PLP believes that using the area under the curve method of relative abundance is suitable for environmental description. PLP has abundance numbers with error-bars. Taking the area under the curve is an accepted method of determining abundance, but with less precision. PLP maintains its stance that the area under the curve method has been scientifically approved and the agency just isn't agreeing with the approach. The agencies asked us to fix the observer efficiency within the aerial surveys, so we have improved confidence limits around the area under the curve instead of doing a direct adult count. (PLP) In 2008, PLP will continue to conduct aerial surveys and determine the area under the curve. PLP will incorporate ADF&G suggestions regarding improving this method. We take away notion of ADF&G offering assistance with towers. Even if we go to towers, have still will have to do aerial surveys to index historical data.

- (PLP) Papers developed in the 1980's show that using the area under the curve is a viable enumeration method. What is ADF&G's position, based on reviewing the Nielson and Geen papers?
- (Agency) ADF&G agrees that in some cases it is a viable option, but not the best option.
- (Agency) Observer efficiency and survey life is supposed to be what makes that method viable.
- (PLP) We heard that and agreed to improve the observer efficiency factor.
- (PLP) Visibility is very good for aerial surveys – which is good for observer efficiency

5. SMOLT TRAPS

- (Agency) Pebble Project could impact salmon: adult returns, productivity, smolt production, and habitat availability. The aerial surveys do not provide any smolt information. One of the many factors is to differentiate resident from anadromous fish. For this you need to set up towers for adult enumeration and smolt traps.
- (Agency) At Chuitna Coal Project they eventually agreed to quantify smolt output.
 - (Buell) The Chuitna is a different system with very different streams, different anticipated impacts, different feasibility, etc., etc. This is not a good candidate for comparison.
 - (Agency) Chuitna Coal is a different project from Pebble which makes for a poor comparison for a variety of reasons – that permit condition was to monitor smolt production. Coal mining regulations are different and consider everything baseline until you submit a permit application. Therefore, in that case, separating baseline and monitoring would have delayed the project.
 - (Agency) Taking out a stream may affect adjacent streams for that species. At that project (Chuitna) smolt traps near tide water could work which is a different situation than Pebble.
- (PLP) Smolt surveys for Pebble got hung up on feasibility.
- (PLP) How do you deal with a percentage of the % population that leaves under the ice?
 - (Agency) Have to wait till ice is out to Fyke net or use incline plane traps. There is a general belief that fish are not going out under ice (not verified).
 - (PLP) Chum salmon juveniles in the Yukon are out way before break-up and it is believed that the same is happening with Chinook and Sockeye. It can be assumed that the same happens at the study site where breakup is not till May or, as in June this year.
 - (Buell) Smolt traps have been discussed amongst the TWG with acknowledgement that it is not practical with ice conditions. Ice jams breaking and re-forming does not allow the maintenance of smolt traps. It would be interesting data to have, but it is not feasible to get on these stream systems.
 - (Agency) Does this mean we don't need to do this or that it is logistically difficult?
 - (Buell) Both.
 - (Agency) We want you to monitor upper reaches for smolt where systems are smaller – no ice jams.
 - (Buell) There aren't any smolts in the upper watersheds where project footprints are likely to be, especially with respect to the Koktuli forks. Smolts come from where there has recently been water.

- (R2) There are lots of ice jams during May in the areas where sockeye spawn later. No sockeye smolts out of UT going to Lake Iliamna. May need to focus on Coho.
- (Buell) In the Koktuli drainage coho and Chinook smolt are the primary emigrants, whereas in the Talarik drainage sockeye fry are the primary emigrants..
- (Agency) It is worth looking into smolt/fry trapping as a possibility to better understand production.
 - (Buell) How indicative is fry production to overall productivity?
 - (Agency) Don't know.
- (Agency) Are there options to mark fry for studies?
 - (R2) Fry have a high mortality to Bismark Brown dye marking techniques and we don't recommend it as a tool.
- (Bailey) Have the agencies tackled smolt outmigration on a river this size - a couple hundred feet in width? UT smaller systems could possibly be a candidate, but bigger systems are difficult. Precision is an issue. The data may turn out to be more variable than that for adults. This has failed in many systems.
 - (Buell) Towards the mouth, trapping success will be more difficult.
 - (Agency) Based on our juvenile trapping experiences elsewhere, it seems likely that we could successfully trap sockeye fry in the area near the mouth of Talarik Creek.
- (Bailey) The agencies are suggesting techniques for more precise adult escapement, multiple towers and smolt traps and potential variability from a bad winter. Are you suggesting adult increases and juvenile decreases as a monitoring parameter? – If so: how do you deal with adverse and variable conditions?
 - (Agency) Not variation vs. project . If we could find reference streams outside the footprint to study concurrently, it would provide information on regional variation.
- (R2) Smolt precision may only have a precision of (+/- 20-40%) anyway – isn't that more or less than what we getting now with aerial adult enumeration?
- (Agency) Many smolt trapping projects have precision of +/- 5% (i.e., Russian River). And unlike the example with aerial surveys and towers, with smolt trapping this is the most cost effective and efficient scientific approach available.

VII. PUBLIC COMMENT

- (Public – Carol Ann Woody) There is a new salmonid protocol book from the American Fisheries Society that is available.
- (Andrew DeValpine) How are budgets determined? Is it a set fund?
 - (PLP) Each consultant submits an annual proposal and budget. Not a set budget.

- (Andrew DeValpine) I hear requests for data and am concerned that there is not enough data for the agency comfort level. This is concerning to me because the public is relying on the agencies. PLP seems to be saying that they are doing what PLP thinks needs to be done and agencies are wanting more.

VIII. ACTION ITEMS/INFORMATION REQUESTS

- (Agency) There is an appearance that PLP is not taking recommendations (collect data in accordance with a BACI design) in a serious manner. Would like to know when PLP will respond to that particular topic.
- (Agency) Would like PLP to respond to all past written comments on study design.
- (Agency) Request PLP and its consultants set up block nets prior to snorkeling for calibrations.
- (Agency) Request that PLP and its consultant's consider standardizing power applied to the water during electro-shocking.
- (Agency) PLP to check electrofishing permit regarding the shocking of non-anadromous adult fish.
- (Agency) Request that PLP and its consultants define criteria for when to stop or suspend desist electro-shocking at a site.
- (Agency) Request PLP and its consultants consider using both electro-shocking and mark-recapture to calibrate snorkeling.
- (Agency) Request PLP and its consultants consider trying mark-recapture overnight, but if it does not work, try marking early in the morning and recapture the fish in the evening.
- (Agency) It would be nice if PLP and its consultants could set some minimal amount of effort, when determining the upstream extent for fish distribution before concluding the fish aren't there.
- (Agency) It is suggested that you do some repeat surveys on a small sub sample when conducting Tier III surveys to determine variability due to observer.
- (Agency) PLP and its consultants might want to consider adding ox-bow as an OCH stream characteristic. Ox-bows act more like a pond with inflow and outflow than a stream.
- (Agency) In the OCH studies, consider comparing the OCH habitat with a pre-determined reach that incorporates all habitats within it instead of seeking similar main channel habitat in the adjacent area.