

Susitna-Watana Hydroelectric Project Document

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Revised Study Plan
Susitna-Watana Hydroelectric Project
FERC No. 14241

Appendix 4

**Consultation Documentation for Informal Consultation,
July - November 2012**



December 2012

APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION

TECHNICAL WORKGROUP
MEETING NOTES

**TECHNICAL WORKGROUP AND AGENCY CONSULTATION MEETING
DOCUMENTATION (See Table 1-1 of RSP)**

- 1) August 8, 2012 Social Sciences Meeting Notes
- 2) August 9, 2012 Terrestrial Resources Meeting Notes
- 3) August 15, 2012 Aquatic Resources Meeting Notes
- 4) August 16, 2012 Instream Flow and Groundwater Meeting Notes
- 5) August 17, 2012 Geomorphology and Water Quality Meeting Notes
- 6) September 6, 2012 Landbird and Shorebirds Meeting Notes
- 7) September 7, 2012 Cultural Resources Meeting Notes
- 8) September 13, 2012 Fish Distribution and Abundance Meeting Notes (ADF&G)
- 9) September 13, 2012 Fish Distribution and Abundance Meeting Notes (USFWS)
- 10) September 13, 2012 Wildlife Resources Meeting Notes
- 11) September 14, 2012 Instream Flow and Geomorphology/Ice Meeting Notes
- 12) September 18, 2012 Wetlands Meeting Notes
- 13) September 19, 2012 Cook Inlet Beluga Whale Meeting Notes
- 14) September 20, 2012 Recreation and Social Sciences Meeting Notes
- 15) September 24, 2012 Cultural Resources Meeting Notes
- 16) September 25, 2012 Salmon Escapement Meeting Notes
- 17) September 27, 2012 Fish and Aquatic Study Plans Meeting Notes
- 18) September 27, 2012 River Productivity Meeting Notes
- 19) October 1, 2012 Instream Flow-Riparian Meeting Notes
- 20) October 2, 2012 Instream Flow and Modeling Meeting Notes
- 21) October 3, 2012 Recreation and Social Sciences Meeting Notes
- 22) October 4, 2012 Instream Flow and Aquatics Field Meeting Debrief Notes
- 23) October 4, 2012 Waterbirds Meeting Notes
- 24) October 16, 2012 Terrestrial Resources Meeting Notes
- 25) October 17, 2012 Recreation and Social Sciences Meeting Notes
- 26) October 23, 2012 Geomorphology, Water Quality Meeting Notes
- 27) October 24, 2012 Instream Flow and Groundwater Meeting Notes
- 28) October 25, 2012 Aquatic Resources, Geology and Soils Meeting Notes
- 29) November 2, 2012 Cook Inlet Beluga Whale Meeting Notes

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

ILP Formal Study Plan Meeting for Social Sciences
August 8, 2012, 8:30 am – 4:00 pm

Attendees:

Organization	Name
ADF&G	Mark Fink
ADF&G	Davin Holen
ADF&G	Stormy Haught
ADNR-OPMP	Marie Steele
AEA	Bryan Carey
AEA	Wayne Dyok
AEA	Betsy McGregor
AEA	Bruce Tiedeman
AGO	Brian Bjorkquist
AHTNA	Joe Bovee
ANLC – UAF	James Kari
Aquatic Restoration and Research Institute	David May
BLM	John Jangala
Charles M. Mobley & Associates	Chuck Mobley
Chickaloon Village	Lisa Wade
DHSS	Paul Anderson
DOWL HKM	Kristen Hansen
DOWL HKM	Maryellen Tuttle
EPA	Jennifer Curtis
EPA - Intern	Lisa McLaughlin
FERC	David Turner
FERC	Frank Winchell
FERC	Ken Wilcox
FERC	Kim Nguyen
HDR	Tracie Krauthoefer
Long View Associates	Steve Padula
The Louis Berger Group	Lisa McDonald
McDowell Group	Bob Koenitzer
MSB	Fran Seager-Boss
MWH	Sarah Callaway
MWH	Kirby Gilbert
MWH	John Haapala (by Phone)
MWH	Brian Sadden (by phone)

Organization	Name
National Heritage Institute/ HRI	Jan Konigsberg
Northern Economics	Pat Burden
Northern Economics	Don Schoden
NLUR	Peter Bowers
NPS	Cassie Thomas
NPS	Harry Williamson (by phone)
OHA/ SHPO	Shina DuVall
Stephen R. Braund & Associates	Stephen Braund
Stephen R. Braund & Associates	Paul Lawrence
URS	Bill Simeone
URS	Taylor Brelsford
URS	Bridget Easley
USFWS	Jenny Spegon
URS	Amy Rosenthal
URS	Louise Kling
ERM	John Gangemi

Introduction and Meeting Overview – Kirby Gilbert (MWH)

Cassie Thomas (NPS) noted she and Harry Williamson provided some initial comments to AEA yesterday. Cassie asked how AEA will incorporate information from 2012 reconnaissance by October agency comment deadline along with any winter 2012 reconnaissance. For the formal studies Cassie is wondering how to integrate outputs from some studies that are necessary inputs for other studies, within the timeframe of a two-year study window. David Turner (FERC) responded that if needed there are provisions within the ILP process for updates to the approved study plans, “with good cause.” Wayne Dyok (AEA) indicated that AEA will provide a schematic with dates of how the studies interconnect to the group before the October 15 comment deadline.

Action Items

1. Distribute schedule showing interconnections between studies before October 15th comment deadline.

Regional Economics & Socioeconomics – Pat Burden (Northern Economics)

- **Regional Economic Evaluation Study** – power related benefits/effects of the Project, focuses on Railbelt
 - There was a general request to define in the PSP how the “knowledgeable persons” to interview for input into the model will be chosen. Pat noted that the categories of persons and types of interview questions will be added to the study plan.
 - Jan Konigsberg (National Heritage Institute) indicated that the retail rate for power would be important to include in modeling. He also requested if there was going to be comparison on opportunity costs regarding power alternatives, such as

analyzing the costs of other power alternatives that might be foregone by pursuing a large hydropower project. In terms of using surveys to obtain information, Jan agreed it would be good to have any draft survey instrument in the study plan if we know we are going to do interviews.

- **Social Conditions and Public Goods and Services Study** – Includes Project effects on the economies of affected communities, including: Municipality of Anchorage, Fairbanks North Star Borough, Valdez-Cordova Census Area, Kenai Peninsula Borough, Y-K Census Area, Mat-Su Borough, Denali Borough.
 - Lisa McDonald (The Louis Berger Group) indicated that there is new information in the field of sociology to provide guidance to identifying objective questions for surveys and how to extract the information using a survey instrument. She asked what methods would be used to estimate any economic values associated with subsistence and recreation use of the region. Pat Burden (Northern Economics) indicated that existing data will be used to the extent available. Decision to use travel cost versus random utility model will be made soon in terms of trying to put some economic values on these uses.
 - Cassie Thomas (NPS) expressed concerns about whether the recreation study and the socioeconomics study plans are going to sample the “adventure tourist” population of recreationists (in state and out of state tourists), which she speculated may be more significant to this Project area than commercial tourism. Cassie noted that commercial service providers (e.g. Mahay’s, Princess Lodge, etc.), are not really the primary users of the Project area, particularly in the winter. Many people get to the Project area without the use of commercial service providers. She asked how non-consumptive users (someone who is not there to hunt/fish) would be sampled?
 - Bridget Easley (URS) indicated that creating a description of recreational uses of the Project area is not going to be strictly statistical in nature and that many data collection efforts will be made
 - Jenny Spegon (USFWS) expressed concern that local communities will feel left out if not involved in the surveys. The surveys might appear to be to a selective audience, rather than a random audience. They may feel like they are part of the affected group, but were not surveyed for their input, particularly with respect to quality of life issues.
 - Jan Konigsberg (National Heritage Institute) suggested online surveys. The group agreed that online surveys could introduce statistical bias, but could be valuable from a qualitative standpoint or capturing certain types of users.
 - Cassie Thomas (NPS) mentioned that phone surveys could also introduce bias; many residents have only cell phones, and no land lines.
 - Jan Konigsberg (National Heritage Institute) commented on the exclusion of the national valuation component to the study, In his mind, it is a difference of opinion on interpretation of the Federal Power Act. However, he is not opposed to the current studies, but feels that there should be a national component as well. He agreed to disagree on that aspect, but is supportive of moving forward with the existing studies.

Action Items

1. Identify typical survey questions and categories of who will be surveyed. Check recent literature regarding use and methods for improving informal surveys. Participate in follow up meetings on surveys methods and instruments to help ensure quality of life and recreation questions are included in the surveys.

Transportation & Air Quality – Kristen Hansen (DOWL HKM)

- **Transportation Resources Study – Includes** all routes and modes, primarily in the Mat-Su and Denali boroughs, and also port and rail activity. There will not be a specific transportation survey; transportation usage will be gathered from existing information and by inclusion on other resource surveys (i.e. recreation).
 - Cassie Thomas (NPS) indicated that this study highlights the need to include transportation questions on other surveys. Not only on recreation survey, because people use the river for other purposes than just recreation.
 - Jenny Spegon (USFWS) inquired how will people who own land but are only there seasonally be reached to survey. Bridget Easley (URS) indicated that residents are interested in many things besides just recreation (i.e. quality of life, power availability, etc.).

Action Items

1. Consider use of survey questions in other disciplines to help get at understanding of river and overland transportation uses along the River downstream of Watana dam.
- **Air Quality Study – the** goal is to determine potential for violating any air quality regulations, primarily within the Project vicinity (direct/indirect impacts), and also assess Railbelt emissions.
 - Other studies are going to be utilizing results from traffic and air quality studies. So it will be important to front-load 2013 activities to keep those studies moving forward.

Health Impact Assessment (HIA) – Dr. Paul Anderson (DHHS)

- **Not a FERC requirement, but AEA is electing to go complete an HIA for the Project**
 - HIA technical guidance available at: www.epi.alaska.gov
 - Lisa Wade (Chickaloon Village) inquired what type of HIA, comprehensive versus rapid would be used. Dr. Anderson (DHHS) replied Comprehensive.
 - Lisa Wade (Chickaloon Village) indicated that the data on subsistence use, particularly as it pertains to Mat-Su Borough, is lacking, and asked if there will be a way of getting at that information.
 - Tracy Krauthoefer (HDR) indicated that Traditional and local knowledge interviews will be conducted in this area.
 - Lisa Wade (Chickaloon Village) indicated that this is a traditional use area, and suggested speaking with Knik tribe, or Richard Porter, on subsistence issues as well. Chickaloon would appreciate continued involvement. Dr. Anderson indicated that Newfields would be the contractor conducting the HIA.

- Marie Steele (ADNR-OPMP) highlighted the need for close resource coordination, particularly with regard to the critical path schedule since the HIA will utilize results from many resource studies.
- Pat Burden (Northern Economics) indicated there would be some coordination with social conditions study results as well

Project Safety: Probable Maximum Flood & Seismic Studies – Bryan Carey (AEA)

- **Probable Maximum Flood**
 - Marie Steele (ADNR-OPMP) asked if any of the studies will evaluate an unintentional release from the reservoir. Bryan Carey (AEA) responded that an unintentional release from the reservoir would not result in the entire reservoir suddenly emptying. The dam structure would still be in place, and an unintentional release would likely come in the form of a leak or crack in the dam..
- **Site Specific Seismic Hazards Evaluation – Bryan Carey (AEA)**
 - Brian Sadden (MWH) explained that every dam under FERC jurisdiction undergoes periodic dam break modeling. An emergency action plan is developed based on this flood condition/ event, and is activated in tabletop drill scenarios. This will be developed in early design and construction.
 - Kirby Gilbert (MWH) added that there will be temporary emergency action plans for construction activities (for use of cofferdams to reroute flows, etc).
 - Marie Steele (ADNR-OPMP) encouraged a robust community planning aspect for emergency response, as this Project moves forward, using lessons learned from Louisiana and gulf oil spill. David Turner (FERC) indicated that these issues will be addressed in the dam safety plan, rather than during NEPA assessment. Brian Carey (AEA) added that the Board of Consultants will be involved very early in the Project development, which typically occurs much later.
 - Kim Nguyen (FERC) requested that AEA contact Doug Johnson at FERC at Portland Regional Office regarding any further comments to the study plan.

Action Items

1. Contact Doug Johnson at FERC Portland Regional Office to obtain any comments on the study plans.

Recreation, River Flow, and Aesthetic Studies – Bridget Easley (URS)

There will be several different types of surveys and interviews. Much of it will be qualitative, some statistical. More development is needed in these areas. Other than sightseeing along the Parks Highway, recreation is varied and sparse (e.g. hunting) – interception surveys will be difficult. A multi-disciplinary survey may be necessary to avoid reaching out to the same people multiple times.

Harry Williamson (NPS) indicated the importance of seeing a preliminary version of the survey instrument as soon as possible. Bridget Easley (URS) indicated that a survey instrument could be ready to be released by mid-September or so and a review/discussion meeting could be held.

- Recreation Resources Study

- Cassie Thomas (NPS) would like to see a survey instrument that specifically addresses recreation winter use and travel.
- Bob Koenitzer (McDowell) cautioned about survey creep; perhaps it is necessary to send out smaller surveys to targeted groups (snow machiners, etc.).
- Aesthetics Resources Study (includes sound)
 - Jim Kari (ANLC-UAF) mentioned that nomenclature from Alaska Native groups, specifically Ahtna, could be included in naming sites.
 - Bridget Easley (URS) requested to meet with NPS and others on methodology for the sound study. Cassie would like to be consulted on site selection; she is unavailable August 9-27. Mark (ADF&G) would also like to be included. Sound (and visual) sites can be discussed further at a meeting in September.
- Recreational Boating/ River Access Study (likely to be renamed Recreation Flow Study)
 - Ken Wilcox (FERC) inquired how users of the upper reach (from Project area up to the Denali Highway) would be affected once they reach the Project area. John Gangemi (ERM) responded that this is an area that will be targeted; is important for egress from the river as well.
- Harry Williamson (NPS) indicated the need to understand how all the surveys and data gathered from other studies are going to be interrelated. He inquired when/what preliminary information from the 2012 recreation study would be available before the October 15 comment dead line. Betsy McGregor (AEA) indicated that the 2012 recreation data was basic reconnaissance-level information.
- Cassie Thomas (NPS) – We understand that it is preliminary data, and likely will change, but it will at least provide some baseline information.
- Harry Williamson (NPS) would like to see the revised study plans include appendices of the actual survey instruments.
- Ken Wilcox (FERC) indicated that the Revised Study Plan should include a list of potential locations identified for intercept surveys and initial Key Observation Points (KOPs) should be identified in the study plans if possible.

Action Items

1. Hold workshop or meeting to go over survey instrument, survey plan, and initial selection of KOPs.
2. Conduct consultation prior to distribution of the preliminary survey instrument. Include Cassie Thomas (NPS).
3. Set up meeting between URS and NPS regarding sound study methodology and site selection.
4. Include survey instruments as appendices in Revised Study Plans.
5. Add a list of potential locations identified for intercept surveys and initial KOPs.

Cultural & Paleontological Resources Studies – Chuck Mobley (Charles M. Mobley & Associates)

- **Cultural Resource Inventory and Evaluation**
- **Ethnogeographic and Traditional Cultural Properties (TCPs) Inventory and Evaluation**

- **Paleontological Resource Inventory**
- **2012 Survey Data and Applications**
- Frank Winchell (FERC) indicated that the definition of the Area of Potential Effect (APE) is the primary issue to be resolved. He suggested starting out with APE map that shows area of direct effect, area of indirect effects, land ownership and previously-surveyed areas and distributing it to the cultural resources workgroup for a meeting later in August or so. Shina DuVall (OHA-SHPO) indicated that it is acceptable to refine the APE as the Project components become clearer and unknowns are eliminated.
- Pete Bowers (NLUR) confirmed that transportation and recreation studies will be considered in refinement of the APE, particularly the indirect effects.
- Shina DuVall (OHA-SHPO) indicated that distinguishing between direct/indirect APE is less important to SHPO, but is usually helpful for project planners. APE should include all alternatives, and when they are eliminated, then the APE can be refined.
- Chuck Mobley (Charles M. Mobley & Associates) inquired if the entire list of native entities identified in the PSP should be invited to the APE meeting. Shina DuVall (OHA-SHPO) indicated that it would be better to cast a wider net, and allow the various groups the opportunity to participate. However, just sending a letter and not receiving a response is not necessarily enough; a good faith effort to follow up with groups and give them an opportunity to respond and participate would need to be made.
- Frank Winchell (FERC) suggested consulting with the Advisory Council on Historic Preservation concerning the APE discussions.
- Pete Bowers (NLUR) mentioned the need to identify culturally-modified trees, such as intertwined trees or trailmarkers.
- Frank Winchell (FERC) inquired if a tribal representative/monitor would participate during field studies.
- Wayne Dyok (AEA) suggested including the Mat-Su Borough (Fran Seager-Boss) in the discussions.

Action Items

1. Develop a map/maps showing draft direct/indirect APEs and land ownership and provide to workgroup.
2. Set up a workgroup meeting for later in August or September to develop APE rationale and initial APE.

Subsistence Study – Paul Lawrence (Stephen R. Braund & Associates)

- Paul Lawrence (Stephen R. Braund & Associates) confirmed that preliminary information would be available within a relatively quick timeframe for other resources to utilize in their analyses.
- Steve Braund (Stephen R. Braund & Associates) stated that cultural and subsistence studies should be coordinated to identify the “overlap” between the two resources.
- Davin Holen (ADF&G) confirmed that the ADF&G interviews will help to identify the people in the communities that will be good to interview.

- Ken Wilcox (FERC) indicated that it would be nice to have clarification between the users that are living off the grid (a subsistence lifestyle) versus those utilizing areas for recreation.
- David Turner (FERC) inquired how off-the-grid residents would be captured.
- Marie Steele (ADNR-OPMP) inquired if a comprehensive data document of all survey results could be produced after all work is completed.
- Steve Braund (Stephen R. Braund & Associates) suggested that following the recreation survey workshop meeting, a list of desired survey questions be sent to them to determine how they can be accommodated in their survey.
- Kirby Gilbert (MWH) requested the survey instrument be included in the Study Plan..

Action Items

1. Davin Holen (ADF&G) to send Steve Braund (Stephen R. Braund & Associates) a list of communities to be studied.
2. Davin Holen (ADF&G) to provide a copy of the survey instrument, for work that will be conducted in January 2013.
3. Steve Braund (Stephen R. Braund & Associates) to provide survey instrument for the remaining communities.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
ILP Formal Study Plan Meeting for Terrestrial Resources
August 9, 2012, 8:30 a.m. – 4:00 p.m.
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
ADF&G Wildlife Conservation	Mark Burch
ADF&G Wildlife Conservation	Kimberly King
Aquatic Restoration and Research Institute (ARRI)	Gay Davis
BLM-Glennallen Field Office	Sarah Bullock (by phone)
BLM-Glennallen Field Office	Ben Seifert (joined later by phone)
Office of Project Management and Permitting	Marie Steele
Natural Heritage Institute (NHI)	Jan Konigsberg
USFWS	Catherine Berg
USFWS	Jennifer Spegon (by phone)
USFWS	Bob Henszey (by phone)
USFWS	Maureen de Zeeuw
FERC	David Turner
AEA	Betsy McGregor
AEA	Wayne Dyok
ABR, Inc.	Brian Lawhead
ABR, Inc.	Terry Schick
LVA	Steve Padula (by phone)
MWH	Kirby Gilbert
Solstice AK	Robin Reich

Presentations

Kirby Gilbert (MWH)

- Overview of AEA Proposed Study Plan

Brian Lawhead (ABR, Inc.)

- Wildlife Proposed Study Plans
 - Surveys of Eagles and Other Raptors
 - Waterbird Migration, Breeding, and Habitat Use
 - Breeding Surveys of Landbirds and Shorebirds
 - Wood Frog Distribution and Habitat Use
 - Moose Distribution, Abundance, Movements, Productivity, and Survival
 - Caribou Distribution, Abundance, Movements, and Productivity
 - Distribution, Abundance, and Habitat Use of Large Carnivores

- Dall's Sheep Distribution, Abundance, and Habitat Use
- Wolverine Distribution and Abundance
- Terrestrial Furbearer Abundance and Habitat Use
- Aquatic Furbearer Abundance and Habitat Use
- Population Ecology of Willow Ptarmigan in Game Management Unit 13
- Evaluation of Wildlife Habitat Use
- Wildlife Harvest Analysis
- Little Brown Bat Distribution and Habitat Use
- Small Mammal Species Composition and Habitat Use

Terry Schick (ABR, Inc.):

- Botanical Proposed Study Plans
 - Vegetation and Wildlife Habitat Mapping
 - Wetland Mapping Study
 - Riparian Study
 - Rare Plant Study
 - Invasive Plant Study

Introduction/Overview of AEA Proposed Study Plan

After introductions, Kirby Gilbert (MWH) gave an overview of the Proposed Study Plan (PSP). He said that there are 16 study plans to cover wildlife resources and 5 study plans to cover botanical resources. There will be topical meetings through next week to present all the plans in the PSP. These meetings are the formal PSP meetings in the Federal Energy Regulatory Commission (FERC) Integrated Licensing Process (ILP) process. The PSP is about 1,300 pages long and includes 58 separate study plans. The PSP was filed with FERC on July 16, 2012.

Kirby said that Sections 1 and 2 of the PSP are the introduction. He said that Section 3 of the PSP discusses studies not proposed. The PSP's Sections 4 through 14 include study plans organized by 11 resource areas. Each section has appendices that record consultation with agencies.

Kirby said that there are 2012 field studies currently occurring which will inform the 2013/14 study plan development. Some of the 2012 studies will continue in 2013/14.

Kirby said that the Alaska Energy Authority (AEA) and/or FERC received 52 formal study requests and 150 comments on the PAD that helped develop the PSP. A few studies proposed in the PSP did not have a study request. He said that FERC issued the Scoping Document II, which is being used to input the study planning process. The Study Plan should be finalized by

November 14, 2012. Comments on the PSP are due by October 15, 2012. Kirby said that FERC will make the study plan determination about one month after the study plan is submitted.

Kirby said that the goal of this terrestrial working group meeting is to develop a plan to gather agency comments, so that AEA can address them. This meeting should help to coordinate smaller group meetings. He said that today each terrestrial study would be presented and questions and comments would be gathered and discussed. He said that ABR would also report on the 2012 fieldwork. He said that if follow-up is needed, the Team will try to determine dates for additional topical meetings. He said that the group should focus on action items and areas of concern.

Jenny Spagon (USFWS) asked when and where the notes from this meeting would be posted. Kirby said that the notes would be posted on the Project website within a week or so. Betsy McGregor (AEA) said that the notes and presentations would be posted on the page where the meeting is advertised (<http://www.susitna-watanahydro.org/meetings/>).

Catherine Berg (USFWS) said that the U.S. Fish and Wildlife Service (USFWS) team has started going through the PSP; however, these meetings are a bit premature. Catherine said that the USFWS will not be able to get all their comments in during these meetings. She said that she hoped that this meeting is the start of a process. Kirby said that he agreed and that this meeting was more of a clearinghouse effort. He said that written comments should be sent to Wayne Dyok at AEA when they are ready. Wayne said that the Team is listening to comments today, but that this is an ongoing process.

David Turner (FERC) said that agencies need to be cognizant of the FERC timeline. He said that we need to get moving on gathering comments on the PSP so that the Revised Study Plan addresses all the issues when it is submitted November 2012.

Wildlife Proposed Study Plans

Brian Lawhead (ABR) said that his presentation would give an overview of the wildlife study plans. He said that the Team was interested in agency feedback to identify areas needing more attention.

Survey of Eagles and Other Raptors

Brian summarized the eagle and other raptor study objectives. He said that the survey of eagles and raptors is important because of the concern with eagle nest take under the Bald and Golden Eagle Protection Act. He said that there could be eagle and raptor issues with transmission lines. He said that eagle nest aerial surveys were occurring in 2012 and would continue in future years. These surveys would also record other raptors. He said that aerial

surveys were also gathering data on nesting eagles, falcons, and other raptors, as well as fall and winter concentration areas (communal roosts and foraging sites).

Brian said that the proposed study area for the eagle and other raptor survey is a 3-mile buffer around the transportation and intertie corridors and a 10-mile buffer around the impoundment area, as requested by USFWS.

Mark Burch (ADF&G) asked which transportation corridors were being proposed and which were not being considered. Brian said that there are three corridors under investigation. Kirby said that the corridors shown on the map are still under study and it hasn't been determined which corridors would be carried forward for further study. Wayne said that AEA would like to look at two transmission corridors, which would include one corridor co-located with the intertie and the other transportation corridor separate from the intertie corridor. Wayne said that the Alaska Department of Transportation and Public Facilities (ADOT&PF) completed a high-level analysis of the access corridors. Comments on the corridor document are due by the end of August 2012. He said that the ADOT&PF document is non-decisional and gives an overview, schedule, and costs of corridor alternatives. Betsy confirmed that the corridors to the northeast of the reservoir have been dismissed and are not being studied. Wayne said that the corridor selection is a process depending on avoidance measures. Betsy said that the transmission and access corridors bifurcate at times due to wetlands avoidance for the access route and icing issues for the transmission lines.

Brian said that the 10-mile buffer will be a much larger area than was surveyed in 2012 and there are concerns about whether the entire area can be covered during the nesting period because it is so big.

Brian summarized the eagle and raptor survey study methods used in 2012 and proposed for continuation in the PSP. He said that additional work may be needed to better estimate what might be missed on the nesting surveys (sightability assessment). He said that the Team may need more discussion with USFWS regarding small raptor species and cavity-nesting owls because they are difficult to study. He said that one component of the raptor study would be to review information on food habits and diets for use in the mercury bioaccumulation study.

Brian summarized the expected results of the eagle and raptor study. He said that migratory flight activity and potential for collision risk would be estimated from the information collected. He said that the Team would need time to examine habitats to figure out nest detectability in the study area.

Brian summarized the relationship of the eagle and raptor study to other studies. He said that the Team may propose sampling unhatched eggs and feathers to provide baseline data on mercury levels before project development.

Brian summarized the results of the 2012 study. He said that many nests were found. He said that not all of the nests found were occupied and not all occupied nests were successful. Catherine asked whether the surveys were only conducted in the 10-mile buffer. Brian said that they surveyed a 2-mile buffer around the Project area in 2012. Betsy added that ABR also surveyed the river corridor downstream all the way to Gold Creek.

Brian said that it is difficult to compare the results of the 2012 survey with previous studies because the search area in the 1980s surveys was not clearly defined in the reports. He said that there were significantly more Peregrine Falcons, which shows that they are continuing to recover. He said that no large owl nests or raven nests were observed.

Brian summarized the eagle and raptor discussion points. He said that the design of the eagle and raptor study methods was based on conversations with USFWS and in consideration of eagle take. He said that the study area will be expanded around the proposed reservoir impoundment. He said that the Team understands that more discussion regarding the survey area and survey methods for other species of raptors is needed.

Brian said that suitable habitat mapping would be done within a very large area (5-mile buffer around the Project area) and would be drawn from wildlife surveys and vegetation mapping. He said that mapping suitable cliff habitat must be done in the field because a GIS modeling effort cannot reliably identify all potential nesting habitats. He said surveys of small raptors, including cavity-nesting owls, involve logistics and safety concerns that need to be discussed further with USFWS. He said that BLM also had concerns about transmission corridors becoming nesting and perching sites, which might have effects on raptor prey species. Brian said that the project design would employ Best Management Practices (BMP) to help avoid raptor electrocution. He said that towers would need to be designed to keep them from becoming nesting or perching sites for ravens and raptors.

Maureen de Zeeuw (USFWS) asked when the results of the 2012 survey would be available. Brian said that a technical memorandum summarizing the information would be completed by the end of August 2012. Maureen said that there was good information provided on this in the PSP, but that there are other species that need to be discussed and that a nest productivity assessment and mapping needs to be discussed. Brian and Maureen will plan a meeting, hopefully by early September, with Jordan Muir, who issues USFWS eagle take permits. Maureen confirmed that the items that Brian presented were the primary issues. Brian said that a second helicopter survey group may need to be added to survey the entire 2013/14 study area. Betsy said that the enlarged survey area (10-mile buffer around the reservoir) is just for the eagles. Brian said that the team could pick up other large stick nesters even though the large survey area is for eagles. Brian said that in the Lake Louise flats there are more bald eagles. Mark Burch said that ADF&G is interested in all species and may have more comments

on the raptor survey methods. Mark said that he would like to be aware of the discussion. Sarah Bullock (BLM) said that BLM was interested in hearing the outcome of the eagle and raptor meetings. Catherine asked whether there was a small raptor or owl expert at ADF&G, and Mark said not really.

Brian said that there are some practical considerations that need to be considered with study methodology. He said that winter night ground surveys would be needed to find owl cavity nesters, which would be difficult. Maureen said that there are many oddball birds that can't be studied by typical survey methods. She asked what analysis would best to get a handle on those species. Brian said that the best way to determine their locations would be good wildlife habitat maps.

Maureen said that she was confused about the habitat mapping effort and how it would be done. She said that there are other factors that should be considered when mapping habitat but the study plan doesn't provide enough details. Brian said that the maps would recognize the vegetation, landscape position, and soils, which are factors that might affect habitat use by bird species.

Maureen and Catherine confirmed that the USFWS would be able to review the PSP before meeting with Brian and the ABR Team.

Brian said that there are 50 to 55 species of birds in the project area that are of concern in the USFWS/FERC Memorandum of Understanding (MOU) and methods for study differ among species.

Waterbird Migration, Breeding, and Habitat Use

Brian summarized the objectives of the waterbird study, which included determining breeding and migration locations, especially related to the locations of project components. He said that the waterbird study would review data on food habits and diets, which will also inform the mercury study.

Brian summarized the waterbird study area. He said that the study area is a 3-mile buffer that would be expanded in some areas to incorporate additional waterbodies, as needed. He said that more discussion is needed with USFWS regarding the study area size. Brian said that the study area corresponds with 1980s study area. He said that because of elevation and ice, there are areas that would not be as heavily used in spring as in fall, and these areas would not be highly used as a migration corridor.

Brian summarized the waterbird study methods.

Catherine asked the reason for doing 4 surveys instead of 8 surveys as requested by USFWS. Brian said that this needs to be discussed. He said that there is a lot of ice in the spring that could limit survey numbers.

Catherine asked why the survey spacing in the study plan is 800 meters while the requested study methodology has 400 meters spacing. Brian said that the protocols could be modified. Catherine said that the spacing should be closer in lowland lake areas. Brian said that generally transects don't work in this type of variable terrain. He said that spacing needs to be looked at and discussed in more detail.

Brian said that Harlequin Ducks are a species of concern and need to be looked at in more detail. He said that night migration is not detectable without using methods such as radar. He said that we need to agree on how to study these species because the methods are difficult and the terrain may limit radar study effectiveness.

Brian summarized the expected results. He said that brood surveys will help determine how successful species are over the season.

Brian summarized the discussion points. He said that the main difference between USFWS requests and the PSP is survey timing based on what is thought to be appropriate. He said that the USFWS requested a 15-mile radius around the project components, and the PSP proposes a smaller buffer. He said that the Team has questions about how the USFWS buffer was derived and whether it was needed, considering the project nexus. David Turner said that FERC wants to understand the relevance of the 15-mile buffer. Maureen said that the recommended 15-mile buffer came from the 1980s studies, and there is room to discuss the distance.

Brian said that the 800-meter transect spacing that USFWS requested versus the 400-meter transect spacing proposed in the PSP needs to be worked out.

Brian said that ADF&G's request for a helicopter survey of seaduck broods needs to be discussed, since ground surveys of waterbird broods are proposed, which should provide equivalent information. He said that the 1980s study concluded that the project area was not a major migration corridor. He said that the Team needs to figure out study methods and suitability of study methods. He said that BMPs to avoid impacts, for example moving the intertie corridor toward topographic features that would discourage crossings by migrating birds, may help to avoid collisions.

David Turner asked whether there are any prohibitions on using radar because the Air Force uses the area. Brian said that there is no real concern because the radars work on different frequencies.

Maureen said that USFWS was interested in density information, which wasn't included in the PSP. She said that it was not clear how that information would be determined. She said that it is important to the USFWS to get actual numbers of individuals. She said that they were interested in breeding species in the suitable habitat in the Project area. Maureen said that she was also interested in estimation of long-term effects of the Project on waterbird productivity. She said that the buffer area was requested so that it could be compared to the 1980s findings. She said that the buffer might only be relevant in a few areas; however, it needs further discussion. She said that the intensity of the migration survey needs further discussion to make sure the study is not missing migration peaks. She said that the transect spacing distance needs to be discussed further.

Maureen said that the migration surveys to determine strike risks are most important in specific areas and that the USFWS doesn't expect migration surveys to be conducted in all areas. She said that even though the 1980s data didn't show a big migration corridor, it doesn't mean it isn't important. She said that the 1980s study may have been looking at use not birds flying over, which is a different question. Maureen said that if the project didn't include lighting of facilities that attracts birds, then expensive studies would not be needed. She said that the Project needs an operational plan, but on other projects she has seen BMPs proposed that weren't implemented. She said that further discussion of radar surveys is needed to figure out where the Project risk to birds might be the greatest. She said that waterfowl experts could be involved in the meetings, but they are out in the field in August.

Kirby said that we will need a series of several meetings and that it would be good to schedule them as soon as possible.

Catherine said that the reporting and deliverables outlined in the PSP need to be more detailed so that USFWS can understand what will be in a study report. She said the USFWS needs the requested information so that they can determine project impacts.

David Turner asked whether the information requested by ADF&G for seaduck species was different than for other waterbird species. Catherine said that ADF&G comments may have been related to migration timing. She said that dabbling ducks migrate at different times than diving ducks and may require a different study period. Catherine said that seaducks should be covered by the study timing presented in the PSP.

Breeding Surveys of Landbirds and Shorebirds

Brian summarized the objectives of the landbird and shorebird breeding survey. He said that not all the species would be detected by the point-count methodology, which would be the primary method used. He said that the study would focus on areas of high interest, including the inundation area.

Brian summarized the study area for landbirds and shorebirds. He said that the area includes a 5-mile buffer around the Project area, which corresponds to the wildlife habitat mapping area. He said the study area is proposed to understand the relative abundance and locations of rare, high-value habitats. He said that the area has been mapped in the past, but would be much more specific this time. He said that the work would be tied to the wildlife habitat evaluation study.

Brian summarized the landbird and shorebird study methods. He said that they would conduct stratified sampling depending on habitat abundance. Maureen asked whether the study would provide density estimates. Brian said that the intent would be to determine density by correlating information from the point-count data. Maureen said that the project needs to determine landbird and shorebird densities, even though it is difficult to do.

Brian said that additional point counts would be done apart from the habitat-based sites in areas that are important for nesting of fluvial and riverine species, for example, clear water habitats in tributaries. Catherine asked how the sites would be selected without bias. Brian said that site selection needs to be discussed further because it may be biased because fluvial habitats would be selected specifically to address USFWS concerns for those species.

Brian said that the Team is proposing to do surveys over broad area. Maureen said that the methodology wasn't clear about the number of plots, transects, or whether there would be plots with several points. She said it is not clear how plots would be distributed. Brian said that the study would generally try to cluster plots so that they would not have to do a lot of helicopter flying. He said that the number of plots depends on what the crew can accomplish and the number of habitats that can be reached by clustered points. Maureen said that the methodology needs to be explained more fully.

Maureen asked whether habitat data would be collected at the same time as point counts. She said that trying to do both simultaneously is not an effective way to do this type of study. She said that the study would have to have extremely simple habitat parameters, which is not recommended. Brian said that when the bird surveys start, the wildlife habitat map would not yet be done to determine which points to examine, so the 1980s vegetation mapping would need to be used. Maureen said that focusing on birds and collecting habitat data at the same time is a difficult effort and could make a huge difference to the study. Maureen said that she understands that, at some point, they need to look at the big picture and concentrate on some species more than others. Brian said that this would be a valuable discussion.

Brian summarized the landbird and shorebird study discussion points. He said that the study-area buffer size needs to be discussed. He said that the USFWS rationale for locating "study

plots” in Denali National Park and the Copper River Basin needs to be discussed in detail. He inferred that those study plots may be aimed at trying to figure out rare species detectability. Maureen said that this might be a more cost-effective way to get answers, but that it would need more discussion.

Brian said there needs to be a discussion about surveys of “overwintering” birds and spring surveys of resident breeding species. He asked whether “overwintering” birds means resident species. He said that the Team needs to determine how to study these species, acknowledging that some overwintering birds are hard to detect and that winter survey methods are difficult.

Brian said that the request for mist netting should be discussed, because it is a big effort with risks to birds. Maureen agreed that mist netting should be discussed.

Maureen said that we need to figure out how to study landbird light attraction and the potential for collisions. She said that USFWS is concerned about facility lighting and its impact on migrating birds. She said that during low visibility or at night the Project facilities could pose a collision risk. Maureen asked whether the dam would be lit on top. Wayne said that it hasn’t been determined, but that safety is paramount. Maureen said that there are numerous reports of disoriented birds circling and being attracted by lighting. She said that she understood that the lighting plan is important for human and bird safety.

David asked whether the lit area of the Project would be within the migration corridor. He asked whether the radar study would help to determine the migration corridor. Maureen said that USFWS was not proposing to sample the entire corridor. She said that topography and Project components would help to determine the survey location. Wayne said that the project airstrip would have lights. Maureen said that it would be good to find out where the Project risks to birds would be located.

Maureen said that random plots across prominent habitat types are a good idea. She said that kingfisher and dipper methods need to be discussed because they are only mentioned within the PSP as an additional set of point-count surveys. She said that point-count surveys along the river might not work because of water flow noise. She said that density estimates are important but the estimates can’t just be done based on habitat use. She said that basing the study on habitat use information from the Lower ’48 is not a good idea, but it might be the only way since we don’t have good data for Alaska. She asked how we can figure out specific habitat being used by the birds and collect the habitat information at the same time. She said that mapping methods, including how many categories of habitats would be mapped and what parameters would be used, need to be discussed in more detail.

Maureen said that understanding the Project’s likelihood to injury to birds would help with study design. She said that Table 8-98 in the PSP indicating abundance isn’t enough to

understand the number of birds that might be impacted by the Project and more details are needed there. She asked what approximately 400 point-count samples meant and whether it was points or clusters. She asked how many habitat types would be represented under this methodology. Maureen said that first-light protocol should be related to the local sunrise.

Maureen said that Page 8-95 of the PSP states that density estimates are not proposed. She said that the USFWS doesn't accept this because we don't know what species would be using each habitat type. She said that she would like to bring Dave Tessler at ADF&G into the small group meetings.

Maureen said that they would like to discuss what classifications would be used for habitat mapping and to what scale.

David said that, unless we related the study to the management area or to the population as a whole, it will be difficult to figure out the significance of effects. Maureen guessed as much as 30,000 to 40,000 pairs of landbirds could be lost by the impoundment zone. Brian said that not all would be dead and that they may move elsewhere. Maureen said that the USFWS would need something to show that they would go elsewhere. She said that the bird season is short and that the displaced birds would not have enough time to find another location to nest. She said that a very low percentage of birds would go somewhere else to nest.

Wayne said that it would take two to three years to fill the reservoir. Kirby said that there are some strategies to help minimize damage to birds. David said that he wanted to know how the data would be used in the impacts analysis. Maureen said that the relative abundance would not give you the information needed. She said that they need to figure out the significance of impacts. Betsy said that impacts could be mitigated and added that not all birds would be lost and that many would be displaced. Betsy asked if the USFWS expected AEA to recreate the same amount of territories that would be lost due to the Project.

Maureen said that she was not prepared to discuss mitigation. Kirby said that lost habitat could be replaced by other habitat types. Maureen said it would not be replaced if it is water. She said that we need the right data to figure out mitigation.

Terry Schick (ABR) said that, based on comments from ADF&G and the recent literature they cited, that density estimates from point count data are likely to be quite variable. He said widely variable distance estimates to birds detected only by songs and calls can result in unreliable density estimates. Maureen agreed with Terry Schick in saying that using range finders does not solve the problem of getting accurate distance estimates to birds detected only by sound. Terry said the study team would collect the data needed to do the distance analyses, and then the decision would be whether or not to conduct those analyses. He said that that distance analyses might give better density estimates for common species (with larger

sample sizes) and less reliable density estimates for less common species (which often are the species of most concern). Maureen said that this is a bigger issue than can be discussed today. Terry said that if enough plots were surveyed and enough habitats were sampled, density measurements could be determined, but those densities still would have large error margins surrounding them (i.e., the estimates of the number of birds affected by the Project would be widely variable). Maureen said that they could use ranges of numbers affected.

Maureen said that she wanted to reiterate that virtually the entire population of one subspecies of Rock Sandpipers overwinter in upper Cook Inlet and feeds primarily on *Macoma balthica*, a small clam that lives in intertidal sediments. She said that the clam is a critical resource for Rock Sandpipers in upper Cook Inlet, including the area around the mouth of the Susitna River. She said that the presence of the clam and Rock Sandpipers is understood, but how the operations of the Project could affect *Macoma* is not understood. She said that they do not need more study of the sandpipers, but instead need to know how their food resource would be affected. Betsy said that the river productivity study team looked into the issue and determined that *Macoma* is a strictly marine species. Betsy said that the study team will look into how clams could be impacted through potential Project-induced changes to their environment through sediment modeling, water quality modeling, and geomorphology studies. Maureen said that a connection needs to be made between clams and sandpipers. Wayne said that the river study team was looking at the issue through the water quality, modeling, and sediment-transport studies. He said that AEA would have to think about how to address the topic in the RSP. Maureen said that they have looked at this issue on the Columbia River.

Wood Frog Distribution and Habitat Use

Brian said that the Susitna Hydroelectric Project Studies didn't survey for frogs in the past.

Brian summarized the frog study area, which includes the area that could be affected directly by the Project footprint, including the reservoir impoundment.

Brian summarized the study methods and the expected results. He said that detectability estimates using an occupancy survey protocol are proposed. He said that the timing of calling males would be assessed from other studies to try to schedule the surveys during the peak calling period. He said that they would survey suitable habitats including waterbodies and wetlands where frogs are likely to breed. Habitats where frogs move after breeding would be evaluated in the habitat evaluation study.

Brian summarized the wood frog discussion points. He said that the study team would evaluate the chytrid fungus concern and the possibility of collecting frogs/tissue for bioassays in conjunction with the survey; however, the study team would need more information on how to properly collect samples. He said that there are standard methods for assaying for the fungus

but that there were questions about whether there was a realistic relationship between the proposed Project activities and the spread of the fungus. He said that it was not clear how widespread the fungus is or whether it could be related to Project activities.

Catherine said that there may be effects on frog breeding ponds due to the Project's gravel roads and dust. She said that USFWS would evaluate the frog work on the Kenai. She said that there are results from the Kenai area for the last few years. She said that impacts to frogs have to do with dust, temperatures, contaminants, and predator interactions from the road. She said that a gravel roadway is more of an issue than a paved roadway.

Betsy said that the study area would need to be assessed also. She said that it might not make sense to study the transmission line corridors because there would be no gravel roads or pads in those areas. Wayne said that the air quality study could provide information on how far dust would travel.

Wildlife Resources Studies

Brian summarized the objectives of the moose study. He said that the moose study focuses on numbers and movements of animals in the Project area. He said that the study would help to develop mitigation measures for the Project.

Kimberly (Kim) King (ADF&G) said that ADF&G was hoping to do work this November (2012) and looked at logistics and ran some numbers. She said that surveying the areas below and above the dam at the same time would be preferable to looking at them at different times. The data would be collected for application of ADF&G's geospatial population estimator (GSPE) method, which uses intensive sampling of smaller quadrat areas. She said that they could input numbers into the system and get moose estimates below and above the dam. She said that they would need the weather to cooperate for seven consecutive days. She said that the moose population composition surveys would be going on at the same time, so they may have difficulty getting enough pilots and airplanes to conduct this survey. She said that they would do fixed-wing surveys of random plots, dividing the area up into 6-square-kilometer sample units. She said that they would be looking at 200 sample units.

Brian summarized the caribou study objectives. He said that ADF&G would be recollaring animals known to use the Project area. He said that they would also use individuals that are already marked.

Brian summarized the objectives of the large carnivore study (bears and wolves). He said that, according to ADF&G, not a lot of new field work would be needed. He said that the study would rely largely on existing information. He said that the bear study would look at bear use

of anadromous fish spawning streams in the Susitna drainage below the proposed dam to understand changes in use of the streams.

Brian summarized the moose study area. He said that it was based on moose management subunits. He said that the purple areas on east (see slide) are where long-term trend counts have been done, located both south and north of the Project reservoir.

Brian summarized the caribou study area. He said that the study area is designed to look at specific movements of the Delta and Nelchina herds and where they overlap. He said that it is divided up into game management units. He said that the study area is complicated because two caribou herds and several subherds potentially occur in the study area. He said that herds are defined on the basis of their fidelity to calving grounds. He said that the Nelchina Herd uses the area in the eastern Talkeetna foothills in Game Management Unit 13A. He said that the Delta Herd calves in an area off the map, north of the Alaska Range.

Brian summarized the large carnivore study area. He said that they would do an analysis of existing data. He said that they needed to revise the study area map (see slide in presentation) because not all areas were shown.

Brian summarized the moose and caribou study methods. He said that a combination of the monitoring of GPS/satellite and VHF radio collars would give good information on movements in relation to the Project area.

Brian summarized the large carnivore study methods.

Brian summarized the expected results of the moose, caribou, and large carnivore studies.

Brian summarized the 2012 study activity. He said that the late-winter moose survey was completed in 2012 because of the high snowfall. He said that wolf and wolverine telemetry data from the 1980s studies were not available. Betsy said that the data might be in Juneau.

David asked whether the existing wolf and bear data would be good enough for the agencies, and Brian confirmed that it was.

Mark said that ADF&G put out satellite GPS collars on bull moose.

Brian summarized the moose, caribou, and large carnivore discussion points. He said that BLM asked whether there were plans to validate the moose carrying-capacity study done in the 1980s. He said that the work wasn't planned because the current studies of moose browse removal would use a different method and model. Sarah said that this is acceptable to BLM.

Kim said that ADF&G had started doing telemetry on 170 caribou with satellite and VHF on collared bulls. She said that it was taking longer to track all of the animals than they originally thought it would. She said that they flew the study area last week. She said that the half of the study area (the northern and western portions) took 8 hours to fly on Sunday and 6 hours to fly on Monday. She said that the valleys make it hard to cycle through all the collar frequencies. She said that their goal is to survey all frequencies and to locate all of the collared animals every time they fly. She said that because it takes so long, they are going to fly every two weeks instead of flying the study area weekly. She said that ADF&G thinks that this sampling period would be good enough because they also have satellite data. She said that in November 2012 ADF&G would be putting satellite collars on some cows. She said that they could use the VHF transmitters on the satellite collars to find the animals even if the satellite transmitters had problems. Kim said that she did not remember how often the satellite data were collected, but that the ARGOS data provided on CD is taken half as often to save battery life. She said that until collars are removed they are unable get GPS data, which is stored on board the collars for downloading after retrieval.

Kim said that right now ADF&G was only planning on biweekly flights. Mark said that in September 2012 they would increase to weekly survey flights during migration periods.

Jan Konigsberg (NHI) asked what the problems were with relying on satellites instead of flying. Kim said that VHF collars have a longer battery life and cost 3 to 4 times less than satellite collars. Jan asked whether GPS data could be stored on the collar. Brian said that it depends on the collar's duty cycle. He said that the most complete data is collected on the GPS collars. Brian said that there is a new technology that might be able to be used to kick up the frequency of data collection when collared animals come near a specifically defined geographic area.

Mark said that BLM had comments related to putting collars on the right caribou during the right season. He said that the Nelchina Herd is important. He said that there are few times when they can effectively collar because of weather, climate, and the hunting season timing. He said that ADF&G does have success on identifying and distributing collars on various herds. Sarah said that BLM just needed to understand this better and that the agency accepted the information that was being provided. Kim said that October is the best time to figure out whether individual moose are resident or moving through and that is why ADF&G selected October to sample. She said that once the data are returned, ADF&G will adjust the collared caribou if they figure out that one group is oversampled.

Sarah said that in the 1980 studies caribou were captured during calving. She said that the Project needs to figure out who would be going across the inundation zone. Mark said that ADF&G would be putting more collars on the Nelchina Herd to understand this. He said that the Delta Herd isn't expected to cross the inundation zone. He said that they have 10 satellite collars on Nelchina bulls and will deploy 10 more in November 2012. They have 5 satellite

collars on Delta bulls and will deploy 5 more in October 2012. He said that they have 80 Nelchina females collared and 40 Delta females collared. He said that the numbers are in the newest version of the PSP and should address BLM's comments.

Mark said that ADF&G has been issuing more hunting permits for the Nelchina herd because ADF&G is concerned about the population getting too large.

Kim said that they started marking bulls with collars equipped with orange color and numbers. She encouraged other field crews to report back if they are seeing collared moose.

Mark said that he had talked with the ADF&G biometrician and he thinks that they may be able to use bear transect data to estimate population size using a new model just developed. He said that this would be worth discussing more with Earl Becker (ADF&G) to figure out what the existing data can do for the Project. He said that there may be other density modeling by habitat type that could be done using the existing transect data and reanalyzing the data.

Sarah said that she had not looked over the updated study plan, but most of BLM's questions were related to study details and transparency. She said that she would not mind going over BLM's questions with ADF&G. She said that she would like to look over the PSP before planning a meeting. Mark said that the methods have changed a bit. Sarah said that overall she did not have any big issues.

Wayne said that the adjustments to the study plans sound sensible and that the Project Team would try to pass this information on so that it is understood. David said that the ILP addresses changes to study plans. He said that the risk is that agencies might not agree with the changes; however, the end of year reports could reconcile differences.

Brian asked whether there were questions or concerns on the DNA and stable isotope study for bears downstream. Mark said that he thought that ADF&G and AEA were on the same page on the study methods.

Jan asked whether the surveys of bear population downstream would go up the tributaries. Brian said that the intent is to go upstream to look for bears in all stream drainages that are known to be anadromous fish spawning streams.

Dall's Sheep Distribution, Abundance, and Habitat Use

Brian summarized the objectives for the Dall's sheep study. He said that the primary concern was acquiring adequate information on sheep numbers and summer range use north and south of the reservoir. He said that there was no indication that sheep are crossing the river in the area of the proposed inundation zone, but that the potential effects of the Project on mineral

lick use by sheep and increases in human harvest would be issues. There are mineral licks near Jay Creek (just above the proposed reservoir level) and upper Watana Creek (away from the reservoir zone). He said that the potential for increased predation by coyotes may become another issue affecting the sheep population, which is one area of focus for the terrestrial furbearer study.

Brian summarized the study area. He said that the map in the PSP needs to be revised to not go as far south and to include areas near access corridors north of the Susitna. Mark said that it makes sense to include the access corridors. Kim said that ADF&G does not survey for sheep, but that they could.

Brian summarized the Dall's sheep study methods. He said that there was a newer survey method that the National Park Service uses, but there are flight safety issues with that method, so the aerial survey method traditionally used by ADF&G will be used.

Brian summarized the expected results of the Dall's sheep study and the activities that would be completed in 2012, which include analysis of existing data from ADF&G and a site visit to the mineral licks to inform study planning for 2013/14.

Brian summarized the Dall's sheep discussion points. David asked whether ADF&G was satisfied with the methods. Mark said that ADF&G wants to look at the study plan more closely. Brian said that the study area map needs to be updated.

Wolverine Distribution and Abundance/Terrestrial Furbearer Abundance and Habitat Use/ Aquatic Furbearer Abundance and Habitat Use

Brian summarized the wolverine study methods. He said that the wolverine, terrestrial furbearer, and aquatic furbearer studies all rely on track surveys in the winter to various extents.

Brian summarized the terrestrial furbearer study objectives. He said that the study would be conducted on the ground using DNA sampling of scats and hair samples and capture-mark-recapture methods.

Brian summarized the aquatic furbearers study objectives. He said that beavers are important to understand because of their impacts on riparian, lacustrine, and fish habitats. He said that surveys would be conducted downstream to Talkeetna to determine use of the middle and upper river reaches. He said that they might be able to gather river otter information during the winter from low-altitude helicopter surveys. He said that they would be comparing furbearer populations in the Susitna mainstem to the tributaries to provide background information for the study of potential bioaccumulation of mercury in fish. He said that review

of information on the food habits and diets of aquatic furbearers would inform the mercury study.

Brian summarized the wolverine study area. He said that quadrats would be sampled to look for tracks as part of the sample-unit probability estimator (SUPE) survey technique.

Brian summarized the terrestrial furbearers study area as a 6.2 mile buffer around the Project area.

Brian summarized the aquatic furbearers study area. He said that it would target streams and waterbodies in Project area footprint, as well as riparian areas downstream.

Brian summarized the methods, expected results, and study interrelationships of the wolverine and terrestrial and aquatic furbearer studies.

Brian summarized the discussion points of the wolverine and terrestrial and aquatic furbearer studies. He said that the SUPE survey approach was dropped for wolves but would be used for the wolverine survey. He said that the ADF&G comments were addressed. He said that the most discussion is needed on the aquatic furbearer study plan because USFWS requested the study.

Mark said that he talked with Howard Golden at ADF&G about aquatic furbearers. He said that they were concerned with how muskrats and mink would be surveyed. He described a survey method (used by Herrington, Herrington, and McDonald) that employs floating structures on water to record tracks of mink. He said that this might be a better method for surveying aquatic furbearers. Mark said that he would forward the scientific journal article to Brian.

Mark said that Howard Golden has spent a lot of time studying river otters. He said that just surveying latrine sites (also called spraints) should give a good indication of the number of otters in the area. Mark said that the Team would need to select the creek and then survey latrine sites. He said that hair snares employing roughened wire cables and DNA analysis would give the Project a way to estimate the baseline population without collecting animals.

David asked whether there was a need to do the mercury analysis (which is the subject of another study to be discussed separately on Friday, August 17). Mark said that ADF&G understands USFWS's concerns about mercury. He said ADF&G had not thought about it in the beginning, but now they agree with conducting a risk assessment for mercury bioaccumulation. Mark said that ADF&G is also interested in abundance information to determine impacts. Brian said that they previously discussed where surveys should be conducted. Brian asked whether they needed a population estimate. Mark said it might not be needed.

Mark said that ADF&G had comments on the wolverine study. He said that the Region 4 biologist consulted with Howard Golden and Todd Rinaldi to determine how the study could address the winter distribution of wolverines. He said that ADF&G questioned whether the study would be able to determine winter habitat without more survey work. He said that just because an animal is passing through an area doesn't mean it is winter habitat. Mark asked whether determining winter habitat was needed.

Mark said that the study plan says sampling would be done in 25 square mile blocks, but it should be 25 square kilometers instead. He said that there might not be wolverines in the mountainous area in the winter. He said each of the blocks should be 25 square kilometers and that the Team might want to change the study area boundaries to reduce the potential error from boundary effects caused by wolverines moving out of survey blocks and entering others. He said that some areas should be added to square up the study area. Mark said that the Team might want to talk with Earl Becker (ADF&G biometrician) to figure out how to deal with animals leaving and entering the study area. He said that ADF&G would be willing to consult on this in more detail.

David said that he thought there were more comments related to terrestrial furbearers. Mark said that ADF&G had not been able to get back into it and that it may still have issues. Brian said that they would talk with ADF&G about additional comments.

David said that BLM requested additional spring surveys of beavers to assess overwinter survival. Brian said that the study plan accommodated BLM's comments, but that calculating exact population estimates would not be possible. Mark said that Howard Golden did not think that you could figure out exact population numbers for survival estimates, but that the survival of individual colony locations could be assessed.

Population Ecology of Willow Ptarmigan

Brian summarized the objectives of the Willow Ptarmigan study. He said that ptarmigan were the primary small game bird in the Project area and surrounding region.

Brian summarized the ptarmigan study area and described the capture sites and alternative capture sites that have been proposed by ADF&G.

Brian summarized the ptarmigan study methods, expected results, and the 2012 study activities.

Brian summarized the Willow Ptarmigan discussion points. He said that most comments on the study were from BLM, and some generic Department of Interior comments were received. He

said that BLM comments were on the study request. Terry said that the Migratory Bird Treaty Act applies to resident and migratory birds but not to invasives.

In response to BLM questions on the study request, Mark said that ADF&G would determine age and sex of the animals captured. He said that they did start an effort in 2011 and have 192 wings from birds taken in Game Management Unit 13. He said the question is whether the Project area is serving as a refugium for ptarmigan and whether increased access would affect the bird population by improving hunter access. He said that right now the Project is looking at 3 capture sites north and 3 capture sites south of the impoundment zone. He said that deploying additional radio transmitters to increase sample size could be a problem because of the number of radio transmitters already operating on the frequencies that would need to be used. He said that the question of using different pulse patterns to differentiate radio-tag frequencies is difficult because it has never been done with ptarmigan and could be risky for getting the study done. He said that they would have to shorten the life cycle of the collars if sample sizes were increased further. He said that if BLM has questions on the analytical models proposed for use, then perhaps Mark Lindberg at UAF could discuss those in more detail. Kirby said that we need to get with ADF&G to determine whether study area changes are needed and with BLM to see whether their comments have been addressed. Mark said that there is doubt that there is ptarmigan habitat in some of the access corridors. He said that ADF&G has a lot of management interest in ptarmigan.

Brian said that this is a remote area and that there could be secondary effects with increased access to the Project area. Wayne said that this is a State issue to be worked out with DOT&PF, ADF&G, and other State entities.

Wildlife Habitat Evaluation Study

Brian summarized the goals of the wildlife habitat-evaluation study. He said that AEA would be collecting information on habitat use for all the wildlife species observed. He said it is likely, based on other work in Alaska, that there would be at least two dozen habitat types. He said that a matrix would be generated indicating the categorical rankings for each wildlife species or group and each mapped habitat type. He said that they might not have project-specific information for every species (e.g., some mammals are rarely observed), but the study would use the best available data. The protocol would be to use project-specific habitat-use data first and then seek habitat-use information in the scientific literature (published and unpublished) for those species for which there are few observations. He said then they would use the wildlife habitat mapping to depict geographically the high-value habitats for various species in different seasons in the Project area. He said that the habitat evaluation study would facilitate a determination of which habitats would be affected by the Project and how many acres of each would be affected.

Brian indicated that the study area for the wildlife habitat evaluation was a 5-mile buffer around the Project area. This is the same study area to be used in the wildlife habitat mapping study (see below).

Brian summarized the methods that would be used to evaluate wildlife habitat use. He said that they would select for analysis: bird species of conservation concern (based on the MOU between FERC and USFWS), birds and mammals that are of concern for subsistence and sport hunting in Alaska, species of management concern in the state, and species that play important ecological roles.

Brian summarized the expected results of the wildlife habitat evaluation study.

Brian summarized the 2012 activities for wildlife surveys (which would serve as data sources for the habitat evaluation study). He said that the historical (1980s) vegetation mapping had been acquired from ADF&G and had been pulled into GIS. This mapping would be used to help allocate study plots for some wildlife studies by habitat type. He said some fieldwork had been initiated (e.g., raptor surveys).

Brian summarized the discussion points for the wildlife habitat evaluation. He said, following up on comments by ADF&G, that the study team would investigate the Alaska Gap Analysis Project (GAP) as a source of data on habitat use for the Project area.

David said that quantifying impacts on a habitat basis could help with understanding the significance of the Project impacts in a regional context. He said that the GAP data might be able to help. Terry said it is likely they study team could use the Alaska GAP data to do assess affects at a regional or statewide scale, but probably would have to rely on finer scale local mapping from the vegetation and wildlife habitat mapping study (see below) to assess local-scale impacts. David asked about the State's management concern. Terry said that it varies by species.

Catherine asked why the Project was waiting until 2013 for determine which species to analyze in the evaluation. Terry said that it was likely just scheduled to coincide with the point at which the study team would have a fair amount of habitat mapping completed. He said that the species could be selected before 2013. Catherine said that USFWS would like the species selection completed early enough to understand what habitat types are important to map. She said species should be selected soon and identified in the study plan so that something isn't missed. Mark said that game species were left out because they are managed separately. Brian said that they needed to determine which species have bag limits. Catherine said that if species could not be identified, it would be good to understand what group of species would be analyzed. Brian said that the FERC/USFWS MOU for birds would provide some direction. Mark said that ADF&G would need to come up with priority species.

Wildlife Harvest Analysis

Brian summarized the objectives of the wildlife harvest analysis. He said that the work would be based on information provided to the State by hunters and trappers in harvest reports; however, there are big holes in the data. He said that there are concerns about the completeness of the data. He said that the data would be fed into the recreation study and potentially into the subsistence study for the Project. He said that analysis of harvest data will help to identify potential changes in harvest after construction.

Brian summarized the study area. He said that it was primarily Game Management Area 13E but also includes surrounding management units. Jan asked whether the data shows where the animal was harvested. Brian said that it isn't always reported.

Brian summarized the expected results of the wildlife harvest analysis. Catherine asked whether information on ptarmigan was provided. Mark said that there isn't much information on ptarmigan harvest. He said that there is some from the last season, but not many details. Brian said that information is related to the species harvested, the level of hunting effort, and the success of the effort.

Brian summarized the discussion points of the Wildlife Harvest Analysis.

Little Brown Bat Distribution and Habitat Use and Small Mammal Species Composition and Habitat Use

Brian summarized the objectives of the little brown bat study and the small mammals study. He said that studying the bat was of interest because of white-nose syndrome, a fungal infection that has affected the little brown bat population in the northeastern United States. He said that the study would generally look at forested areas because the bat isn't a tundra species. He said that they can roost in caves and rock crevices. He said that the cultural resource survey might help to determine roosting areas in human dwellings.

Brian summarized the bat and small mammal study area, which would include the reservoir zone and Project infrastructure area.

Brian summarized the bat study methodology, which can detect other bat species if they are present in the study area. He said that the area would be surveyed between May and October. He said that they would attempt to locate hibernacula, but they might have to infer this because these areas have not been found in Alaska. He said that, in addition to the more common species of rodents and shrews, the small mammal survey would be looking for the

Alaska tiny shrew, which is a species of concern for BLM, to get a better handle on whether this species would be directly impacted by the Project.

Brian summarized the expected results of the bat and small mammal studies.

Brian summarized the 2012 activities, which are limited to estimation of snowshoe hare and vole population indices, beginning in August 2012 for the terrestrial furbearer study.

Brian summarized the bat and small mammal studies discussion points. He said that the Project team needed to consult with Dave Tessler at ADF&G to make sure that he is comfortable with methods.

Brian said that they had tried to address BLM comments regarding the access and transmission corridors by proposing to study those areas, but that the collision risk for bats at transmission lines is slight. Sarah said that she would get back with Brian to make sure that BLM's issues were addressed.

Botanical Proposed Study Plans

Vegetation and Wildlife Habitat Mapping

Terry summarized the vegetation and wildlife habitat mapping goals and objectives. He said that the mapping data will facilitate quantitative assessments of impacts on vegetation and habitats for a set of bird and mammal species of concern.

Catherine asked whether operational impacts would be addressed. Terry said that operational impacts would be addressed through analyses of potential habitat alterations in areas adjacent to project infrastructure, but that most of the operational impacts would occur downstream of the dam, and those impacts would be addressed in the riparian successional vegetation study. He said that it would be difficult to use the 1980s vegetation map polygons in the current mapping of vegetation and habitats (because the 1980s map polygons are based on old imagery), but the study team would try to determine the usefulness of the previous mapping in facilitating the current mapping study.

Terry summarized the vegetation and wildlife habitat mapping methods. He said that the study team would identify the aerial photo signatures on current high-resolution imagery by collecting ground reference data for each photosignature. He said that variability in photosignatures would be addressed by collecting field data at multiple plots in each photosignature type and by collecting field data throughout the mapping area.

David asked whether the work would consider age and percent cover. Terry said that they would first map everything to Veireck level IV vegetation type, which entails collecting data on percent cover. Data on forest age would be obtained in the timber volume work, which is likely to be a separate study (see below).

Bob Henszey (USFWS) asked whether soils and hydrology information would be collected at each site. Terry said that soils and hydrology information would be collected at each field ground-reference plot because the field effort the wetlands mapping study (which requires field data on soils and hydrology) is being combined with the field effort for the vegetation and habitat mapping study.

Terry summarized the study area. He said that it would be a 5 mile buffer around the proposed Project components. He said that this is a big area that goes way beyond the Project effects. Kirby asked whether the study area needed to be that large. Wayne said that this is typical for FERC Projects. David said that he could not remember seeing a mapping study area this large. David said that it was good, however, because there would be comparable data to use for all wildlife topics. Wayne said that AEA wants to do the right thing and use common sense and that the study area could change as more information is collected in the field. Terry said that the larger study area would help in placing the impacts to vegetation and wildlife habitats in a regional context.

Terry summarized the 2012 activities. He said that approximately 250 ground-reference plots had been surveyed and some additional vegetation verification plots as well. He said that some mapping would be completed this fall and winter.

Terry summarized the discussion points for the vegetation and wildlife habitat mapping study plan. He said that the timber volume determination (for areas to be cleared of vegetation during construction) was not included in the proposed study plan and may need to be a separate study. Wayne asked who and why there was interest in a timber volume assessment. Terry said that it was a Department of Interior and BLM study plan comment. Betsy said that there is a big area of BLM land in the inundation zone. Sarah said that she would provide more information.

Ben Seifert (BLM) said that BLM requires a timber volume assessment to determine compensation to BLM for timber take on their lands. Wayne asked whether a separate study was needed. Terry said it is likely that a study of timber volume would need to be separate from the study of vegetation and wildlife habitats because a timber volume study would require intensive field data to be collected only in forested habitats. In contrast, the field studies for vegetation and habitat mapping are focused on surveying all habitat types, forested or not, and that collecting detailed data in forest habitats would slow down the study of

vegetation and habitats. Ben said that he would like to be involved in the discussion of the forest volume study plan.

Terry said that the USFWS requested a comparative analysis of changes in vegetation (1980s to current). He said that it could be done, but the scale of the analysis would need to be changed (likely made broader with more generalized vegetation types) to make valid comparison to the 1980s mapping, and there would be comparison concerns given the differences in the vegetation classifications used. He said that there needs to be more discussion with USFWS to determine whether a change analysis is feasible and to determine the rationale for that analysis. Bob said that he thought that the analysis was requested to determine the rate of change in plant communities. Bob said that he would look at the comment because it wasn't meant to be burdensome.

Jan asked how is AEA was going to make a decision about whether the inundation zone would be cleared, inundated, or both without doing studies. Wayne said that AEA was not sure that timber harvesting would be economical. He said that AEA would need to do a cost-benefit analysis as well as a study of the effect of decay in the inundation zone to determine what would be done. He said that there would be more discussion about the inundation zone. Jan asked whether there would there be a separate study to make the decision. Wayne said that AEA would use information from a variety of studies. Wayne said that the engineers don't think that they need to clear the reservoir area, but AEA would be looking at other projects in northern areas to determine the best method.

David asked about USFWS's comment regarding minimum mapping sizes. Bob said that he didn't remember that detail, but he thought that waterbodies were to be mapped to 0.5 acres and other vegetation types to 1.0 acre. [The numbers in the study plan are 0.25 acres for waterbodies and 1.0 acre for other vegetation types.] Terry said that they typically map wetlands at a finer scale in areas where there would be direct impacts (e.g., in the inundation zone and areas where fill or physical disturbance would occur).

Wetland Mapping Study

Terry summarized the wetland mapping study's goals and objectives. He said that in the area downstream of the proposed dam, wetlands would be mapped (in the riparian study, see below), but that wetlands determinations would not be completed. He said this approach was agreed to in meetings with ABR, AEA, USFWS, Environmental Protection Agency (EPA), and U.S. Army Corps of Engineers (USACE). He noted that a series of meetings with these agencies had been conducted to determine the wetlands mapping and functional assessment methods to be used for the Project.

Terry said that they would be using a method that combines several wetland assessment elements including the Cook Inlet basin wetland methodology. He said that the wetland functions to be assessed would be specific to the region and the remote and relatively undisturbed environment.

Terry summarized the wetland study area, which would be a two-mile buffer around the Project components. Catherine asked whether the study area would be two miles outside the 100-year flood limits. Terry said that the study area buffer for wetlands would be around the Project components including the inundation zone. Terry said not all areas to be mapped were within the active floodplain. The 100-year flood limit applies to the riparian study area (see below).

Jan asked why the wetland mapping ended at Gold Creek. Terry said that there was overlap between the wetlands mapping effort and the riparian vegetation mapping effort. Wetlands would be mapped (in the riparian study, see below) downstream of Gold Creek, but the wetland mapping study is focused on those wetlands that would be affected by fill, disturbance, or inundation by the reservoir. He said that the USACE stated that they only need to see wetlands mapped in the area where direct fill is proposed.

Terry summarized the 2012 wetland mapping activities, which involved both field surveys and GIS work in the office. As noted above, Terry said that approximately 250 ground-reference plots had been surveyed (field data for vegetation, wildlife habitats, and wetlands are collected simultaneously) and some additional vegetation verification plots were surveyed as well. He said that some wetlands mapping would be completed this fall and winter.

Terry summarized the wetland mapping discussion topics. David said that FERC would like to see all the issues that are listed addressed in the final Revised Study Plan. Specifically, a final decision must be made on the wetland functions to be assessed.

Riparian Vegetation Study

Terry summarized the goals and objectives of the riparian vegetation study. He said that data on riparian vegetation and wildlife habitats downstream of the dam site would be collected in the field. He said that the study team would first map riparian ecotypes, wetlands, and wildlife habitats, and then determine possible changes in these resources with changes in stream flow, ice processes, and fluvial geomorphology.

Mark said that ADF&G had some questions related to aquatic furbearers and changes water flow. Mark said spring flooding could result in suitable habitat. He said that if furbearers lose that habitat because of project operations (reduced spring flows), the species could be affected

and those potential impacts would need to be understood. Brian said that the instream flow study and the riparian habitat study would help answer the aquatic furbearer habitat question.

Bob asked how much overlap there would be between the riparian vegetation data collection and the instream flow study. He said that he wanted to make sure that the two teams worked together to collect all the needed information. Terry said that the instream flow and riparian vegetation team leads were in the field together this year (sampling simultaneously), and that they have been coordinating closely throughout the study plan phase, so the needed data should be acquired for both studies.

Terry summarized the riparian study's relationship to other studies.

Terry summarized the riparian mapping methods. He said that the proposed methods were similar to the wildlife habitats mapping methods. He said that successional vegetation information would be collected to determine riparian ecotypes at a finer scale than would be used for the mapping of wildlife habitats.

Terry summarized the riparian study area. He said that they estimate that mapping will be completed downstream of the dam to mouth of the Susitna River; however, the study area length depends on the findings of the instream flow study. He said that they needed to work with the instream flow researchers to make a determination of where flow effects of the Project would be overridden by the tides or flow from other tributaries.

Terry summarized the riparian study's 2012 activities, which involved both field surveys and GIS work in the office.

Terry summarized the riparian study's discussion points. He said that the width of the riparian study was originally proposed as the 100-year flood limit plus a buffer. He said that buffer size had not been determined and the issue should be discussed. Bob suggested an elevational distance in some areas, particularly in the canyon areas. Terry said an elevational buffer could be used and that made more sense than a horizontal distance buffer. He noted that the other issue to solve is whether to use the 100-year or 50-year flood limits. Bob said that it might be better to look in the field to determine the area. David said that the geomorphology information could help determine the study area. Betsy added that the ice processes should be considered. Terry said that AEA knows this is a big issue and that they selected the 100-year limit because it would provide the widest study area in which flooding can occur currently (the Project would result in reduced flooding with concomitant changes in riparian vegetation). Wayne said that there was a flood on Gold Creek in 2012 that could help to determine the study area.

David asked when the length of the study area downstream would be determined. Terry said that the riparian vegetation team and the botanical lead need to meet with the instream flow and fluvial geomorphology teams to determine the appropriate length for the riparian study area using data collected in 2012.

Betsy said that the study area might be changed after the 2013 field effort. David said that a phased approach could be used to determine the study area. He said that the phased approach or path would just need to be defined and documented in the study plan for FERC to accept it.

Wayne said that AEA would be doing a climate change study to the dam site as a part of the agreement that they have with DGGs and UAF. He strongly discouraged using climate change as a driver (e.g., there might be larger 100-year floods with climate warming) to determine the study area size for the riparian study. He said that the climate change study would be independent study.

Rare Plant Study

Terry summarized the goals and objectives of the rare plant study. He said that the study team would be looking for species tracked by the Alaska Natural Heritage Program. He said that the surveys would be focused in areas that would be directly affected by the Project (e.g., fill for roads and pads, disturbance in areas adjacent to Project infrastructure, and the reservoir area).

Terry summarized the rare plant study area, methods, and expected results.

Invasive Plant Study

Terry summarized the goal and objectives of the invasive plant study. He said that the study team would survey disturbed sites within the Project area and would survey also along highways and other disturbed sites near the Project area, which could serve as sources of invasive plant seeds or propagules.

Terry summarized invasive plant study methods and expected results. Bob said that the study team should not discount the lack of comments on the invasive species study because USFWS is very interested in the invasive plant study. He said that he thought that the study covers USFWS's interest well, and that AEA and USFWS are close to agreement there.

Bob said that other nonnative species (which may not be invasive) should also be recorded in the study. Terry said that the study team planned to record all nonnative species, whether invasive or not.

Follow-up and Study Plan Revisions

Terry said that the key element to coming to agreement on the wildlife and botanical study plans is to schedule additional small-group meetings in September 2012 to resolve the set of concerns that need further discussion. He said that focused meetings with key people from key agencies will be important and that with small groups the meetings can be more productive. Betsy said that they might need to Doodle-poll key agency staff to determine availability, and then announce the meeting time to everyone that might want to participate so as to not leave any licensing participants out of the process.

David said that FERC wants to get all the wildlife and botanical issues resolved soon so that there would not be a need for any additional comments on the RSP in October 2012.

Action Items

1. Eagles and Raptors Study needs further discussion with USFWS regarding small raptor species and cavity-nesting owls regarding the survey area and survey methods for other species of raptors is needed; Brian and Maureen to plan a meeting, hopefully by early September, with Jordan Muir, who issues USFWS eagle take permits.
2. Waterbird study needs further discussion with USFWS regarding spacing of transects and the 15 mile buffer recommendation, along with intensity of the migration survey (and timing for seaducks) needs further discussion to make sure the study is not missing migration peaks
3. Landbird and Shorebirds study needs further discussion regarding rationale for locating “study plots” in Denali National Park and the Copper River Basin needs to be discussed in detail along with overwintering bird methods and appropriateness of mist netting.
4. Caribou study needs further discussion with Earl Becker (ADF&G) to figure out what the existing data can do for the Project, there may be other density modeling techniques to use.
5. Dahl Sheep study map needs updating.
6. For aquatic furbearer study follow up with Mark Burch on idea of using floating structures on water to record tracks of mink.
7. Wolverine study needs follow up with Earl Becker (ADF&G biometrician) to figure out how to deal with animals leaving and entering the study area.
8. For little brown bat and small mammal studies, follow up with Dave Tessler at ADF&G to make sure that he is comfortable with methods.
9. Wetlands Mapping Study needs follow up consultation to make a final decision on the wetland functions to be assessed.

10. Riparian study needs to outline any phased approaches with regard to expanding the study area in the future.

**Meeting Summary
 Susitna-Watana Hydroelectric Project Licensing
 Technical Workgroup Meetings
 August 15-17, 2012
 AEA Project Offices, First Floor Conference Room
 411 W 4th Avenue, Anchorage, AK**

**ILP Formal Study Plan Meeting for Fisheries and Beluga Whale
 Resources, August 15, 2012, 8:30 am – 4:00 pm**

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Jennifer Spegun (by phone)
USFWS	Bob Henszey (by phone)
ADNR	Kim Sager
ADNR OPMP	Marie Steele
NMFS	Eric Rothwell
NMFS	Mandi Migura (by phone)
NMFS	Kate Wynne
EPA	Jennifer Curtis (by phone)
ADF&G	Richard Yanusz
ADF&G	Joe Klein
ADF&G	Mark Burtch
ADF&G	Kim King
ADF&G	Bob Small
ADF&G	Stormy Haught
NMFS	Ed Meyer (by phone)
FERC	David Turner (by phone)
FERC	Matt Cutlip
LBG/FERC Contractor	Fred Winchell
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsburg
Long View Associates	Steve Padula
Long View Associates	Cory Warnock
Van Ness Feldman	Matt Love
MWH	Kirby Gilbert (by phone)
HDR	James Brady
HDR	Michael Barclay (by phone)
R2 Resource Consultants	Dani Evenson
R2 Resource Consultants	MaryLouise Keefe
R2 Resource Consultants	Phil Hilgert

Organization	Name
Tetra Tech	Bill Fullerton
R2 Resource Consultants	Tim Nightingale
GW Scientific	Michael Lilly
Stillwater Sciences	Dirk Pedersen
Stillwater Sciences	Jay Stallman
LGL	Michael Link
ARRI	Jeff Davis
Alaska Ratepayers	Scott Crowther
R2 Resource Consultants	Alan Olson (by phone)

Introduction

Steve Padula opened the meeting and explained that the intent of this meeting was to discuss the fisheries and beluga whale studies that have been proposed and to have substantive discussions related to any remaining misunderstandings or inconsistencies. Steve went through a few slides reminding everyone about the formal study planning process, current status, and associated deadlines. He noted that another set of TWG meetings is scheduled after the October 15 due date for filing comments on the Proposed Study Plan (PSP) to address any remaining issues.

Action Item. Steve stated that the agenda, meeting minutes and all presentations given during the day would be made available on the AEA website. Introductions were held.

Jeff Davis (ARRI) requested clarification as to whether technical work groups had been set-up and if so, who the representatives were. Steve clarified that the members of this meeting were the TWG and depending on the outstanding technical issues, there was potential for smaller groups to meet at a later date. Jeff inquired as to how the smaller groups would be selected. Steve stated smaller discussions would be convened based on specific subject matter that would be identified in the agendas so that appropriate individuals could participate. Wayne Dyok (AEA) added that he wants to see an open and honest discussion to resolve issues and that it was AEA's desire to develop a good study plan to support development of a license application for FERC.

Jeff stated that the study plans were vague and inquired if additional detail would be added and whether another review period would take place. Steve stated that the Revised Study Plan (RSP) is due on November 14th after which, the stakeholders will have 15 days to review and make additional comments. FERC will then review the RSP and comments on the PSP/RSP and issue its study plan determination. Steve added that it was AEA's intent to continue to have collaborative discussions throughout the duration of the study period. Wayne added that the next three days of meetings are important to identify and hopefully resolve any outstanding issues.

Jeff asked whether there would be a QA/QC plan. Matt Cutlip (FERC) stated that there was another stakeholder comment period of two weeks in late November prior to the study plan determination being issued. David Turner (FERC) stated that it was important to use the next three days to identify any differences so that by October 15th, the number of issues remaining is

as minimal as possible. That is FERC's goal. Wayne reiterated AEA's desire to make this a collaborative process.

Eric Rothwell (NMFS) noted that the ILP timeline is inconsistent with AEA's agreement to help bring on a consulting team to assist the agencies.

Presentations

- Steve went through a few slides reminding everyone about the formal study planning process, current status, and associated deadlines.

STUDY PLAN PRESENTATIONS AND DISCUSSIONS

Mary Lou Keefe (R2 Resource Consultants) stated that there were a number of collaborators on these studies and multiple people would be giving presentations. Time constraints on presentations and the relative order were also discussed.

Characterization of Aquatic Habitats with Potential to be Affected by the Project

Mary Lou Keefe gave the Characterization of Aquatic Habitats with Potential to be Affected by the Project presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Eric Rothwell asked how sampling structure detail would be determined, (substrate, channel type, etc.). Mary Lou stated that multiple studies would be collecting this type of data. Eric asked where all of the data would be collected for habitat typing. Mary Lou stated that habitat typing was not one of the goals of this study but to the extent that supplemental habitat data could be used, it would be. Phil Hilgert (R2 Resource Consultants) elaborated that it was a matter of scale and that all of the habitat studies were linked.

Jeff Davis asked why the USFS methodology for the Tongass National Forest was selected for this study. Mary Lou stated that through a series of TWG meetings, AEA had decided on this methodology and that the protocol for this study is to look at riffles, runs and glides in tributaries. She continued that this method is accepted widely and was previously agreed to. Jeff asked if there was going to be a meeting in September to go over the methods. Phil stated that AEA planned an internal meeting to verify that all the studies were appropriately coordinated.

Jeff asked what level of classification would be used on the videography work. Mary Lou stated that there would be three different scales depending on the area of the river being analyzed. The upper river would be classified by looking at variables to include riffle, run or glide along with substrate and large wood debris. The lower river would include six or seven main habitat types and the middle river would be a hybrid of the upper and lower river. Jeff asked if a Tier III analysis would only be done on the tributaries. Mary Lou confirmed this and said some Tier III work may be done on the upper river as well.

Jeff added that details related to methods for channel typing, substrate, sinuosity, etc. needed to be more detailed. Mary Lou stated that some details are in the plans and that others are detailed in the referenced methods. Jeff inquired specifically about channel typing methodology and Mary Lou stated that finalizing this method would require further discussions with the geomorphology folks after their field visits this summer. Matt Cutlip asked when that detail would be provided. Mary Lou stated that that level of detail wouldn't be available until after the RSP. Wayne Dyok added that all questions related to detailed methods may not be able to be addressed during these three days of meetings. Jeff stated that time was running out relative to the ILP timeline and decisions and discussions need to happen. Eric Rothwell added that the objectives of the studies were good but the actual details of some stakeholder requests were not addressed in the plans.

Matt Cutlip stated that the level of detail being discussed was necessary for the RSP. Betsy McGregor (AEA) stated that the geomorphology crew wants to do its fieldwork at a low flow in September. Matt stated that that should be documented in the study plan and a schedule discussing when habitat types will be final should be included as well.

Betsy McCracken stated that she has concerns about the Tier III methodology and shared concerns regarding the lack of detail in the plans. She additionally wondered if some form of hierarchical mapping method would occur. Mary Lou stated that the mapping will be done at a reach level and that Bill Fullerton's (Tetra Tech) work and 1980's data will assist in determining meso-habitat characteristics in the tributaries. Mary Lou asked the group to bring forth any other suggested methods if they had them.

Joe Klein (ADFG) stated that additional detail was needed but that Tier III methodology was appropriate and that it had been used in SE Alaska before. Jeff Davis stated that the habitat types currently proposed don't exist in the Susitna tributaries. Wayne stated that alternative suggestions for methodology are encouraged. Mary Lou added that final habitat typing couldn't be detailed until reach breaks were established.

Mary Lou continued with the presentation noting that an additional habitat type had been identified. "Pocket waters" was added to the classification system for tributaries to the upper Susitna River. She stated that these were boulder gardens unique to this area. Eric Rothwell asked if this new habitat type was due primarily to the nature of the substrate. James Brady (HDR) and Mary Lou stated that this was correct. Joe Klein asked where this habitat type was primarily located. James used Kosina Creek as an example.

Fish Distribution and Abundance in Upper, Middle and Lower Susitna River

Mary Lou and James Brady gave the Fish Distribution and Abundance in Upper, Middle and Lower Susitna River presentation. Areas discussed included goals and objectives, study area, methods and expected results.

A question was asked regarding the specific life stages being evaluated as part of this study. Mary Lou stated that telemetry and tagging were going to be used to get movement data on multiple life stages.

Mike Buntjer (USFWS) asked how much accessible habitat was available in the tributaries. James displayed a slide showing the amount of accessible habitat in yellow. A question was asked as to whether the entire eighteen miles of Kosina Creek was evaluated during each survey. James confirmed this and stated that all of the fish were observed spawning in a 1 ½ mile stretch of the creek. Betsy McCracken asked where radio tagged fish had been found. Michael Link (LGL) stated that the table presented by James was consistent with their findings.

Eric Rothwell asked about estimates for the Chinook run in the Susitna in 2012 relative to a “normal” year. James stated that the 1980’s data indicated no fish in Kosina Creek. Mary Lou added that you can’t say with any certainty that higher counts will occur in the tributary during better Chinook years. Betsy McGregor pointed out that there were three impediments to passage in Devils Canyon and Devils Creek was downstream of the 3rd impediment.

Richard Yanusz stated that escapement goals for the Susitna were defined over a twenty year average and the 2012 run year was quite low. Michael Link stated that the run was about 25% to 50% of normal for the Susitna.

A general discussion related to James’s presentation was had relative to 60 mm juvenile salmonids, their relative age and if juveniles of this size were going to be tagged. James stated that they were not but site specific data related to their length and habitat utilization would be taken. It will be stratified sampling on the meso-habitat level.

Jeff Davis asked if fish sampling efficiency was low in certain habitat types. James stated that it was. Mary Lou then continued with the presentation.

Mike Buntjer inquired about the metrics that would be used to evaluate fish densities, sample size and design. He added that general methods were lacking and he was unclear as to what the actual sampling effort entailed. He stated that the winter timeframe is critical and little effort appears to be placed during this time. Mike stated that it appeared nothing was being done for the early life history of the fish (egg deposition to emergence). Mike stated that he didn’t see a way to get from the existing baseline to defining conditions during load following operations without this information.

Mary Lou stated that in general, she is hearing that the level of detail in the study plan isn’t meeting stakeholder expectations.

Mary Lou stated that certain winter components will be addressed within the instream flow study. Eric Rothwell stated that that was not discussed in the instream flow study plan. Mike Buntjer asked if movement from tributaries to sloughs would be addressed. Mary Lou stated that juvenile movement would be addressed via PIT tagging. Mike reiterated that 60 mm size fish and smaller were the most critical life stage to assess for load following operations and that no tag would work. Phil Hilgert stated that the instream flow study was looking at stranding and trapping and that the model would also document egg incubation. Eric stated his concern that the biological information needed to support that model isn’t going to be collected under the current plan.

Mary Lou stated that monitoring 30 mm-60 mm fish is challenging and requested suggestions from the stakeholders. Jeff Davis suggested sampling habitat multiple times. Mary Lou stated that seasonal sampling was currently in the plan. Mike Buntjer stated that seasonal sampling was not proposed in the winter. Mary Lou agreed that the stratification system needed to be made clearer.

Mike inquired as to why winter work was limited to open leads. Mary Lou stated that a decision was made based primarily on safety concerns. Mike stated that you can't compare data from this proposed approach with the 1980's work and added that the current winter work proposed won't give you the juvenile information you need. He suggested placing minnow traps below the ice. Jeff Davis agreed and stated that you can safely place minnow traps below the ice. Mary Lou restated that safety was a primary concern. Matt Cutlip stated that if a suggestion is made by the stakeholders that AEA chooses not to adopt, a justification must be given in the RSP.

Wayne Dyok confirmed that if an agreement on a certain issue isn't reached, it will be included in the RSP. He added that safety was a key issue on the mainstem but there was room to discuss other methods in the sloughs. Wayne acknowledged that additional detail and discussion were needed to address the winter work. Mike restated his concern regarding only sampling open leads. Mary Lou stated that she understood additional detail was needed.

Jan Konigsberg (NHI/HRC) asked what would be done if winter baseline information couldn't be acquired and whether that would be specified in the RSP. Mary Lou stated that sampling is limited and that fish presence tells you fish are there but lack of fish does not necessarily mean they are not present. Mike Buntjer reiterated the importance of evaluating egg deposition to emergence. Mary Lou stated that in June, it seemed the stakeholders were in agreement that dealing with that life stage as part of the instream flow study was acceptable and now it appears that isn't the case. Mike stated that the instream flow plan was not clear as to how the juvenile life state was being addressed. **Action Item.** Mary Lou suggested that the topic be revisited after the instream flow presentation tomorrow.

Joe Klein stated that detail related to methods for shocking, specifically the inclusion of block nets, needed to be added. Jeff Davis inquired about issues related to catch per unit effort, whether data collection was repeatable and measure of error. He also inquired about mesh size and types of nets to be used.

Mary Lou expressed some concern related to the time constraints of the meeting and whether all topics could be discussed today. Wayne Dyok added that AEA wanted to hear all of these comments and wants to work hard to address as many issues as possible by November 14.

Betsy McCracken asked whether the terrestrial study would evaluate the nutrients available to bears. Betsy McGregor confirmed this. Mike Buntjer asked why, if you were collecting food availability data, why you wouldn't collect food use data. Mary Lou stated that it was being addressed in the productivity study.

Salmon Escapement

Michael Link (LGL) gave the Salmon Escapement presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Eric Rothwell clarified that the median year lines associated with a hydrology figure in Michael's presentation could have significant daily fluctuations. Michael concurred.

Betsy McCracken inquired about the types of tags used on non-salmonids. Michael stated that no non-salmonids were tagged.

Joe Klein asked if any netting was done as part of the 2012 work. Michael stated that it would be discussed later in the presentation.

Jan Konigsberg asked why there was variation in catch when comparing the right and left banks. Michael stated that analysis was ongoing and conclusions have not been reached yet.

An inquiry was made as to the flows in the Susitna when Chinook travelled upstream of Devils Canyon. Michael stated that 12 fish moved above the third impediment between the morning of the 17th and the 20th. Another group of 12 fish made it to the third impediment not long after but fell back and never passed. The 12 fish that got upstream moved quickly and spent time in various tributaries. Michael went on to say that he was unsure if the passage of the impediment was flow dependent or simply a "push through" mentality but the flows at the time of passage were only 1000 cfs above the record low median flow for that period. A question was asked if there was any mainstem channel spawning observed. Michael stated that none was documented.

Eric asked what the spawning time period was for the middle and upper river. Michael stated that it was almost over now but that there were still a few fish coming through that may spawn later.

Jan Konigsberg asked if any tissue samples had been collected. Michael stated they none were collected at the fish wheels. Some tissue samples were taken in the tributaries but sample collection is hindered by the scarcity of fish. Betsy McCracken asked how old the existing genetic data from the drainage was and where the fish were from. Michael stated that most of the data was from the last decade and a majority of the fish were from Indian and Portage creeks.

Betsy McGregor stated that ADF&G has specific sampling goals for tributaries and the AEA data would supplement that. Rich Yanusz stated that ADF&G had a grant to document the systems and that numbers were currently insufficient to have a suitable sample size in 6 or 7 tributaries. Sample size is currently acceptable in 8 tributaries.

Jeff Davis inquired if Coho numbers were being underestimated by not assessing certain areas. Michael stated that based on 1980's data, Curry was chosen as the best capture site. Jeff asked if receiver sites were evaluated for detection efficiency. Michael confirmed that they were. Jeff asked how far tags could be picked up. Michael stated approximately ½ mile upstream and

downstream of the receiver and all the way across the river width. Betsy McCracken asked whether assessments of areas downstream of Curry would be done as part of another study.

Mike Buntjer asked if habitat availability would be addressed. Phil Hilgert stated that it would be addressed in the instream flow model.

Eulachon Distribution and Abundance

Mary Lou gave the Eulachon Distribution and Abundance presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Betsy McCracken asked if Didson work and target verification would be done at the same time. James Brady stated that acoustics would be supplemented with netting, electrofishing, etc. Density information will be collected. Wayne Dyok asked if Betsy was comfortable with the direction of the study. Betsy said she might provide some follow-up at a later date.

Cook Inlet Beluga Whale

Mary Lou gave the Cook Inlet Beluga Whale presentation. Areas discussed included goals and objectives, study area, methods and expected results. See the presentation on the AEA website.

Mandi Migura (NMFS) raised three issues that she felt hadn't been addressed:

1. Are there any plans for assessing beluga presence during the over-winter months? She presented passive acoustics as an option.
2. She stated that there was nothing currently in the study plan regarding use of the area by reproducing females or calves. She stated that it is difficult to distinguish life stages from the air and asked if any exploration had occurred into other potential methods.
3. She stated that the project has the potential to change habitat conditions at the river mouth/delta and that this could have direct impacts on the feeding potential for belugas.

Kate Wynne (NMFS) stated that any project related impacts should be addressed as they relate to belugas, not just the "significant impacts".

Mandi asked if the beluga whale and habitat data will be used to assess impacts to fish. And if so, it should be done in the opposite order. Betsy McGregor agreed that that portion of the plan was poorly worded and it was going to be in the opposite order. Betsy went on to explain that AEA's beluga expert was not present but that it was her understanding that May and June were selected as study months in an effort to focus on the calving period. Bob Small (ADF&G) stated that year-round monitoring should be considered and that telemetry data shows that belugas use the deltas in the winter. He stated that foraging behavior has been cited in data from work done in the past 10 years as well.

Bob asked for clarification of the objective related to the 2 days of monthly aerial surveys. He stated that you could get group size, distribution and presence/absence information from this data but no population size. He additionally inquired as to why emphasis was being placed on all of

critical habitat area 1. Mary Lou asked if since AEA was only doing 2 days of aerial surveys, should the survey area be narrowed down to just the mouth and delta to allow for more intensive survey. Kate stated that her first impression that a survey of all of critical area 1 was not needed but follow-up within her agency prior to a final recommendation would be needed.

Mandi stated that data suggests that calves are being produced in July as opposed to the May/June timeframe currently proposed. She went on to question the viability of aerial surveys for identifying calves. Bob suggested collecting supplemental observations opportunistically from other flights using the area.

Bob recommended looking into passive acoustic monitoring as a potential methodology option for the beluga work. He stated that ADF&G has successfully used it for the past 4 years. He stated that it can be set up to process data as it is collected and they can run 24/7. He stated that he would be willing to discuss this with AEA's beluga specialist if adding it to the study plan was an option. Michael Link stated that the primary issue with this approach in the Susitna Flats was the possibility of false negatives. Bob stated that this approach would at least give you some data in the winter but agreed it wouldn't be 100% successful. He acknowledged that the amount of time needed to post-process video and photo data is extensive and that this approach would be more efficient. Michael reiterated that it wouldn't be good to spend the time and money for inconclusive data. Bob stated that you would need to get the baseline data to determine actual feasibility.

Wayne Dyok asked if there were other alternatives for winter beside acoustics. Mandy stated human observation in the winter isn't reasonable due to safety issues and that acoustics was a better choice in the winter. Wayne asked if there were any suggestions on defining criteria for impacts. Mandy stated that a meeting with AEA's specialist would be helpful. Bob stated that the change in hydrology as a result of the project won't likely impact the whales directly, but it could impact their prey. He stated that the question is how and acknowledged that it may help and it may hurt. Wayne stated that more discussion was needed.

Mary Lou stated that the May and June surveys were focused on the primary months that eulachon would be in the river. Betsy McCracken stated that there should be additional surveys in August and September to focus on prey as well. Mandy stated that data from NMFS's survey events would not be a quick turn around and if it was needed quickly, AEA may want to consider an additional survey in August. She was not comfortable committing to an expedited analysis period from NMFS personnel without discussion with them.

Future Reservoir Fish Community and Risk of Entrainment

Mary Lou gave the Future Reservoir Fish Community and Risk of Entrainment presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Wayne Dyok asked about the maximum elevation of the reservoir area displayed on the presented map. Betsy McGregor stated that it was at 2200 feet, which depicted the planned extent of the study area for resources adjacent to the proposed reservoir. Wayne stated that AEA was continuing to evaluate the proposed maximum water surface elevation for the reservoir and

that currently it was anticipated that the maximum elevation would be 2050 feet. Joe Klein asked if that would increase the drawdown. Wayne responded no and stated that AEA was still refining the plan.

Jeff Davis asked if anyone had looked at shelf ice and its potential impact on fish in the littoral zone. Mary Lou stated that it had not been brought up to date. Wayne stated that AEA reviewed Williston Reservoir in the 1980s and it wasn't an issue there. He asked if Jeff could cite some examples where shelf ice was an issue. **Action Item.** Jeff stated he would find some references.

Jeff asked if sediment deposition and settling rate downstream of the dam would be looked at. Wayne stated that it would be discussed on Friday and that it was considered in the 1980's.

Jeff asked if smolt movement through still water habitats would be looked at. Mary Lou stated that that would be part of the passage study.

Fish Passage Barriers in Middle/Upper Susitna River and Tributaries

Mary Lou gave the Fish Passage Barriers in Middle/Upper Susitna River and Tributaries presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Jan Konigsberg asked if any assessment of barriers below Talkeetna would occur. Mary Lou stated there was no assessment planned because it is assumed that the project will not create any barriers and the instream flow study will identify additional need, if any. Jan stated that winter fluctuations may create barriers and inquired if any work was planned. Mary Lou stated that the hydrology has yet to be finalized and that if a need is apparent, the study plan will be amended.

Jeff Davis stated culverts should be evaluated and used the Twister Creek culvert as an example.

Jeff stated that these methods were working under the assumption that the bed elevations would remain stable. He asked if elevation fluctuation and bed profile changes would be addressed. Mary Lou stated that Bill Fullerton would address geomorphology issues on Friday.

Jeff stated that it appeared that all passage issues were focused on adult anadromous species and there was no discussion of rainbow trout passage in the spring or juvenile sockeye movement into side channels for rearing. Mary Lou stated that the intent of the passage work was not to be life stage specific.

Michael Barclay (HDR) stated that the study was designed to collect the necessary information to determine what effect a change in water surface elevation would have on depth and access. Once that data is collected, you can apply it to the selected species and life stages to determine level of impact. Jeff stated that he'd like to see all species included in the analysis. Additionally he stated analysis of delay of access to river mouths, increased predation and stranding should be looked at. Michael stated that some of this could be addressed by the instream flow study. Mary Lou confirmed this.

Jeff asked if a change in turbidity occurred as a result of the project, would there be an impact on out-migrating juveniles. Wayne stated that he is unsure if the water will be clear enough to facilitate additional predation and that the water quality discussion on Thursday should be helpful in answering this question.

Joe Klein stated that other life stages and timing should be included in the fish passage study. Michael Barclay stated that the timing issue will be addressed in the hydraulic modeling.

Genetics Baseline for Selected Fish Species

Michael Link gave the Genetics Baseline for Selected Fish Species presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Mike Buntjer asked how many samples were needed to meet the study objectives. Michael stated that about 200 were needed from each basin. Mary Lou stated that the methods AEA is proposing will supplement the statewide database.

Mike Buntjer asked if out-migrant traps were an option in the upper river. Mary Lou confirmed that they were an option but the trapping locations haven't been determined. Additionally she stated that there likely won't be enough fish captured to determine the proportion that have come from the upper river. Jeff Davis asked if AEA would know the proportion of upper river fish that rear downstream of the impediments. Michael Link stated that information would not be able to be determined. Betsy McCracken stated that the extent of genetic differentiation is important to understand. Michael stated that he understood the concerns and some additional detail could be added to the study plan to refine the document.

Jeff Davis asked if only Chinook were being evaluated. Michael Link confirmed this and stated that there was no plan to evaluate any other species. He stated that samples from other species would be collected but not analyzed. There is no baseline to work with for other species and a large amount of gene flow occurs with sockeye. He stated there is very little site fidelity.

Mary Lou asked Jeff Davis to clarify an earlier statement related to fish rearing outside of the middle reach. Jeff stated that he was referring to juveniles that moved downstream, out of the middle reach and into tributaries to rear. Mary Lou asked Jeff why that couldn't be addressed using fish habitat availability information. Phil Hilgert stated that data is still being compiled from the 1980's and that sockeye were rearing in upland sloughs.

Michael Link made two clarifications to the flow chart he showed during the Salmon Escapement presentation:

1. There was a large increase in flow in mid-June.
2. When the fish passed the 3rd impediment in Devils Canyon, they were within 1000 cfs of the all-time low flow for that period.

Jeff Davis asked how that low flow related to movement of fish into other tributaries. Michael stated that there was no obvious relationship.

Aquatic Resources Access/Transmission Alignment/Construction Area

Mary Lou gave the Aquatic Resources Access/Transmission Alignment/Construction Area presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Eric Rothwell asked if there was any text discussing passage design at stream crossings. Mary Lou stated that the standards were referred to in the study plan. Matt Cutlip stated that it was not uncommon to discuss potential for evaluation of building crossings on fish. Mary Lou stated that the state has criteria for passage at stream crossings and those are discussed in the plan. Stormy Haught (ADF&G) stated that a fish habitat permit would be needed for each crossing. Eric stated that NMFS has passage standards that must be met as well. Mary Lou stated that if passage is needed, from a state perspective, it was her understanding that a bridge should be used wherever possible. Stormy stated that wasn't necessarily true. It is the preferred alternative but not always the case. Mary Lou stated that the intent of the study is to identify areas where impacts may result from stream crossings. Betsy McGregor elaborated by stating that this study is the first step toward determining where the stream crossings will be and that there are currently three road options that must be narrowed down to one.

Fish Harvest In and Downstream of Project Area

Mary Lou gave the Fish Harvest in and Downstream of Project Area presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Jeff Davis asked if the study took into account the ability to navigate the river during the spring Chinook fishery. Mary Lou stated that the recreation study addresses that issue.

Fred Winchell (LBG) indicated that the potential for the project to impact the fishery is listed in the plan. Fred stated that it would be useful to put together a table of how the studies are related and how they work together to address the overall impacts. Mary Lou stated that that was a good point but the intent of this study wasn't to address changes to the fishery. Catch statistics from ADF&G would be used. Dani Evenson (R2 Resource Consultants) confirmed this and stated substantive harvest records and commercial data would also be used.

Joe Klein stated that effects of emergency closures should be included in the analysis. **Action Item.** Dani stated that it will be added. Betsy McGregor stated that this data was being collected to feed into the recreation and subsistence studies.

Jeff Davis asked if the ADF&G studies are to a scale so that they can be accurately utilized. Dani stated that they were for broad-scale regions. Jeff Davis stated that new surveys could be done. Dani stated that sometimes the state doesn't like duplication of their effort.

River Productivity

Tim Nightingale gave the River Productivity presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Mike Buntjer inquired about the rationale for not having surrogate sites. Mary Lou stated that they couldn't find a comparable system and a literature review would allow a broader search.

Jeff Davis disagreed and stated that the Kenai may be comparable but he doubted it. He stated that there aren't other rivers like the Susitna so a literature search likely wouldn't work. Mary Lou stated that rivers outside Alaska may be relevant for a literature search. Jeff Davis asked how that would be more comparable than the Talkeetna or the Chulitna rivers. Tim stated that using the Talkeetna and Chulitna rivers as references was still an option. Joe Klein stated that a literature review wouldn't work and that a stream-based approach was needed.

Tim stated that there are a number of glacially fed rivers in Europe that would provide good review material. Joe asked if some Alaska rivers may be assessed in addition to any literature review. Tim stated that this was correct. Joe asked if an appropriate system was found in Alaska, would the licensing period permit its analysis. Joe stated that he needed to put a bit of thought into the current proposed process and potential alternatives. Mike Buntjer concurred with this approach.

Jeff Davis stated that primary productivity should increase due to the project. He asked why AEA was conducting this study by looking at periphyton. He suggested looking at primary productivity, ecosystem production, dissolved oxygen in sloughs, etc. Mary Lou asked Jeff to clarify if he thought AEA shouldn't look at periphyton. Jeff stated no, but the other variables should be looked at as well. Mary Lou asked when Jeff thought these variables should be assessed. **Action Item.** Jeff stated that they should be looked at throughout the growing season and asked if anyone else had brought this issue up and noted that there were references to this methodology from Idaho that he could provide. Eric Rothwell and Mike Buntjer stated that no one else had raised this issue.

Mary Lou acknowledged that if they modified the methods in accordance with Jeff's suggestions it would be a significant departure from what is currently being proposed. **Action Item.** She suggested a smaller group meet to discuss further details. Joe Klein agreed with this approach and requested that Jeff get everyone the references that he was referencing. Jeff stated that the primary reference was from Snyder and the work was done on the Kootenai River.

Jeff asked how deep water would be sampled. Mary Lou stated that only wadable sections were being assessed since the margins are the areas that will be most impacted by the project. Michael Lilly (GW Scientific) stated that supporting fish data will assist in documenting areas for sampling macroinvertebrates. Phil Hilgert added that bathymetry and the flow routing model results will be available in December and they will know what to look for prior to heading out into the field.

Jeff stated that the margins may or may not be more productive than deeper areas. Joe Klein concurred that sampling of deeper areas should occur. Phil stated he has looked at similar situations in Washington State and the margins that stay wetted tend to be the most productive.

Fish Passage Feasibility at Watana Dam

Mary Lou gave the Fish Passage Feasibility at Watana Dam presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Wayne Dyok stated that AEA has not decided at this time that fish passage will be needed and that the results of the studies will drive this decision. Wayne asked for Ed Meyer's (NMFS) thoughts on the proposed study plan. Ed stated that the study plan seemed to cover everything that was typically needed but that a bit more evaluation was needed. Wayne noted that Ed would be participating in a site reconnaissance in September and that passage related efforts will incorporate the results of other studies. Wayne stated that AEA is looking at the passage evaluation effort as an iterative approach.

Steve Padula recapped the discussion from the meeting and stated that a series of small group meetings would be planned once the next two days of meetings had taken place.

Mary Lou stated that AEA heard the feedback that the study plans are lacking detail in some areas. She acknowledged that they aren't to the point where field study could occur and they won't be there entirely by November due to how integrated some of the studies are. She stated, for example, that Bill Fullerton's work on habitat mapping will be completed in September and is the first step in the habitat evaluation process.

Mary Lou stated that prior to the RSP, AEA will develop and incorporate a schedule/flow chart showing how the integrated process will take place. **Action Item.** Wayne stated that the stakeholders will see this in September. Mary Lou stated that in addition, AEA will define in the RSP the process that will be used to get to the necessary detail. Betsy McGregor added that wherever possible the additional detail requested will be included in the RSP.

Eric Rothwell asked if the ILP schedule can be extended to work through some of the issues. Wayne stated that AEA needed to think about that and the preference would be to get things done within the current timelines. Wayne stated that AEA was committed to a collaborative process throughout and opportunities for input will be ongoing.

Marie Steel (ADNR OPMP) asked for an explanation of the process for dealing with ongoing issues. Matt Cutlip stated that if additional details are not expected to be worked out until after the RSP, a schedule must be presented in the study plans to deal with these issues. He also requested periodic reporting. Steve stated that the TWG would continue to exist past the RSP and that AEA would keep the TWG up to date on progress of the study program and engage the TWG in reviewing study reports. It will be an interactive and collaborative process throughout. Wayne added that he believes there is value in having the stakeholders in the field periodically to keep them involved.

Steve previewed the next two days of meetings prior to adjourning.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Technical Workgroup Meetings
August 15-17, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

ILP Formal Study Plan Meeting for IF, Riparian IFS, Groundwater, Glacial Runoff, Geology/Soils, August 16, 2012, 9:00 am - 4:00 pm

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
AEA	Bryan Carey
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Bob Henszey
ADNR	Kim Sager
ADNR	Roy Ireland
ADNR OPMP	Marie Steele
NMFS	Eric Rothwell
ADF&G	Joe Klein
ADF&G	Stormy Haught (by phone)
USGS	Dave Meyer
USGS	Chris Holmquist-Johnson
Tribal Council	Wilson Jastin
FERC	Matt Cutlip
LBG/FERC Contractor	Fred Winchell
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsberg
Long View Associates	Steve Padula
Long View Associates	Cory Warnock
Van Ness Feldman	Matt Love
MWH	Kirby Gilbert (by phone)
MWH	Brian Sadden
HDR	James Brady
R2 Resource Consultants	Kevin Fetherston
R2 Resource Consultants	MaryLouise Keefe
R2 Resource Consultants	Phil Hilgert
R2 Resource Consultants	Stuart Beck (by phone)
R2 Resource Consultants	Dudley Reiser
Tetra Tech	Bill Fullerton
Tetra Tech	Mike Harvey (by phone)
University of Alaska Fairbanks	Regina Hock (by phone)
Cardno Entrix	Jim Gill

Organization	Name
GW Scientific	Michael Lilly
Stillwater Sciences	Dirk Pedersen
Stillwater Sciences	Jay Stallman
LGL	Michael Link
URS	Paul Dworian
ARRI	Jeff Davis
Alaska Ratepayers	Scott Crowther

Introduction

Steve Padula opened the meeting and explained that the intent of this meeting was to discuss the Instream Flow, Groundwater, Glacial Runoff and Geology/Soils studies that have been proposed and to have substantive discussions related to any remaining differences or inconsistencies. Steve went through a few slides reminding everyone about the formal study planning process, current status, and associated deadlines. (See the presentation on the AEA website.)

He noted that another set of TWG meetings is scheduled after the October 15 due date for filing comments on the Proposed Study Plan (PSP) to address any remaining issues. Steve stated that the agenda, meeting minutes and all presentations given during the day would be made available on the AEA website. Introductions were held.

Jeff Davis (ARRI) stated that the Susitna River is dynamic but stable. He stated that the Project would reduce the high summer turbidity and trap sediment. This may make the Susitna more like the Kenai River and it may become a more confined, single channel type situation where primary productivity and species of macroinvertebrates are changed. He expressed concern that the focus of the studies would not address the actual impacts. Phil Hilgert (R2 Resource Consultants) suggested that Jeff had basically just provided an introduction to the Instream Flow presentation and added that the approach on the Susitna instream flow study is more integrated than a typical instream flow study. Jeff stated that the fish habitat, distribution and productivity studies aren't addressing the "Kenai scenario". Phil asked Jeff to hold that thought until later in the instream flow presentation. Phil stated that Bill Fullerton's (Tetra Tech) work would be used to document the existing habitat and forecast what will happen to habitat over time. If it turns out that the river will become more confined, that effect will be modeled.

Jeff went on to state that appropriate biological data needed to be collected as input to the model. Bill Fullerton stated that the changes can be documented within the model. Jeff stated that there was the potential for the river to change from heterotrophic to autotrophic. Steve Padula stated that while Jeff's comments were relevant, the studies needed to be reviewed individually for study planning purposes with the understanding that the study efforts would be integrated at a later date. Steve asked for folks to identify the holes in the integration process so they could be addressed. Jeff stated that everyone needed to go back and look at the biological studies that inform the models and asked Joe Klein (ADF&G) for his thoughts. Joe stated that it was an iterative process but he felt the plans were on the right track. Eric Rothwell (NMFS) stated that he wasn't sure if the plans were on the correct path and that he didn't feel the study plans adequately addressed the issues that had been raised by NMFS.

Wayne Dyok (AEA) encouraged the group to read FERC's draft EIS from the 1980's. He stated that the same issues that are being raised now were raised then but our technology and quantification tools are much better now. Betsy McCracken (USFWS) echoed the concerns raised by Jeff and Eric and stated that she was concerned about the instream flow study approach. Phil stated that he thought that everyone had common objectives regarding using the instream flow study to assess Project effects and that more detail was needed to refine the approach.

Study Presentations

Fish and Aquatics Instream Flow

Phil Hilgert gave the Fish and Aquatics Instream Flow presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Eric Rothwell stated that the goals and objectives in the presentation sounded similar to his vision but what he read in the study plans sounded different. He stated that utilization of habitat types by all species and life stages needed to be understood. Phil stated that it was unlikely that data for certain species (e.g., burbot) would be able to be acquired and that you have to obtain and utilize the best available data. Eric asked what the end product would look like if inadequate data were being used. Phil stated that the RSP was not the end product and that details could be worked out after the Study Plan Determination (SPD). He stated that collaboration would be ongoing throughout the process.

Matt Cutlip stated that a schedule in the RSP relative to when that continuing collaboration would take place is necessary for FERC to approve the plan. Phil acknowledged that the PSP didn't have that level of detail but text and tables would be developed to incorporate into the RSP. Joe Klein stated that the instream flow plan was a good concept but he needed more confidence in the approach and associated details. Phil stated that a 3-day meeting at the end of September would address some of the detail. It would consist of a one day office workshop and 2 days in the field. Joe stated that another meeting was needed before that to discuss habitat suitability curves (HSC).

Betsy McCracken stated that she didn't want to replicate the 1980's work. Phil asked her to hold that thought as it was addressed in the presentation and encouraged the idea of having an additional meeting.

Mike Buntjer (USFWS) asked how the instream flow sites would be selected. Phil agreed that details of the site selection process were needed in the RSP. Study site selection is dependent on the results of reach stratification and habitat mapping that is being done later in 2012. **Action Item.** In the absence of identifying study sites, the RSP should describe the process, schedule and criteria for identifying and reaching consensus on study site selection. Phil acknowledged that they will try to increase the level of detail in the RSP regarding process, schedule and criteria for reaching consensus on instream flow details.

Chris Holmquist-Johnson (USGS) asked if there had been any thought into using the Delphi Method. Phil stated that it was a possibility depending on what site specific data are available

and what can be acquired. Dudley Reiser (R2 Resource Consultants) stated that the Delphi method exists in the hierarchical approach that is planned; primarily if enough data points can't be acquired for a specific species. Joe asked why all species data couldn't be acquired during the open water period. Phil stated that certain species just don't exist in numbers high enough in the Susitna to acquire the needed data. Eric stated that areas where AEA feels that the participants are requesting too much must be specified in the PSP. Betsy McCracken stated that the USFWS put a good amount of effort into their requests and much of it was ignored. Wayne Dyok stated that discrepancies would be addressed during RSP production and AEA wants to work through all of the issues.

Joe asked what the contingency plan was if site specific species data couldn't be acquired. Eric Rothwell asked what variables other than depth and velocity influence habitat suitability for species. Mary Lou Keefe (R2 Resource Consultants) stated that topography and gradient are considerations in describing mesohabitat units, and that other factors such as substrate, cover, and upwelling will influence microhabitat suitability.

Dudley Reiser stated that the initial HSC work will use the 1980's data and then current data will be integrated as it comes in. Betsy McCracken stated that the "good" and "bad" data needed to be sorted out prior to utilization. Jeff Davis stated that the fish distribution study plan needs a lot of work and noted that that study feeds the instream flow work.

Jan Konigsberg (NHI/HRC) asked if any of the literature related to stranding discussed peaking in the winter and ice flows. Phil stated that there is a lot of literature on peaking operations, but much of it was from the Pacific Northwest; they would also be looking at a hydropower peaking project on a large river in Manitoba with similar characteristics.

Jeff Davis asked about the image of Whiskers Creek Slough in the presentation and noted that changes had occurred since that image was taken. He pointed out that backwater effects exist in the slough and there are different conditions now than in the 1980's. Phil stated that the degree of change is a matter of scale; the gross channel characteristics have not changed much, but there have been localized changes, such as large woody debris distribution. The localized changes are one of the reasons why they need to replace and expand hydraulic modeling from the 1980's.

Eric Rothwell asked if the 2-D model addressed upwelling. Phil said that 2-D modeling can be used to quantify depth, velocity and substrate and they will be looking to integrate upwelling as an additional parameter. Michael Lilly (GW Scientific) pointed out that there are several models that will be used with this Project and that the cumulative output from these models will tie together to answer the big questions.

Betsy McCracken asked if the groundwater studies were at a scale appropriate for fish habitat. Michael stated that they were. Betsy suggested that piezometers be installed at the sites. Michael stated that that language was already in the plan. Michael mentioned that the AEA teams such as geomorphology, instream flow-fish and riparian had been discussing and coordinating their approach. Bob Henszey (USFWS) asked why he hadn't been involved in all of the discussions leading up to plan development. Phil stated that some discussions of study approach have been internal to the AEA project team but no one has been excluded from any participant meetings.

Joe Klein asked if AEA would be using PHABSIM/RFR for certain life stages. Phil stated that the river flow routing model (RFR) will be used to identify river stage under alternate Project operations at locations downstream of the dam site, thus it will be used for all of the studies connected to river flow. Betsy McCracken asked how the appropriate habitat models could be selected prior to knowing fish distribution and abundance. Phil stated that model selection is preliminary at this time but is tailored to anticipated Project effects based on the 1980s studies. Model selection may change depending on the results of current studies, but the intent is to collaboratively make decisions with the TWG.

Jan Konigsberg asked if ice formation will be modeled and how stranding and trapping would be addressed during the winter. Phil stated that a combination of the ice work from HDR and the varial zone model will quantify the potential for stranding and trapping during the winter time under alternate Project operating scenarios.

Eric Rothwell stated that the overall schedule seemed idealized and that a contingency should be built in to extend the study period if it can't be completed within the current confines of the ILP. **Action Item.** Phil stated that AEA is working to fit it into the existing schedule. Eric stated that he wanted to make the point to FERC that if the process or approach wasn't consistent with participant sentiment, the schedule needed to be extended. Matt Cutlip stated that he understood and that there were opportunities throughout the process to comment and if extensions deemed appropriate, FERC would make that determination.

Marie Steele (ADNR OPMP) asked if Alaska was unique given that an abundance of statewide data isn't available. Matt stated that this was a unique project. He stated that it was a large project on a large system and that the data needed to be seen before a determination relative to extensions was made. Matt Love (Van Ness Feldman) stated that every project is challenging and what was needed was a path to move the study program forward.

Action Item. Eric stated that he needed to see biological cues related to flow. He wanted that added to the overall instream flow analysis. Phil said he understood. Joe Klein added that more discussion was needed and listed a series of questions:

1. What is the sampling strategy for the defined habitat types?
2. How many and at what range will discharge-calibration sets be collected for each sampling method?
3. Will the 2-D model include side channels and sloughs within the study area?
4. What criteria will be used to identify cover types and substrate sizes?
5. For PHABSIM, will transects be dependent or independent?
6. What water surface elevation models and composite suitability index will be used?
7. What criteria will be used to select and weight transect-derived models?
8. What criteria will be used to identify "a representative number"?
9. HSI curves are needed for identified target species for each habitat type, over two years.
10. How will the data be aggregated to evaluate single flow recommendations?
11. Will a DSS-type program be available to review study results?
12. How do you envision the "collaborative process" will work?
13. When will major decisions be made, (e.g., site selections) and how often will the work group get together?
14. What equipment will be used?

15. Similar information is needed for the eulachon and boating evaluations. What is the sampling strategy, how many cal-sets and how will HSI curves be developed?
16. Varial zone modeling may need more defined time steps.

Phil stated that these were the details that needed to be discussed and worked out with the TWG. Joe stated that more meetings were needed. Phil stated that some details could be addressed prior to the RSP. Relative to the areas that can't be addressed till later, the RSP will discuss the process, schedule and criteria for reaching that level of detail.

Joe asked what type of equipment would be used for velocity measurements. Phil stated that his personal preference was the Price AA but there were other options including ADCP (acoustic Doppler current profiler), and Swoffer meters and stated that this was a good example of the detail that could be worked out at a later date. Matt Cutlip stated that FERC would have to make a determination about whether implementing the RSP will provide the FERC with enough information to make licensing decisions. Ideally, this level of detail should be worked out at the RSP phase under the ILP, but it comes down to a FERC determination about study plan adequacy. Dudley Reiser stated that instrumentation use can be a contentious issue and they expected that the level of detail of instrumentation would be worked out collaboratively with the TWG. Wayne Dyok thanked Matt for his input and stated that the Boundary Dam PSP/RSP, which had been approved by the FERC had been used to a large extent as a template for the level of detail presented in the PSP. He acknowledged that some studies needed additional detail and that AEA plans on being collaborative throughout. Matt said he understood and reiterated that if the RSP is missing information needed to respond to specific requests, there needs to be a specific plan and schedule for reaching agreement on those details.

Phil stated that the proposed 3-day meeting was brought up after the June meeting; after some discussion, the dates for the meeting were set at September 26-28.

Marie Steele asked if there would be a workshop with participants to go over instream flow field methods. Phil stated that this would happen in 2013 prior to field work occurring. Marie asked if that was in the plan. Phil reiterated that additional detail would be added to the RSP and where that detail couldn't be added, the RSP will discuss the process, schedule and criteria for reaching that level of detail.

Betsy McGregor stated that there would be another preparatory instream flow meeting in September prior to the 3 day meeting/site visit. **Action Item.** Eric Rothwell wanted to make sure that everyone who wanted to attend would be notified. Wayne agreed. Eric suggested that once the "core group" was invited, the dates should be put on the AEA website. Joe asked if there was a SharePoint site for meeting minutes, correspondence, etc. Betsy stated that the meeting minutes and presentations are located on the AEA website and that an FTP site existed as well for transferring large files.

Riparian Instream Flow

Kevin Fetherston gave the Riparian Instream Flow presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Bob Henszey stated that before the presentation started, he wanted to preface by saying that the plan needed more detail and collaboration.

Action Item. Bob asked if seed recruitment would be looked at. Kevin stated that it would be.

An ADNR representative asked if wetlands would be included in the analysis. **Action Item.** Kevin stated that some wetlands would qualify and that floodplain conditions and alterations would be addressed. Jan Konigsberg asked if the role of downed cottonwoods would be evaluated. Kevin stated that it would be discussed later in the presentation.

Joe Klein asked if ice scars on trees were indicative of an ice jam. Kevin stated that that was the preliminary conclusion. Jeff Davis stated that at times, multiple chunks of ice the size of sheds flow through certain areas.

Michael Lilly led a discussion on ice jams and ice erratics and their associated processes. Eric Rothwell asked if data existed documenting at what flows ice jams form and break-up occurs. Kevin stated that they haven't yet collected these data. Michael elaborated by saying that you will get pulses moving down the system causing these conditions.

Bob Henszey pointed out that transpiration can be measured on plants by looking at the water table. He added that by looking at the water table, you can get a feel for root length. **Action Item.** Jan Konigsberg asked if the study will document how transpiration is affecting the understory. Kevin stated that it would.

Bob stated that given the bimodal flow trend on the Susitna, he doesn't see any 2 year old seedlings. He asked if it was worth looking at both peaks. **Action Item.** Kevin stated that during the study, seedlings would be evaluated for age and then the hydrograph would be reviewed.

Michael Lilly lead a discussion on the Whiskers Slough complex, its specific issues and resource areas to be addressed. Eric stated that he saw a need to have a stream gauge on the Chulitna. Michael pointed out that the USGS was in the process of reestablishing a gauge on the Chulitna.

Bob stated that he'd like to see more wells near the channels. **Action Item.** Kevin stated that further discussion could be had to refine well sites.

Bob asked how groundwater will be linked to perennial response. Kevin stated that if a robust data set exists, this can be done. Michael stated that there are long-term USGS gauge data that can be run through project groundwater models to predict what will happen relative to plant response.

Joe Klein asked if cottonwoods needed a descending water table to recruit. Kevin stated that they can't be drowned but need to stay wet.

Action Item. Joe asked if climate and wildlife issues would be integrated into the analysis of riparian succession. Kevin confirmed that it would.

An ADNR representative asked if longer term monitoring stations were needed. Kevin stated that it depended on the results from the initial 2 years of monitoring.

Jeff Davis asked how changes in channel formation would affect patterns of vegetation. Kevin stated that it would have a dramatic affect and that looking at changes in channel formation over time will help identify vegetation patterns.

Jay Stallman (Stillwater Sciences) asked if different operational scenarios as they relate to geomorphic change over time were going to be evaluated. Bill Fullerton stated that it will be characterized but some of the longer term changes would extend beyond the license term and the results would be speculative. He stated that the results of the geomorphology study wouldn't be as specific as defining new topography but that reviewing the history of the areas and associated changes would help the process of predicting pre vs. post project conditions. Kevin added that there are likely to be zones of change. Bill Fullerton stated that integrating dendrochronology with photos will be a great tool.

Jeff Davis asked if a reduction in fines would change the groundwater. Kevin stated that it could. Michael Lilly stated that if fines were removed from the system, there would likely be a change to the downstream environment. It could be positive, it could be negative.

Jeff asked if we had the data to support the hypothesis that there was limited embeddedness in the system. Michael stated that the work was currently being conducted to assess bed mobility and noted that the bed was active.

Michael Lilly added to the earlier ice jam discussion by stating that ice jams and flooding in early May are more temperature related than flow related. He pointed out that significant events aren't always driven by flow. They also result from temperature.

Cross Section Study

Michael Lilly gave the Cross Section Study presentation which was included within the Fish and Aquatics Instream Flow Study presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Bob Henszey asked if any of the 1980's wells had been found. Michael stated that they haven't looked for them.

Joe Klein asked if the ADCP was being used in shallow water. Michael Lilly said the ADCP was the primary velocity measurement tool used in the cross-section and showed pictures of it mounted on a carcraft for use in shallow water. He pointed out that velocities in very shallow areas between channels were estimated. Moving bed tests were conducted and water temperatures were collected.

Groundwater Related Aquatic Habitat

Michael Lilly gave the Groundwater Related Aquatic Habitat presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Michael Lilly began the presentation by saying that additional meetings are needed to address the details, process, etc. If the stakeholders could get their questions and concerns to him prior to those meetings, it would be helpful.

Joe Klein asked if wells would be dug as a part of this work even though it isn't discussed in this plan. **Action Item.** Michael confirmed this and reiterated that coordination was the key to the study program. Joe asked which group would be the appropriate one to discuss the details related to the wells. Michael stated that discussion with multiple groups at once would be the best approach. Wayne Dyok asked what the best approach for showing the integration would be. Michael stated more meetings were needed along with continual dialogue. He stated that after the RSP is in, continued collaboration to develop the details was imperative.

Jeff Davis stated that the groundwater and surface water work should be related to the fish work. Michael pointed out that this would be discussed later in the presentation. An ADNR representative asked if water temperatures could be measured near the bottom of the water column to identify groundwater sites. Michael stated that this would be addressed during the water quality presentation tomorrow. Jeff Davis stated that it wasn't clear who was doing what from a water temperature perspective.

Wilson Jastin (Tribal Council) pointed out that there is a precipitation cycle to take into account and he is worried that AEA is collecting the right data but will reach the wrong conclusions. Michael pointed out that historical data would be reviewed.

Jeff asked if the same water quality parameters would be measured for the water quality study and the instream flow study. Michael stated that the parameters were different because of differing needs.

Betsy McCracken asked how the lower boundary for the study was selected. Michael explained that the current lower boundary is based on the assumption that project effects will not extend below this point. The river routing model will be used to help confirm that potential downstream limit of Project impacts. If the impacts appear to extend downstream further or not as far, the boundary may be adjusted. Betsy McGregor stated that the 2012 data should assist in finalizing that boundary. Phil Hilgert stated that the intent is to use the flow routing model results to define the downstream boundary prior to 2013 field work. Jeff stated that the boundary should vary depending on flows out of the Chulitna and Talkeetna. Phil stated that that would be looked at as part of the boundary selection process. Wayne Dyok pointed out that AEA was looking at the amount of flow fluctuation that would result from the most extreme levels of load following operations.

Joe Klein asked a series of questions:

1. Will the operational scenarios be developed in 2012?
2. Will project design and access be developed in 2012?
3. Is the goal of the intensive study sites to overlap studies as much as possible?

Wayne answered the first two questions by stating that no project infrastructure or operational scenarios would be developed in 2012. Michael confirmed that the intensive study sites were intended to integrate many of the individual studies.

Wilson asked about a comment from Wayne regarding “negotiating” with landowners and stated that he gets concerned when he hears discussion related to negotiations. Wayne stated that he was stating that all parties with ownership interests should be involved in discussions related to potential access routes. Wilson pointed out that Indian grave sites, campsites, etc. should be taken into consideration.

Bob Henszey stated that more wells were needed. Wayne stated that AEA wasn’t averse to discussing this but he needs certainty that additional wells will add value to the study.

Michael displayed a flow chart showing the integration of resource areas and pointed out that there would be intensive data collection at the intensive study sites. Eric asked how many intensive study sites were proposed. Kevin Fetherston stated that 6 intensive study sites were proposed. Eric asked if a similar flow chart existed for the aquatics because the chart was very helpful. Michael stated that a chart was in development.

Jeff Davis stated that available habitat in sloughs can change depending on the season, flow, etc. He stated that appropriate water quality parameters in the sloughs were key. Michael reiterated that more detail was forthcoming and where that detail couldn’t be incorporated into the RSP, additional schedule, process and criteria information would be included.

An ADNR representative asked if the discharge measuring stations were telemetered. Michael stated that they were. Dave Meyer (USGS) stated that there was a QA/QC process for their stage data in the winter and anomalous data is removed.

Joe Klein stated that there was a good amount of work to do to get to the appropriate level of detail. He stated that he needed more comfort and confidence about how the study will be conducted.

Geology and Soils Characterization

Bryan Carey gave the Geology and Soils Characterization presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Wilson Jastin asked about the fault that caused the 2002 earthquake and whether it joins the fault system near the project. Bryan stated that the USGS had many recording instruments in the area and that fault would be included in the assessment. He continued that 4 more seismographs were being installed 10-40 miles from the dam site to collect additional data. Brian Sadden (MWH) stated that there was going to be an extensive analysis of factors that could impact the project. Wilson stated that his question was more emotional than scientific.

Jay Stallman asked if AEA was looking at potential instability along the shorelines. Brian stated that there are shoreline areas that have slumped without the reservoir, so rising of water could increase instability. Areas that have potential for movement will be evaluated. Bryan Carey stated that Watana Creek would also be looked at to see if any instability there could impact the project.

Wilson stated that he was very familiar with both the 1964 and 2002 quakes and they were very different with respect to the amount of upland sloughing.

Glacial Runoff Changes

Bryan Carey gave the Glacial Runoff Changes presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Bob Henszey asked if this study will be looking at sediment from the glaciers. Bill Fullerton confirmed this and stated that it will be evaluated in terms of how much of that sediment will reach the reservoir. Mike Harvey -TT stated that glacial surges will increase sediment loading and that the big question is, will the sediment loading increase sediment flux downstream. Bob asked if any sediment increase would attenuate out. Mike stated that it would.

Wayne stated that due to personal reasons, Dr. Harrison's services couldn't be used to date in the study plan development. Wayne will follow up to verify his future availability. Wayne introduced Regina Hock (UAF) to discuss the modeling component of the study. Regina stated that the modeling set-up and file preparation was underway. She stated that initially the error bars would be large due to stations still being installed. The data collection effort in 2013 will assist greatly. Wayne asked her to explain how the model works.

Regina explained that it was a fully physical based watershed model that includes glacial retreat. It can model changes in the water cycle. She is currently using existing climate data sets and will refine further once site specific data is collected. Wayne stated that he had talked briefly with Sue Walker (NMFS) and Eric Rothwell and asked Eric if he'd like to speak on the topic. Eric declined and requested a meeting in 2 or 3 weeks. Wayne agreed to explore that possibility.

Wayne asked Regina how permafrost and changes to vegetation were monitored. She stated that the developer of the model was coming to Fairbanks to work on adjusting the model to better fit Alaskan conditions.

Steve Padula reminded everyone of the schedule for Friday and reiterated AEA's understanding of the need for additional detail in the RSP. He stated that after the meeting on Friday, follow-up meetings would be scheduled. **Action Item.** He added that all details that could be added prior to the RSP, would be added. Where detail cannot be added, the process, schedule and criteria for reaching that level of detail will be included.

Eric Rothwell stated that it would be helpful to know when that additional detail would be provided to the agencies for review. He requested some indication be provided at the close of this set of meetings. Steve stated there would likely need to be some internal discussion and small group meetings prior to producing text for review.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Technical Workgroup Meetings
August 15-17, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

ILP Formal Study Plan Meeting for Geomorphology, Ice Processes, Water Quality, Mercury, August 17, 2012, 8:30 am - 3:00 pm

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
AEA	Bryan Carey
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Bob Henszey
USFWS	Lori Verbrugge
ADNR	Melissa Hill
ADNR OPMP	Marie Steele
NMFS	Eric Rothwell
ADF&G	Joe Klein
ADF&G	Ron Benken
USGS	Dave Meyer
Tribal Council	Wilson Jastin
FERC	Matt Cutlip
LBG/FERC Contractor	Fred Winchell
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsburg
Long View Associates	Steve Padula
Long View Associates	Cory Warnock
Van Ness Feldman	Matt Love
MWH	Kirby Gilbert (by phone)
Watershed Geodynamics	Kathy Dube
HDR	Robin Beebee
R2 Resource Consultants	MaryLouise Keefe
R2 Resource Consultants	Phil Hilgert
R2 Resource Consultants	Dudley Reiser (by phone)
Tetra Tech	Harry Gibbons
Tetra Tech	Rob Plotnikov
Tetra Tech	Bill Fullerton
Tetra Tech	Bob Mussetter
GW Scientific	Michael Lilly

Organization	Name
Stillwater Sciences	Dirk Pedersen
Stillwater Sciences	Jay Stallman
URS	Paul Dworlan
Genovar	Karen Olson
ARRI	Jeff Davis
ARRI	Gay Davis
Alaska Ratepayers	Scott Crowther
Tetra Tech	Mike Harvey (by phone)

Introduction

Steve Padula (Long View Associates) opened the meeting and explained that the intent of this meeting was to discuss the Geomorphology, Ice Processes, Water Quality and Mercury studies that have been proposed and to have substantive discussions related to any remaining misunderstandings or inconsistencies. Steve went through a few slides reminding everyone about the formal study planning process, current status, and associated deadlines. He noted that another set of TWG meetings is scheduled after the October 15 due date for filing comments on the Proposed Study Plan (PSP) to address any remaining issues. Steve stated that the agenda, meeting minutes and all presentations given during the day would be made available on the AEA website. Introductions were held.

Jeff Davis (ARRI) stated that he didn't understand how the geomorphic classification could be done when the fish data weren't acquired yet. He stated that without the site specific distribution data, you don't know how geomorphic classification relates to fish in Susitna. He stated that fish communities should drive geomorphic classification. He went on to state that alterations to the biological fish studies may be needed to get the appropriate data.

Study Presentations

Geomorphology

Bill Fullerton (Tetra Tech) gave the Geomorphology presentation. Areas discussed included goals and objectives, study area, methods and expected results. See the presentation on the AEA website.

Wayne Dyok (AEA) pointed out that the studies were looking at all 3 potential access routes and that AEA will narrow down to a preferred option later in the process.

Eric Rothwell (NMFS) asked if current data was being collected in the Chulitna River. Bill stated that it was. Eric added that it would be nice to know the location of all of the bed loading sites. **Action Item.** Bill agreed and stated that he would add a map.

Betsy McCracken (USFWS) asked if there was a significant gradient change below the tri-rivers area that would affect the habitat. Bill stated that currently, the downstream boundary of the study is at Sunshine and that if project impacts appear to extend further downstream, the boundary may be moved. Matt Cutlip (FERC) asked when that boundary decision would be made. Bill stated that additional coordination meetings over the course of the next month would assist in determining the boundary and if a consensus couldn't be reached by the RSP, a protocol and schedule would be put in place for reaching that decision. Michael Lilly added that the cross section analysis is actually looking downstream of Sunshine to river mile 75 and if project impacts extend further downstream, the model will be adjusted accordingly. Matt Cutlip clarified that that decision could be reached by the Initial Study Report (ISR). Betsy McGregor (AEA) said that it would.

Betsy McCracken asked why the study wasn't looking all the way to the mouth as she felt that there would be biological impacts all the way down the river. Bill pointed out that he was only dealing with geomorphology issues and that other studies were looking all the way down to the mouth. Matt Cutlip stated that it would be helpful to identify the downstream extent of each study and put a mechanism in place to modify the boundaries if needed. **Action Item.** Bill stated that as information was developed, a technical memo would be developed for discussion purposes.

Jeff Davis asked if the eulachon study was tied to the geomorphology study. **Action Item.** Wayne Dyok stated that AEA would provide how studies are interrelated.

Jan Konigsberg (NHI/HRC) asked if AEA would be able to determine the downstream project affects over a 50 year period. Bill stated that that would be looked at. Jeff asked if the studies would be able to document how the sediment that was transported out of the middle affected the lower river. Bill stated that would be done as well. Bob Henszey (USFWS) asked Matt Cutlip if the cumulative impacts of the project don't show up in the term of the license will an impact beyond that term be taken into account by FERC when making the determination. Matt stated that FERC only considers a 50 year timeframe (i.e., the term of an original license).

Jay Stallman (Stillwater Sciences) asked if bank erosion would be evaluated. Bill stated that it would. Jay asked if the sediment budget was broken down into different size classes. Bill stated that the field work would initially be looking at bed load and the model would be more specific. Eric Rothwell asked if that meant that there wouldn't be good resolution on diffuse processes. Bill stated that that was correct with respect to the field work.

Wilson Jastin (Tribal Council) stated that he was concerned about mixing disciplines to reach conclusions. He was concerned that the right data will be acquired but the wrong conclusions will be reached.

Ron Benken (ADF&G) stated that an inventory and assessment should be done along the Denali Highway if the Seattle Creek access route is chosen. Ron stated that if the Seattle Creek access

route was chosen, improvements would be needed and ADF&G would like to see Tier 1 stream crossings if the streams were fish bearing.

Betsy McCracken asked if one flow was being modeled for the lower river. Bill clarified that they were just looking at one flow in 2012 but it had nothing to do with the model. Betsy asked what that flow was. Bill stated that it was 36,300 cfs. Bob Henszey asked if tributary input would be evaluated. Bill said that it would be evaluated during modeling exercises. Bob asked if the modeling relied on some of the field data being collected in the field during this study. Bill confirmed that it did.

Jeff Davis asked/made a series of questions/statements:

1. Explain the effective discharge sites for bed load movement and how the data will be used.
2. The tributaries discharge a good amount of sediment during storm events.
3. Explain the interrelationship between ice processes and bank erosion on sediment.
4. Can the scale of large wood debris be assessed on fish habitat in sloughs?

Bill answered questions 1-3:

1. The sediment rating curves are indicative of the river over time. We assume that the river is in a state of dynamic equilibrium. The 1-D model will further detail the sediment balance.
2. Tributaries will be taken into account during modeling.
3. We need to continue to get a handle on ice processes and develop an approach for handling them. One key factor will be where ice forms now and where ice is influencing the channel.

Kathy Dube (Watershed Geodynamics) answered question 4:

4. The goal is to look at how large woody debris influences aquatic habitat. Wood will be mapped via aerial surveys and some site specific work.

Jeff Davis asked if the study would look at spawning habitat modifications for chum salmon at specific sites along the river. Bill stated that the next presentation would discuss this.

Betsy McCracken asked how ice processes were being related to project impacts. Bill stated that AEA currently wasn't proposing to model geomorphological changes under ice conditions because the low flow conditions don't warrant it. Wayne stated that Robin Beebee's (HDR) presentation would look at this issue.

Jeff Davis stated that the channel cross section can be reduced when ice is present. Even though flows are low, the channel is still compressed. Bill stated that as the study progressed, they would consider that as an option for 2-D modeling.

Bryan Carey (AEA) stated that current work included looking at slope stability issues in the reservoir area, particularly Watana Creek. Eric Rothwell asked if the reservoir geomorphological analysis would look at the potential effects for different dam heights. Kathy Dube stated that the plan was to look vertically above the maximum height of the dam and create a band around the reservoir.

Matt Cutlip stated that yesterday, Kevin Fetherston (R2 Resource Consultants) said he was looking at 6 focus sites and they were going to be integrated with the 2-D modeling sites. Matt stated that those sites should be selected soon because if the stakeholders decide to say that they feel there should be more than 6 sites, AEA will need a justification for why this isn't necessary. Bill stated that the study plan says approximately 6 sites will be evaluated. Matt reiterated that the possibility exists that the stakeholders will request more than 6 sites and that would have a significant impact on the level of effort. Bob Henszey stated that Matt's comment was a good one and that with only 6 sites, you'd have a low level of confidence relative to the results. Bill pointed out that the 2-D modeling won't be completely based on the intensive sites and that the 2-D modeling is only one tool that will be used. Matt asked if the stakeholders would assist in selecting the 2-D modeling sites. Bill stated that they would.

Jay Stallman stated that more detail was needed about specific geomorphic data variable collection. He additionally stated that it would be helpful if you further defined the stratification system at both a local and reach scaled. Bill acknowledged that more detail was needed.

Jan Konigsberg asked if you have 2 similar sites but one produces fish and one doesn't, is there value in modeling both sites. Mary Lou Keefe (R2 Resource Consultants) asked if Jan was talking about spawning. Jan stated that he was talking about sites where you'd expect fish to be but they aren't. Phil Hilgert (R2 Resource Consultants) stated that sites were being expanded to include both areas where we know fish are and areas that look good but fish aren't present. Phil acknowledged the need for more detail in the plans and stated that more detail would be incorporated into to the RSP. Any areas where the detail cannot be added until a later date, the RSP will describe the schedule, process and criteria for getting to that detailed level. Phil went on to say that the goal is to be able to extrapolate the findings at the intensive study sites to other areas and that this method would be developed with collaboration with the stakeholders.

Wilson Justin stated that he felt 6 sites were not enough. He used the Copper River salmon run as an example of how drift in peak spawn timing can be altered over time. He stated 60 or 70 sites were needed.

Jay Stallman pointed out that in the USFWS and NMFS study requests they ask for pebble counts and asked that more detail be added as to when and where bed material samples will be taken. Bill noted the comment and stated additional detail would be added.

Fluvial Geomorphology Modeling Below Watana Dam



Bill Fullerton (Tetra Tech) gave the Geomorphology presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Bob Henszey asked what the mesh size was for the 2-D modeling. Bill stated that mesh sizes would be adjusted relative to the study site. Jeff Davis asked if feedback from the field measurements would define the mesh sizes. Bill stated that field data input would help focus on the appropriate areas. Bob Mussetter (Tetra Tech) stated that if only hydraulic conditions were being modeled, the mesh sizes could be adjusted significantly. He stated that he expect to have 2 meshes for each site, 1 for habitat conditions and one for the mobile boundary. Marie Steele (ADNR OPMP) asked at what point in the process mesh sizes would be chosen. Bill stated that they would be selected within the next year.

Eric Rothwell asked if additional cross sections may be selected at areas that aren't hydraulic controls if sediment deposition was being evaluated. Bill confirmed this. An unknown person asked how long a model run would take. Bob stated that the mobile boundary run would take 1-3 days and the hydraulic and sediment run would take a few hours.

Betsy McCracken asked for more information related to the data needs for modeling. Bill stated that stakeholder expectations and needs along with data collected will assist in populating the model. Betsy stated she wanted to see how fish distribution over time changes with the proposed project. Bill stated that that was the goal of the interaction of the models.

Jeff Davis stated that the modeling would be somewhat limited due to the use of intensive study sites. Bill agreed. Bob Henszey asked if a comparison was done between what the stakeholders requested and what was in the study plan. Bill stated that he felt that everything that could be addressed at this point, has been and that the additional detail needed would continue to be worked on. Bob stated that the discussion related to the discrepancy between what was in the plans and what was needed. Betsy McGregor pointed out that there was a table discussing the comments.

Jay Stallman stated that FERC requested that if there were multiple requests for model production and output, it must be made clear what model will do what. Bill acknowledged the need to come up with a hierarchical diagram that will document what model feeds what. Matt Cutlip asked if that could be done for the RSP. **Action Item.** Phil Hilgert stated that AEA would try to have it ready by that point. Betsy McGregor pointed out that in June, Bill produced a technical memo related to what models will be used. She asked if anyone had any comments. Eric Rothwell stated that he was comfortable with the memo. He asked if the 2-D model was proprietary. Bob Mussetter stated that hydraulic component was publically available and the mobile boundary had limited availability but Tetra Tech has been granted access.

Bill reviewed an internal comment response table. There was a request for AEA to make the table publically available. **Action Item.** AEA stated that a modified version may be made available after the upcoming small group meetings.

Eric Rothwell stated that the geomorphology plan lined up better with stakeholder requests but that more detail would be needed to refine the plan. Eric asked Matt Cutlip if it would be possible to extend the comment deadline by 30 days. Matt Cutlip stated that he wasn't the coordinator and couldn't make those decisions.

Jay Stallman stated that it wasn't clear to him how calibration of the 2-D modeling sites occurred without existing measurements. Bill stated that there would be a good deal of ADCP data and more was forthcoming and as far as sediment transport modeling, there would be no calibration at the 2-D sites. Bob Mussetter stated that water surface elevations would also be calibrated. He added that transport rates would be used to calibrate the sediment transport model. Bill added that water surface elevation data loggers would be installed at each site. Michael Lilly reiterated that the integration of studies would be clearer in the RSP.

Jeff Davis asked if the model could be calibrated to model chum spawning with changes in substrate size, and how can the model be depended upon. Bob Mussetter explained that the model is calibrated to all available parameters. For the data that isn't available, you must trust the physics and reliability of the model. Phil Hilgert added that you can model changes in gravel movement but you can't calibrate it.

Betsy McCracken asked if the models are what would be used to quantify habitat loss in an effort to mitigate for the project. Bill stated that the models are part of the process and that it is all coordinated. Betsy stated that if studies are cut off at the downstream boundary, the area of concern is being limited. She asked if mitigation options were being considered. Betsy McGregor and Wayne Dyok stated that they weren't ready to discuss mitigation.

An ADF&G representative asked how far along the engineering models were. Wayne stated that the reservoir operations model was done and output of that model would provide input to the cost production model. He stated that there were still unknowns including maximum flows, size of units, etc.

Betsy McCracken asked when she could expect to hear about mitigation options. Matt Love stated that at this phase in the process, AEA was setting up the methods to determine what the project impacts would be. Once those are determined, then PM&E's would be discussed. He stated that conversation was premature at this point. Betsy asked if AEA had adequate budget to mitigate for the project. Wayne stated that mitigation has been considered in the overall budget. Betsy McGregor stated that AEA was considering options but nothing was firm yet. AEA is currently most interested in developing studies that will adequately define project impacts.

Matt Cutlip asked if the 30,000 cfs release would be from a low level outlet. Bryan Carey stated that it would be combination of spill and a low level outlet.

An ADF&G representative asked if PM&E options wouldn't be seen until after model runs in 2015. Matt Love suggested that after the study planning process was complete, the TWG get together to understand the process for PM&E's.

Ice Processes

Robin Beebee (HDR) gave the Ice Processes presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Mike Buntjer asked if this modeling effort would be done in conjunction with the other modeling and what the downstream extent of this work would be. Robin stated that the downstream extent was river mile 75 and the model type had not been determined yet.

Eric Rothwell asked how many sites would be evaluated and how often discharge measurements would be taken. Robin stated that the River 1-D model used the same open water calibration sites and that fewer sites were used in the winter. Eric acknowledged that winter discharges were hard but stated that flow change significantly in the winter and without enough discharges, the winter time frame may not be defined appropriately. Robin asked if Eric was thinking primarily of braided areas. Jeff Davis confirmed that this was his concern. Michael Lilly stated that AEA was coordinating with USGS for additional winter gauging data.

Bob Henszey asked if the model could document water coming out of the proposed reservoir. Robin confirmed that this was possible.

Bob Henszey asked if jumble ice in the fall resulted in stronger ice in the spring. Michael Lilly confirmed this and stated that there are indications that you'll see some of this type of ice in the Susitna.

Bob asked if there would be a camera in Devils Canyon. Robin stated that there would not be. Eric asked about the availability of the telemetered data. **Action Item.** Betsy McGregor stated that the 2012 videography and photos from Robin would be available soon via the ADNR website and Michael Lilly's work would be available via the AEA website. Michael added that other available data would include water temperature, water height, air temperature and images for ice studies.

Joe Klein asked if the ice processes model would predict anchor ice. Robin confirmed that it would.

Jeff Davis stated that jumble ice appears overnight and asked if it was coming from upstream. Robin stated that it was. Jeff asked how the model dealt with calibration and what the level of confidence was. Robin stated that it depended on the process. It wouldn't predict overflow at a bend but it would predict less localized events. Steve Padula asked about the timing for getting folks more information on the model. Robin stated more information would be made available in the next month. Wayne Dyok asked the group if they had an issue with using the University of Alberta 1D/River 2d modeling framework. Eric Rothwell stated that he didn't have a problem with it but more detail was needed. Robin stated that a model hierarchy would be created. Bob Henszey asked if a 2D model was necessary. Robin stated that it would be a huge time

commitment and there would be a need to route water down the river laterally. Robin stated the primary need for 2-D model would be for lateral routing across a floodplain.

Baseline Water Quality

Harry Gibbons (Tetra Tech) gave the Baseline Water Quality presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Lori Verbrugge (USFWS) stated that the criteria weren't specified to address aquatic life and that needs to be addressed. Jeff Davis added that detection limits need to be clarified. **Action Item.** Harry stated that that would be specified.

Bob Henszey asked if copper was being looked at. Harry stated that it was. Lori stated that the plan doesn't include analysis of element mixture toxicity. Harry stated that mercury was the parameter with the highest interest but the intent was to look at all metals. Lori added that toxicity related to pH interaction should also be evaluated. Harry stated that by going through the pathway analysis, other methods would be understood. Lori disagreed and stated that at some point an aquatic toxicity model would be required.

Wilson Justin stated that there have been massive changes in the sediment in the river and that criteria are going to be difficult to work with. He stated that having a standard in an ever-changing system is difficult.

Joe Klein stated that more information was needed relative to site selection and what is being sampled. Rob Plotnikov (Tetra Tech) stated the 6 intensive study sites were selected based on historical studies and concerns voiced by stakeholders.

Jeff Davis stated that water quality parameters in the side channels and sloughs of the middle river need to be understood. He added that DO needed to be focused on in these areas and that a comparative analysis was needed. He stated a calculation was needed for limited concentration in macro nutrients. He stated turbidity at depth, suspended sediment and water color in the presence of less turbidity should be looked at. Rob stated that there were more complex temperature monitors in place in the sloughs at various depths to understand and explain what other characteristics are influenced.

Eric Rothwell stated that in case thermal imaging didn't work, he'd like to see a decision tree in the RSP that would document what will take place to adjust to the appropriate methods. He stated his concern was what would be done with things like upwelling, thermal refugia, etc. if thermal imaging wasn't successful. Michael Lilly stated that Robin Beebe's work will look at the bigger picture of upwelling and open leads and that there are USGS methods for evaluating upwelling. Eric pointed out that these methods weren't currently proposed. Michael stated that the intensive study sites are used to look at upwelling and then scale up to extrapolate over the river length. He stated that if the processes are understood at the intensive study sites, then we will know what level of confidence to have in the ability to scale up.

Joe Klein asked when the QAPP would be ready. Matt Cutlip asked if it could be filed with the RSP. Harry said that that could probably be done.

Water Quality Modeling

Rob Plotnikov gave the Water Quality Modeling presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Lori Verbrugge asked about inputs from vegetation, peat, etc. Rob stated that the plan was to rely on how work like this has been successfully conducted under similar conditions. Detail will be added prior to modeling. Lori asked if after the small group meetings, the necessary level of detail could be reached. Matt Love stated that perhaps a red-lined comment response table would be made available. Wayne Dyok asked Lori when her study plan comments had to be approved by the USFWS. **Action Item.** Lori stated that she would get AEA her comments soon and that she saw some inconsistencies in the plan. Rob stated that detail would be added to the plan. Bob Henszey asked if the slides could be referenced. Matt Cutlip confirmed that this was ok.

Matt Cutlip stated that two other things FERC would need to see would be:

1. An incorporation of evaporation into hydrology
2. Methane production

Mercury Assessment and Potential for Bioaccumulation

Paul Dworlan (URS) gave the Mercury Assessment and Potential for Bioaccumulation presentation. Areas discussed included goals and objectives, study area, methods and expected results.

Jeff Davis asked what fish species are being sampled. Paul stated that AEA was using the Alaska DEC list for adult fish. Lori Verbrugge asked why macroinvertebrates were not being looked at. Paul stated that there would be a lot of non-detections with macroinvertebrates.

Jeff Davis asked if lake turnover increased methylation. Rob Plotnikov stated that cold water environments have very limited stratification and that modeling will inform the methylation question.

Lori asked if there was a step for conducting a risk assessment for terrestrial species. Paul stated that there was a sampling issue with terrestrial species and since fish were being evaluated the higher trophic levels would be easier to predict. Lori stated that some bird species like the kingfisher were possibilities and it would be good to know how much assimilative capacity terrestrial species have. Paul stated he was confident that the risk to terrestrial species could be evaluated based on the data being gathered.

Wayne Dyok asked if everyone was ok with using the EFDC model. The general consensus of the group was that would be okay. Wilson Jastin asked if the pathway analysis had predictive powers to look into the future. Paul stated that it did and the idea was to predict conditions with the reservoir in place.

Eric Rothwell asked when meetings will be scheduled to review stakeholder comments. He stated that he didn't want to have the meetings the day after stakeholder comments were due to FERC. Betsy McGregor stated that AEA would like to have those meetings in September.

Steve Padula adjourned the meeting.

Susitna–Watana Hydroelectric Project

Agency Consultation on Proposed Study Plan for Landbirds/Shorebirds

Thursday, September 6, 2012 — 10:00 A.M.

AEA conference room, 411 West 4th Avenue, Anchorage, AK

Invitees: Maureen de Zeeuw, USFWS; Catherine Berg, USFWS; Steve Matsuoka, USFWS; Kim King, ADFG; Brian Lawhead, ABR, Inc.; Terry Schick, ABR, Inc.; David Turner, FERC; Betsy McGregor, AEA; Robin Reich, Solstice
[David Tessler, ADFG, will be unable to attend]

Goal: To understand, discuss, and resolve differences between agency comments/study requests and AEA's Proposed Study Plan, as discussed at the Terrestrial Resources Technical Work Group meeting on Aug. 9, 2012, for incorporation into AEA's Revised Study Plan

Agenda Items:

- 1) Example of wildlife habitat mapping and evaluation approach proposed by ABR
- 2) Discussion and resolution of differences between USFWS study request (May 2012), ADFG comments on AEA study request (May 2012), and AEA's Proposed Study Plan (July 2012):
 - Study-area size (1–10-mile vs. 5-mile buffers around Project area)
 - Point-count survey methods (level of effort, distance estimation, detectability, habitat characterization) and relationship to Alaska Landbird Monitoring System protocols
 - Need for 'study plots' outside of Project area (Denali NP&P, Copper R. Basin, etc.)
 - Survey methods for riverine/fluvial species
 - Surveys of 'overwintering' birds and spring surveys of resident breeding species
 - Migration surveys using mist-netting and/or nocturnal sampling with radar
 - Other topics?

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Landbirds and Shorebirds
Study Plan Meeting
September 6, 2012; 10:00 am–2:00 pm
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
ADF&G	Kim King
USFWS	Maureen de Zeeuw
USFWS	Steve Matsuoka
FERC	David Turner (by phone)
AEA	Betsy McGregor
ABR, Inc.	Brian Lawhead
ABR, Inc.	Nathan Jones
ABR, Inc.	Terry Schick
Solstice Alaska Consulting, Inc.	Robin Reich
MWH	Kirby Gilbert

Assessing Habitat Loss Effects for Landbirds and Shorebirds

The steps to be conducted in assessing habitat loss impacts for landbirds and shorebirds for the Susitna-Watana Project are described below. In the Proposed Study Plan (PSP), this information is described in several different sections (Vegetation and Wildlife Habitat Mapping Study, Breeding Survey of Landbirds and Shorebirds, and Evaluation of Wildlife Habitat Use Study).

1. Prepare a fine-scale wildlife habitat map in GIS by combining *Alaska Vegetation Classification (AVC)* Level IV vegetation types (Viereck et al. 1992) and other landscape factors such as physiography, surface form, soil drainage, disturbance type, as needed. The mapping methods are described in the PSP (Vegetation and Wildlife Habitat Mapping Study). All mapping of landscape features will be done by photointerpretation, supported by ground-truth data for each of the landscape features in each photosignature in the Project area. (As an aside, wetland types will be mapped during this effort and separate jurisdictional wetland maps for the Project area will be created; the wetlands mapping work will be done as described in the Wetland Mapping Study section in the PSP).
2. Preliminary mapping of wildlife habitats will be prepared and checked during the field ground-truth surveys. Detailed information on plant species occurrence and percent cover, vegetation structure, physiography, surface form, soils, and disturbance will be collected in the field during the ground-truth surveys.
3. Field surveys for breeding landbirds and shorebirds will be conducted using standard point-count methods with distance estimation, as described in the PSP (Breeding Survey of Landbirds and

Shorebirds). Because the habitat mapping will not be complete at the time of the point-count surveys, point-count locations will be allocated by photosignature type using stratified random sampling. The goal will be to sample each photosignature type (habitat type) repeatedly over two years of surveys. The habitat being used by each bird species at the time of detection will be recorded whenever possible. The sampled habitat at the point-count location will be treated as the “focal habitat.” On field forms, observers will record the use of the focal habitat (yes or no), and the use of adjacent habitats will be recorded whenever feasible.

- a. **As described in the PSP, and agreed to in the meeting, the point-count surveys for landbirds and shorebirds would occur at a different time (mid-May through mid-June) than the ground-truth effort for the habitat mapping study (late June through August).**
4. Overlay the point-count locations on the wildlife habitat map in GIS to link each point-count site with the final mapped habitat type surrounding each site.
 - a. **The group agreed that Kessel’s bird habitat classification system for Alaska (Kessel 1979) should be crosswalked to the Level IV vegetation types of Viereck et al. 1992.** Most of the data needed for Kessel’s classification would be collected also for the Susitna-Watana Hydro habitat mapping study (e.g., shrub height information would be collected). Steve Matsuoka (USFWS) will send out a document that Colleen Handel (USGS) prepared that compares the Kessel classification with Viereck; Steve’s recollection was that the two classification systems are very similar. The ABR team will review that document and get back with the agencies on a proposed classification for the mapping of wildlife habitats.
 5. Determine how important each mapped habitat is to selected species of birds and mammals. This work will be done as described in the PSP (Evaluation of Wildlife Habitat Use Study).
 - a. The product of the habitat evaluation study will be an array of each mapped habitat type and each bird and mammal species to be evaluated, with the cells representing a habitat value ranking category.
 - b. The habitat-value ranking categories are likely to be: “0” = negligible value, “1” = low value, “2” = moderate value, and “3” = high value. The rankings for each species will be based on how often the species is observed in that habitat using Project-specific data whenever possible. For less common species with fewer observations, habitat-use information from the literature will be used; Alaska-specific habitat-use information will be used as much as possible. From a number of recent studies in the state and in Canada, there is more habitat-use information available for boreal forest areas (i.e., there should be less need to evaluate habitat use from studies in the lower 48 states). Some professional judgment likely will be needed when observations or information from the literature does not exist for a particular habitat. ABR will employ the professional judgment of bird and mammal biologists who have worked in the state for many years (often with over 20 years of field experience).
 - c. **The group agreed that the rationale and assumptions used in the habitat evaluation study would be clearly documented.** It is understood that just because a landbird or shorebird

species is not observed or documented in certain habitats, does not mean that those habitats are not used by that species. This is the case especially for species that are less common and infrequently observed. ABR is aware of this and the habitat rankings for less common species always take into account the number and quality of the field observations. USFWS agreed that the Pebble Project documentation (which included individual sections for each species assessed describing that habitat-use information used to determine the habitat-value rankings), would be an appropriate model to follow on the Susitna-Watana Hydro effort.

6. Finally, using GIS, overlay the Project footprint and disturbance buffers on the habitat map to determine the acreages of each habitat type that would be directly affected (lost) or indirectly affected (altered by disturbance) from Project activities.

Focal Species in the Landbird and Shorebird Surveys

All birds that are seen or heard will be documented, although in the habitat evaluation study (noted above), a subset of species of concern will be evaluated for habitat use and, ultimately, habitat loss effects.

The group agreed that the landbird and shorebird surveys should focus on the species listed in Table 2 of the *Wildlife Data-Gap Analysis For The Proposed Susitna–Watana Hydroelectric Project*, from August 2011. Steve will review Table 2 further and provide feedback on the species listed, specifically to determine whether any additional species of conservation concern could occur in the area, which should be listed in the table. During the surveys, species that use riverine habitats, like Belted Kingfisher, American Dipper, and several shorebirds will be sampled using a set of point-count surveys along the Susitna River and tributary streams; the riverine corridors will be walked inbetween point-count locations and all incidental observations of birds will be recorded.

The group agreed that a survey from a boat would be conducted to record breeding swallow colonies along the Susitna River within the inundation zone. Swallows are a concern because the inundation zone would flood swallow breeding habitats, including cliffs and cutbanks.

The group agreed that a winter survey for owls is not needed. Maureen said that although the current study plan doesn't adequately cover forest owls, additional field study isn't needed. A good explanation of the value of owl habitat should be assessed based on existing literature and field studies conducted in Alaska.

Study Area Size

The Proposed Study Plan (PSP) identifies a 5-mile buffer around the Project footprint (roads, powerline corridors, and inundation zone) in which landbird/shorebird surveys would be conducted.

The group agreed that a 2-mile study area buffer around the Project footprint will be adequate for the landbird/shorebird surveys as long as the inundation zone and representative habitats within the

Project area are sampled. The study area would not extend west of the Parks Highway near Cantwell or beyond the east bank of the Susitna River and Chulitna River.

The group agreed also that the 5-mile buffer study area could be maintained for the mapping of wildlife habitats.

The group agreed that additional point counts outside the Project study area, for example, within Denali National Park or the Copper River Basin, are not needed. The USFWS noted, however, that existing point-count data from those other areas could be used to bolster the habitat use information used in the study (e.g., for less common species that are infrequently recorded), and the group agreed this would be an important step to take in the analyses of habitat use for the habitat evaluation study. Data from those other areas can be obtained by coordinating with Colleen Handel at the USGS.

Point-Count Survey Methods

The current level of effort for the landbird/shorebird surveys identified in the PSP is:

- 4 field crews of 2 people each
- Assume at least 8 point counts per crew per day = 32 point counts per day
- 14 survey days total in May and June (beginning mid-May survey for shorebirds and early nesting landbirds, and early June survey for Neotropical migrants)
- Likely ~10 to 15 different habitat classes sampled in May and up to ~25 in June
- Surveys in 2013 and 2014
- Total number of point counts per year could be 448
- About 900 point counts total for 2 years
- No location would be visited more than once, except if randomly selected

USFWS and ADF&G (according to Maureen) do not think that this is enough field time to get an adequate understanding of the number of birds using the Project area and to get density estimates. USFWS thinks that there may be logistical and weather problems that could limit the number of actual survey days. It is also known that interannual variability in numbers of breeding landbirds and shorebirds can be substantial. USFWS also is concerned that the number of point counts conducted in each habitat type (assuming ~25 habitat types will be mapped) may be low with level of effort noted above. USFWS would like the sampling to occur continuously from mid-May to mid-June (approximately a month).

The group agreed that the Alaska Landbird Monitoring System (ALMS) protocols should be used. The ALMS methods allow for a determination of densities and would be comparable to other studies. **The group agreed that the ALMS methods can account for both how far away and how often birds are calling (queuing rate).** Distance analyses and removal analyses would be completed on the point-count data (by species) to estimate densities of breeding landbirds and shorebirds.

The group agreed that existing detection functions, derived from other point-count studies in Alaska, could be used in cases (e.g., uncommon species) in which data from the Project are too limited to

derive adequate detection functions. Steve said that the distance analyses to determine bird densities should not require an inordinately large effort.

The group determined that the addition of double-observer methods would not be needed and the ALMS methods with distance analyses and removal analyses should be adequate. Steve indicated that he thought the application of double-observer methods would result only in a small increase in the reliability of the resulting density estimates and that the extra field and analysis effort was probably not worth the return.

Overwintering/Resident Species

Maureen said that no winter surveys for landbirds are needed because sampling in mid-May would probably be adequate in identifying resident species. She agreed that the winter bird surveys completed in November/December 1984 and late January and late March 1985 would help in determining which resident bird species use the Project area during the winter.

Migration Mist-netting

The group did not decide whether mist-netting should be used to determine if the inundation zone is used as a stopover habitat for landbirds or shorebirds. Maureen noted that mist-netting could potentially be used to determine whether the inundation area is an important migration stopover habitat. Maureen said that determining the importance of the proposed inundation zone habitat is important, since this habitat would be replaced by open water once the project is constructed. Terry and Brian questioned where nets should be placed and how many nets and stations of nets would be needed to understand the importance of the area for migration stopover. The utility of this method for achieving the objective of determining the value of the affected area as a migratory stopover site was considered to be equivocal.

Migration Radar Survey

The group did not decide whether a radar study should be conducted to quantify the volume of nocturnal bird migration. Maureen said that the issue is potential bird collisions with project infrastructure, which could be exacerbated by attraction to lights. She said that the biggest area of concern is around the dam and associated facilities.

Terry said it would be possible to conduct an intensive collision-hazard study using visual observations only in the corridor area once the corridor(s) is/are determined; such a survey would not address use of those areas by nocturnal migrants, but, in comparison with the dam area, attraction to lights should not be a problem.

Terry said that a radar survey around the dam site could be completed in the fall and spring, but collision hazard likely is greater in the fall with the extended migration period and the increased number of birds present (adults and juveniles). The radar work could be coupled with migration point counts. Brian said that flight volumes from previous studies in the Tanana and Copper River valleys could be compared

with the results of the study. Brian said that he would talk with ABR employees Brian Cooper and Bob Day regarding the feasibility and design of radar studies for the Project.

Maureen said that wetland areas potentially used by migrating shorebirds should be surveyed at least within or near the Project footprint. Terry indicated that such surveys would have to be ground-based and that point counts are not really appropriate; more likely these surveys would need to be walking transect surveys.

Study Method Decisions That Have Not Been Made

- Landbird and shorebird point-count survey effort; the mid-May to mid-June timing was agreed to be appropriate, but the number of days of point-count surveys needed remains unresolved.
- Sampling method(s) to determine bird collision-hazard potential, especially for nocturnal migrants.
- Sampling method(s) to determine whether the inundation area provides stopover habitat for migrating shorebirds and landbirds.

Action Items

- Brian will follow up with Dave Tessler, ADF&G, since Dave was unable to attend the meeting.
- Steve will try to locate a copy of Colleen Handel's document that compares Kessel's classification with Viereck's AVC and send it out to the group.
- Steve will look over the list of bird species in Table 2 in the *Wildlife Data-Gap Analysis For The Proposed Susitna–Watana Hydroelectric Project* to make sure all species of conservation concern likely to occur in the Project area are included.
- Brian will talk with ABR radar experts Brian Cooper and Bob Day regarding bird migration study design considerations and logistics for this Project, as well as identifying information available from previous radar studies.

AEA Team Member		Other Party	
Name:	<i>Justin Hays, Cultural Resources Study Lead</i>	Name:	
Organization:	<i>Northern Land Use Research, Inc.</i>	Organization:	<i>AEA</i>
Study Area:	<i>AEA Office</i>	Phone Number:	<i>800-315-6338 code 3957#</i>
Date:	<i>September 7, 2012</i>	Time:	<i>9:03am to 11:37am</i>
Meeting held by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others at meeting:

Present:

Taylor Brelsford, URS

Bill Simeone, URS

Fran Seager-Boss, MatSu Borough

Kirby Gilbert, MWH

Betsy McGregor, AEA

Richard VanderHoek, OHA

John Jangala, BLM

By Telephone:

Chuck Mobley, CM & A

Scott Miller, NOAA

Angela Wade, Chickaloon

Katherine Martin, Ahtna

Dara Glass, CIRI

Frank Winchell, FERC

Subject: Cultural Resources Study Plan Workshop

Discussion:

Introductions around the conference room table and then teleconference participants. The URS/NLUR study team introduced themselves and led the discussion of their study plan and study efforts to date. General comments about the proposed study plan (PSP) were made with regards to up-coming milestones. Katherine asked if Ahtna would still be able to provide comments about our plan. Kirby informed her that they and all stakeholders can provide comments to the proposed study plan (PSP) filed with FERC and distributed to interested parties on July 16, 2012. The next step in the formal process is get all formal comments on the PSP by October 15th and then file an updated study plan, or Revised Study Plan (RSP) with FERC on November 14th after the comments have been addressed.

Angela asked if we had looked for culturally modified trees (CMT) this year. Justin described that the study group had looked and recorded two in the study area. None of the CMTs were the braided willow variety. It was agreed we need to incorporate the methods for recording CMTs in the RSP. John inquired how we planned to determine the meaning of some tree modification beyond bark stripping. We agreed it was a good question without a straightforward answer so some more follow up is needed.

Taylor gave the Project background to the meeting attendees. He defined what traditional cultural properties are, and other types of cultural resources such as prehistoric lithic scatter and historic mining claims. He informed the meeting attendees that we have a plan for inadvertent discoveries in the field regarding resources and human remains.

The direct impacts APE was described by AEA as the impoundment area and adjoining transportation and transmission facilities which are defined by three distinct corridors on the overall Project study area maps. The current plan is that the normal maximum impoundment area is planned at elevation 2050 feet ASL. The draft APE maps used the 2,200 foot elevation study boundary and thus this needs to be changed for the next series of maps. At this point in the Project planning process Kirby said they did not know of locations of future campgrounds, boat launches, etc. but they would likely be added after the recreation studies are complete and a recreation plan is developed, however the area we are tentatively planning as indirect should encompass likely locations of such future development. The transmission and road corridors themselves are buffered as an initial proxy indirect effects APE. They could be thought of in terms of a buffer around a narrow corridor that will contract as studies progress and things are better defined. We presented our 2-mile buffer map as a starting point of discussion. We all agreed that recreation trails should be drawn even though the data is incomplete and the indirect affect areas can extend along those trails possibly. It was also discussed that to refine the coarse 2-mile buffer, we should use sub-watershed drainage basin boundaries adjoining the Project features, as those would be likely locations where people in the future might move into (once the Project is built), centering on drainage courses and not necessarily over the top of ridge lines. Betsy mentioned we should also trim the buffer at the terminal ends of the corridors where they meet the railroad. The Denali Hwy Susitna Bridge was another area that will likely see increased use as an indirect result of the proposed project. John thought we should add trails that are near by the project area that may extend or reroute as an indirect result of the project. Richard asked how the permafrost would be affected due to the increase in temperature from adding a 39-mile lake. Betsy said mass wasting studies have been on going and are looking at those types of effects.

Land status was another topic discussed in the meeting. We were directed to make new maps with the most recent land status information and consider using with both topographic and aerial photograph backgrounds. Kirby showed examples of map panels being produced for the Revised Study Plan. Frank asked when we could have these new APE maps made, Taylor said by the end of next week. There was a question about if there are any 14h1 ANILCA selections that BLM is transferring to Ahtna within the study area. For those areas there was another question about whether BIA done any surveys on any of those or other conveyed lands? Katherine thought that Ahtna may have heard that there were some BIA surveys performed this summer in the region. Dara at CIRI also wondered about this and follow up with BLM and BIA is needed.

There was general discussion that the locational model needed to be described in more detail in the RSP. Frank said there was not enough information about how it will be used, reiterated, etc. Justin indicated we would improve and enlarge that section in the RSP. Frank asked when we will be producing the model as a geodatabase. Justin said it was already completed but that it still requires input from this year's data. Frank asked when that would be done? Frank then asked Richard if they would concur with our RSP or at least the APE definition prior to the FERC filing. Rich said that his office will be working with everyone as much as possible. Frank said that the APE can be modified after the 11/14 filing date but we just needed to go forward with the best APE we have from the information we presently have.

Ethnogeography was described by Taylor to all participants. The language areas were introduced: Ahtna, Tanana, and Dena'ina. Frank advised us to look where things are that might be affected in the cultural landscape. We agreed to make a new language area map that showed more of the arbitrary language family boundaries. We noted how the ethnogeography study will help inform not only the archaeological survey strategy but also the other disciplines such as wildlife, fish, stream, etc.

The topic of having area interns was introduced by Taylor. Justin said that the idea today was to come up with some ideas for internships. Both field and laboratory settings were suggested by Fran. John said in the lower 48 states he had hired area guides to be present in places where they thought they may encounter human remains during construction. Dara suggested our starting point should be to contact the Alaska Heritage Center in Anchorage.

Fran asked Betsy if she could see the study area this year before a snowpack develops. She asked if Justin would be willing to go in the field to show Fran the APE by air. Justin said yes and Betsy said she would see when the next opening on the helicopter schedule would be and get back with us.

Action Items:

1. Incorporate CMT recording methods in the RSP
2. Draw maps with the new 2050 ft. impoundment area elevation
3. Incorporate updates to the indirect effects to our buffer map
4. Use newer land status map with mining claims and ANCSA designations
5. Identify if there is any BIA surveys information on conveyed land
6. Combine maps to show intensively tested areas next to unsystematic surveys
7. Augment methods section in RSP to reflect locational modeling
8. Maps of survey area by type (pedestrian and aerial)
9. Create new language area maps with larger scale
10. Contact the Alaska Heritage Center for possible internship applicants
11. Schedule next meeting for 9/24 1-3pm
12. All new maps are due for circulation by 9/21
13. Schedule aerial survey of APE in September



SUSITNA-WATANA HYDRO

Draft Minutes Fisheries Study Plan Work Session September 13, 2012

LOCATION: ADF&G Office
Denaina Conference Room
333 Raspberry Rd, Anchorage, AK 99518

TIME: 12:30 pm – 2:30 p.m. (AKDT)

CALL IN NUMBER: Conference Dial-in Number: (712) 451-6000
Participant Access Code: 603667#

SUBJECT: Fisheries Study Plans

GOAL: To define the processes that will be utilized for sampling stratification, selection of sample sites, and techniques that will be applied by objective and season.

12:30 – 12:35 Introductions, Review Meeting Objectives

Attendance: MaryLouise Keefe (R2)*, Steve Padula (LVA)*, Jack Erickson (ADF&G), Joe Klein, (ADF&G), Stormy Hought (ADF&G), Monte Miller (ADF&G), Mike Buntjer (USFWS), Dani Evenson (R2), and Kathryn Toews (LVA). *on the phone

MaryLouise Keefe reviewed the agenda and meeting objectives. She explained that this was going to be a focused discussion on the Fish Abundance and Distribution study plans; the River Productivity study plan would be discussed separately.

Sample Locations

MaryLouise Keefe set the stage for the discussion on study site selection by explaining that she envisioned three levels of fish sampling:

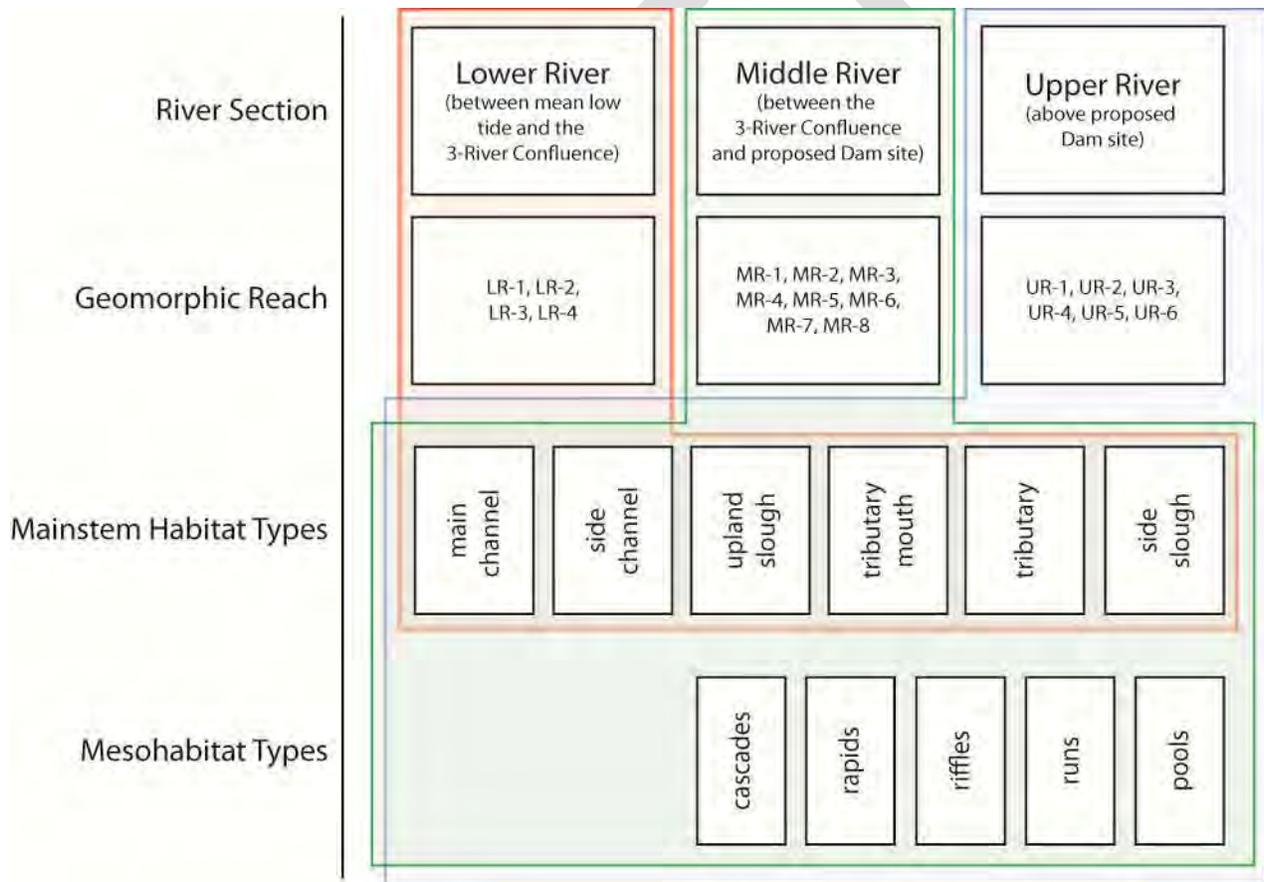
- 1.) fish presence/absence and distribution
 - a. sampled for at many sites throughout the river
- 2.) relative abundance (Catch-per-unit-effort) and fish density
 - a. sampled for at various sites including “intensive study sites” to get representative coverage
- 3.) population density
 - a. involves more robust sampling and statistical design
 - b. sampled for at the “intensive study sites”



SUSITNA-WATANA HYDRO

Study sites would be selected based on a stratified random design. The first level of stratification is by Lower, Middle and Upper reach. The 2nd stratification level will be the 6 major mainstem habitat types: main channel, side channel, side slough, upland slough, tributary, and tributary mouth. Due to the scale of the Chulitna and Talkeetna rivers relative to the Susitna River above the Three Rivers Confluence, sampling in the Lower River will go down to the level of major mainstem habitat type, as the potential Project impacts in the Lower River is expected to be substantially moderated by the Chulitna and Talkeetna rivers. For the Middle and Upper river, AEA is proposing to sample down to the mesohabitat level. In Upper River tributaries, methods would be similar to that outlined in Buckwalter et al (2011) which was also used in the 2012 Upper River Fish Barrier study. These methods suggest sampling habitat units at 150-meter intervals upstream up to the 3,000 foot elevation level, as Chinook salmon have been documented that high in an Upper River tributary.

For a visual reference of the classification tiers:



(KT-9.19.12)

Fish presence/absence and distribution involves a low level of effort and therefore can be done at many sites, but population level sampling requires a much greater level of effort and will occur at “intensive study sites”. Keefe provided examples of the type of methods that would be used for each of the 3 levels of sampling. For example, 1-pass electrofishing may be used for fish presence, and at intensive study sites, block nets and multiple methods may be used. She stated that the goal of level one sampling was

'who's home where'. She asked that everyone keep these three levels in mind as study site selection is discussed.

Dani Evenson explained that intensive study sites would be locations where a full complement of studies would occur— instream flow, geomorphology, ice, groundwater, riparian, and fisheries. Proposed study reaches would be discussed in further detail at the September 14, 2012 instream flow Technical Workgroup (TWG) meeting, but proposed sites were generally 1-2 river miles long and encompassed the suite of habitat features. She added that there are essentially 2 approaches. Firstly, sites should be representative and descriptive of the habitat types present in-river. Because there is data from the 1980s, the representative sites will be supplemented with critical sites- areas that are known to be biologically important to fish. She also said that reaches where the 1980s studies did not document fish would be included as well. An important goal would be to focus more empirically on early life history. She showed a few examples of maps of proposed intensive study sites.

Joe Klein asked whether the first two levels, fish distribution and relative abundance, could be combined. Jack Erickson remarked that they differ in terms of level of effort. To generate a catch-per-unit-effort (CPUE) takes more effort than presence/absence. Dani Evenson pointed out that for some methods, i.e., gillnetting, both levels are similar but for other methods such as electrofishing they differ. Mike Buntjer asked why not just collect relative abundance data everywhere. Jack suggested that if that was done the additional effort required would likely limit the total number of sampling sites.

Jack Erickson asked how population abundance/density would be estimated at critical sites. MaryLouise said that mark-recapture would be used where possible. Jack Erickson said that it may be very difficult to get abundance estimates; perhaps more rigorous and frequent sampling would yield sufficient estimates of relative abundance.

Jack asked how rare species such as burbot would be sampled. MaryLouise Keefe responded that she thought it was a good question. She indicated that if monthly sampling did not catch them, then specific objectives would be developed to address rare species.

Joe Klein commented that he likes the scope of the proposed study plan, but would like to see more detail.

Sampling Methods

Mary Louise Keefe discussed methods for sampling and said that they would be habitat and species specific. Keefe stated that with 20 fish species and 3 freshwater life stages and sampling of up to 140 sites, it is possible that fish will be found at every sampling site. Erickson expressed sympathy over the size and complexity of this study. Joe suggested that due to the relative short-timing window for open water sampling (i.e., assuming June 1 – Sept 15 window gives only 14 weeks of field time), considerations should be given to ensure a dedicated effort is made (e.g., during the 1980s, ADF&G's approach was to hire a lot of Fish Technicians and maintain a continuous field presence throughout the summer to provide adequate manpower and availability for field sampling activities).

Keefe asked whether fish distribution and abundance was a worthy endeavor throughout the river. Stormy Haught responded that it is important, but not at the expense of focal sites.

Monte Miller added that a "who's home where" approach was important but "when" should be added as well. There are specific traits of certain species— i.e., whitefish, burbot that make them hard to find at



SUSITNA-WATANA HYDRO

some times. Trot lines are age-selective; the life stage information is important. ADF&G generally agreed the sampling effort to compare over space and time was valid. Discussion ensued about the value of the population sampling effort and it was decided that relative abundance would be adequate in place of population estimates.

The instream flow study includes an intergravel study and a Varial Zone study.

Mary Louise Keefe added that the approach would be flexible and sampling locations and methods would be adjusted over the course of the study as new information became available. Mike Buntjer mentioned the possibilities to adjust effort in 2014 based on 2013.

Added Specific Objectives

An objective to address burbot was discussed. The discussion was expanded to include white fish and it was suggested that a new objective be added to the study that focuses on life history of winter spawning fishes. Joe Klein will send contact information for the ADF&G biologist to discuss how to further refine this objective.

Winter sampling

Joe Klein mentioned that he was struggling with specifics such as winter use, i.e., burbot spawning. There will be limitations of access to sites during the winter months. This needs to be considered when creating a schedule. Some methods discussed for winter field efforts included video, minnow traps, trot lines. The 2012 pilot study created to determine feasible winter efforts was agreed by all as a good tactic considering limited field seasons. MaryLouise Keefe mentioned a December 1st and April field effort at two sites with the hopes of fitting in a November effort.

Permitting

Dani Evenson asked ADF&G whether it would be difficult to obtain a Fisheries Resource Permit for specific methods such as electrofishing and gillnetting and if so, should methods be tailored in advance. Stormy Haught responded that it is difficult for even ADF&G to get a permit to electrofish when adult salmon are present (i.e., July through September) and that ADF&G has also expressed concerns with gillnetting. It was agreed that permitting may be a limiting factor and that ADF&G Area Management Biologist, who make the determination on permissible gear types, should be contacted as early as possible in the process (Sam Ivey for the Susitna River).

Outmigrant trapping, radio tagging and PIT tagging

ADF&G mentioned concerns with using PIT tags. Monte Miller asked why half duplex tags were proposed for use. In the Columbia River, PSMFC's PIT tag data system, PITAGIS, uses full duplex tags. He suggested reading a recent paper out of the USFWS Abernethy Lab, "Aquatic PIT Tag Interrogation System Construction and Standard Operating Procedures (Steinke et al 2011). It was mentioned that it would be worth contacting Doug McBride at USFWS. MaryLouise Keefe said that would be considered as well as the manufacturer's delay for tags. Stormy Haught added that the consequences of implanting a 12 mm long tag in a 60 mm long fish should be considered.



SUSITNA-WATANA HYDRO

Stormy Haught asked what happens if a person eats a PIT tag. Monte Miller and MaryLouise Keefe pointed out that on the Columbia River, this issue is ignored. PIT tags are encased in glass and have some copper and other metals. It is an interesting question.

Dani Evenson discussed the location of outmigrant traps. She said that in the 1980s there were four inclined plane traps deployed at Talkeetna Station, Sunshine, and near the mouth at Flathorn; one of the traps was mobile. She summarized the comments of the USFWS discussion earlier in the day and asked if ADF&G had any insights or preferences. Stormy Haught thought that outmigrant traps would be valuable in Upper and Middle River tributaries.

Stormy Haught inquired as to the sample size for radio tags. Dani Evenson responded that the PSP indicates 10 per species per habitat type in the Lower and Middle river. She also suggested not limiting the sampling strategy by habitat type since fish may not be captured in all habitat types and the opportunities to tag fish could be lost. ADF&G agreed, but wanted to make sure tags were distributed longitudinally along the river. Monte Miller cautioned that all tags should not be deployed in one location. MaryLouise Keefe agreed. MaryLouise Keefe asked if Eulachon Smelt should be included on the list of fish to be tagged. ADF&G responded that since they are too small to tag they should be dropped from the list, but they would like to see Arctic grayling added. To make sure all the species of interest were included, Dani Evenson compiled the list- lamprey, humpback whitefish, round whitefish, rainbow trout, grayling, burbot, Dolly Varden, and northern pike.

Monte Miller requested that the information be organized in a table by species explaining tagging metrics by species including the type of tag (PIT or radio), # of individuals and any discrepancies. He stated that it would be easier to understand how each species would be addressed. MaryLouise said that it is a good suggestion.

Stormy Haught mentioned that the State has specific rules on fish anesthetics. Dani Evenson responded that AEA's study team is aware of those regulations and would comply.

Details are requested in the RSP including surgical methods, battery life and specifications which determine battery life.

River Productivity

MaryLouise Keefe suggested scheduling a meeting for river production before the site visit on September 26, 2012.

Draft Minutes
Fisheries Study Plan Work Session
September 13, 2012

LOCATION: US Fish and Wildlife Service, Anchorage Field Office
605 W. 4th Ave, Room G-72
Anchorage, AK 99501

TIME: 9:00 am – Noon (AKDT)

CALL IN NUMBER: Conference Dial-in Number: (800) 315-6338
Participant Access Code: 3957#

SUBJECT: Fisheries Study Plans

GOAL: To define the processes that will be utilized for sampling stratification, selection of sample sites, and techniques that will be applied by objective and season.

Attendance: MaryLouise Keefe (R2)*, Betsy McGregor (AEA)*, Wayne Dyok (AEA)*, Steve Padula (LVA)*, Mike Buntjer (USFWS), Betsy McCracken (USFWS), Matt Cutlip (FERC)*, Ethan Bell (Stillwater Sciences)*, Fred Winchell (Louis Berger Group)*, Jeff and Gay Davis (ARRI), Brian Lance (USFWS), Phil Hilgert (R2)*, Dani Evenson (R2), and Kathryn Toews (LVA). *on the phone

MaryLouise Keefe reviewed the agenda and meeting objectives. She explained that this was going to be a focused discussion on the Fish Abundance and Distribution study plans; other study plans would be discussed separately.

Sample Locations

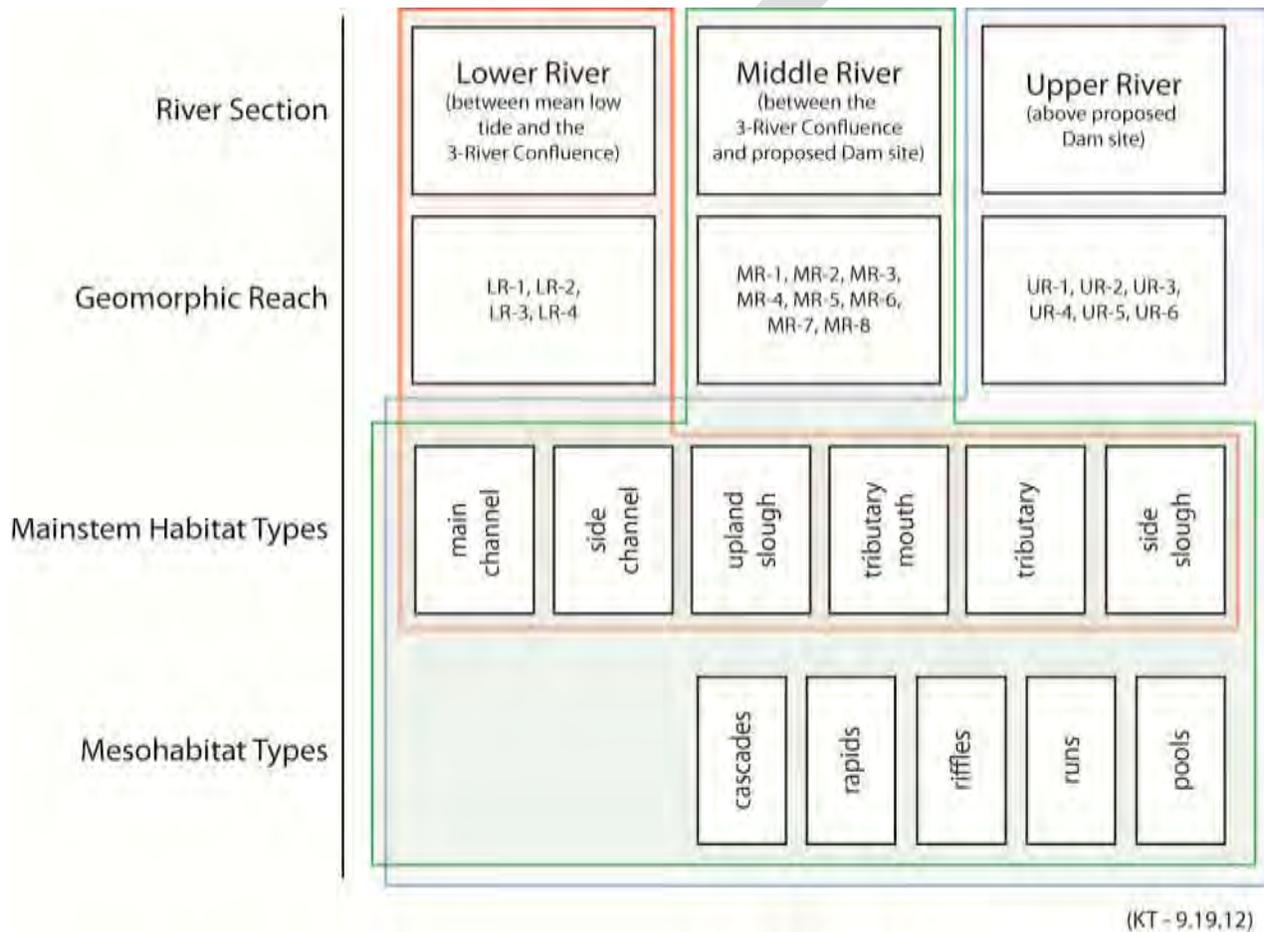
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SUSITNA-WATANA HYDRO

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For a visual reference of the classification tiers:



Fish presence/absence and distribution can be done at many sites, but population level sampling requires a much greater level of effort and will occur at “intensive study sites”. Keefe provided examples of the type of methods that would be used for each of the 3 levels of sampling. For example, 1-pass electrofishing may be used for fish presence, and at intensive study sites, block nets and multiple methods may be used. She asked that everyone keep these three levels in mind as we discuss study site selection. Keefe also reminded participants of the March meeting at which a site-specific habitat classification system specific to the Susitna River was developed and adopted, and this classification system includes application of the USFS Aquatic Habitat protocol for on the ground surveys.



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MaryLouise Keefe and Phil Hilgert explained that the mesohabitat characterizations are not the same approach as the 1980s studies. The 1980s took a unique hydrologic based approach based on breaching flows rather than a physical habitat approach.

M. Keefe and D. Evenson explained Intensive Study Sites; these would be locations where the suite of studies would occur— instream flow, geomorphology, ice, groundwater, riparian, to enable modeling of Project effects. Currently proposed sites are generally 1-2 river miles long and encompass the suite of habitat features. Phil Hilgert added that there are essentially 2 approaches. Firstly, sites should be representative and descriptive of the habitat types in river. Because data from the 1980s is available, representative sites will be supplemented with critical sites- areas that are known to be biologically important to fish. An important goal would be to focus more empirically on early life history. Hilgert also mentioned that review of the potential intensive study sites would occur on Friday, September 14 during the instream flow TWG meeting.

MaryLouise Keefe explained that the plan is to collect data that are representative of fish communities within the sampling strata, i.e. meso-habitats and/or geomorphic reaches and there is no plan to extrapolate the abundance numbers to the river scale. There was much discussion about the ability to extrapolate the data and to what level extrapolation is needed. Jeff Davis expressed concern that the data may not be representative if sites are selected without developing species- and life stage-specific hypotheses. Others expressed concern that by focusing on what we think we know about target species regarding habitat use, migrations, etc. we might miss something.

M. Keefe raised the importance of going back to what the Project effects were likely to be— access and quality of different habitats as a result of regulated river flows. Clarification came, just prior to a fire alarm, when Mike Buntjer noted that the general fish distribution and abundance sampling was only directed towards Objective 1 of the study plan and was not intended to provide information for all study objectives. MaryLouise indicated that yes all of the discussion of distribution and abundance was to fulfill Objective 1, and added that additional objectives requiring the collection of fish samples would also be addressed with this sampling scheme. Objectives regarding movements and migrations would require a different sampling program to be discussed later in the meeting.

R2 clarified that fish distribution and abundance study sites will be selected randomly within mesohabitats, with a goal of 25% of each habitat type being sampled.

SAMPLING FREQUENCY

MaryLouise Keefe suggested that frequency of sampling should be somewhere between 8 times per year and monthly with more sampling occurring at intensive study sites. Specific objectives to sensitive species or life stages would be in addition to baseline fish community characterization.

Sample frequency would increase based on parameters used to predict critical life stages. Depending on the stage, a variety of collection techniques will be used, such as screw traps, fyke nets, and electrofishing. Jeff Davis suggested that sampling occur bi-weekly during the critical periods for early life stages of salmon.

JUVENILE SALMON



SUSITNA-WATANA HYDRO

Phil Hilgert referenced studies from the Pacific Northwest suggesting that fish <55 mm are highly vulnerable to stranding and trapping in the Varial Zone. It is a concern that fish <55 mm will be overlooked using the given methods. **MaryLouise Keefe noted that attention must be placed on this topic and that the group will address it later under the Additional USFWS Objectives agenda item.**

MaryLouise Keefe stated that stranding will be captured in the Varial Zone study and it will include physical parameters in spawning areas. Phil Hilgert pointed out that PHABSIM is an effective model for spawning. The Varial Zone model would be used to evaluate trapping and stranding. This model incorporates physical and biological elements (alevins, emergence, and fish up to 55mm). MaryLouise also indicated that an intergravel temperature study was being developed by the instream flow program for inclusion in the RSP.

Some of the participants remarked that they hadn't seen the Varial Zone and Intergravel Temperature study plans and requested more details.

Someone pointed out that juvenile salmon was missing from objective 2. MaryLouise Keefe said this was an oversight and that it would be added.

OUTMIGRANT TRAPPING, RADIO TAGGING AND PIT TAGGING

Outmigrant traps are labor intensive and there was some uncertainty how many could be realistically deployed. Discussion ensued about locations for 6 to 8 traps at the mouths of tributaries and lateral habitats to focus on target salmon species. For example, to address Chinook salmon migrations, consider placing a trap or two downstream in tributaries, such as Fog Creek, Kosina Creek, Potage Creek, Indian Creek and possibly Gold Creek.

MaryLouise Keefe suggested that PIT tag arrays would be concentrated at intensive study sites and Dani Evenson mentioned that the 1980s studies used 4 traps including one mobile trap, moving it as needed. The 1980s studies were focused on getting information on the timing of outmigration and size at migration. As in the 1980s, the possibility of one trap being mobile is up for consideration.

Which species are being tagged and how are they being selected? MaryLouise Keefe will address before next meeting.

WINTER SAMPLING

There would be a pilot study in winter 2012-2013 in conjunction with instream flow studies. This study would likely occur at Whiskers Creek and Slough 6a and will test different methods including DIDSON, video, minnow trapping, and trot lines. **This topic was tabled for future discussion due to a lack of time.**

ADDITIONAL OBJECTIVES FROM USFWS/NMFS.

Mike Buntjer said that he is interested in egg deposition through development post emergence. Jeff Davis added that the movement of juveniles from incubation areas to rearing areas was also important. Discussion ensued about additional empirical study needs.

MaryLouise Keefe summarized Mike Buntjer's objectives for study as follows:



SUSITNA-WATANA HYDRO

1. How will the Project effect changes in temperature and survival? (There will be an Intergravel study in the instream flow program).
2. How will flow fluctuations affect early life history? (The instream flow physical habitat model will address this)
3. When are fish active- day vs. night?
4. Timing of movements with respect to flows to understand Project flow effects

MaryLouise said that her perspective was that USFWS was looking for additional empirical data such as an incubation study. Mike and Jeff both talked about their concerns for incubating eggs, emerging fry and small juveniles less than the size suited to PIT tagging. The USFWS is not necessarily looking for an egg box study but is looking for information on emergence timing, and success of fry to leave spawning habitat and move into rearing habitats. MaryLouise Keefe summarized the process to study fry emergence and movement. The first step is a desktop analysis based on spawning timing and degree days for incubation, the results of which will help narrow down the time frame for sampling. Secondly, sample frequency would be increased, and then a variety of methods would be applied. Jeff Davis suggested sampling bi-weekly during the critical periods.

Discussion ensued about conducting an early life history study for Chinook, coho and sockeye salmon. Jeff Davis asked when habitat quality of incubation habitat would be discussed. MaryLouise and Phil suggested that he bring that up the following day at the instream flow meeting.

Susitna–Watana Hydroelectric Project

Agency Consultation on Proposed Study Plans for Selected Mammals

Thursday, September 13, 2012 — 10:00 A.M.

Alaska Department of Fish & Game, Fischer Conference Room, 67th St. building, Anchorage

Invitees: Mark Burch, Kim King, Earl Becker, Howard Golden, Todd Rinaldi, David Tessler, all of ADF&G; Brian Lawhead & Alex Prichard, ABR, Inc.; David Turner, FERC; Betsy McGregor, AEA; Robin Reich, Solstice Alaska Consulting
[Terry Schick & Nate Schwab of ABR plan to join for latter portion of the meeting]

Goal: To understand, discuss, and resolve differences between ADF&G comments on AEA's study requests and Proposed Study Plan, as discussed at the Terrestrial Resources Technical Work Group meetings on June 6 and August 9, 2012, for incorporation into AEA's Revised Study Plan

Agenda Items:

- 1) Discussion and resolution of differences between ADF&G comments on AEA study request (May 2012) and AEA's Proposed Study Plan (July 2012):
 - Analytical techniques for bear population density; survey methods for downstream study area along anadromous streams (DNA, stable isotopes)
 - Survey methods for wolverine & aquatic furbearers (river otter, mink, beaver, muskrat)
 - Survey methods and study area for Dall's sheep
 - Other topics, if needed (terrestrial furbearers? big game species?)
- 2) Break-out meeting, after above session, with Dave Tessler [Terry Schick will join]:
 - Wildlife habitat evaluation
 - Survey methods for bats [Nate Schwab will join via teleconference]
 - Survey methods for wood frogs
 - Survey methods for landbirds/shorebirds (follow-up to Sep. 6 meeting with USFWS)

Meeting Summary
Susitna–Watana Hydroelectric Project Licensing
Alaska Department of Fish and Game (ADF&G) Office, Fischer Conference Room
333 Raspberry Road, Anchorage, AK

Wildlife Program Meeting on Selected Study Plans (Mammals, Frogs, Landbirds/Shorebirds)
September 13, 2012, 10:00 a.m. – 3:50 p.m.

Attendees:

Organization	Name
ADF&G Wildlife Conservation	Mark Burch
ADF&G Wildlife Conservation	Kimberly King
ADF&G Wildlife Conservation	Earl Becker
ADF&G Wildlife Conservation	Todd Rinaldi
ADF&G Wildlife Conservation	Howard Golden
ADF&G Wildlife Conservation	David Tessler (joined at 1:20 p.m.)
FERC	David Turner (by phone, left at 12:00 p.m.)
AEA	Betsy McGregor
ABR, Inc.	Brian Lawhead
ABR, Inc.	Nathan Schwab (by phone, 1:30–2:00 p.m.)
ABR, Inc.	Alex Prichard
ABR, Inc.	Terry Schick (joined at 1:30 pm)
Solstice AK	Robin Reich

Brian opened the meeting with introductions and briefly summarized the Proposed Study Plan (PSP) and the 16 study plans for wildlife before beginning discussion of specific study plans.

Analytical Techniques for Bear Population Density Modeling

- No field surveys are planned for bears. The group agreed that existing data from previous line-transect surveys conducted by ADF&G would suffice for the analysis.
- Earl said that it may be possible to apply a recently developed spatial density modeling technique, which uses distance sampling data from line transects, to existing regional survey data for bears and derive a density estimate specifically for the Project area and surrounding areas nearby, which were surveyed in the past during two different survey efforts.
- This modeling effort would need to be developed by ADF&G working cooperatively with the originator of the technique, who recently moved to the University of Rhode Island from Scotland.
- The work would begin in 2013 and would need to be completed in winter 2013–2014, preferably by the end of 2013. A study plan description and cost estimate for this work is needed from ADF&G by October 10, 2012 so that it can be incorporated into the revised study plan.

Bear Survey Methods for Downstream Study Area Along Anadromous Fish Streams

- Fieldwork is needed downstream of the inundation zone to investigate bear use of, and numbers in, fish-spawning areas that could be impacted by alteration of flow. ADF&G stated that DNA and stable-isotope data could be collected from hair samples to determine the minimum numbers of bears and their diet, respectively.

- The group agreed that anadromous waters cataloged within the middle reach of the Susitna drainage should be examined. The study area will be modified to include and depict cataloged anadromous fish streams.
- ADF&G suggested using hair traps that capture one individual's hair (and then close) rather than using hair snags. Check with Laverne Beier for more details on this sampling approach. ADF&G suggested that scat also could be used for DNA sampling.

Survey Methods and Study Area for Dall's Sheep

- Brian mentioned that the goal of the Dall's sheep study is to understand sheep use of natural licks and obtain a minimum population estimate of sheep using the Project area, rather than generating a statistically robust population estimate. The latter approach (using a line-transect method developed recently by the National Park Service) would pose unacceptable safety risks to aerial survey crews, so ADF&G's more traditional aerial survey method is proposed.
- The group decided the study area should be revised to incorporate more area north of the Susitna River. The group discussed using a watershed approach to define the study area, instead of applying a buffer around the Project area.

Study Methods for Terrestrial Furbearers

- ADF&G is supportive of the proposed terrestrial furbearer study, but offered some suggestions to improve the study plan.
- Earl and Howard said that applying standard mark/recapture techniques to derive furbearer population estimates poses some problems in the proposed study area because of the expected low densities (and thus low sample sizes) of furbearers available for capture, particularly during the low phase of the snowshoe hare population cycle, and because of potential problems with capture heterogeneity and population closure assumptions. Instead, Earl recommended using spatially explicit capture-recapture (SECR) model/cluster-grid sampling to account for spatial variability and differential capture probability. A suggestion also was made to consider extending the length of the study to allow population estimation techniques to be modified, if necessary.
- ADF&G said that coyotes are potentially important for game management because coyotes could be positively impacted by the Project. If coyote numbers increase, there could be negative impacts on prey species such as Dall's sheep.
- ADF&G said that the Project could result in increased trapping pressure on furbearers by improving access. Because furbearer population density is naturally variable, it will be difficult to determine indirect Project impacts.

Study Methods for Aquatic Furbearers

- Brian mentioned that USFWS is interested in population estimates of river otter and mink in the inundation zone and areas downstream for use in assessing the potential risks of mercury bioaccumulation to piscivorous wildlife. He then described a discussion he had with Dr. Steve Buskirk, who conducted the furbearer studies for the original Susitna Hydro Project in the 1980s, regarding the low abundance of river otters and mink in the study area, as well as the difficulty of working in the area, which makes development of reliable population estimates problematic.

- ADF&G agreed that developing population estimates for otters and mink will be difficult, although enumeration of beavers and muskrats would be much more straightforward and amenable to aerial survey methods. A mark/recapture study would be difficult with low-density populations. Density estimation methods have been developed for coastal river otters by examining latrine sites or by obtaining hair samples for DNA analysis, but applying those methods to a low-density interior population would be difficult and time-consuming. Presence/absence surveys would be sufficient, in view of the large size of the Project area. It would take a large amount of work to develop a potentially poor estimate of uncommon species such as river otter and mink.
- Howard suggested getting relative abundance information by surveying river otter tracks from the air. The method would involve flying the study area after snowfall and using GPS to mark tracks (specify single versus many tracks). ADF&G suggested flying the area for 2 to 3 days, 2 or 3 times in a season.
- Earl said that winter track surveys of furbearers should be done by estimating the number of segments and number of networks.
- Howard said that mink are more difficult to study than river otter; for this reason, he suggested that the aquatic furbearer study should focus on river otters and not try to focus on mink. The use of aquatic trackbeds to detect mink would require an intensive effort for a small number of animals. Howard suggested consulting with Dr. Merav Ben-David at the University of Wyoming because of her experience working on these species in coastal Alaska.
- Howard said river-bank surveys to determine beaver density and caches are difficult because of the tree canopy. He agreed that helicopter surveys in fall (after leaf-fall and before freeze-up) to detect fresh caches are the best way to enumerate active colonies. He recommended noting all lodges and fresh food caches. Muskrat pushups can be readily detected by aerial surveys, as proposed in the study plan.

Study Methods for Wolverines

- ADF&G (Howard, Earl, and Todd) said that the sampling blocks (quadrats) for the SUPE should be 25 square kilometers, not 25 square miles. The study area should be “squared up” to avoid issues with animals leaving and reentering the study area. (The group redrew and agreed on the revised study area boundary.) Howard said that quadrats should be stratified based on the likelihood of seeing wolverines.
- ADF&G said that the aerial survey should be done 12 to 36 hours after a snowfall. February and March are the best times to do surveys because of increasing daylength and abundant snow but, later in that period, some females might not be out of maternal dens because of the presence of small youngsters.
- ADF&G said that there could be issues determining when/where the snowfall occurs. Also, wind effects may cause problems by wiping out tracks at higher elevations. ADF&G suggested hiring pilots to do reconnaissance flights to assess snow depth and freshness (besides fresh snowfall, enough snow to cover low shrubs is needed).
- Only one good survey needs to be done to get adequate information to calculate population density. The work should be attempted in 2013, however, because the survey might need to be attempted again in 2014 if suitable conditions do not occur in 2013.

- ADF&G recommended dropping the study plan objective regarding habitat associations because a single survey effort would not be adequate to provide that information. The most effective way to obtain good data on habitat associations for wolverines is to use GPS telemetry.
- ADF&G is concerned about the ability of wolverine populations to sustain themselves in the face of harvest pressure. It is difficult to sustain a population anywhere where wolverines are actively trapped without recruiting replacement animals from outside of the harvest area; that is, harvested populations appear to need nearby refugia where harvest pressure is low to provide a population source of dispersing animals. The Project should look at harvest data to determine levels of harvest in the Project area. Denali National Park (which is not trapped) and other areas with difficult access may provide additional wolverines. This information would help with ADF&G management decisions.

Lunch break, 12:30–1:30 p.m.

Study Methods for Bats

- Brian said that, although there was only one record of a bat (presumed to be a little brown bat (*Myotis lucifugus*) from the 1980s Susitna Hydro Project studies, bats are assumed to occupy suitable (forested) habitats in the Project area.
- Dave Tessler said that ADF&G has received reports of bat records in Alaska for every month of the year. The records are all associated with structures and bats may be hibernating in buildings. Bat sightings are reported most commonly between mid-August and late September/mid-October, after juveniles have become flight-capable.
- Dave said that the bat study should identify topographic features that may be suitable as roosts or hibernacula, although it is recognized that the field effort can't feasibly survey all dead trees (snags) or rock crevices. The study should assess habitat suitability. Human structures are good habitat and should be identified through a survey of historical resources and other dwellings.
- Use of broadband ultrasonic detectors in different forest habitats within the reservoir inundation zone should be conducted throughout the entire flight season (between emergence and hibernation). Dave approved of the use of Anabat™ detectors, as proposed in the study plan.
- Dave said that an acoustic survey should be conducted throughout the area of interest during the first year of study (2013). In the second year (2014), the acoustic survey should focus on following up on detections from the first year's surveys. Dave suggested scaling down the listening time (reducing sampling to match night length) around solstice.
- Dave said that acoustic sampling won't be appropriate for identifying bat habitat associations. A structure and geological features inventory should be completed to determine where bat roosts and hibernacula could be located.
- Dave suggested focusing on the Project infrastructure area and reservoir inundation zone and not in the access and power transmission corridors. He said that efforts should focus on areas where there are geologic features and historical structures of any size, including small cabins.
- Dave agreed that the study won't be able to determine Project impact levels, but impacts on bats could be inferred from the wildlife habitat evaluation.
- Dave said that the Project likely will not have much impact on bats, although there would be a direct threat if bat hibernacula occur in the inundation zone.

Study Methods for Wildlife Habitat Evaluation

- Terry outlined the procedure proposed for mapping wildlife habitats and evaluating wildlife habitat use for the Project. Wildlife habitat mapping would be a local-scale effort based on fine-scale imagery (1-m pixels or less), and the wildlife habitat evaluation would be prepared using those mapping data. Dave Tessler said that the Alaska Gap Analysis Project (GAP) map data are at a coarser scale than what is planned for the habitat mapping and evaluation studies for the Project. GAP data are derived from coarse-scale satellite imagery, using 30-m pixels, so the resulting habitat-use information also is coarse-scale (most suitable for regional-scale analyses). Dave suggested that it would be helpful if the wildlife habitats mapped for the Project could be crosswalked with the habitats defined in the GAP mapping. Keith Boggs and Tracy Gotthardt at the Alaska Natural Heritage Program should be consulted regarding data comparisons between the Project and Alaska GAP. The Alaska GAP data may be suitable to provide a regional-scale context for assessment of Project impacts. Such a regional-scale assessment would complement the local-scale impact assessment that is planned using the fine-scale habitat mapping for the Project.

Study Methods for Wood Frogs

- Dave Tessler said that the Project should gather data on fish presence in waterbodies to determine whether frogs are present. Where fish occur, it is very unlikely that frogs will be present. Dave said that any flooded vegetation could be breeding habitat for frogs. There is no minimum size of waterbody (very small flooded areas can be used for breeding) and generally larger waterbodies are not frog habitat because of the presence of fish. Betsy noted that a number of waterbodies will be studied in the fish study program for the Project, so data will be available on fish occurrence in many waterbodies.
- The PSP described a method for breeding frog surveys employing a single visit to each waterbody with two observers, timed during the peak calling period for male frogs. Dave said that, because of variability in calling among male frogs, a negative detection at a particular waterbody during a single visit does not prove that frogs aren't there. If the waterbody supports fish, however, then that negative detection is likely to be accurate.
- Dave mentioned that the USGS amphibian monitoring protocol suggests a second visit to improve detectability and occupancy estimates. He suggested conducting two visits in May because the peak calling period can be difficult to identify in a given year.
- Alex noted that occupancy estimates are likely to be more robust statistically if two or more visits are made to each waterbody.
- Terry noted that multiple visits to each waterbody could be performed within fairly reasonable cost and time constraints, but only if the number of waterbodies to be surveyed was not excessively large.
- Dave suggested that the Project may result in direct loss of breeding habitat in the inundation zone, as well as indirect effects in the access corridor due to road-related transmission of contaminants or possibly chytrid fungus, but that effects are unlikely to impact wood frogs on a regional or global level.
- Dave said that frogs don't need to be collected to determine the presence of chytrid fungus. Instead, a simple swab of the frog is all that is needed. Meg Perdue or Mari Reeves (USFWS) can suggest suitable laboratories to analyze swab samples from frogs.

Study Methods for Landbirds/Shorebirds

- Dave Tessler noted that, based on subsequent discussions he had with Maureen de Zeeuw of USFWS, his concerns had been addressed during the previous meeting on the landbirds/shorebirds study (September 6, 2012), which he was unable to attend.
- Dave emphasized that the observers used in the point-count surveys for the landbirds/shorebirds study should undergo distance estimation training and testing before field surveys are conducted.
- Dave said that, although he sees some validity in using double observers, the USFWS recommendation of employing distance and removal analyses based on standard Alaska Landbird Monitoring System (ALMS) field methods would be adequate.
- Dave agreed with the USFWS recommendation of conducting point counts over a longer period of time than currently proposed in the PSP, largely because weather and logistics constraints may limit the number of point-count samples collected.
- Dave said that getting an estimated 440+ point counts each year was a good goal and that it was not necessary to revisit those same sites in the second year. He emphasized the need for a longer sampling period, however (as above), and also noted the difficulty of finding a large number of qualified observers to conduct these surveys.



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Draft Meeting Summary Instream Flow Study-Fish, IFS-Riparian Groundwater, Ice, Geomorphology, Water Quality Technical Work Group Meeting 14 September 2012

LOCATION: AEA Project offices – 1st Floor Conference Room
411 W 4th Avenue; Suite 1
Anchorage, Alaska 99501

TIME: 8:00 am – noon; 1:00 pm – 3:45 pm (AKDT)

SUBJECT: Preliminary Instream Flow Study Site Selection

Attendees: Bob Henszey USFWS, Jeff Davis ARRI, Gay Davis ARRI, Leslie Jensen ARRI, Dudley Reiser R2, Joe Klein ADF&G, Phil Hilgert R2, Betsy McCracken USFWS, Kevin Fetherston R2, Stormy Haight ADF&G, Michael Buntjer USFWS, Betsy McGregor AEA, Michael Lilly GWS, Ron Benkert ADF&G, Dani Evenson R2, Kathryn Toews LVA, Marielle Remillard GWS, Paul Dworian URS, Wayne Dyok AEA, Joetta Zablottney R2, Mark Lamareaux Village of Eklutna, Bill Fullerton TetraTech, Robin Beebee HDR

On the phone: Rob Plotnikoff TetraTech, MaryLouise Keefe R2, Kim Sager ADNR, Matt Cutlip FERC, Fred Winchell Louis Berger, Matt Love Van Ness Feldman, Steve Padula LVA, Becky Long Coalition for Susitna Alternatives, Tim Ruga Louis Berger, Ethan Bell Stillwater, Krissy Plett ADNR

This meeting was focused on the Study Site Selection process. Dudley Reiser noted that since there had been many different issues and questions raised regarding the instream flow study, the plan moving forward was to have TWG meetings that would focus on and advance the state of understanding issues central to moving the study forward. This meeting was focused on Study Site Selection, but there will be other meetings scheduled that will focus on Methods selection, Habitat Suitability Curve development, Periodicity, and more topics. More information regarding specific TWG meeting topics and schedules would be provided in subsequent TWG meetings.

Following introductions, there were a series of four PowerPoint presentations prepared by Dudley Reiser and Phil Hilgert (Instream Flow Study – Fish), Kevin Fetherston (Instream Flow Study -Riparian), Bill Fullerton (Geomorphology), and Robin Beebee (Ice Processes). The presentations are available on the Susitna-Watana Hydroelectric Project website (<http://www.susitna-watanahydro.org/meetings/>).

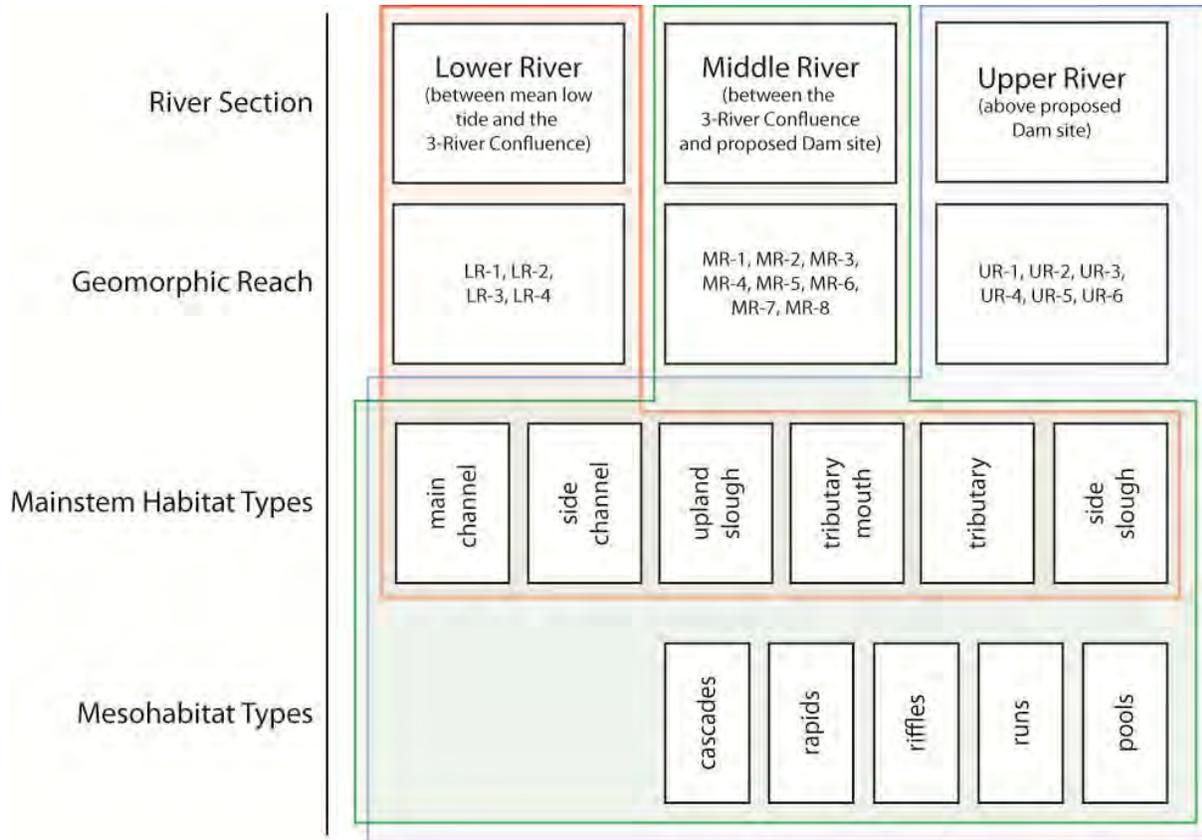
It was explained by AEA and study leads that the process being discussed during this meeting related to site selection is a first cut and that refinements would be made based on further information (e.g. results of habitat mapping) and further discussions with the TWG.

Status of Reach Stratification and Habitat Mapping



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Habitat classification was explained by Dudley Reiser in the following hierarchical arrangement (NOTE - this figure was not presented at the meeting but is included here to summarize the classification system).



(KT-9.19.12)

The current study sites were selected based on interpretation of the high resolution aerial imagery gathered with the LiDAR data by the Mat-Su Borough in 2010 and 2011. The study areas will be further refined as additional data (e.g. 2012 ADCP transect data, habitat mapping videography) become available.

River Mile Designation

Joetta Zablone presented the work underway to create a current GIS hydrography data layer for the Susitna River as well as the naming convention for tributaries and features in the mainstem Susitna River, such as side channels, side sloughs and upland sloughs. The hydrography and thalweg location is being determined by the current aerial imagery and the ADCP transect data. The new river mile system being created will be utilized project-wide. A crosswalk will be created to compare the historical and current river miles.

Joe Klein asked if river mile (RM) 0 will be located at mean low tide. Dudley Reiser indicated that is under discussion. Mean low tide may be designated as zero or as a negative number (i.e. distance) from



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the existing/historic river mile zero. The location of mean low tide needs to be determined. Betsy McGregor added that the updated mapping will be made available (once finalized), through the ADNR's website for the Susitna Watana Project.

Jeff Davis questioned which study is sampling to the level of meso and/or microhabitat. Habitat mapping will be done as part of the Aquatic Habitat Characterization study (see Section 7.9 of the PSP). Currently, all proposed intensive study sites are based on mainstem habitat types, as that is the most specific information presently available. Jeff Davis pointed out that species are affected on a microhabitat level. Videography of the middle river has been gathered for mesohabitat mapping purposes and is currently being processed; habitat types may be refined based on that data as well as additional data gathered in the field. Betsy McGregor mentioned that the videography, when finalized, would also be available on ADNR's website; Courtney Smith at ADNR is the contact person for the Susitna-Watana geodatabase.

Study Site Selection/Extrapolation Criteria

Intensive study sites¹ (i.e. Focus Areas) were chosen to represent many aspects of the respective river reach including fish habitat, geomorphology, water quality, groundwater and riparian resources. The objective of this approach is to evaluate and determine relationships between main channel flow in the Susitna River and the quality and quantity of habitats within off-channel habitats (e.g. side channel, side slough, upland slough, tributary mouths). It is anticipated that the study results within these areas will be extrapolated and applied to a larger scale of the river.

Bill Fullerton stated that the lower river stations were sampled at a single flow in 2012. Sampling at additional flows is an option in the future if additional data are deemed necessary.

With respect to the selection of the Focus Areas, raptor nest locations will need to be factored in, as there are buffer requirements during the nesting season to avoid disturbance to the birds. Other Focus Area selection considerations include accessibility and land ownership. Phil Hilgert noted that data from the 1980s had been reviewed and factored into the identification of the candidate Focus Areas as listed in the PowerPoint presentation. Site selection completed in 1981 and 1982 was extensive and incorporated a random selection approach. Sites became more focused in 1983 and 1984 as information became available indicating where the highest fish use occurred. Dudley Reiser noted that there was an extensive amount of data collected in the 1980s and that it is important to use and apply these data in planning future studies. Other sources of information that will be used in determining Focus Areas include results of the 2012 studies and the LiDAR data. Wayne Dyok added that the dramatically changing water conditions this year may help to understand conditions associated with Project operations.

Preliminary Study Site/Focus Area Selection

¹ During the course of the meeting, this terminology "intensive study sites" was modified to "Focus Areas".



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Jeff Davis voiced concerns of sampling in turbid water and the difficulty of differentiating whether there are no individuals present (if not collected) or if the methods simply limit the collection of the individuals. He feels that sampling methods need to be suitable to have confidence in the results. Phil Hilgert indicated that sample sites will be in both turbid and clearwater areas. Focus Areas: Phil Hilgert noted that Focus Areas will be used to sample across resource disciplines (fish, habitat, riparian, geomorphology, water quality, ice, groundwater). The areas will not necessarily be the only locations of data collection for each resource area, but will serve to provide a more comprehensive understanding of how specific areas are influenced by and respond to main channel flows. Study Leads (Phil Hilgert, Kevin Fetherston, Bill Fullerton, Robin Beebee) presented proposed river reaches and Focus Area descriptions (refer to presentations available on AEA's website for the 9/14/2012 Instream Flow Study-Fish, IFS Riparian meeting). These Focus Areas were selected as representative of the respective geomorphic river reach in which they are located and include all mainstem habitat types. Joseph Klein asked if the entirety of each Focus Area will be evaluated by, for example the riparian study. Phil Hilgert indicated that this would be the case. He further explained that the reason no Focus Areas were identified between MR3 and MR4 was for safety concerns related to their proximity to Devils Canyon. It was emphasized that safety will take precedent in conducting all studies so that locations with dangerous or hazardous sampling conditions would not be selected

Some added details regarding specific Focus Areas that were discussed are as follows:

- The MR1 Focus Area includes a portion of a side slough. It was noted that the upstream portion of the slough was not included in the area and a concern was raised regarding the absence of a hydraulic control for that slough in the area. New boundaries were considered and Phil Hilgert mentioned that there will likely be some adjustment in final boundaries of the Focus Areas. He mentioned that a location downstream of current proposed Focus Area was discussed during an internal meeting but was deemed less representative of side channel habitat types.
- The Focus Area in MR2 (upstream site) will likely include a gross mesh (i.e. larger spacing) in the main channel and a finer mesh (more dense spacing) sampling strategy in the side channel areas when applying 2D modeling. This Focus Area is representative of rearing habitat and of features found between Devils Canyon and the proposed Project site. This area was not studied in the 1980s because the 1980s design concept included 2 dams and this area coincided with the lower reservoir that is not part of the current Project. This area includes groundwater and surface water as well as multiple geomorphic characteristics.
- MR5's Focus Area includes Portage Creek and is representative of the MR5 reach.
- With respect to the Focus Areas in MR6, Joe Klein mentioned that he knows of coho presence above the boundary shown in Slough 8A. He asked for fisheries work to cover that area. Michael Lilly clarified that other studies would include sampling outside of Focus Area boundaries as appropriate to each particular resource. Dudley Reiser indicated he observed chum and sockeye spawning in Slough 8A during 2012 field reconnaissance. He also noted there were no beaver dams present at this site on September 13, 2012. Robin Beebee noted that in some cases, the absence of beaver dams may reflect areas where ice jams are not present and



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the river narrows. She thought Slough 8A would be a good location for evaluating effects of the Project in the winter because the added winter flow would likely flush this area.

- Betsy McCracken requested that Focus Areas include both areas where fish occur and areas where no fish occur. Phil Hilgert noted that few/no fish were observed in Slough 17 which is part of the Indian River Focus Area (MR6). The Focus Area at Indian River (in MR6) was actually selected because it had this side slough (Slough 17) which looks similar to Slough 6A which did support substantial fish use in the 1980s. Adding the river delta at Indian was another factor in choosing this site. He also reiterated that no fish sampling was conducted in the 1980s at the Focus Area sites above Devils Canyon. Kevin Fetherston pointed out there were sharp lines between areas with meadows and trees and hypothesized this may be due to ice shear. Beaver dams can also form meadows. This site includes such meadows and will ensure that such habitats are studied.
- Robin Beebee discussed Slough 21 (in MR6) as having characteristics considered interesting for the ice processes study. According to the 1980s data, a channel in this area seems to have been created by river ice. Based on the 1980s simulation, this area will incorporate the edge of ice formation on the river after the Project effects are established. Jeff Davis also mentioned that Slough 21 is a sockeye spawning location. Spawning was seen in the 1980s but not in 2012. This slough currently includes a beaver dam complex; beaver dams were likewise mentioned in the 1980s at this location.
- Whiskers Slough is a Focus Area in MR8 that supports chum salmon spawning. Jeff Davis asked why chum would prefer this area since it is not distinguishable from other areas in the river. He asks that studies be developed to address this question.
- Slough 11 (also in MR6) is downstream of Gold Creek and the railroad bridge. Studies of this area were done in the 1980s. However, access to railroad property may constraint sampling intensity at this focus area. Dudley Reiser stated that spawning was seen on September 13, 2012 just down from the beaver dam.
- Dudley Reiser noted that while no specific proposed Focus Areas had been identified yet for the lower river, plans were to select one or more sites. The 2012 salmon radiotelemetry data would be used to identify specific study locations in the lower river section.

Critical Sites: Critical sites will be added to emphasize particular life stages. Jeff Davis asked what classification scale the critical sites would be based on (mainstem habitat type, mesohabitat or microhabitat). Dudley Reiser explained that the life stages may be associated with either a mainstem habitat type or mesohabitat type.

Betsy McCracken and Jeff Davis asked if non-physical habitat characteristics at the micro level (such as temperature, DO and food source) will be used in selecting the site locations. MaryLouise Keefe explained that those factors are based on the physical habitat (meso level) so the mesohabitat level will allow us to map all habitat types. Jeff Davis is interested in biotic information being a factor in choosing critical sites as attributes. Dudley Reiser mentioned that other studies will tie into this. The AEA team is



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aware that factors other than those currently available are important to fish. Joe Klein indicated he supported moving forward with the critical site concept. As important sites are recognized (a location of spawning burbot for example) then a critical site could be created.

Instream flow sites will include the tributary delta upstream to the upper extent of potential hydrologic influence from the Project, but not further upstream within the tributary itself.

Phil Hilgert expressed the need for Focus Areas and critical sites to be chosen by March 2013 in order for data collection to begin.

Winter studies: A participant (not identified) inquired when winter studies were scheduled to occur. Phil Hilgert said that they would begin this winter and that the dates would depend on the weather and ice conditions.



Ice damming and shearing effects were explained by Kevin Fetherston and Robin Beebee. The scarring on trees of the riparian zone will be used to map out the ice floodplain – tree interactions and to define ice process domains for site selections. Also, bringing data in from the botanical riparian study will provide a greater understanding. Michael Lilly brought in a portion of a tree with an ice scar. Kevin Fetherston explained how these scars can tell the height of the ice as well as the years in which the scarring occurred, providing historic data (see photo). A core sample can be taken and growth rings can date the time of the ice scar. He noted that the upper and lower end of the scar could be measured for scar elevation.

The effects of the Project on ice will be predicted by looking at current effects of ice dams. The proposed dam will be “collecting” any upstream ice. This needs to be considered when predicting post-Project ice damming. Natural climate change is also a consideration as it may be a factor changing ice and its effects. Robin indicated that there is currently insufficient data to determine if ice cover has naturally changed since the 1980s. Wayne Dyok elaborated by saying that NOAA/NMFS is working on collecting data, and AEA is planning on combining NMFS’s and AEA’s data to see if natural climate changes have occurred. The distance of an ice free zone caused by the Project was discussed. The ADCP transects and possible controls (for GIS accuracy) will be used in ice process zone mapping.

Betsy McCracken asked that side slope be considered in the floodplain to choose sites. It was explained that would be possible with the use of the surveyed transects and the LiDAR data.

Other Topics Discussed

Terminology



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The importance of consistent language throughout the studies was discussed and will be provided in the RSP, in the form of a glossary. It is important to note that different terminology exists for different fields (e.g. geomorphology and riparian). These terms will be defined in the RSP.

References

Michael Buntjer mentioned that references were not provided/correct in the PAD with regard to chum emergence dates. References, emergence dates and how to handle variability of multiple references going forward will be explored by the team.

Corrections to the presentation material

In the Geomorphology PowerPoint Presentation on the slide titled “Mainstem Aquatic Habitats Determination of 1980s and 2012 Areas”, the final sentence should read:–1980s habitat types only available *downstream* of RM 149 (Portage Creek) since 1980s effort did not extend upstream from Devils Canyon.

Protocol and future meetings

The protocols for TWG meetings were discussed regarding the distribution of presentation materials. Betsy McGregor said that any materials such as PowerPoint presentations will be available online prior to each TWG meeting and the attendees are responsible for printing materials if they would like hardcopies. Hardcopies of agendas will be provided at the meeting by AEA.

Jeff Davis requested an outline for the habitat classifications and the integration of studies. Dudley Reiser indicated he would try to present something at the next TWG meeting but that final details of the classification are still being refined. These would be more fully described in the RSP. Jeff Davis has requested a visual representation showing the integration of studies for him, and others, to comment on.

The next TWG meeting will focus on Methods and will include a Site Reconnaissance. Several participants commented that the protocol for providing feedback on meetings needs to be clear. It was noted that when providing comments to AEA one may also file it with FERC by CCing them in the email or distributing it directly to FERC.

Action Items

- The designation of mean low tide as river mile (RM) 0 will be determined.
- Videography, when finalized, will be made available through the ADNR’s website for the Susitna-Watana Project.
- The RSP(s) will include:
 - glossary of terms;
 - outline/schematic of the habitat classification system; and
 - schematic/description of the integration of the studies.



SUSITNA-WATANA

HYDROELECTRIC PROJECT

DRAFT AGENDA

**2013-2014 Wetlands Preliminary Study Plan—Wetlands Functional Assessment
18 September 2012**

LOCATION: AEA Project offices – 1st Floor Conference Room
411 W 4th Avenue; Suite 1
Anchorage, Alaska 99501
(Parking off 3rd Avenue; at Sunshine Mall)

TIME: 1:30-3:00 pm

SUBJECT: Discussion for Finalizing List of Functions for Wetlands Functional Assessment

TELECONFERENCE NUMBER: 1-800-315-6338 Code 3957#

1:30-1:45 pm Overview of Current Proposed List of Functions

1:45-2:45 pm Discussion

2:45-3:00 pm Action Items (if needed)

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
AEA Project Offices, Conference Room
411 W 4th Avenue, Anchorage, AK

Wetlands Delineation and Mapping
September 18, 2012 1:30 pm-3:00 pm

Attendees:

Organization	Name
ADEC	William Ashton
EPA	Matt LaCroix
USACE	Michiel Holley (on phone)
USFWS	Maureen de Zeeuw
USFWS	Bob Henzsey (on phone)
AEA	Betsy McGregor
ABR, Inc	Terry Schick
ABR, Inc.	Janet Kidd
ABR, Inc.	Wendy Davis
ABR, Inc	Sue Ives
MWH	Kirby Gilbert (on phone)
Solstice Alaska Consulting, Inc.	Robin Reich
Van Ness Feldman	Matt Love

Terry Schick (ABR) opened the meeting and said that the primary goal of the meeting was to agree on wetlands functions to assess for the Susitna-Watana Hydroelectric Project.

Janet Kidd (ABR) (following the PowerPoint presentation attached to these notes) discussed various functional assessment methods employed in Southcentral Alaska and their data collection requirements.

Water Quality Function

There was discussion regarding how the “modification of water quality” function should be assessed. Primary points included:

- The group agreed that it is difficult to assess pristine wetlands that are not near human development for the modification of water quality function, because there is little opportunity to perform this function.
- USACE, USFWS, and EPA stated that sediment, toxicant, and pathogen retention could be important once the project is built.
- Mike Holley (USACE) stated that the USACE needs to understand a wetland’s role in water quality protection for the permitting effort.
- The group discussed whether the water quality function should be split into functions like sediment/toxicant/pathogen retention and nutrient removal / retention / transformation.

- As proposed in the study plan, ABR is planning to collect functional data for modification of water quality function by assessing the presence of inlets and outlets, outlet restriction, cover types and distribution, and soil types.
- **The group decided that it is important assess the “modification of water quality” function, but that the function did not need split into more detailed water quality modification functions or subfunctions.**

Contribution to Abundance and Diversity of Wetland Fauna Function

There was discussion regarding assessing the contribution to abundance and diversity of wetland fauna function of wetlands within the Project area. Primary points included:

Fish Habitat Function

- Determining whether wetlands are functioning in support of fisheries habitat is important to agencies.
- The summer 2012 wetlands fieldwork did not assess the fish habitat function of wetlands.
- A separate comprehensive fish study is occurring for the Susitna-Watana Hydro project. The wetlands field study area and the fisheries field study area do not completely overlap.
- Matt LaCroix (EPA) prefers that a fish habitat function be validated in the field; however, the outputs of the separate fish study could be attributed to the wetland functional assessment work in GIS.
- **The group agreed that fish habitat would be assessed as a subfunction of the abundance and diversity of wetland fauna function. Data collected by the fish study will be incorporated into the wetlands functional assessment to determine whether wetland polygons are performing a fish habitat function.**

Wildlife Abundance and Diversity Function

- Maureen de Zeeuw (USFWS) said that it will be important to document when wildlife diversity is low.
- Matt Lacroix said that it would be good to have a list of associations for determining whether the wetland is functioning in the abundance and diversity of wildlife. For example, functional level could be determined by the number of species or the number of species group retained within a wetland.
- Terry Schick (ABR) said that if necessary the wildlife habitat evaluation could be repeated using the wetland types instead of the wildlife habitat types.
- Matt LaCroix said that moose and caribou are important to the public and that there is value to looking at public’s interest.
- Matt LaCroix said wetland fauna attribution will be very important as the Project moves forward.
- Maureen said that wildlife habitat attributions will be very important especially outside inundation zone as these could change once the Project is constructed.
- Bob Henszey (USFWS) said that the wetlands effort should rely on the wildlife habitat evaluation for information about the wildlife function. He said that it is important to

assess whether the wetland will be able to provide that function once the Project is constructed.

- **The group decided that wildlife abundance and diversity would be assessed as a subfunction of the abundance and diversity of wetland fauna function.**
- **The group agreed that the wildlife habitat work will be incorporated into the wetlands functional assessment to determine whether wetland classes are performing a wildlife diversity and abundance function.**

Wetland Function Scoring

There was discussion regarding assessing wetlands functional scores or weighting functions within the Project area. Primary points included:

- The group discussed how wetland functions could be scored.
- Janet said that the methodology will not make an assessment of what function is most important or weigh functions at this point.

Permafrost

- ABR confirmed that there were some wetlands with permafrost in the Project area.
- Terry said that there have been limited studies conducted on permafrost characteristics in the Project area.
- Matt LaCroix asked whether there might be different wetland functions related to permafrost. Janet said that permafrost usually lowers functional values like floodwater storage and productivity. She said that permafrost wetlands, however, are more sensitive to disturbance.
- Matt LaCroix said that the team might want to note in the method/report document where permafrost is seen and document how it affects wetland functions.
- **The group decided that permafrost would be addressed by classifying permafrost dependent wetlands as separate classes.**

General comments

- Matt LaCroix asked whether the proposed wetland functions meshed with the types of functions seen in the field during the summer 2012 wetlands delineation field effort. Janet said that many of the functions proposed for the Susitna-Watana Hydro wetlands field effort would be analyzed using GIS; however, she said that parameters that reflect wetland functions would still be assessed in the field. Matt said that he wanted to be sure that the GIS-based, landscape-level assumptions are validated with field data.
- Mike Holly (USACE) said that he agreed with the listed wetland functions. Mike said that had no preference whether the wetlands function list was split into more concise functions or lumped together into larger functional categories. Mike said that the USACE needs to be able to address wetland functions in the decision document. He preferred that wetland functions that could be performed once the Project is constructed remain in the assessment method.

- William Ashton (ADEC) said that he agreed with assessing the habitat contribution of fauna. He said that fish and large fauna should be assessed as separate wetland functions because of public interest and because these functions could be important for mitigation later in the process.
- Matt LaCroix said that not all of a certain type of wetland will have the same function, and he said that information from the field might be needed to support the GIS-attributed functions.

Susitna–Watana Hydroelectric Functional Assessment Methodology



ABR
inc. *environmental research & services*

 **SUSITNA-WATANA**
HYDROELECTRIC PROJECT

Wetland Functional Assessment as Part of the Section 404 Process

- Identify development alternatives that result in the lowest impacts to wetlands in terms of functional value
- Determine the magnitude of the effects of potential impacts (i.e., what is the functional value of the wetlands that will be lost)
- Develop mitigation plans to compensate for losses in wetland function

Wetland Functional Assessment Methodology Requirements (from Smith et al. 1995)

- Standardized methods
- Applicable across study area
- Inclusive of all wetland types and functions
- Compatible with time and resources available
- Sensitive to potential impacts
- Addresses agency and other stakeholder concerns
- Capable of incorporating new data or changing project requirements

ABR Functional Assessment (modified Magee Hollands Approach)

- Wetland Functional Classes will be used as the foundation of the assessment and will be linked to HGM classes
- Landscape, hydrologic, soil, and vegetation variables will be incorporated into the model
- GIS layers identifying wetlands important for recreation, subsistence, and habitat use will be used in developing the models
- Allows for developing criteria for determining the functional value of wetlands for compensatory mitigation planning

Wetland Functional Assessment Methods

HGM (Slope/Flat Wetlands)

Cook Inlet Basin

- Discharge of water to downgradient systems
- Surface and shallow subsurface water storage
- Particulate retention
- Organic carbon export
- Cycling of elements and compounds
- Maintenance of characteristic plant communities
- Maintenance of characteristic habitat structures
- Interspersion and connectivity

Interior Alaska

- Soil Profile Integrity
- Characteristic Soil Thermal Regime
- Surface and Near Surface Water Storage
- Cycling of elements and compounds
- Organic carbon export
- Plant Community
- Faunal Habitat Components
- Interspersion and connectivity

Mat-Su Wetlands Functions and Values

- Contribution to groundwater
- Transmission of groundwater
- Streamflow moderation
- Floodflow alteration
- Sediment/Toxicant/Pathogen retention
- Sediment shoreline stabilization
- Nutrient removal/Retention/Transformation
- Foodchain support
- Anadromous fish habitat
- Habitat and maintenance of biodiversity
- Habitat for species of interest
- Recreation
- Consumptive uses
- Education
- Visual quality/Aesthetics
- Cultural and historical significance
- Uniqueness

ABR Proposed Functions and Values

- Modification of groundwater discharge
- Modification of groundwater recharge
- Storm and flood-water storage
- Modification of stream flow
- Modification of water quality
- Export of detritis
- Contribution to abundance and diversity of wetland vegetation
- Contribution to abundance and diversity of wetland fauna
- Consumptive uses
- Uniqueness



SUSITNA-WATANA HYDRO

Draft Meeting Notes Cook Inlet Beluga Whale Study September 19, 2012

LOCATION: AEA Project offices
411 W 4th Avenue
Anchorage, Alaska 99501
(Parking off 3rd Avenue; at Sunshine Mall)

TIME: 10:00 am – 12:00 pm (AKDT)

SUBJECT: Cook Inlet Beluga Whale Study Plan

Betsy McGregor (AEA), Wayne Dyok (AEA), Keri Lestyk (HDR), Michael Link (LGL), Mandy Migura (NMFS), Mark Burch (ADF&G), and by phone: Bob Small (ADF&G), Kate Savage (NMFS) and Matt Love (VanNess Feldman).

Topics:

Aerial surveys

- The PSP included aerial surveys of all of Type 1 critical habitat for beluga whales. However, after further discussion AEA decided to limit the study area to the Susitna River delta to concentrate efforts where possible Project effects could take place. The NMFS and ADF&G agreed that this was the appropriate study area.
- Approximately the same number of flight hours (80-100) will be flown, but given the smaller study area, these hours will provide for more surveys. How these additional surveys will be distributed will be described in the Revised Study Plan.
- The RSP will also address the schedule of the aerial surveys to include not only periods when large fish runs are present (May and June), but also times when beluga whale calves may be present (July and August).
- The RSP will also address survey timing in relation to tidal cycle. Surveys during low tide are preferred for group counts because whales are more concentrated than when the mudflats are covered with water at high tide. However, surveys during high tide are more appropriate to assess the northern (upriver) extent of animals in the Susitna River. AEA will take this into consideration when planning surveys.
- Aerial surveys will also serve as a means to ground-truth the video analyses. There will be direct comparisons between the two study methods.
- Aerial surveys are only being used to assess distribution and relative group size. There will be no attempt to calculate an abundance estimate from these surveys.

Video Cameras



SUSITNA-WATANA HYDRO

- The video camera data will serve as the primary means to assess group composition since it will be hard to distinguish smaller, darker animals from the aerial surveys that will be flown at 1,000 feet altitude. Some opportunistic still photography will be obtained from the aircraft when it does not interfere with counting animals or greatly reducing survey coverage.
- Video camera data will also serve as a means to observe behavior, especially for individual animals rather than the group behavior that will be documented during the aerial surveys.

Acoustics

- ADF&G questioned how non-daylight and winter months were going to be addressed because aerial surveys and video cameras will only be used during the open-water season (April – October) and are effective only during periods of daylight. They suggested acoustics as a way of documenting beluga whale presence and foraging behavior during these times.
- There was a lengthy discussion on the costs and efficacy of acoustics in this area, especially during winter months. The group concluded that several factors would limit the efficacy of an acoustic array, including sufficient range/coverage of the survey area, ice scour in the river and intertidal areas, high in-water noise, and, most importantly, a high probability of false negatives regarding presence of whales.
- Because lack of acoustic recording cannot necessarily imply that whales are not present (only that they were not detected), and there is evidence of use of the area in winter, the impact analysis will just assume that whales are present during winter months.
- ADF&G suggested that AEA consider using bottom-founded acoustic recorders during the summer months to augment the aerial and video visual-based methods.

Impact Analyses

- There was discussion regarding how the information from this study would be analyzed to look at potential Project-related impacts. Everyone agreed that if Project impacts did occur it would be through impacts to either habitat or prey availability rather than directly to beluga whales in the form of altering access to the areas they use. Therefore, the impact analyses needs to address these indirect pathways to potential impacts on the beluga whale population and its critical habitat. AEA explained that there are several studies that will address potential Project impacts on habitat and prey including: Instream Flow, Geomorphology, Ice Processes, Water Quality, and fish studies for salmon and eulachon. Data from these studies will be incorporated with beluga whale data for characterizing potential impacts. NMFS asked AEA to clarify this in the RSP.
- There was a discussion about the potential for impacts to the mudflats because that is also a PCE for beluga whales. The Project will be placed upstream approximately 180 RM from the mudflats. Physical impacts to the environment will decrease with increasing



SUSITNA-WATANA HYDRO

distance from the Project given additional inputs to the river from tributaries and relative contribution by the Susitna River to Upper Cook Inlet. Project effects at the mouth of the Susitna may be dwarfed by the large tides. AEA will look into adding a modeling component to the RSP that will include a more in-depth look at tidal flow, currents, and oceanography in the Susitna River delta and put these into perspective with the Project-related changes to the hydrograph at the mouth of the river.

- NMFS requested clarification for what type and magnitude of impacts will be considered significant. NMFS and AEA agreed to work closely to help establish these criteria. It was agreed that impacts to foraging ability will be easier to establish criteria (i.e. decrease in prey density) than criteria for reproductive success since information on beluga whale reproductive success is limited in Cook Inlet.

DRAFT

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Recreation and Social Sciences Survey Meeting
September 20, 2012, 9:00 am – 1:00 pm

Attendees:

Organization	Name
ADF&G	Joe Giefer
ADF&G	Davin Holen
AEA	Wayne Dyok
AEA	Nick Szymoniak
AEA	Betsy McGregor
Alaska HIA	Paul Anderson*
BLM	John Jangala*
BLM	Cory Larson
Center for Water Advocacy	Harold Shepherd
DOWL HKM	Maryellen Tuttle
FERC	David Turner*
FERC	Ken Wilcox*
HDR	Tracie Krauthoefer
The Louis Berger Group	Lisa McDonald*
McDowell Group	Donna Logan
McDowell Group	Bob Koenitzer
MWH	Kirby Gilbert*
Natural Heritage Institute/ HRI	Jan Konigsberg
Northern Economics	Pat Burden
Northern Economics	Jonathan King
NPS	Cassie Thomas
NPS	Harry Williamson*
SRB&A	Steve Braund
SRB&A	Liz Sears
URS	Bridget Easley
URS	Tim Kramer
URS	Louise Kling*
URS	Mark Storm*
ERM	John Gangemi*
NOAA	Scott Miller*
Resident	Becky Long*
ADNR	Dave Griffin*

*by telephone

Introduction and Meeting Overview – Wayne Dyok (AEA)/Kirby Gilbert (MWH)

Kirby provided an overview of the recreation and social sciences study planning process from release of the PSP on July 16th through the current phase of study plan revision. He also provided an overview of the agenda, which is focused on surveys and survey instruments along with interconnections to other studies, and he noted that the August 8th meeting minutes had been posted..

Recreation Survey Planning

Donna Logan (McDowell) provided an overview of the surveys planned through the recreation studies. Donna outlined the three categories of surveys; 1) incidence observation survey form; 2) Intercept Surveys (w/Online component/option); and 3) Mail Survey (with telephone component). Donna went on to describe the Project area and the study areas including a study area for the intercept survey. The area is generally bordered by the Parks highway, Denali highway, Richardson highway and Glennallen highway.

Cassie Thomas (NPS) expressed interest in having more intercept survey sites on the lower Susitna River that could be affected and suggested that it would be prudent to collect seasonal information on users and use patterns in the river areas, especially related to angling use but also river flow changes and possible ice changes. She suggested that perhaps more emphasis could be given to survey and evaluate recreation downstream of Talkeetna in the Susitna River corridor and perhaps less along the Richardson Highway. Bob (McDowell) explained the stratified random access rationale for the various intercept locations.

Scott Miller (NOAA) noted that NOAA Fisheries is interested in Essential Fish Habitat and associated recreation changes to the river downstream of Talkeetna. Scott also mentioned boaters and users might go up the Susitna River from Cook Inlet, departing from Anchorage possibly, and that it would be important to capture these forms of recreation in the intercept survey.

There was further discussion about the Intercept survey sites. Cassie (NPS) suggested basing the intercept survey area using information from other resource study areas such as what anticipate effects might occur in ice processes, river flow, and fish. . Following on this, there was some discussion that perhaps popular gas stations and the larger boat ramps would be good places to pick up survey respondents. There was also discussion of the use and merits of using the Statewide Angler surveys and freshwater guide log books. Scott cautioned use of the Statewide Angler survey may introduce potential bias. However, AEA's consultant's thought that the survey data would be sufficient for the intended use. Kirby (MWH) emphasized the importance of characterizing the regional recreational environment, including those beyond the immediate project area, to understand use and establish context and the potential displacement of recreational use.

Becky Long (Talkeenta Resident) asked about how we will get at river transportation uses. Tracie (HDR) stated that there will be a separate resident subsistence survey that includes

questions related transportation uses. It was discussed that the subsistence survey and the recreation surveys will contribute to the efforts in the transportation study attempting to characterize the transportation uses of the river corridor. Scott Miller (NOAA) expressed support for using the Whistle Stop train stops to undertake the surveys.

Bob (McDowell) summarized the details of the Intercept Survey including timing, logistics, anticipated response numbers, the rationale behind intercept site selection, key recreational groups, and the methodology to be used to ensure a stratified random sampling. There will be three sampling periods centered on based on seasons (i.e., winter starting late February 2013, June-August peak summer use, and the fall hunting period). Some discussion occurred on additional methods and instruments (postcards on vehicle windows, polling at internet forums, and focus groups) that could be utilized and the pros and cons of each.

Donna went on to explain that the Intercept Survey will likely serve as the basis for the mailing survey, but there are practical questions that change. A post card mail out survey will include a map that is easier to understand than if we were surveying by telephone and an invitation to a website. Location data collected will help determine the location of use areas, activities and the intensity of use. There was discussion of the need for potentially providing some incentives, something like participants being entered in a contest for a lodge stay, or gift certificate for a sporting goods store. Wayne Dyok (AEA) agreed to look into AEA's procurement rules to see what is permitted.

For winter surveys there was mention of going to a highly used location, like Turnagain Pass as we might find some of those users recreate in the Susitna River valley. A key goal of the recreation surveys is to get a better understanding of recreation demand. Jan Konigsberg (NHI) suggested linking the survey on other sites such as dog mushing or snowmobile sites, but it was noted that this would introduce bias in the survey.

Harry Williamson (NPS) asked if the licensing participants can help review the data once it is collected. There was some discussion of what might be in the Initial Study Report to be completed in early 2014 and if there would be time to have analysis of the survey results or just reporting of the results. The report will summarize the data collected but the analysis of the data will take more time. In response to a request from Joe Giefer (ADF&G), Wayne (AEA) said that it may be possible to provide data before the report, but only after the data has gone through a quality control review.

Donna explained more about the mail out survey, which would have about 10,000 mailings, likely in two batches of 5,000. This survey will help get at resident's uses of the area, not just limited to recreation uses. A short telephone survey (400 individuals) would occur following the mail survey to test for level of bias.

Donna also emphasized the need to limit the length and number of questions on both the intercept and mail surveys for practicality, given a respondent will become impatient if the survey is too long. Questions will need to be focused and limited in extent. Other methods of

collecting data should be explored if possible. In response to a question about the use of focus groups, Donna noted that a focus group is not planned for the recreation study.

Discussion then turned more toward process and Cassie (NPS) expressed interest in further developing a communication protocol perhaps or something that would help agencies know or track what changes are being made to the study plans, or how and when participants could review and contribute to the final products, outside of the formal comment periods. Ken Wilcox (FERC) also suggested that AEA provide more clarity on its process to prepare the revised study plans. David Turner (FERC) emphasized that this informal comment period is intended to help find resolutions and identify areas of agreement and disagreement, rather than for participants to merely comment on the Proposed Study Plan. Jan (NHI) suggested that AEA prepare a table that reflects points of agreement and disagreement. Wayne (AEA) agreed to consider confer with the AEA team to see how AEA might best identify agreements and disagreements.

Kirby (MWH) mentioned that each of the 58 study plans have their own process as each has various needs for updates and revisions, but suggested that at each meeting, we could start by going over the comments and revisions we are or have made to the study plans. He also suggested that the Recreation Study many need more structure given the number smaller of items relating to it and that for future meetings, materials could be made available prior to the meeting.

Socioeconomic Study Plan

Pat (NEI) provided an overview of efforts to assess socioeconomic impacts and NEI's efforts to coordinate with McDowell on the survey to collect information on spending activities. He noted that quality of life will be considered in the socioeconomic study teams contributions to the recreation survey, as well as in the subsistence survey.

Jonathan King (NEI) discussed the socioeconomic survey aspects regarding the expenditure information the McDowell group is intending to help collect in their surveys as well as social welfare information that will help inform the use of other modeling. Jonathan discussed the use of a Random Utility Model (RUM) that may potentially be used to assess the economic impact of the top four or five recreational activities within the study area. The RUM was added in response to comments on the PSP. If developed using appropriate variables, the RUM would enable modeling of the economic impacts of current and new site development. Cassie (NPS) expressed interest in the model but emphasized the importance of including future management regimes and different planning scenarios.

Dave Griffin (ADNR State Parks) explained he had not participated previously but was glad to join the workgroup and mentioned several items of possible interest that State Parks has been doing in the upper Susitna River Valley. Dave described they are working on developing a new visitor center in Denali State Park, but do not have all the funding yet, however are planning on developing a camping area (55 sites) near MP 135 on the Parks Highway. He also mentioned they had done a feasibility study with some visitation information he could pass along. In addition, they will be extending three-phase power supply up the highway from MP 101 to MP

121 and have plans to further extend three-phase power to MP 135 and then onto the Princess Lodge. Wayne Dyok (AEA) gave Dave his contact information so Dave could send along the reports and information which Wayne then could pass onto the study team. Dave also recommended working with the Alaska Railroad for surveying along the Whistle Stop train.

River Flow Study Plan

John Gangemi (ERM) went over the river flow study plan surveys in terms of what was planned for each of the three river reaches defined in the study plan(i.e., upstream of Watana, Watana to Portage Creek and Portage Creek to the confluence). John described the targeted interview method, along with an online survey for boaters and how the surveys are trying to get at flow preferences and frequency of use among other things. John agreed he could provide copies of draft or typical survey instruments to the participants in the next few weeks. Cassie (NPS) again mentioned the need to understand river use patterns, river uses downstream of Talkeetna if flows, winter ice, or fisheries are going to be affected by the Project. John noted that for summer effects, he can apply the information gained from the reach upstream of Talkeetna to the reach downstream.

Aesthetics Study Plan

Louise Kling (URS) briefly described the aesthetics study survey components. It was agreed she would have more materials for review prior to the next technical focus group meetings on recreation and aesthetics, including sound and methods/locations of tentative information collection points, etc. Mark Storm was introduced as the lead for the Sound assessment. The aesthetics study may piggy back on the time lapse cameras set up for the ice studies and cross sections.

The meeting concluded that more follow up discussion would occur and Cassie was going to do a Doodle Poll to confirm when a follow up meeting on the surveys could take place in the next few weeks. It was mentioned that for those that cannot participate in some follow up meetings or conversations, the study teams could recap at the scheduled October 16th TWG what changes they have made to the study plans and the result of the smaller meetings.

Action Items

- Evaluate adding more Intercept survey sites in Lower River locations and perhaps cutting back a little on Richardson Highway locations/effort to make the adjustment.
- Consider the merits of evaluating Susitna River bound boaters departing from Anchorage as potential survey locations and follow up to evaluate significance/extent of such use.
- AEA to consider if there is a potential gap in the mail survey for out of town land owners.
- AEA to consider obtaining debriefs from AEA's helicopter pilots travelling in the project area.
- Coordinate with Subsistence and Transportation studies on segmenting transportation uses of river verses recreation uses of the Susitna River.

- Wayne Dyok to follow up on AEA procedures regarding potential use of incentives in survey.
- Consider the potential of using popular day use areas for survey sites like Turnagain Pass (for snow-machiners) to survey a group who may have some familiarity with use in the upper Susitna River basin.
- Outline the likely extent of survey results reporting in the first year report (Initial Study Report due out Feb. 3, 2014) and consider a process to allow licensing participants to review survey data prior to analysis.
- AEA to consider producing a table to outline the process for working with licensing participants to review study plan changes prior to finalizing for RSP December 14th (and prior to comment close November 14th).
- John Gangemi to provide example or tentative Online and Executive Survey instruments by end of next week.
- Tracie to send John Gangemi a list of subsistence survey locations so he can determine if additional questions should be added to facilitate the river flow study.
- Tracie to post the subsistence survey online.
- Louise Kling to provide more details on KOP selection and any survey instruments or focus group plans within the next week.
- Follow up with Cassie on scheduling a small focus group session in next couple weeks to further go over the survey plans, consider adding Aesthetics and Noise survey plans, work with Betsy and Kirby to schedule this meeting.

AEA Team Member		Other Party	
Name:	<i>Charles M. Mobley, Cultural Resources Program Lead</i>	Name:	
Organization:	<i>AEA</i>	Organization:	<i>AEA</i>
Study Area:	<i>AEA Office</i>	Phone Number:	<i>800-315-6338 code 3957#</i>
Date:	<i>September 24, 2012</i>	Time:	<i>1:00 -3:00 pm</i>
Meeting held by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others at meeting:

Present:

Taylor Brelsford, URS
 Charles M. Mobley, Charles M. Mobley & Associates
 Justin Hays, NLUR
 Fran Seager-Boss, MatSu Borough
 Kirby Gilbert, MWH
 Betsy McGregor, AEA
 Bruce Tiedeman, AEA
 Richard VanderHoek, AOHA
 Wayne Dyok, AEA

By Telephone:

John Jangala, BLM
 Dara Glass, CIRI
 Jim Kari
 Chuck Sensiba, Van Ness Feldman
 Becky Long, Coalition for Susitna Dam Alternatives

Subject: Cultural Resources Study Plan Workshop – revised APE map and other maps

Discussion: After introductions, NLUR’s Justin Hays presented five draft maps that NLUR has prepared and revised using the direction received at the September 7th cultural resource meeting in AEA offices. Similar to the September 7th meeting, the focus of this meeting was on defining the Area of Potential Effect (APE) and associated aspects including where previous surveys have taken place and likely level of effort associated with future surveys.

A new draft map was presented by Justin showing a revised Direct Impacts APE as well as an update to the preliminary Indirect Effects APE. The direct impacts area was refined from 2,200 foot down to the 2,050 foot contour around the impoundment area. The indirect effects APE was revised to follow logical subwatershed boundaries around the reservoir. User made trails were added to the Indirect Effects APE on the map, including those leading to the reservoir that were identified from several sources including field observation and BLM geodatabase. The road and transmission corridors were also included on the map using the current study area buffers for those corridors as the Indirect Effects APE. The Direct Effects APE would be along the actual road and transmission line alignments, once selected and those are within these corridors.

Ensuing discussion focused mostly upon details of the Indirect Effects APE and trails. John Jangala of BLM pointed out that BLM’s data are incomplete, and that the recently created “Raptor Trail” was omitted on these maps but should be added. Rich VanderHoek of AOHA urged clarity in applying trail

information for use in reconstructing historic uses versus defining potential impacts. Jim Kari suggested distinguishing foot-trails from other types, and Fran Seager-Boss recommended researching historical maps including the 1906 Rumsey map to identify historic trail locations. Dara Glass of CIRI stated that all trails on CIRI land were likely used by trespassers and voiced concern that a map depicting trails in any context including cultural resource investigations could inadvertently appear to legitimize those trails. Becky Long echoed concern about inadvertently affecting access.

It was agreed that a map legend stating what the trails were (designated or user-defined physical features) and where the data came from would be appropriate and to consider somehow making some notation on the maps or in a footnote that the trails mapped are not necessarily public access trails but some trails could be on private lands not available to public access without permission. It was further concluded that at least three layers of trails will be compiled: a BLM layer, a layer based on actual field observations, and a layer depicting historic foot trails. The maps will be revised accordingly.

A map of the legacy surveys from the 1980s was shown in overview and more detail formats. The legacy surveys of the 1980s had several types of survey and the maps are intended to show the spatial extent of the various types of surveys. The distribution and type of early 1980s survey data was discussed. These maps also show the Direct and Indirect Effects APE (impoundment and three road/transmission corridors), and the distribution of areas surveyed between 1979 and 1984.

Discussion included some explanation of the differences between the types of surveys. Discussion also included the status of ANILCA 14(h)(1) sites in the area and there was some agreement the status of sites need to be addresses and perhaps located on the maps if in the Project area. John Jangala mentioned that most of these sites are awaiting transfer to ANCSA Regional Corporations pending BIA archaeological surveys. The 14(h)(1) site near the mouth of Tyone River was tentatively seven sections in size. Mobley indicated that BIA had been contacted about obtaining 14(h)(1) site information (that data was acquired for the study teams consideration later in the day).

In further discussion it was suggested that the map title for the map of previous surveys be more descriptive ("Legacy" doesn't convey much), and that the legend be more explicit, as well. Presentation of the 1980s survey zones on the map was truncated at the edge of the current impoundment/corridors footprint and it was recommended that the missing portions of the polygons be reinserted onto the map.

The map showing types of surveys proposed for 2013/14 was presented and discussed. This map attempts to show how the Direct Effects APE will be surveyed in terms of primarily pedestrian coverage, or primarily aerial coverage.

Discussion focused on ways to make the map more descriptive and accurate. The "Combo" category is actually "not enough data," and the aerial method also includes touchdowns for pedestrian scrutiny, while the pedestrian coverage requires helicopter support. The proposed Indirect Effects APE shown on the maps was not yet characterized according to which survey methods would be used and it was felt more discussion was needed in the text as to the activities planned for those areas. In addition to changes on the map legend there also was acknowledgment for the need for a developed explanation of all survey methods in the text of the revised study plan.

The final map discussed was the Language Map, showing general Native language boundaries and the Project area. This map shows the larger region and the approximate demarcation of traditional Native languages in relation to the Project area. Discussion on this map included a request from Jim

Kari that the Tanana label be changed to Lower Tanana. Bruce Tiedeman and Dara Glass both recommended that Alaska Native Regional Corporation boundaries be included. Further discussion revealed it might be more appropriate for the Regional Corporation boundaries to be placed on the land ownership map which will be a separate map from the language and APE maps.

Summary. All five maps will receive some revision, with the intention that they appear in the RSP to help present the details of the cultural resource study plan. Attendees at the meeting were reminded that formal comments on the PSP are due to AEA before November 14 and AEA would be sending out draft RSP sections around the time of the next TWG meetings in October for parties to consider in formulating their comments.

Action Items:

- Add Raptor Trail to Indirect Effects APE
- Add a map of land ownership with Native Corporation boundaries
- Clarify where specific trail data comes from and make sure its clear what these trails mean and also identify any formal designated trails verses any user created trails that are not sanctioned by landowners.
- Update maps with minor adjustments as noted in meeting such as scale and format, etc.
- Update language map to show Lower Tanana verses just Tanana
- Provide detail text discussion of survey method, including quantitative metrics, to go with map of methods.
- Update study plan with information about ANILCA 14(h)(1) sites.
- Provide additional narrative of the details of survey methods to go with the maps.

AEA Team Member		Other Party	
Name:	<i>Michael Link</i>	Name:	<i>Jack Erickson, James Hasbrouck</i>
Organization:	<i>LGL Alaska Research Associates, Inc.</i>	Organization:	<i>ADF&G</i>
Study Area:	<i>Fisheries Resources</i>	Phone Number:	<i>267-2398</i>
Date:	<i>September 25, 2012</i>	Time:	<i>11:00-12:00</i>
Meeting held by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others at meeting:

n/a

Subject:

ADF&G Sport Fish Division’s comments on the 2013-14 Proposed Study Plans, Salmon Escapement and Fish Genetics

Discussion:

Purpose of meeting: review ADF&G comments and additional input to the Salmon Escapement Study Plan in preparation of the Revised Study Plan.

Reviewed the emailed comments from ADF&G (Klein) on August 23, 2012.

Specifically, we discussed the request for locations for weirs in the Yentna and Susitna rivers. This material was in the PSP but additional emphasis/clarification was recommended.

Of greatest importance was to clarify that the coho salmon escapement estimates are not currently requested by ADF&G (as was in an earlier Study Request in May 2012) for the entire Susitna River but instead for the Susitna River *above the confluence with Yentna River*. This change was made in the RSP and language was added to further clarify the scope.

Reviewed the PSP and made several modest edits to descriptions. All edits were made and retained for the RSP by AEA.

Discussed the general feasibility of using genetic markers for mark-recapture based abundance estimates in the Susitna River.

Discussed the utility of marking additional Chinook salmon at Devils Canyon area to increase sample sizes in the Canyon for assessing fish passage and the distribution of fish above Devils Canyon. The RSP contains a provision for additional tagging effort at Devils Canyon.

A productive 1-hr meeting and all of ADF&G’s comments and concerns were addressed in the RSP.

Action Item:

n/a



SUSITNA-WATANA HYDRO

Draft Meeting Notes Fish and Aquatics Studies September 27, 2012

LOCATION: AEA Project offices
411 W 4th Avenue
Anchorage, Alaska 99501
(Parking off 3rd Avenue; at Sunshine Mall)

TIME: 10:00 am – 12:00 pm (AKDT)

SUBJECT: Discuss Michael Buntjer's comments raised after the 9/13/2012 USFWS meeting on the Fisheries Studies

Attendees: Betsy McGregor AEA, Michael Wiedmer ARRI, Chiska Derr NMFS, Dani Evenson R2, Kathryn Toews LVA, Justin Crowther AEA, Michael Link LGL, Wayne Dyok AEA, MaryLouise Keefe R2, James Brady HDR, Joe Klein ADF&G, Michael Buntjer USFWS, Jeff Davis ARRI

Following the 9/13/2012 meeting at USFWS, Michael Buntjer requested additional clarification on aspects pertaining to the Fisheries Studies. This meeting was intended to address those requests in a small working group.

A description of the tiered objective approach to the fish distribution and abundance studies was explained as follows:

1. Fish presence/absence- requires less effort and less costly techniques. Because of this, these data can be collected at more locations than data for the other objectives. Methods may include 1 pass electrofishing, 1 pass snorkel and 1 pass minnow traps. This objective is to characterize fish assemblage and may be used to weight sample locations for other studies.
2. Relative abundance/density- samples at fewer sites than presence/absence with a higher level of effort. Methods may include 4 set removal of drift nets for 90 minutes each set, block netting, 4 pass minnow traps, 3 pass electrofishing. Dani Evenson referred to a Bryant paper which explains protocol for minnow trapping.
3. Population estimates were initially proposed to be collected only in Focus Areas. Based on feedback from ADF&G and further consideration, MaryLouise Keefe proposed eliminating population estimating efforts, asking if the level of effort required was worth the risks of providing insufficient data (due to being unable to reach the required level of effort for population estimates in such a large system). Joe Klein requested that if population estimates were removed from objectives, then effort be added to relative abundance/density. It may be possible to answer population questions by collecting sufficient relative abundance data.



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MaryLouise Keefe explained that the purpose of objective 1 is to characterize what fish are present and how many of them are where, when. Jeff Davis highlighted the need to concentrate on the “when” while addressing life stages of specific fish. He feels catch-per-unit-effort should be tied to the targeted fish. MaryLouise explained the difference between broadcast sampling (objective 1: fish distribution) vs. specific objectives; broadcast sampling will be based on representative habitats and specific objectives will be added for species of interest. These objectives may require more effort at certain times and locations specific to the species of interest. Methods will also be limited/dictated by the habitat. Multiple methods may be used at a given habitat to ensure that all life stages and species present are identified.

Jeff Davis is concerned that AEA will be repeating the mistakes in 1980s of using incorrect methods. Betsy McGregor emphasized that AEA’s team will not be simply repeating the 1980s studies.

Jeff Davis and MaryLouise Keefe agreed that the presence/absence data cannot be used to infer relative abundance, expanded efforts and methods are necessary to understand relative abundance.

MaryLouise Keefe explained the need to tie the objectives to the methods. She asked for confirmation that population estimates are not necessary and asked if relative abundance would be adequate for early life history. The feedback from the group generally confirmed that population estimates are not necessary. MaryLouise suggested that early life history population estimates be collected in Focus Areas. Is that worth the added effort, possibly conducting mark-recapture for larger fish and using out-migrant traps or DIDSONs? This question remains under discussion.

Michael Buntjer questioned the approach for sampling the Lower River (downstream of the Three Rivers Confluence). His concern is based on the habitat classification being less specific than the Middle River. MaryLouise Keefe explained that due to the videography and extremely high number of channels, the Lower River is only feasibly mapped to the mainstem habitat type. Dani Evenson elaborated by saying that the level of effort will not be changed, only the level of strata that the study sites are distinguished by.

The discussion switched to the topic of stranding and trapping. Michael Buntjer asked how sites will be chosen to best understand the possible Project effects on stranding and trapping. Joe Klein requested that any historic data used for stranding be referenced and that all low gradient areas, not only banks, of the Middle River be modeled. MaryLouise Keefe explained that the varial zone model, to be presented at the upcoming 10/2/12 Instream Flow TWG meeting, will explain in detail the stranding/trapping aspects of the Instream Flow Study. Wayne Dyok stated that the up vs. down ramping have different effects, and Joe Klein said, biologically speaking, the down ramping affects the fish more than the up ramping due to the possibility of stranding and trapping.

Jeff Davis’ request to keep each species and their life stages in mind while choosing sample locations and methods was agreed on by all. MaryLouise Keefe elaborated by offering a sub-objective to compile available periodicity charts and available data (including from the 1980s)



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before finalizing locations and method details. Michael Buntjer requested that periodicity data be referenced so it is possible to weigh the reliability of data.

MaryLouise Keefe mentioned that the habitat characterization study plan is being refined based on available video (limited by the level of detail) and interim comments. Joe Klein mentioned that many comments that ADF&G will be filing on the Fish Distribution and Abundance PSPs may have already been addressed. Betsy McGregor informed all that the October 23-25, 2012 TWG meetings will include populated comment / response tables including discussion of all significant comments received through all types of communication since AEA's filing of the PSPs. Study Interdependency figures and schedules will also be provided. This will provide people with a current view of how AEA is addressing interim comments / discussions. The Instream Flow Study draft RSP will not have every aspect finalized, but will include a schedule showing when remaining study details will be addressed.

It was reiterated by all that terminology needs to be standardized.

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Draft Meeting Notes River Productivity Study Subgroup Meeting September 27, 2012

LOCATION: AEA Project offices – 1st Floor Conference Room
411 W 4th Avenue; Suite 1
Anchorage, Alaska 99501
(Parking off 3rd Avenue; at Sunshine Mall)

TIME: 1:00 pm – 5:00 pm (AKDT)

ATTENDEES: Michael Buntjer USFWS, Stormy Hought ADF&G, Justin Crowther AEA, Kathryn Toews LVA, MaryLouise Keefe R2, Dani Evenson R2, Chiska Derr NMFS, Brian Lance NMFS, Jeff Davis ARRI, Betsy McGregor AEA

ON PHONE: Tim Nightengale R2, AJ Keith Stillwater, Dirk Pedersen Stillwater, Matt Cutlip FERC, Fred Winchell Louis Berger, Mark Winfrey UAF, Erik Schoen UAF, Sue Walker NMFS

This meeting was held in order to:

- address the feasibility of a trophic analysis to describe potential changes in the primary and secondary productivity of the riverine community following Project construction and operation;
- discuss the concept of reference sites on the Talkeetna and Chulitna Rivers to monitor baseline productivity, pre- and post-construction; and
- discuss the need for/value of a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River.

MaryLouise Keefe introduced Mark Winfrey and Erik Schoen of UAF. They will assist in drafting AEA's River Productivity RSP. Michael Buntjer requested documented feedback from Mark Winfrey's review of the PSP. Mark Winfrey explained that he had reviewed the PSP and provided feedback through conference calls with R2 without documentation. Mark Winfrey expressed his agreement with Tim Nightengale's Before-After Control-Impact BACI design thus far (details still pending).

What is productivity? The question was raised by MaryLouise Keefe. The definition of productivity varies between resources and individuals, making the title of this study misleading to some. MaryLouise's proposal to change the title of the River Productivity Study is under discussion. The river productivity study plan measures eco-responses including the food web

and possible responses to Project effects. Mark Winfrey defined productivity as the production of carbon.

Trophic analysis

Jeff Davis suggested that the river productivity study plan should be measuring primary and secondary productivity by conducting stream respiration / metabolism studies. Mark Winfrey suggested using emergent traps to assess river productivity. Emergent traps are tent like structures which collect emerging macroinvertebrates in a preservative such as alcohol as they emerge from a defined surface area of the aquatic habitat. This may allow one to assess how consumers of periphyton are responding and how periphyton is affected. MaryLouise Keefe reminded everyone that ultimately, the main concern is how the proposed Project could affect the ecosystem's ability to support fish. Emergent traps measure prey for fish and although they don't directly measure primary production, they will tell how lower trophic levels respond. Fish are dependent on the lower trophic levels and will be directly impacted by any change in the lower trophic level community. Jeff is concerned that the emergence traps do not account for biomass taken by consumers within the river system (prior to emergence). Mark Winfrey agreed that this is an inevitable limitation since there is currently not a sampling technique that is able to measure all consumption of biomass.

Jeff Davis asked if there was any published work regarding emergence sampling. Mark Winfrey said that he had conducted a study in the summer of 2011, and "it went very well". Jeff Davis asked how one would study emergence in times of ice, heavy flows and break up. Mark Winfrey said that ice flows could be sampled in areas of partial ice and little to no flow, but most invertebrates emerge after ice has left and often emerge in side channels with less flow (areas easier to sample). Betsy McGregor added that many lateral habitats have open water leads throughout the winter. Jeff Davis explained that by collecting spring emergence, one is essentially collecting the biomass generated throughout the winter and can infer production within the aquatic environment. Mark Winfrey agreed and added that the emerging species are easily identified and can be confidently collected due to an abundance of knowledge regarding emergence times linked to times of the year, temperatures and life histories. Jeff Davis asked about plans to sample post-Project and MaryLouise Keefe said this is to be discussed at a later date.

Jeff Davis asked why one would measure emergence rather than secondary productivity. Mark Winfrey responded by saying that secondary productivity measures require expensive techniques. The results are also variable and may be unreliable. Mark Winfrey suggested sampling for benthic macroinvertebrates as well as emergence for a better understanding of productivity. Jeff Davis asked to discuss emergence traps further and may consider them being coupled with bioenergetics for sufficient understanding.

Bioenergetics modeling and isotope analysis

Isotopic analysis can allow one to differentiate pathways and is important in understanding the riparian system. The riparian system is a large contributor to the aquatic environment productivity with up to half of the prey of juvenile salmon coming from terrestrial habitats. Another large source of nutrients in the Susitna River is marine-derived such as salmon and their



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eggs. Analyzing stable isotopes can help identify the amount of marine and freshwater/terrestrial carbon utilized by individuals. MaryLouise Keefe asked if one could differentiate between freshwater and terrestrial sources using isotopic analysis. Mark Winfrey said that it is possible, but not guaranteed and he does not feel that the added costs are worth the risk of unreliable data. Mark Winfrey asked Jeff Davis if he knew of any Susitna River studies with isotopic analysis. Jeff only knew of studies on the tributaries (one brown water stream with heavily dissolved organic carbon and one clear water stream), and summarized that benthic organic matter is difficult to differentiate and that periphyton had little variation. He knows of no studies regarding benthic invertebrates in the Susitna River or its tributaries.

Jeff Davis asked how bioenergetics is linked to the riparian habitat. MaryLouise Keefe said that the link is not yet explained, but is being developed with Erik Schoen's assistance. Jeff asked if one can differentiate between periphyton. Mark Winfrey said that periphyton can be very variable and therefore, not reliable when trying to differentiate. It may be possible to identify how heavily fish are relying on salmon eggs and/or insects which prey on decomposing fish. Mark also mentioned that the marine traces go away from consumers of fish eggs relatively quickly. MaryLouise confirmed that it can be untraceable after 90-100 days. Jeff was happy to see that bioenergetics modeling is being considered.

Stormy Haught reminded the group that this study could be the basis for a long term monitoring project and therefore must consist of methods able to be repeated often. MaryLouise Keefe showed concerns in studying the macroinvertebrates because they can start to show changes 25-50 years after the environmental changes begin occurring. Stormy finds that geomorphology can be the first change noticeable and may be the indicator of further effects. Jeff Davis mentioned that hydrologic effects have been seen as the first indicator of Project impacts in some studies. MaryLouise said that since the biologic community is affected by changes in all resources, using the community as an indicator may be the best approach for observing change.

Erik Shoen explained that bioenergetics takes the amount of energy a fish gets from food and turns it into a representative growth number. With what the study is currently proposing to sample one can make "what if" scenarios and integrate with changes for growth. MaryLouise Keefe mentioned that target indicator species need to be agreed upon. The following was agreed upon by the participants:

- Anadromous salmon – Chinook or coho salmon fry/juveniles
- Non-anadromous salmonid – dolly varden or rainbow trout
- Non-anadromous non-salmonid – stickleback or sculpin

Mark Winfrey expressed interest in stickleback, because they may be significant competitors of salmonids. They are also potential salmonid prey and may benefit by warmer temperatures. Jeff Davis prefers stickleback over sculpin. Stormy Haught supported choosing stickleback over sculpin because there is an abundance of information on the Susitna basin stickleback. He did warn that they might not be abundant in the Middle River, but Jeff mentioned that they could be found in beaver ponds and backwater or in off channel habitats. MaryLouise Keefe said that those habitats could be affected by the Project, agreeing in the choice of stickleback.



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Jeff Davis asked how the river productivity study relates to habitat suitability criteria and instream flow studies. MaryLouise Keefe said that it is important to connect this with habitat modeling and the riparian study, but the river productivity study is based on growth and not the numbers of fish. She said that it may be possible to apply an algorithm to map high productivity areas and use that information to weight sites. Jeff Davis added that productivity is more important than the number of fish since fish are mobile.

Jeff Davis and Mark Winfrey discussed the influence of O₂ in the Susitna River. Jeff Davis feels that turbid waters are not O₂ deprived. A single DO meter in the still water sloughs will not have an issue regarding oxygen diffusion.

MaryLouise Keefe pointed out that turbidity in the Susitna River is not constant, varying with location and time of year. Jeff Davis explained that the changes in turbidity affect primary production by changing the light penetration. Jeff Davis referenced a Snyder and Minshall paper when discussing the change from a heterotrophic community to autotrophic with less turbidity.

Mark Winfrey explained that one can expect minimal periphyton in turbid waters with more primary productivity in off-channel habitats.

Reference sites on the Talkeetna and Chulitna Rivers to monitor baseline productivity, pre- and post-construction.

Tim Nightengale reminded others that USFWS' study request called for a pre-Project monitoring program which included reference sites in the Talkeetna and Chulitna rivers. The group discussed some differences and similarities of the two rivers relative to the Susitna. According to USGS (Kyle and Brabbots 2001) the Chulitna is colder than the Susitna. The Talkeetna is comparable in regards to temperature. Knot et. al. concluded that the Chulitna is also more turbid than the Middle Susitna River. Tim Nightengale suggested using a site upstream of the proposed Project inundation zone on the Susitna River since it experiences the same flow and environmental effects. This area also has the same temperature as other parts of the Susitna, but it lacks influences of tributaries. MaryLouise Keefe explained that the geomorphology study crew collecting data this summer (2012) noted that the geomorphic processes don't differ from the middle and upper Susitna. Jeff Davis brought to everyone's attention that there aren't any marine derived nutrients present in the upper Susitna and Tim Nightengale added the there is also a difference of elevation. Tim feels that whichever location is chosen, if any, it must have comparable annual flow variation and vegetation variability. Jeff Davis suggested a location above the west fork of the Chulitna although lower Talkeetna has more similar species with similar tributaries and habitat types. All agency representatives agreed that the biomass is most similar in the lower Talkeetna. Tim proposed to choose a site for 2013 sampling and compare it to the Middle Susitna to confirm or refute its representativeness. The upper Susitna will be sampled regardless so it can become a reference site if needed. Betsy McGregor added that when choosing a site, one must consider future development so it is important to choose a location that will not be affected by any future growth of Talkeetna or other neighboring communities.

MaryLouise Keefe began the discussion of what to monitor at this/these reference sites. She suggested including macroinvertebrates since effects on them will be seen sooner than on fish.



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Jeff Davis suggested stable isotope analysis and periphyton samples at multiple locations which are paired with sites on the Middle Susitna of similar habitats to reduce variability. MaryLouise Keefe stated that more resources need to be sampled than just macroinvertebrates. Chiska Derr suggested collecting riparian data. Betsy McGregor mentioned the extensive data that will be collected in the Sustina River basin as part of the Riparian Instream Flow Study and that it seemed unnecessary to conduct in depth studies of the riparian environment at a reference site in another drainage.

MaryLouise Keefe proposed a single reference site on the Talkeetna River. Jeff Davis needs confirmation on other studies' Susitna site selection before deciding numbers or locations of reference site(s). Stormy Haught feels two sites are necessary. Jeff Davis feels at least three sites with five providing more reliable statistics.

Jeff Davis asked if reference sites would be located in the main channel. MaryLouise Keefe said that they would not, which raised concern with Jeff since he believes productivity in the spring may only be possible in the main channel due the lateral habitats being frozen. Sue Walker added that the main channel of the Susitna would be more important from a productivity perspective due to Project effects. Betsy stated that this was not known and added that the Susitna River is not expected to convert to a single channel river in the spring and noted the open water leads present during the winter in the lateral habitats.

MaryLouise Keefe asked if two years was ample time to define a system enough to apply a BACI design. It is possible that only large differences will be detectable with such a short study time. Stormy Haught answered with "the sooner, the better". Tim Nightengale asked if it was even possible to establish sites with Project effects as the only variable. MaryLouise questioned the need for reference sites, and Michael Buntjer claimed that the risk is just as high when only using literature as a reference. MaryLouise said that there are many studies throughout the world to be referenced, and she expressed concern in the possibility of BACI being unreliable due to interannual variability. Brian Lance asked what would be implemented if not BACI. Tim Nightengale suggested a cluster analysis or ordination plots (which Brian Lance finds inferior to BACI). Stormy Haught said that using reference sites is necessary at some point, but the timing to begin sampling and number of sites is under discussion and may not be decided until after the license is issued. MaryLouise Keefe added that these sites would come with a high price tag so if implemented, one must reduce variability between a reference site and the middle Susitna site. Jeff Davis asked when the agencies should expect details regarding reference sites, and MaryLouise Keefe said this is under discussion.

Betsy McGregor stressed that this meeting is an open discussion and is not a commitment by AEA and asked everyone to consider the goal of all studies; to collect the necessary baseline data to be able to assess the potential impacts of the Project in support of a FERC License Application.

Need for/value of a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River

MaryLouise Keefe stated that a surrogate would need to be a glacial fed river with a lake/river volume ratio relative to the proposed post-Project reservoir/river volume ratio.



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The Kenai River was ruled unfit as a surrogate due to its maritime climate. Sue Walker stated that a proper surrogate would not be found in Alaska but possibly Canada or Finland. Canadian hydropower projects are typically run-of-the-river projects and are therefore not comparable. MaryLouise Keefe questioned the likelihood of finding a proper surrogate and asked if the literature review would suffice, adding the proposal for writing a white paper (a synthesis of similar projects and their effects). Jeff Davis added that the results of a white paper approach should be used in the river productivity study site selection. MaryLouise ensured all that Tim Nightengale's study design reflects the literature due to his experience and expertise, adding that modifications can be applied if found necessary.

Jeff Davis mentioned Alexander "Sandy" Milner as being the expert on glacial streams and their invertebrate communities. He suggested contacting him for further information if needed.

Open Discussion

Jeff Davis provided draft comments from USFWS stating that they were still being finalized internally.

Jeff Davis asked about the main channel site locations for macroinvertebrates. He asked for random and repetitive sampling at uniform depth and velocity at each site. He also asked to have repeated benthic sampling at each site in the same microhabitat. Tim Nightengale said that the details may be dictated by sampling gear and he intends on sampling at uniform flows. Jeff asked not to be limited by methods, rather choose what is to be characterized and find method to achieve it. He wants to be assured that a representative number of sites are sampled and plans to rely on habitat suitability criteria (HSC) curves for algae and macroinvertebrates. Jeff recognized that the large size of the Susitna River makes it difficult to sample enough sites for representation. Tim will use literature for habitat suitability curves and samples to assist in developing the HSC. Jeff asked if the HSC is based on 1980s data. He was not aware if HSC data was collected in the 1980s. MaryLouise Keefe said that the details will be explained in a future HSC TWG meeting.

Jeff Davis asked the source of all data to be identified in the HSC curves. MaryLouise Keefe will present a literature curve, new data curve and a hybridized curve created collaboratively between AEA's instream flow team and the TWG.

Sue Walker questioned about the possible negative effect that the recent flooding would have upon sampling next year. MaryLouise Keefe explained that this is an uncontrollable variable and can't be avoided. Jeff Davis said that the flood may have reset the macroinvertebrate community. He referenced Alexander Milner as having studied the reset of macroinvertebrate communities. He mentioned that disturbance tolerant species seem to remain after extreme events such as this flood, adding that Alaska has many disturbance tolerant species.

Michael Buntjer asked if marine clams were being studied. Betsy McGregor explained that the Beluga Whale study is modeling the hydrology of Cook Inlet and after combining these modeling results with the results of other models (e.g. sediment transport, water temperature and other water quality parameters, fluvial geomorphology) the probability of the Project affecting drivers to the clam community will be assessed. If it looks as though those drivers will be affected, a clam study may be added in 2014.



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Betsy McGregor reminded attendees that AEA will be providing comment / response tables at the upcoming October TWGs.

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Draft Meeting Notes Instream Flow Study-Riparian Technical Work Group Meeting October 1, 2012

- LOCATION:** AEA Project offices – 1st Floor Conference Room
411 W 4th Avenue; Suite 1
Anchorage, Alaska 99501
- TIME:** 12:00 pm– 5:00 pm (AKDT)
- SUBJECT:** **Instream Flow Riparian Study Plan & USFWS Comments**
- ATTENDEES:** Bob Henszey USFWS, Chiska Derr NMFS, Steve Padula LVA, Kathryn Toews LVA, Betsy McGregor AEA, Justin Crowther AEA, Jan Konigsberg National Heritage Institute, Michael Lilly GWS, Marie Steele DNR, Bill Fullerton TetraTech, Kevin Fetherston R2
- ON PHONE:** Becky Long Coalition for Susitna Alternatives, David Turner FERC, Paul McCowsky FERC, Matt Love Van Ness Feldman, Hal Shepard CWA, Zoe Bigary Stillwater, Tim Sundlov BLM, Paul Dworjan URS, Aaron Wells ABR

This meeting was held to compare and contrast USFWS' study plan request and the PSP by presenting the current study plan and to provide an opportunity for questions and concerns of the participants. Kevin Fetherston explained that the riparian study would identify current/natural conditions and use models to show possible effects of the proposed Susitna Watana Project (Project) on riparian resources below the Project. Kevin stated that very few aspects of the current study plan are new (since the PSP), with the only changes being additional details and the RSP format. A PowerPoint presentation which Kevin Fetherston referenced throughout the meeting can be found at http://www.susitna-watanahydro.org/wp-content/uploads/2012/09/IFS_Riparian_TWG_mtg_20120911_1500.pdf.

Synthesis of 1980s data and other literature

Bob Henszey requested literature to be included from other rivers both regulated and unregulated by dams. Kevin Fetherston agreed to add studies on floodplains unaffected by hydro-regulation to the literature review.

Focus Areas

Focus Areas are ~1-2 mile representative areas along the Susitna River where multiple disciplines will be conducting integrated studies for a more complete understanding of the ecosystem. Betsy McGregor highlighted that sampling was not limited to the focus areas and that sampling would occur at other sites along the river, specific to the issues/concerns for each resource area. Focus Areas are chosen to capture the riparian, aquatic and fish habitat variability present in the identified geomorphic reaches for the multidisciplinary study. The



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candidate Focus Areas were chosen using best professional judgment by the consultant team based on a review of the available data.

Study site design

Kevin Fetherston explained that classification of the river corridor into riparian process domains (segments of the river with similar riparian disturbance regimes) would allow efficient sampling and modeling of the entire Project area. The hierarchical riparian process domain approach, with each process domain sampled using Focus Areas, will allow extrapolation of the modeling data to the larger Project area.

Bob Henszey expressed a concern that the overall instream flow study effort seems to be “fish-centric”, and he wants to be assured that riparian areas are not overlooked. Kevin Fetherston explained that in regards to riparian, each Focus Area will include groundwater–surface water modeling, historic geomorphology, sediment transport modeling, and vegetation and soils mapping of the entire floodplain. There will be multiple replicates for many aspects of the Focus Area sampling in the Riparian Botanical Survey however less for groundwater (due to costs).

Fine sediment deposition can be a key factor in both colonization and the plant community establishment. Sediment transport and surface water modeling will be 2D modeled in Focus Areas to evaluate the Project effects on flow and sediment regimes. It was noted that one option for collecting historic data is to determine the rate of sediment deposition using cesium 137 (a radioisotope deposited during nuclear testing in 1950s and 1960s. Carbon dating of organic deposition is another option. Dating a number of core samples and combining the data with tree core dating, one may obtain a thorough understanding of the age of riparian communities. Sediment deposition rates throughout the Project area will be measured using isotopic dating of fluvial sediments and dendrochronology.

Bob Henszey said in the methods section, exact study locations are not necessary in the study plan. When selecting site locations, Bob Henszey asked to be sure to select some locations that are predicted to be affected by the Project, including a site immediately downstream of the proposed dam site.

Kevin indicated that the study area will be based on the flow routing modeling to determine the down river extent of Project operational influence. Final Focus Area selection is expected to be determined in collaboration with the TWG in early 2013. Candidate Focus Areas were presented and the following locations were discussed as follows:

- MR2 – The river reach MR2 (middle river 2) includes two Focus Areas.
 - Upriver Focus Area
 - Less confined reach with greater floodplain and side channel complexity
 - Greater suite of vegetation types and ages
 - Downriver Focus Area
 - Bob Henszey noted that the Focus Area excludes an emergent wetland just upstream of border.
 - It was noted to include this emergent floodplain wetland in this Focus Area, if selected as one of the study areas.



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- Portage Creek Focus Area, MR-5
 - Just downstream of Devils Canyon
 - Not much floodplain
 - Bob Henszey feels this could be eliminated as a Focus Area but that it could be a site for specific aquatic resources of concern (not for riparian).
- Indian River Focus Area, MR-6
 - Beaver dams present with associated side channel and floodplain meadow
 - Many features imply fish presence
 - Moderately confined channel
 - Has a range of plant community types
 - Kevin Fetherston said the islands' distinct plant variability may be influenced by frequent ice floodplain shearing.
- Gold Creek Focus Area
 - Moderately confined
 - Has a range of plant community types
 - Includes terraces and side channel
 - This Focus Area will be fairly straight forward to instrument with wells for both fish and riparian needs
- Slough 6A, MR-7
 - Multiple beaver dams present
 - Signs of significant ice influences
 - Low density Poplar forest
 - Mid-channel island
 - Moderately confined channel
 - Off-channel water body
 - Floodplain peatlands
- Slough 8A, MR-6
 - Moderately confined
 - Has a full range of plant community types
- Whiskers Slough, MR-8
 - Focus Area located upstream of the Three Rivers confluence
 - Moderately confined channel
 - Hydrologically unique due to Chulitna River influence and Susitna River backwater effects
 - Mike Wood has a home at this location and can provide observations on ice formation
 - Area was studied in the 1980s and Whiskers Slough has been relatively stable since 1949, as illustrated in the comparative geomorphology study
 - Ice tree scars indicate active ice floodplain interactions

Groundwater-surface water interaction study

Project effects on floodplain vegetation will occur through the interaction of groundwater and surface water and sediment transport reduction. Bob Henszey noted his understanding that



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groundwater sampling is costly so the number of groundwater sampling sites will need to be limited. Because of this, the Focus Areas need to be carefully selected to represent the range of variability found within each Riparian Process Domain.

Michael Lilly explained that due to the lateral effects of changes in surface water the Focus Area well locations will include adjacent hillslopes to help delineate the project hydrologic boundary. As the river stage is low, groundwater is expected to discharge into the river. When the river stage is high, river water is expected to recharge shallow floodplain aquifers. Surface water affects groundwater by means of hydrologic pressure gradients and occurs underground (where it cannot be seen and does not freeze) and therefore difficult to study. Modeling groundwater (using MODFLOW software) provides a numerical representation of the effects surface water pressure has on groundwater. Identifying how groundwater is affected by changes in surface water can help anticipate the Project effects on groundwater and the associated riparian vegetation. When modeling groundwater, the stage level is used as the key influential factor rather than discharge. This is especially important in the ice season when discharge may be low, but an ice jam may create a localized backwater flood with high stage/added pressure. Michael Lilly identified precipitation as an influence on both groundwater and surface water.

River stage changes can be used as a “natural pump test” by its direct pressure effects on groundwater. Michael Lilly compared the interaction to a water ripple, where there is a delayed effect with the magnitude and frequency dissipated the further from the event (change in river stage). Understanding of the groundwater-surface water interactions is based on the number of unique events observed rather than the number of years observed. Models can make up for a lack of multiple years of data by using events in the modeling process.

Michael Lilly said that piezometers will be used along the Susitna River in lateral habitats such as side sloughs. Shallow wells will be useful for the riparian study. With wells placed in specific plant communities the relationship between groundwater-surface water and the plant communities can be statistically described using the models. Michael Lilly added that some species thrive in areas with precipitation as the only water source. The life history strategies of dominant plants will be summarized with information available. Representative species will be selected after identifying what species rely on what type of water source and specific condition (such as geomorphology). Bob Henszey suggested creating a bell curve with groundwater level on the X-axis.

Ice influences

Chiska Derr asked if isostatic rebound is a factor in the study area. MaryLouise Keefe answered that it is not at a scale of reasonable influence for riparian concern.

Michael Lilly and Kevin Fetherston indicated that the study would include mapping out the influence of ice processes based on scarring of trees.

Action Items

The literature review will include river floodplains in both unregulated systems and systems regulated by dam(s).



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The RSP will include the process, criteria and schedule for final selection of Focus Areas.

DRAFT



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Instream Flow Study-Fish, IFS-Riparian, Groundwater, Ice, Geomorphology, Water Quality Technical Work Group Meeting Notes 2 October 2012

- LOCATION:** AEA Project offices – 1st Floor Conference Room
411 W 4th Avenue; Suite 1
Anchorage, Alaska 99501
- TIME:** 8:30 am – 4:00 pm (AKDT)
- ATTENDEES:** Kathryn Toews LVA, Dudley Reiser R2, Phil Hilgert R2, Bill Fullerton TetraTech, Bob Mussetter TetraTech, Chiska Derr NMFS, Kevin Fetherston R2, Dirk Pedersen Stillwater, Betsy McCracken USFWS, Jeff Davis ARRI, Mike Buntjer USFWS, Ron Benkert ADF&G, Joe Klein ADF&G, Eric Rothwell NMFS, Matt Cutlip FERC, Stormy Haught ADF&G, Bob Henszey USFWS Steve Padula LVA, Betsy McGregor AEA, Wayne Dyok AEA, Justin Crowther AEA, Michael Lilly GWS, Scott Crowther Ratepayers, Jan Konigsburg NHI/HRC, Hal Shepard CWA
- ON PHONE:** Matt Love VNF, Sue Walker NMFS, Laura Arendall R2, Mike Sondergaard, BLM

This meeting was held to prepare licensing participants for the site visit on October 2-4, 2012 to three candidate Focus Areas. Dudley Reiser began the presentation “Instream Flow Methods Review October 2-4, 2012” (available at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/09/TWGMMeeting20121002.pdf>).

Phil Hilgert explained that a number of Focus Areas will be selected to represent the habitats and in which detailed, cross-discipline resource studies will be completed. After that, supplemental study locations can be selected to sample additional areas of biological importance. Focus Areas are reaches of the Susitna River where multiple disciplines will be sampling for a better understanding of the ecosystem as a whole. Betsy McCracken asked if the Focus Area locations were decided before fish distribution data were available. Dudley Reiser explained that the candidate Focus Area locations were selected using best professional judgment and all available data. This includes information on juvenile salmonids, gathered in previous studies completed in the 1970s and 1980s and recent studies completed in 2012. The proposed fish distribution study results will be applied to refine study site area selections, as necessary.

Matt Cutlip expressed concern that AEA assumes the site selection will be confirmed by March 2013 (slide 2). Phil Hilgert explained that without complete habitat mapping, one is unable to employ statistics to ensure that a substantial ratio of all habitats are being sampled. Agreement is necessary prior to initiating the 2013 studies and with incoming data, additional sites may be necessary for a representative portion of all habitats to be studied. Matt asked for justification of the proposed 10 candidate Focus Area locations and Phil said that the Technical Work Group (TWG) meeting held on 9/14/2012 explained the rationale for selecting the sites. Phil added that the potential need for lower river site selection was not presented in the 9/14/2012 meeting, but will be included, with rationale, in the Revised Study Plan (RSP).

Eric Rothwell suggested that randomization of site selection may be a better approach for extrapolating the data than basing Focus Area site selection on incomplete data. Wayne Dyok said that a plethora of



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data from the 1980s is available to support site selection. Phil Hilgert explained how the 1980s data was utilized, but confirmed the ability to refine sample site selection as additional data are collected. When habitat mapping is completed, sites will be double checked to ensure the selected focus areas are representative and enable the ability to extrapolate data. Dudley Reiser acknowledged that random selection is one of several approaches to study site selection but that when strictly applied to a system such as the Susitna River, there is a risk of missing important biologically relevant areas. He indicated that randomization would likely factor into some elements of the study, such as selection of specific habitat units for detailed study, or transect selection. Mike Buntjer suggested that some of the licensing participants' wariness in using 1980s data may be due to a lack of being presented a summarization of the data and methods.

Eric Rothwell said that to see the Susitna River system as a whole, one must rely on the Focus Areas as being representative. However he stressed the need for the data collected at the Focus Areas to be able to be extrapolated to unmeasured areas. He felt that if AEA is selecting the areas based only on biologic characteristics, it would be difficult to extrapolate to other disciplines. He said that if the only sites sampled by multiple disciplines are the Focus Areas, they need to be representative of all resources so that they can be extrapolated for all resources. Phil Hilgert explained that the candidate Focus Areas are based on information from the 1980s, current information where available, as well as available photography and 2012 field reconnaissance. From the photographs and field reconnaissance, a general sense of the present habitat types was achieved and candidate Focus Areas are based on the assumption that they are proportionately representative. The Focus Areas include habitat components and other features (e.g. geomorphology, groundwater, riparian, ice, water quality) that will be evaluated by other resource disciplines. The representativeness of these areas will be confirmed once the habitat mapping is available in December 2012.

Bob Henszey suggested that all resources mark their proposed study locations on a map, and where multiple disciplines overlap, deem that area a Focus Area. Betsy McGregor explained that in a sense, that is how these candidate Focus Areas were chosen. The study locations were identified verbally by AEA's resource experts rather than marked on a figure. Dudley Reiser explained that this approach was taken so that AEA could identify candidate sites and present them to licensing participants as a starting point for comments or approval. He emphasized that the 10 proposed Focus Areas are candidates and not finalized. Sue Walker requested written methodology of Focus Area selection. Betsy McGregor said that site selection methodology will be included in the draft RSPs, as well as the RSPs to be filed with FERC in December.

Eric Rothwell suggested not releasing draft RSPs until all comments were completed by licensing participants and received by AEA. Betsy McGregor explained that the purpose of the draft RSPs is to provide an updated PSP to comment on that reflected in the continuing consultation with licensing participants since issuance of the Proposed Study Plan (PSP) in July 2012. Sue Walker noted that this is a new addition to the Federal Energy Regulatory Commission's (FERC) Integrated Licensing Process (ILP) and said that NMFS will be filing comments only on the information provided in the PSP. Betsy McGregor explained that one can comment on their preferred version (PSP or draft RSP). She agreed that the draft RSP is an added step to the FERC process that informs one of the progress made since the PSP and explained that draft RSPs were requested by other licensing participants. Matt Cutlip indicated that FERC finds the production of draft RSPs useful.

As clarified in the Presentation: Process Overview (found at http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/IFS-TWGMTgs_Schedule_20120930.pdf), Dudley Reiser introduced a concept for continuing instream flow TWG meetings to finalize study details beyond the filing of the RSP. He proposed that an Instream Flow Study – Aquatic TWG meeting be held the third Thursday of every



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month. These would rotate between a full day in-person meeting or half day conference call. Focus groups would meet as needed to discuss specialized details and present them at these TWG meetings. The general consensus of the group was that everyone will think about this proposal and respond at a later date.

Dudley Reiser began his presentation. Dudley described the purpose of the following day's site visit as a chance for those attending to see many types of Susitna River habitats and to discuss different methodologies that may be applied for evaluating them, but that AEA was not looking for anyone to confirm their agreement with Focus Area selection.

Dudley Reiser's presentation provided an overview of the potential flow-related Project effects and influential parameters of upstream migration, fish spawning, incubation and fry emergence, and downstream passage (slides 7-12). He briefly explained the formation and functions of habitats and ice (slides 13-14). A figure on slide 15 provides an overview of the riparian – flow interaction and slide 16 lists many factors involved in assessing instream flows. Dudley continued the presentation by explaining the methods employed in the 1980s studies. In addition to the information on the slides (17-21) the following details were discussed:

- IFG4 and IFG2 (PHABSIM) – In the 1980s studies these methods were applied primarily to the side channels and sloughs. These methods were not applied to the main channel.
- DIHAB – This method was utilized because PHABSIM did not capture all fish habitat types nor did it incorporate groundwater/upwelling as an influence. This method was primarily used to characterize chum salmon spawning areas.
- RJHAB – This method was used to characterize juvenile fish habitats by establishing a series of grids to relate habitat to fish density using depth, velocity, substrate and turbidity.
- Aerial Imagery and Habitat Mapping (Digitization) – This method was used to compare areas over different flow conditions.

The 1980s studies were never integrated and evaluated fully due to the Project studies ending.

The bullets below list multiple candidate Focus Areas and discussions pertaining to them.

- Whiskers Slough - Dudley Reiser proposed repeating the methods conducted in the 1980s at Whiskers Slough to indicate changes, if any. He noted that Whiskers Slough includes an area where chum spawning was identified in the 1980s as well as in 2012.
- Slough 11 - Slough 11 is a candidate Focus Area but that permits for land access are currently incomplete. The 1980s had studied instream flow – habitat relationships here. Sue Walker indicated that she may have aerial photos from September 25, 2012. She asked if any aerial photos had been taken after the recent flooding. Bill Fullerton said that photos were taken the previous Sunday and Monday (9/30/12 and 10/1/12). Betsy McGregor clarified an early comment made by Betsy McCracken, and pointed out that this area was studied for both juvenile and adult salmon presence in the 1980s. Sue Walker asked if the current study plan will be studying spawning in the main channel, and Dudley Reiser said it would, if spawning is found. Jeff Davis hypothesized spawning habitat to be located in the lower side channel of this Focus Area where Dudley indicated a beaver dam currently blocks upstream passage under most flow conditions.
- Indian River - Dudley Reiser suggested that chum salmon may use the lower portion of the Indian River for spawning.
- Slough 21 – Dudley Reiser feels that breaching flows may be an important factor in this candidate Focus Area. Many isolated areas seem to be influenced by groundwater. It will be



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important to understand the breaching flows to these areas with respect to life stage periodicities and how Project operations may influence these.

Eric Rothwell was pleased to see the current study plan relating flow to groundwater, as the 1980s studies did not. Michael Lilly added that the 1980s provided good observational data but lacked the modeling tools. With the current tools, the instream flow studies will be able to advance the groundwater efforts for a better understanding of the surface water - groundwater relationship.

Joe Klein asked if pre-flood data were collected. Michael Lilly said that about 98 cross sections were completed and that changes in the river system are being observed including mass wasting. The helicopter pilot had taken oblique photos from his helicopter throughout the summer of 2012.

Jeff Davis voiced concern with the ability to correlate habitat and fish use, particularly juveniles and that areas with fish may be missed. He feels it difficult to include all habitat characteristics that drive fish distribution and fish growth. Dudley Reiser said that as many variables as possible will be studied.

The Fish and Aquatics Instream Flow Study leads will be working with the Water Quality studies lead to create FLIR/TIR imaging. This will be scheduled for optimal implementation to identify upwelling areas. Jeff Davis is concerned that a thermocline will not be identifiable using these methods. Dudley Reiser said that hopefully, the mixing point of the temperatures will be identified and direct the team to the location of upwelling. Dudley continued his presentation by explaining contemporary methods to assess effects using the Sultan River Projects as an example of past implementation methods (slides 23-46).

PHABSIM – Dudley Reiser explained that PHABSIM addresses microenvironments:

- 1D Modeling - This method models physical parameters.
- 2D Modeling - This method models habitats spatially based on physical parameters. Allows one to create polygons of different habitats.

Stranding/Trapping and Varial Zone Analysis

Phil Hilgert presented an example of stranding/trapping and varial zone analysis using the Baker Hydroelectric Project. This project is located on the Baker River, a tributary of the Skagit River in Washington. When compared to the Susitna River the Skagit River is similarly glacially influenced, but has a lower gradient and 50 percent higher main channel flow. Coho and sockeye spawn in the tributaries during clear water flow. The Baker Project causes tributary flows to vary between 4000 cfs to 80 cfs and flow routing models have been applied to compute the effects of this high flow flux. As flow effects travel downstream the wave height and wavelength dissipate. The flow routing model being developed by Stuart Beck, and anticipated to be available December 2012, will provide the same information for the Susitna-Watana Project during ice free conditions. The ice model, which will be developed by HDR, is anticipated to be available at a later date due to 2012-2013 winter data collection inputs.

Spawning / Incubation Model

Phil presented the spawning/incubation model developed on the Baker Project noting a similar model will be developed for the Susitna-Watana Project. The spawning/incubation model will characterize the groundwater, surface water and temperature influences on spawning and incubation. When modeling, if substrate is mobilized due to flow velocity, one will consider the eggs a complete loss. Mike Buntjer asked if the model will take into account the change of temperature due to possible moving of fine sediment and that a total loss may not be the case in such a scenario. Phil Hilgert answered that the Baker Model did not. That model considered water hardened eggs without water for two days, as a total loss.



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Ramping Rate Models

Phil Hilgert explained that ramping rate models indicate the survival of specific life stages of specific fish species relative to flow and velocity. For example, salmon fry (<50 mm) are considered to have a mortality of 100 percent when stranding occurs. Trapping is not considered to cause immediate mortality of 100 percent. The mortality may increase with the duration of the time they are trapped due to elevated water temperatures and increased predation. Another possible influence is the difference of day versus night activity (steelhead have the same response for day and night flow changes). Naturally the Susitna River experiences three annual stage drops. By using screw traps to collect periodicity information, one can see when stranding and trapping are most critical. The river productivity study will be looking at colonization rates which may be integrated into the ramping rate models. Phil Hilgert explained that the models will initially be looking at two load following events a day and can adjust time periods upon operations. Discussion ensued regarding slope gradient and susceptibility to stranding. Joe Klein asked that areas within the Middle Susitna River where slopes are less than 4 or 5%, where fish are more susceptible to stranding, be identified. Phil Hilgert confirmed that would be done as part of the study. Joe also indicated that Hunter compared natural and regulated ramping rates and asked for both to be incorporated into the IHA table.

Phil Hilgert discussed the Boundary Hydroelectric Project on the Pend Oreille River in Washington as an example of ramping rate model use. A stranding index of less than 4 percent gradient was used. A trapping index used in the Boundary Project defined breaching elevations for trapping areas. For the Boundary Project, tools were modified as observations were made. For example, the presence of macrophytes impacted stranding rates. The Susitna River does not have significant macrophyte presence, but emergent vegetation, which is present may have a similar impact.

Betsy McCracken asked if any of these methods have been used on unregulated rivers. Dudley Reiser stated that to his knowledge, these types of studies are typically conducted on regulated rivers. This is because it has not been necessary/funded to study unregulated rivers in such detail.

Gradient will be presented as a GIS product with a range of colors representing percent gradients. This will show trapping areas relative to different flows. Jeff Davis asked if ice layers, overflow and stranding on ice or within ice are being considered as influences on stranding and trapping. He hypothesized that increases in winter flow will cause breaching into lateral habitats and displace fish to these areas. Phil Hilgert explained that an ice routing model should show the effects of added winter flow on ice and lateral habitats. Jeff Davis is concerned that if the Project avoids stranding and trapping by increasing load following, added velocity may dislocate fish. Dudley Reiser explained that vulnerable life stages will be considered when determining load following. Jeff added the need to look at fish's decreased ability to swim in cold winter water. Joe Klein asked if it were possible to operate the Project in the early winter with a more constant flow level in order to create stable ice cover. Robin Beebee recalled the Peace River Project in British Columbia that operated in such a way to get rapid and stable ice formation. The reasoning for this was to avoid ice jams for the sake of avoiding floods in towns downstream.

Method Selection

Dudley Reiser reviewed the factors that will be used in determining methods (slide 52). He said that the process, criteria and schedule are to be agreed upon and that part of the process in determining methods is applying professional knowledge and experience. The site visit the following day is intended to help those participating to gain first-hand knowledge of the complexity of the environment and how methods may be limited by the habitats and site logistics. Dudley explained the considerations when choosing methods and wants everyone comfortable and accepting of methods and models. Matt Cutlip said that at times, details may not be resolved. FERC can order specifics be added to a plan and has the



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authority to approve an approach regardless of a disagreement. He explained that the ILP includes a mechanism for additional changes post-RSP filing if needed.

Dudley presented slide 53, a chart of proposed methods, and informed everyone that these were simply candidate methods and changes may be necessary in the future. He asked all attending the site visit to consider these methods while in the field. Eric Rothwell questioned if the instream flow team would be sampling water quality. Dudley Reiser explained that certain water quality measurements may be taken by instream flow and linked to the water quality study results. Michael Lilly said that the Water Quality Modeling Study's model will be at a larger scale than instream flows.

Joe Klein asked if PHABSIM 2D modeling was intended to be used for all study sites. Dudley Reiser said that at every site, both 1D and 2D will be considered, and the most practical model will be applied. Accordingly, Joe Klein requested "(2D)" to be changed to "(1D, 2D)" in the proposed habitat modeling techniques table (slide 53). Dudley Reiser continued that the lower river is only practically modeled using 1D. Betsy McCracken requested 2D modeling to be applied to tributary mouths. Dudley explained that it depends on the question being asked as to which tool to use. Michael Lilly explained that modeling everything at all times is not practical or scientifically defensible. Dudley mentioned the use of 1D, 2D and habitat mapping for the Clackamas Hydroelectric Project in Oregon and that the results of all three methods in the same stretch of river were generally similar. He mentioned that even though there are advances in methodologies and modeling techniques all the time, these do not invalidate earlier methods and they should not be dismissed outright if they provide reliable results. Thus, specific methods and models will be selected based on a variety of factors including the types of habitats being measured, logistical considerations, need for spatial depiction, etc.

Pilot Winter Studies

Resource discipline leads discussed an approach for completing pilot winter studies during the 2012-2013 winter. These studies will determine logistical constraints such as safety and access, as well as the practicality of using different sampling/monitoring techniques. The study objectives are presented in slides 63-67. The following clarifications were discussed in the meeting.

With the use of videos and data from the 1980s studies, open water leads may be identified. Intragravel dissolved oxygen (DO) and temperature conditions may be affected by the Project and have implications on egg survival. Intragravel temperature probes will be installed at different locations and depths; these will be coupled with DO meters to see if relationships between flow and temperature and DO can be detected. Michael Lilly stated that there may be a need in using probes that remain on site and are removed to retrieve the data as well as probes that are not disrupted when retrieving the data. He will be looking into the best way of collecting DO in extremely cold waters (-0.2°C - 3.0°C). Underwater cameras may be used to observe fish activities in different locations at different times. Joe Klein asked if cameras can be deployed remotely. Michael Lilly said that he is looking into it. Dudley Reiser mentioned the use of pressure transducers to understand the relationship of flow and stage with temperature changes in reference to the main channel. Michael mentioned that piezometers may be placed in shallow streambeds to observe hydraulic gradients. He explained that an increase of ice causes an increase of pressure in the main channel. This may affect the groundwater level. An understanding of these relationships is necessary when evaluating Project scenarios. Dudley proposed the use of stand pipes and Bob Henszey mentioned that stand pipes may be difficult to maintain through the winter. In regards to fish sampling, Dudley said that minnow traps, electrofishing if open areas are present, trot lines (which the 1980s studies used), and other techniques may be used. Stormy Haight reminded AEA that any winter instrumentation installation requires a fish habitat permit.



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Mike Buntjer asked if PIT tagging will be used this winter. Dudley Reiser said that it is not planned for this winter. Jeff Davis suggested using a hand held antenna in the winter to track fish movement. He suggested contacting Dan Renella of the University of Alaska Fairbanks. Mike asked if the plan would continue for the winter of 2013-2014 and Betsy McGregor answered yes, as well as 2014-2015. Betsy McCracken asked how these winter studies will be presented in the RSP. Dudley Reiser said that in terms of the RSP, the pilot winter studies will be described with a note that additional studies will be conducted in 2013/2014 and 2014/2015. Jeff Davis asked if the pilot winter studies will be targeting areas of spawning, emergence and rearing. Dudley Reiser explained that the intent is to cover multiple habitat types. He suspects that the open water leads will be in areas utilized by rearing juveniles but they may also have resident adults. Jeff Davis suspects that sloughs will have less ice thickness but no open water. Dudley explained that at Whiskers Slough Robin Beebee's videography in 2012 had captured what seems to be open water leads.

Matt Cutlip asked if the equipment is being placed before the ice cover begins. Michael Lilly said that the plan is to start as soon as possible, but may not be able to beat the ice. He said that all will be done as safety permits. Betsy McCracken finds the pilot winter studies a great addition and asked if they will be included in the RSPs. Wayne Dyok said that they will but planning is already underway due to timing.

Meeting Adjourned.

Action Items

- The group is going to consider holding Instream Flow and Water Resources TWG meetings every third Thursday beginning in January 2013.
- In the proposed habitat modeling techniques table (slide 53), "(2D)" to be changed to "(1D, 2D)" to reflect that either technique will be used, as appropriate.
- Michael Lilly is investigating the feasibility of using under water cameras that can be deployed remotely.
- Jeff Davis suggested using a hand held antenna in the winter to track fish movement. He suggested contacting Dan Renella of the University of Alaska Fairbanks.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Recreation and Social Sciences Survey Follow Up Meeting
October 3, 2012, 9:00 am – 12:30 pm

Attendees:

Organization	Name
ADF&G	Joe Giefer
ADNR (State Parks)	David Griffin
AEA	Wayne Dyok
AEA	Betsy McGregor
BLM	Denton Hamby (by phone)
FERC	David Turner (by phone)
McDowell Group	Donna Logan
McDowell Group	Bob Koenitzer (by phone)
MWH	Kirby Gilbert (by phone)
Northern Economics	Pat Burden
NPS	Cassie Thomas
NPS	Harry Williamson (by phone)
URS	Bridget Easley
URS	Tim Kramer
URS	Louise Kling (by phone)
ERM	John Gangemi (by phone)
Louis Berger Group	Lisa McDonald (by phone)

Introduction and Meeting Overview –Kirby Gilbert (MWH)

Kirby provided an overview of the meeting objectives which were to go over the plans for Key Observation Points and process of analysis for aesthetic resources, river flow survey plan, and have an opportunity for dialog on the recreation surveys and survey instruments as a follow up to the September 20, 2012 meeting. This was followed by a brief discussion on the timing of Revised Study Plan (RSP) it terms of a draft being available for review. Cassie Thomas (NPS) asked when she might get to see a copy of the draft RSPs for recreation and aesthetics. Betsy indicated that the plan was to have the draft RSP section for Recreation and Aesthetics available toward the end of October but hopefully by the time of the next working group meeting (Oct. 17th).

Aesthetic Resources

Louise Kling (URS) provided an overview of the aesthetic resource study planned for the 2013/14. Two approaches will be used: 1) inventory of visual resources for the entire study area

based on BLM's VRM & landscape level regions, 2) a more focused assessment of the direct impacts to visual resources from features of the Project (reservoir, power lines, access corridors). Louise indicated that the study area for the inventory will include river segments downstream of Talkeetna.

Louise provided an overview of each visual resource landscape region within the Project area and the potential views that may be affected within each region. She stated the goal was to determine if changes will be detectable to users and to help inform the siting or design of facilities early on in the engineering process.

Wayne Dyok (AEA) noted that the Aesthetics study effort will need to coordinate with the Geomorphology study group in terms of looking at how turbidity levels might change leading to changes in water color and clarity. Louise confirmed that this would be occurring and added that further collaboration with the Geomorphology group would occur to determine if there might be any changes in moving bedload that is currently audible to boaters during certain conditions. David Griffen (ADNR) stated that the Middle Susitna river region will be a major focus for the State Parks Division because Denali State Park is in this area and they will be interested in visual analysis locations in this area. Dave noted that the Alaska Railroad would also likely be interested in understanding any potential aesthetic changes resulting from the Project also.

Louise presented an overview of "Target Analysis Locations" that would include KOPs, and discussed the different types of locations as well as the views and seasons to be assessed. Further discussion followed with respect to how each location will be initially assessed in terms of its nexus to the project and how each will be assessed by identification of the medium of change (form, line, texture) rather than making scenic determinations. There was follow on discussion of why the term KOP (Key Observation Point) was being replaced with "Target Analysis Locations". Louise stated that this was done to avoid confusion in terminology and capture locations that characterize different aesthetic types or "observation areas" that might be not really be "key" observation points. Louise explained that this is needed to capture impacts to dispersed users that are not associated with standard views.

Harry Williamson asked if the use of "Target Analysis Locations", rather than standard KOPs, would complicate the BLM's VRM process. Louise explained that this is similar to the direction BLM is taking with the VRM process since it focuses on the continuum of users' experiences, rather than a static location within the "observation area," or the area represented by the Target Analysis Locations. Harry and Cassie Thomas (NPS) confirmed their support for this approach.

For winter area, Cassie asked if the study would include the analysis of night sky conditions with respect to proposed facilities and inquired about a baseline analysis of current night sky conditions. Louise confirmed that this analysis will occur, with a focus on facilities lighting. Wayne asked for this to be referenced in the RSP.

Following a comment from Cassie about ensuring coordination with the biological and physical resource groups, Louise explained that coordination was essential and when appropriate, Target Analysis Locations will be paired with other study analysis points to take advantage of physical

and biological data being collected by other teams' work (changes in river flows, ice formation, gravel bars, etc.).

Louise summarized the process through which baseline data will be collected from users through executive interview and the rationale behind waiting until 2014 to potentially use focus groups. She emphasized that by waiting to use focus groups until project attributes are more fully laid out, she hopes to avoid clouding place based values with "for/against" comments. Cassie Thomas agreed with the concept of not using focus groups too early in the process if we could not really pin-point or clearly outline the potential changes indicating it would be better to wait until facilities are sited and likely flow regimes determined.

David Griffin asked if new recreational amenities will be provided by the Project, to possibly offset impacts. Wayne and Kirby explained that the Project will have a recreation plan and that would likely include provision for new facilities and management of recreation uses at the Project, but management related to access is also a policy item that needs to be considered at the larger State level, taking into consideration potential impacts. David Griffen mentioned that he had some historical Susitna River trip reports from the 70s and 80s that he could make available.

In conclusion, Louise emphasized that many locations will be assessed but only a small subset of points that will be simulated for future change using Project renderings. There are many factors that will be considered in evaluating key observation points including seasons, and even things like time of day issues such that points will likely be adjusted in the future.

River Flow Study

John Gangemi (ERM-Oasis) provided an overview of river recreation flow and ice processes study and outlined objectives of the study, defined reaches, and discussed approaches that will be used. He broadly summarized the goals of the study as determining: 1) who uses the river corridor and for what purposes, 2) what flow levels users need for these experiences, 3) how these users access the river. John then went over some study methods that will enable him to assess users-based considerations.

There then was some brief discussion of the different reaches that have been defined for the flow study and what attributes were used to define them. Cassie asked for more coordination with other study areas that have defined different river reaches along the river and requested a table or a figure that enabled for cross reference between other study reaches. Kirby specifically requested an overlay of John's River Flow reaches on top of the standardly defined reaches (Upper, Middle, Lower). Following this, Cassie suggested the use of water class, rather than access, could serve as a means to define reaches for the river flow study.

Joe Giefer (ADF&G) inquired why the analysis stopped at the Parks Highway Bridge, given potential flow impacts downstream. John explained that he thought sufficient baseline data on recreation flow levels would be collected below the three rivers confluence, south of Talkeetna, to extrapolate impacts downstream of the Parks Highway Bridge. He emphasized that the purpose was to determine flow levels necessary for recreational activities, not the levels of activity.

Cassie suggested John Gangemi follow up on the 60 hunters who were stranded along Cash Creek, which was recently described in an Alaska Dispatch article. Denton Hamby (BLM) indicated that the BLM had a list of user groups that based on special use permits, are active in this area and that he would make it available upon request.

There was much discussion on how the electronic survey would be utilized for different reaches of the river, with a focus on how these users could be reached and be useful to help inform the study team on how flow changes might affect their experiences. Cassie suggested that an online survey should be specifically tailored for each reach based on the likely users of each reach. This was followed by a discussion of survey methods that could be used to interview the small number of people within the white water community (30 people) who have used the Devils Canyon reach, and how their flow needs differ from other users.

Kirby requested that the online survey methodology and protocol for executive interviews be clearly laid out in the RSP and discussed by the river flow study reaches.

Cassie suggested that focus groups could serve to help acquire more detailed information from user groups; however, John recommended that the use of focus groups be reserved until 2014, after baseline data, executive interviews, and some initial flow management options have been better defined.

Survey Instruments – Covering NPS Written Comments

Donna Logan (McDowell Group) led a discussion of NPS comments on the proposed survey instruments and how each comment was going to be addressed. These included comments on the study area boundary, intercept points to be added and removed, the need for adjustments in survey content, definition of party size vs. group size, use of the online survey, and the reason why the voter registration list was chosen for the mail survey.

Cassie asked the team to consider and layout more defined contingency plans for lost or missing data, particularly in relation to the closure of the King salmon season and its impact on recreational users. David Turner (FERC) indicated that it was extremely difficult to assess all potential issues; however, this issue could be addressed by clearly indicating the process through which data gaps would be addressed. Kirby indicated that while 2013 would be the major focus for collecting data, additional data collection in 2014 could be used to fill in any identified gaps and many studies are trying to use past information and data to help characterize the resource conditions and trends.

In response to some discussion regarding how to introduce the Project to survey participants, Wayne indicated that AEA currently has “fact sheets” that can be handed out to survey participants and during executive interviews.

Pat Burden (NEI) discussed the recreation activities that would be the focus of a possible future RUM model (boating, hunting, fishing, and snow machining), but indicated that riding ATVs and sightseeing may also be added to the analysis. This was followed by a discussion of

displacement issues and how NEI is considering using the RUM model to address displacement potential and more refined recreation demand.

In closing, Donna brought up the need to reduce the number of questions on the current intercept survey. She emphasized that many questions will need to be dropped and shifted to the mail survey, executive interviews, or collected using other methods.

Joe Giefer expressed concern that concerns of some ADF&G staff on the Study Plan were no longer relevant based on the discussions occurring and asked if the Revised Study Plan would be available before the next technical working group. Betsy indicated that the draft RSP would be available as soon as possible around the time of the next TWG meeting, along with a response table for all comments received so far.

Action Items:

- Distribute draft RSPs for recreation and aesthetics and comment-response tables in October
- Aesthetics study group needs to make sure inputs from geomorphology and coordination are depicted in its interdependencies chart or in the text of the study plan
- Louise to outline use of Target Analysis Locations and how KOPs fit into that plan
- Louise to make sure night sky analysis is addressed in study plan with some analysis regarding potential changes due to likely facilities lighting.
- Louise to describe how some target analysis locations will be paired with other resource study sites.
- David Griffin to provide Wayne historical trip reports which Wayne will then forward to recreation planning team.
- The river flow study plan needs to have a map that overlays the Project standard study reaches with their specific river flow study reaches (map and table formats would be useful)
- The recreation study group needs to check into the recent stranding of 60 hunters near Cash Creek to learn of current access considerations (Alaska Dispatch article)
- Denton Hamby of BLM to provide recreation study team with lists of user groups BLM has issued or considered in Special Use Permits.
- River flow study needs to create online survey for all three study reaches, not just limit it to Reach 2 (Devils Canyon). Provide specifics in how each reach will be handled differently both in questions asked and methods used to reach out to potential users who might fill out surveys.
- The recreation study should discuss how they might gather relevant information even if King salmon closures continue.
- The intercept survey needs to be looked at for number of questions and consider ways to reduce to combine questions if we are reaching a limit, based on judgment and past survey efforts, to which a survey responder will be willing to participate.



SUSITNA-WATANA HYDRO

Instream Flow Study-Fish, IFS-Riparian, Groundwater, Ice, Geomorphology, Water Quality

Field Reconnaissance Debrief Meeting Notes - DRAFT

October 4, 2012

- LOCATION:** Northern Susitna Institute
22510 S. Talkeetna Spur Rd
- TIME:** 1:00 pm – 4:00 pm (AKDT)
- ATTENDEES:** Kathryn Toews LVA, Dudley Reiser R2, Phil Hilgert R2, Bill Fullerton TetraTech, Bob Mussetter TetraTech, Chiska Derr NOAA, Kevin Fetherston R2, Kirk Pedersen Stillwater, Betsy McCracken USFWS, Jeff Davis ARRI, Mike Buntjer USFWS, Ron Benkert ADF&G, Joe Klein ADF&G, Eric Rothwell NMFS, Matt Cutlip FERC, Stormy Haught ADF&G, Bob Henszey USFWS
- ON PHONE:** Steve Padula LVA, Betsy McGregor AEA, Wayne Dyok AEA, Matt Love VNF, Jan Konigsburg NHI/HRC, Michael Lilly GWS, Sue Walker NMFS, Hal Shepard CWA

This debrief session was held to review the activities and impressions of those who attended the field visit which took place on 10/03/2012 and the morning of 10/04/2012. Attendees were able to visit three of the candidate focus areas for the Instream Flow Study: Whiskers Slough, Slough 8A and Slough 6A. All debrief attendees were present on the field trip with the exception of Kathryn Toews. Michael Lilly attended the site visit on 10/03/2012 but was unable to attend the visit on 10/04/2012. The site visit was conducted via boat along the Susitna River. AEA's water resources contractors who organized and lead the field visit and their respective responsibilities include:

- Dudley Reiser - Instream Flow Program Lead
- Kevin Fetherston - Riparian Instream Flow Study Lead
- Phil Hilgert - Instream Flow Study Lead
- Bill Fullerton - Geomorphology Program Lead
- Michael Lilly - Groundwater-related Aquatic Habitat Study Lead

River conditions and flood effects

It was noted that the river flow on 10/4/12 was 15,800 cfs. The most recent flood (mid-September 2012) included flows as high as 78,900 cfs. River bed effects from the flood were observed by the Mahay's river boat captain at the three river confluence, with less bed changes noticed as he traveled upstream.

Bill Fullerton and Dudley Reiser mentioned that wood seemed to play a larger role at Whiskers Slough than Slough 8A with an extensive addition of large woody debris from the flood. Bill Fullerton also saw fine sediment with vegetation removed by the flood at Slough 8A.

Kevin Fetherston noticed that at Whiskers Slough, the flood penetrated the willow/alder zones to a level of at least two feet above the full bank. Dudley Reiser saw a geomorphic change in the area of Whiskers Slough that was previously occupied by spawning chum salmon on September 13, 2012.

Round Table Discussion

Dudley led the group in a roundtable discussion to obtain initial impressions from those participating in the field visit.



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Responses are summarized below:

Michael Buntjer – He was surprised to see less spawning fish in the sloughs, seeing only one sockeye Slough 8A) and one coho salmon (Whiskers Slough). He speculated this may be due to the recent high flows.

Bob Mussetter – Seeing the scale of the system was helpful in understanding the habitat modeling challenges. 2D is the only practical approach at a complex site such as Whiskers Slough and Slough 8A, while 2D modeling is not necessary at Slough 6A. He also mentioned it is important to differentiate substrate variability relative to flow conditions. He said that the bed of Whiskers Slough did not appear to have been mobilized in the recent flood but it was at Slough 8A. He feels that a 2D sediment transfer model of both sites would help explain that process.

Ron Benkert – He was impressed by the system and how well the main tem handled the recent high flows without signs of extreme changes and instability. Sediment deposition was seen high from the current river levels, but the vegetation was not ruined. It was nice for him to see first-hand the sites and likes the focus area approach being proposed.

Stormy Haught – Stormy Haught noted that all three visited focus areas were very different from each other. He suspects that if we look at the 1980s transects where they found suitable spawning habitat, we would currently not find the same conditions due to the recent flood impacts. This makes him wary of using only 1980s data in selecting sites. Dudley Reiser explained the difficulty in identifying spawning habitat. An area that may not look suitable for spawning as defined by depth/velocity/substrate combinations may actually be. This is because the system may be more complex than what meets the eye due to factors such as groundwater upwelling. Being out there made Stormy more aware of the groundwater-surface water interaction importance and challenges in understanding the system's complexity.

Eric Rothwell – He expressed concerns of the ability to choose sites suitable for extrapolating data to the river as a whole. He also noted that the three visited candidate focus areas were very different from one another. Eric agreed with 2D modeling approach at Whiskers Slough and Slough 8A. While on the river, Eric found it easy to see the multiple levels of habitats and how habitat classifications can change with flows. He is unclear on how these changes will be addressed in the studies. When assessing the Project effects on groundwater, Eric believes the first objective must be to understand the groundwater – surface water interactions. Eric also requested a draft list of data collection techniques (methods and parameters) at all fish study sites. Dudley addressed this by saying that detail will be added to the draft RSPs and more so in the final RSPs with further details added continuously as they are available.

Betsy McCracken – Betsy indicated she had gained a more interdisciplinary understanding while on the river. She was impressed by the habitat complexity and saw how the various areas were fitting into the current classification system. While visiting the river, Betsy realized the importance of groundwater and its strong role in the environment. She also was pleased to hear it confirmed that some focus areas will include habitat suitability criteria (HSC) sites with other HSC sites being located outside of focus areas.

Bob Henszey – Bob appreciated this time of year for better viewing and navigation on ground. He would have enjoyed more time at each site. He expected to see more changes in the channel from the recent high flows. Ron Benkert noted that the most recent flood was the second highest on record. With that being true, Bob Henszey wonders how the landforms are built in the Susitna system if such a



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significant flood did not considerably influence the existing landforms. He also noted that the trees in the areas visited are uniformly aged, lacking the usual border of younger trees. Bob suspects this to be due to stable channels. Bill Fullerton noted that these trees could be a useful way to age the landforms that they grow on.

Chiska Derr – Chiska noted that Slough 6A included more established habitats which encompassed an old beaver complex. In this complex, she saw moving water and asked how much through flow and how much groundwater can be contributing to this movement. She also saw a floating bog at Slough 6A and explained that the taxa on such a bog can help calculate how old the structure is due to the change of vegetation associated with a timescale. Chiska also noted that according to the currently proposed study plan, this floating bog is considered outside the study area and would not be captured as part of a transect. She would like to see such structures included in transects. Kevin explained that off channel water bodies, such as these, increase in age as one goes away from the river. The peat building systems are the furthest from the river and these areas will be included in the studies. The lateral extent of the study area will include areas that could be affected by Project-induced changes in the flow and sediment transport. It is important to include lateral systems due to water flowing from the river to channel areas. It is important to also consider hill slope vs. river input, and LiDAR will help us to evaluate this input.

Matt Cutlip – Matt Cutlip noticed how sterile some habitats looked without fish being present where he expected. He asked where fish are presently in the river, if not in these areas. If these habitats are not being utilized now, when are they being utilized? Matt is interested in how the fish distribution study will capture such variability. Dudley Reiser suspects that the fish may have been displaced from the side channels to the main channel and that the habitats are used opportunistically at different times and different flows.

Dirk Pederson – Dirk Pederson was impressed by the lack of bed load transport in the side channels from this recent flooding event. He expressed that lower Whiskers Slough looked like ideal rearing habitat and upstream seemed to have groundwater input without any productivity. Dudley Reiser identified visually detectable upwelling at the north end of the slough as well.

Jeff Davis – Jeff Davis mentioned that he understands that resident fish are using the main channel in the winter. He had seen “pockets” along the banks which looked like low velocity areas similar to where he has seen fish in the Little Susitna River in summer months. Dudley Reiser indicated that he noticed these structures at the southern end of the focus area of Slough 6A and confirmed that they are within the currently proposed study areas. Jeff Davis feels that the river’s flow affects the water level in beaver ponds in Slough 6A. Kevin Fetherston suspects this is due to a difference in pressure (relating to groundwater) and this interaction would be modeled with MODFLOW. Bill Fullerton noted the complexity of beaver dam water levels by explaining that beavers control the water level to their liking, adding an additional influence to the water level.

Phil Hilgert stated he was curious regarding night time activity of juvenile fish and Dirk Pederson expects many to be in the beaver ponds.

Jeff Davis also mentioned that the percent of fines in the riverbed influence its permeability. This may be influenced by the Project and can be a factor in the groundwater – surface water modeling. Jeff raised the hypothesis that if Project effects result in a coarsening of the substrates, permeability would be increased, resulting in a quicker interaction with the groundwater. Eric Rothwell asked that if the



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Project changed sediment transport, the effects on hydraulic conductivity be looked at during the studies. Ron Benkert mentioned the need for drilling to find layers and lenses when determining the controls on downward movement of water.

Kevin Fetherston - Kevin saw evidence of flooding of plant communities and sediment deposition of about 4 cm in certain areas due to this most recent flood. Kevin also noted higher elevation floodplain forms with cottonwood. Cottonwood have a general life expectancy of 150 years, implying that the river influences these areas within that time. Water levels could have reached these areas as a result of ice jams since floods do not seem to go to such high elevations. The most recent flood laid sediment occurred in alder and willow thickets, but not above. Kevin also explained that the smaller willows, which seem to be only a few years old, based on their size, are actually much older and are unable to grow very large since they are constantly laid down by winter ice. The root structures are characteristic of much older plants.

Phil Hilgert - Phil Hilgert asked for all to consider the importance of stage as well as the flow. In winter, ice jams cause the stage to increase while the flow does not, causing floods. Bob Mussetter mentioned that most large floods occur June-August. The 2006 flood in late August saw flows around 60,000 cfs. Joe Klein said that high water event history would be interesting to look at with the stage information. This may be historically recorded in reference to property damage.

The meeting concluded with a request from participants for timely posting of meeting materials in the future.

Summary

Whiskers Slough and Slough 8A were recognized as good candidates for 2D modeling. Most participants expressed surprise of the little observed effects of the recent flood, and surmised the Susitna River to be a resilient system accustomed to variable influences. Groundwater-surface water interactions play a large role in the riparian and lateral habitats and are recognized as an important aspect of the overall study effort.

Susitna–Watana Hydroelectric Project
Agency Consultation on Proposed Study Plan for Waterbirds

Thursday, October 4, 2012 — 10:00 A.M.–Noon

AEA conference room, 411 West 4th Avenue, Anchorage, AK

Invitees: Maureen de Zeeuw, USFWS; Bob Platte, USFWS; Catherine Berg, USFWS; Mark Burch, ADFG; Mike Petrula, ADFG; Brian Lawhead, ABR, Inc.; Robin Reich, Solstice Alaska Consulting; David Turner, FERC; Betsy McGregor, AEA

Goal: To understand and resolve differences between agency comments/study requests and AEA's Proposed Study Plan, as reviewed at the Terrestrial Resources Technical Work Group meeting on Aug. 9, 2012, for incorporation into AEA's Revised Study Plan

Agenda Items:

Discussion and resolution of differences between USFWS study request (May 2012), ADFG comments on AEA study request (May 2012), and AEA's Proposed Study Plan (July 2012):

- Study-area extent (3-mile vs. 15-mile buffers around Project area & reservoir)
- Breeding-pair & brood survey methods & relationship to standard survey protocols
 - foot surveys vs. aerial platforms
 - aerial transect spacing for breeding-pair surveys
 - number and timing of surveys
- Specialized surveys (Harlequin Ducks, tree-cavity nesters)
- Migration surveys (visual and/or nocturnal radar sampling; Project area priorities)
- Other topics?

Meeting Summary
Susitna–Watana Hydroelectric Project Licensing
AEA Project Offices, First Floor Conference Room
411 West 4th Avenue, Anchorage, AK

Waterbirds Study Plan, Follow-up Meeting
October 4, 2012, 10:00 a.m. – 12:00 p.m.

Attendees:

Organization	Name
USFWS	Maureen de Zeeuw
USFWS	Robert Platte
ADF&G	Mark Burch
ADF&G	Mike Petrula
FERC	David Turner (on phone)
AEA	Betsy McGregor
AEA	Justin Crowther
ABR, Inc	Brian Lawhead
MWH	Kirby Gilbert (on phone)
Solstice Alaska Consulting, Inc.	Robin Reich
Van Ness Feldman	Chuck Sensiba (on phone)

After introductions, Brian opened the meeting and said that the objective of the meeting was to discuss and resolve differences between USFWS’s study request (May 2012), ADF&G comments on AEA’s study request (May 2012), and AEA’s Proposed Study Plan (July 2012).

Waterbird Study Area

- AEA proposed a 3-mile buffer around the Project area, whereas USFWS originally requested a 15-mile buffer around the Project area and reservoir. AEA proposes to modify the 3-mile buffer area by extending outside the buffer in some places to include certain waterbodies that were surveyed in the 1980s Susitna Hydro Project study, such as Clarence Lake and another lake south of there, as well as several lakes north and east of the “Big Bend” of the Susitna River. In addition, small “holes” between the Chulitna and Gold Creek corridors, which resulted from applying the 3-mile buffer, would be eliminated and waterbodies in those areas would be included in the study area. USFWS agreed that a 15-mile buffer radius was not necessary.
- The USFWS requested that the minimum waterbody size, the spatial extent, and number of waterbodies to be surveyed should be identified in the study plan.
- The group agreed that the 3-mile buffer around the Project area (infrastructure area, access and power transmission corridors, reservoir inundation zone) would be acceptable, with the modifications discussed.
- The group agreed that, within the 3-mile buffer, complete waterbody searches, rather than sampling transects, would be flown, except in the easternmost portion of the study area (near

the upstream end of the reservoir inundation zone). It would be appropriate to fly breeding-pair sampling transects in the easternmost portion of the study area because of the numerous waterbodies that occur in the lowlands. An existing USFWS transect at the edge of the study area has been surveyed annually each spring for about 50 years, so a long-term data set is available for comparative data. The USFWS wants details on the waterbody surveys and transect design to be specified in the study plan.

Waterbird Migration and Breeding Surveys

- The PSP proposed weekly spring migration surveys starting on May 1, but USFWS expressed concern that some birds could be missed in a year of early breakup and melt. The USFWS would like the spring migration surveys to start earlier, by the last week of April. USFWS has reports from migration studies that can provide insights on the timing of spring migration surveys.
- Maureen stated that the study report should indicate that some peaks of waterbird migration could be missed because of the proposed survey interval timing (7–10 days between surveys).
- USFWS has concerns about the timing of breeding surveys. USFWS suggested that the surveys be timed to match seasonal conditions and melting lake ice in each year, based on available weather and breakup data. The USFWS is concerned because there are only two years to collect data and they do not want to miss the onset of breeding in either year. Betsy said that the results of river ice breakup surveys would be available to help determine survey timing.
- Mike suggested that the distinction between spring migration and breeding surveys should be dropped and the two periods should be combined, so that migration surveys would transition into breeding surveys (late April to mid-June). The same survey method (complete waterbody search in lake-to-lake pattern) would be used for both. He suggested that surveys occur every 5 days instead of every 7–10 days, as proposed in the PSP. The surveys would determine abundance, which species are moving through the Project area, and which species remain in the Project area to breed.
- The group agreed to conduct aerial surveys for migrating birds and breeding birds every 5 days from late April to mid-June. The survey timing for the breeding-pair transect surveys in the eastern survey block would be determined based on the results of the lake-to-lake surveys.
- The group agreed that a Robinson R-44 helicopter would be the best aerial survey platform to use for migration and breeding-pair surveys.

Waterbird Productivity Surveys

- The group agreed that brood surveys need not be conducted on foot surveys, but could be conducted by helicopter instead.
- Maureen said that the study plan should review the species list to ensure that the survey methods are appropriate for all species because of differences in phenology and nesting habitat.

- The group agreed that brood surveys should be conducted at least twice, with the possibility of a third survey based on the results of the second survey. The surveys should start the second week of July.

Harlequin Duck Survey Methods

- The PSP proposed four stream surveys for Harlequin Ducks — two pre-nesting surveys in late May–early June and two brood surveys in late July–early August. The group agreed that this timing was acceptable.
- The USFWS asked how the streams to be surveyed would be selected. Brian said that all of the tributary streams flowing through the study area would be surveyed. Betsy mentioned that video footage of all streams in the study area would be available from work done this year for the aquatic resources program. The group agreed that review of those videos would be useful to determine which streams to survey.
- USFWS said that if Harlequin Ducks are seen in a stream, the entire stream should be surveyed, not just that portion of the stream within the study-area buffer.
- USFWS said that they want the study report to state that the survey would not be an exact count of all Harlequin Ducks in the Project area, but would provide an index to numbers and distribution.

Bird Migration Surveys

- Maureen said that the USFWS is interested in actual migrating bird numbers to help understand the level of migration through the Project area. The USFWS is interested in where birds might be migrating through the Project area, so that transmission lines could be sited using the best information. In addition, she said that USFWS is concerned about the risk of collision posed by attraction of landbirds to lighting the Project facilities, including the dam.
- Maureen said that later in the FERC licensing process, the AEA and the USFWS need to discuss powerline design and placement based on existing information from the U.S. and elsewhere. David suggested that the Project could look at topography and vegetation to assess whether and where strike hazards might exist. He said that, by applying avian protection guidelines, the Project should figure out which route(s) are most/least impactful to migrating birds. Betsy said that other factors also will affect route selection for access road and power transmission lines.
- Brian proposed a migration study near the dam site in 2013 to survey landbird and waterbird migration through the Susitna River valley, using a combination of radar and visual survey methods. Nocturnal monitoring would provide data on flight volume, distance, speed, direction, and altitude. Visual surveys would be done during daylight to provide data on species composition that would assist in interpreting the nocturnal radar monitoring results. The data could be compared with other data from similar migration studies conducted in central and

southern Alaska (Tok, Gakona, Healy, Fire Island) to evaluate the magnitude of bird migration through the Project area. Based on the 2013 results, it could be determined whether a second year of monitoring is needed.

- Maureen said that USFWS appreciated Brian's proposal, but USFWS is not yet ready to completely approve the migration study methods. Maureen said that they were much closer to a workable plan, however.

Meeting Summary - DRAFT
Susitna–Watana Hydroelectric Project Licensing
Alaska Energy Authority Main Office
813 West Northern Lights Blvd., Anchorage, AK

Technical Workgroup Meeting on Terrestrial Resources
October 16, 2012, 8:30 a.m.-4:00 p.m.

Attendees:

Organization	Name
ADF&G Wildlife Conservation	Mark Burch
ADF&G Wildlife Conservation	Louis Bender (by phone)
ADF&G Wildlife Conservation	Joe Klein
Coalition for Susitna Dam Alternatives	Becky Long (by phone)
Environ / Normandeau	Sara Barnum (by phone)
Office of Project Management and Permitting (OPMP)	Marie Steele
Natural Heritage Institute (NHI)	Jan Konigsberg (by phone)
USFWS	Bob Henszey (by phone)
FERC	David Turner (by phone)
AEA	Wayne Dyok
AEA	Betsy McGregor
ABR, Inc.	Terry Schick
ABR, Inc.	Brian Lawhead
ABR, Inc.	Alex Prichard (by phone)
ABR, Inc.	Nathan Jones
ABR, Inc.	Janet Kidd (by phone)
Cardno ENTRIX	Lynn Noel (by phone)
MWH	Kirby Gilbert
Solstice AK	Jeff Randall
Van Ness Feldman	Chuck Sensiba

Kirby Gilbert (MWH) facilitated introductions and gave an overview of the meeting objectives, overall study plan schedule and updates on the Susitna-Watana Project engineering studies and facilities plans. The objective of the meeting was described to provide an update on the status of terrestrial resources revised study plans, focusing specifically on responses to comments received (to date) on the July 14th study plans, and any outstanding or unresolved issues. The study plan schedule was presented. Kirby noted that the Comment Response Tables are posted on the Project Web site (<http://www.susitna-watanahydro.org/meetings/>).

AEA PSP and ILP Study Plan Process

The deadline for written comments to FERC on the Proposed Study Plan (PSP) is November 14, 2012. AEA has one month (December 14, 2012) after written comments on the PSP are received to file the final RSP with FERC. Comments are due on the final RSP by January 18, 2013. FERC

will issue the Study Plan Determination by February 1, 2013. Revisions to the Revised Study Plans (RSPs) are ongoing and will be posted to the Project website by the end of October 2012.

Jan Konigsberg (NHI) asked if the revised RSPs would be highlighted to show what has been changed. Kirby explained the RSPs would not be red-lined because it would make the documents too messy, but the Comment Response Tables have subsections for each study, and those could be referenced to see what has changed in the RSPs based on the comments received.

Joe Klein (ADF&G) asked if AEA would hold meetings to address comments. He wanted to know this to help with staff planning. Wayne Dyok (AEA) said one-on-one meetings may be held as needed but no additional TWG meetings for terrestrial resources are planned prior to filing the RSP in December.

Joe Klein said that in theory work could be done on the RSPs up until February 1, 2013. Wayne said in theory that was true and some study plans such as instream flow may still need more work and Wayne said that as issues are resolved AEA would let FERC know. David Turner (FERC) said that in theory that was possible, but last-minute changes are not ideal.

Mark Burch (ADF&G) stated that some studies would have to begin in winter of 2013 for practicality purposes, which means some studies would begin before they are approved. Wayne said changes to the studies would have to be added as the studies move forward. Brian Lawhead (AEA) said that furbearer work requires winter surveys and asked whether any study plan disputes would hold up all of the studies. Wayne said AEA would likely move forward on studies that are not disputed. David Turner said only the mandatory conditioning agencies can dispute the study determination. He also noted that all other studies, not disputed should go forward. If the studies are dependent upon one other, it becomes more complicated.

Jan asked if BLM lands were in the Project area. Kirby acknowledged there are state-selected BLM lands within the Project area.

Project and Study Updates

Kirby went over a few updates to the Project. The 2012 geotechnical investigation led to a slight shift in the location of the dam's axis. The number of workers involved in the construction of the Project is estimated to vary between 300 and 930. The railbelt utility load demand is being input into operation models that can help understand both power and flow outputs from the Project. The three corridors are being further refined and the new details will be presented in the RSP and Terrestrial Study Plans but the same three corridors are still being evaluated.

Comment-Response Review for Wildlife Studies (Brian Lawhead, ABR)

Birds

USFWS had previously expressed the opinion that winter surveys were needed to confirm the presence of small cavity-nesting owls, specifically Boreal Owl and Northern Hawk-Owl. Due to difficulties and safety issues associated with nocturnal surveys in winter, however, the Project will assume that these owls are present in suitable habitats in the study area, but specific surveys

will not be conducted because they would likely yield very little data for a substantial amount of survey effort. No representatives from USFWS were present during the meeting, but it was stated that this approach had been previously agreed to by USFWS at a meeting on September 6, 2012.

With regard to waterbirds, the intent is to include all of the approximately 65 waterbodies sampled in the 1980s studies. The study area boundary, which is a 3-mile buffer around the Project area, will be expanded as needed to include specific lakes that were surveyed in the 1980s. The PSP stated that the waterbird migration surveys would begin in early May, but the plan has been revised to start the last week in April, based on comments from USFWS and ADF&G. Spring migration surveys will begin in late April 2013 and will transition directly into the breeding surveys with no break between them. The survey interval will be five (5) days rather than 7–10 days stated in the PSP. Wayne confirmed with Mark Burch that the timing of the surveys was acceptable.

The majority of the waterbird study area is a high plateau, where waterbodies tend to be clustered in groups, so a lake-to-lake survey pattern makes the most sense in those areas, as suggested by ADF&G and agreed to by USFWS in a previous meeting. In a specifically designated transect-survey block in the southeastern portion of the study area, southeast of the Oshetna River-Susitna River confluence, however, the USFWS protocol for breeding-pair transect surveys will be followed in early June because of the greater prevalence of waterbodies in that lower, wetter area than elsewhere in the study area. USFWS has conducted breeding-pair surveys along several transects in the general area of the eastern portion of the study area for decades, which will provide good comparative data.

As requested by the USFWS, all streams in the study area that have suitable habitat for use by breeding Harlequin Ducks will be surveyed during pre-nesting and brood-rearing surveys by helicopter.

Resolution is still needed on USFWS's concern regarding the risk of bird collision with transmission lines and nocturnal attraction of migrating landbirds to lighted Project structures. A combination of visual monitoring during daylight hours and radar monitoring, both during the day and at night, has been proposed to study the risk of collision with Project structures. Due to the high cost of the radar study, the study is proposed to be conducted in the Susitna River drainage near the site of the proposed dam (not in the mountains to the north). The Susitna River drainage, especially with its east/west orientation in this area, is expected to be traversed by more migrant birds than the mountainous areas. Mark was supportive of the radar/visual combination sampling approach. David said that the reason for choosing to use radar survey over the river as opposed to the neighboring mountainous areas should be clearly explained in the study plan. Brian will follow up with USFWS to confirm whether they support this plan. The radar data will not provide estimates of the number of birds, but will give the number and size of targets, the speed at which they are flying, and flight altitudes, so the data can be used to infer which species or groups of species are passing through the area. The numbers of birds passing through the area (flock sizes) will be recorded from visual observations made during the day and at night using night-vision goggles. Terry Schick (ABR) suggested that, since the radar survey will capture data on all types of birds, the description of the study be presented only in one study plan and

referenced in others. Betsy McGregor and Brian agreed to this approach for documentation. Brian suggested the radar/visual study be described in the waterbirds study plan.

AEA will employ the accepted best practices with regard to lighting of Project infrastructure (e.g., red lights are better than white, and down-shielded lights are better). Wayne said the only caveat would be where the safety of workers and aircraft is concerned and that OSHA and FAA standards would have to be followed. Wayne also described that there were two phases to the lighting concerns: construction and long-term operation; more lights will need to be used during the construction phase.

For the landbird/shorebird study plan, there has been a lot of discussion regarding the specifics of the point-count methods and analyses. The USFWS wants density estimates (e.g., to determine how many breeding pairs are likely to occur in the inundation zone). The study plan has been revised to note that density estimates will be derived from the point-count data. Both removal and distance analyses will be employed, as suggested by the USFWS at a meeting on September 6, 2012.

Mark noted that it had been suggested to split the distance estimates for the bird observations into bands and asked if that was being included in the plan. Terry confirmed that they will categorize the observations into distance classes, but they have not yet defined those distance classes in the study plan. More error in the distance estimates will be removed by using larger classes or bands. Brian said that was a good point that had not been reflected in the meeting notes, but that he would update them.

For the point-count observations, Mark noted that Dave Tessler (ADF&G) had emphasized that he felt using a double-observer method was preferred. Betsy said the double-observer method was discussed and it was decided not to be employed. Mark questioned if there were safety concerns by sending out only a single observer. Betsy confirmed there would be two people present during the surveys. Mark asked if both people in the team would be trained and it was confirmed that they would. Kirby pointed out that only one of them would be recording data. Terry stated, based on comments made by the USFWS, that the additional data from double-observers was not believed to give much greater accuracy in detectability or density estimates than data recorded by a single observer and that the extra data would require more analysis work. Terry recalled that Dave Tessler, at the meeting on September 13, 2012, had been fine with a single-observer approach when following Alaska Landbird Monitoring System (ALMS) protocols and using removal and distance analyses to estimate densities. Mark said that data from double observers would give an estimate of uncertainty, and he will confirm with Dave Tessler if the single-observer approach is acceptable.

The USFWS is concerned about a subspecies of Rock Sandpiper found in the Cook Inlet in winter and wanted to know if changes in flow would have effects on intertidal foraging habitats at the mouth of the Susitna River. The USFWS wants to be sure that the physical effect on the mudflat habitat is assessed. To make this assessment, data from the water resources and geomorphology studies will be examined, including temperature, water quality, flow and sedimentation rates.

At an earlier meeting, Maureen de Zeeuw (USFWS) expressed concern that point-count surveys for breeding birds and habitat surveys for the wildlife habitat mapping study would be conducted concurrently. It will be clarified in the plan that these surveys will be conducted separately.

In the point-count surveys, all bird species heard or seen will be recorded. The USFWS was concerned about species that are present, but not detected. Species may not be detected if they are non-singers or are found in riparian habitats where noise from running water may mask their presence. Swallows and kingfishers are two types of birds mentioned in this regard. Another study element has been added to the landbird/shorebird study plan to include surveys for swallow breeding colonies along the Susitna River within the proposed inundation zone. The study plan also now includes additional point-counts and walking surveys along streams (between point-count sites) in the inundation zone to collect data on species that use riparian habitats.

A 2-mile survey buffer around the proposed Project components had been previously agreed upon as the study area for the point-count surveys, and the study plan and map figure will be updated to show this.

The USFWS agreed that additional point-count surveys outside of the Project area in places such as Denali National Park and the Copper River Basin are not needed because existing detection functions from previous studies can be used for the less common species (for which fewer data are expected in the Project study area).

The landbird/shorebird studies will follow field protocols recommended by ALMS and the data will be analyzed with removal and distance analyses to calculate densities. Based on comments from the USFWS, the length of the point-count survey period has been doubled from 14 to 28 days. Point-count surveys will be conducted continuously from mid-May to mid-June.

Mist-netting had been suggested by USFWS in their original study request as a potential method to study landbird and shorebird migrants in the inundation zone. This topic was not resolved at the September 6, 2012 meeting, but ABR does not recommend mist-netting because it poses a risk to the birds and requires intensive effort for relatively little information in return, when compared with the radar/visual study proposed at a meeting on October 4, 2012; it is not an appropriate method for a study area of this size. ABR's recommendations will be discussed in the proposed study plan. Final resolution has not been reached with the USFWS on the mist-netting issue.

Brian will check with Sarah Bullock (BLM) to see if the response from ADF&G and UAF to her comment regarding the proposed ptarmigan analyses addresses her concern.

Wood Frog

Wood frogs were discussed on September 13, 2012 meeting with Dave Tessler, who stated that a major variable affecting the occurrence of wood frogs is the abundance of fish, because fish prey on eggs, tadpoles, and adult frogs. Acknowledgment of this variable is being made in the revised study plan. Fish occurrence data, if available, will be used as another variable to estimate the likelihood of frogs occurring in waterbodies.

Some of the field study details for frogs were still unresolved. The problem faced with frog detection is similar to the problem faced with the landbird/shorebird point-counts, in that frogs may not be calling at the time of the surveys. This problem is more acute with frogs than birds, however, because birds sing repeatedly and often during the peak of the breeding season. The current frog study plan calls for two observers and two visits to sites at which frogs are not detected on the first visit, to permit calculation of detectability and corrections to the observed occupancy rate. If frogs are detected on the first visit, a repeat visit will not be needed because these are occupancy surveys and occupancy will have been confirmed on the first visit.

Mark asked if ABR needed standardized protocols for surveying for frogs. Brian said he was aware of a standardized USGS protocol for areas with road access, which involves acoustic surveys at designated stops along a road route, but he needs to confer with Dave Tessler to see if other standardized protocols may exist. Terry said he thought the USGS protocol was specific to roaded areas and was similar to the Breeding Bird Survey (BBS) routes used for birds along roads, and that those methods would not apply to this study since there are no existing roads.

Sampling for the chytrid (Bd) fungus will be done opportunistically during the wood frog surveys when frogs are observed and can be caught. The details of the sampling protocols for chytrid fungus need to be added to the plan and Meg Perdue (USFWS) will be consulted regarding this. The goal will be to determine if the fungus is present currently in the frog population in the Project area.

Moose

In response to Sarah Bullock's (BLM) comment, the moose study will not attempt to validate the 1980s carrying-capacity model. The current plan calls for a more recently developed browse removal method used by ADF&G. Sara accepted this approach in an earlier meeting.

ADF&G has decided to conduct a GeoSpatial Population Estimator (GSPE) survey within a single year, as opposed to the two years stated in the PSP. This effort is currently planned for November 2012, but if it is not conducted due to unfavorable weather conditions, it will be conducted in 2013. By the time the RSP is finalized, it will be known whether the 2012 effort was successful.

Caribou

In response to a question posed by Sarah Bullock (BLM) in an earlier meeting, a response in the comment response table stated that the Nelchina caribou herd is known to cross in the proposed reservoir inundation zone, but that the Delta herd is not expected to cross there because they occur farther north. Mark stated that collars were being placed on caribou this week and those are expected to provide empirical data to answer this question. He said what dictates which herd an individual is assigned is where they calve, but that herds overlap at other points in time. Bulls especially can be variable in their location. The language in the plan regarding the crossing of the inundation zone by the two herds will be revised to state that this is not known conclusively.

Based on a comment submitted by ADF&G regarding their expected ability to estimate calf survival, the plan has been revised to delete estimation of calf survival as an objective.

The frequency of relocations by radio-tracking flights has been changed from happening weekly during the spring and fall to twice a month during the spring and fall, due to the length of time required to track all collars, and once a month for all other months. The study plan will be updated to show this change.

Dall's Sheep

The study area defined in the plan was revised based on a suggestion from ADF&G to include all suitable habitat in Game Management Unit 13E located east of the Parks Highway and south of the Denali Highway.

ADF&G will conduct an aerial survey annually in late July or early August, after lambing but before sheep hunting season opens.

Consideration had been given to potentially conducting genetic tests or radio-collaring sheep to examine the degree of isolation of sheep north of the proposed inundation zone in the Watana Creek Hills. At this time, this testing will not be added into the study plan; it is thought that aerial surveys should provide enough information that genetic testing and telemetry are not needed.

The study plan will be updated to reflect that ADF&G will conduct a single summer aerial survey for Dall's sheep each year. It was decided that there would be no value in conducting camera monitoring of mineral licks or using telemetry.

** Lou Bender (ADF&G) and Alex Prichard (ABR, Inc.) joined the meeting via phone.*

Large Carnivores

The study plan for large carnivores proposed using DNA and stable-isotope analyses from hair samples to evaluate the minimum number and dietary composition of bears using salmon spawning streams downstream from the proposed dam. Laverne Beier of ADF&G in Southeast Alaska will be consulted about the feasibility of using hair traps that close after obtaining hair from a single bear, as opposed to wire snags that will obtain samples from more than one bear. The results of that consultation will be included in the RSP.

The study plan has been revised to include a recently developed method of analyzing existing population data from line-transect surveys, which have been conducted in the region by ADF&G twice since 2001, to derive spatial models of population density. Earl Becker of ADF&G will work on this analysis with an expert, David Miller, from the University of Rhode Island. Text describing this analysis has been added to the study plan and the estimated cost will be adjusted accordingly.

Wolverine

The map figure in the PSP portrayed sampling blocks as being 25 square miles, but it should have been 25 square kilometers (as was stated correctly in text). The plan and map have been updated to show the correct area and to consolidate the shape of the study area, as suggested by ADF&G in earlier meetings. The objective of obtaining habitat-use information was removed from the study plan, as suggested by ADF&G, because a single survey would not be sufficient to

obtain this information. However, data on habitat associations can be derived from the occupancy surveys proposed by ADF&G (see below), so that objective will be reinstated.

The wolverine survey needs to be conducted 12–36 hours after a fresh snowfall in February or March. The logistics will need to be in place so the survey team can mobilize rapidly when the conditions to conduct the survey are favorable. ADF&G is interested in conducting the survey work with the expectation that a contractor could provide additional personnel if needed. Details regarding the wolverine survey will be added to the RSP.

In addition to using a Sample-Unit Probability Estimator (SUPE) survey, ADF&G also proposed conducting a less-intensive survey for use in occupancy modeling. At the end of the meeting, Wayne announced that AEA had decided to use both survey approaches, as suggested by ADF&G, so the study plan will be revised accordingly.

** Lou and Alex left the call after the portion on Occupancy Modeling was discussed.*

Terrestrial Furbearers

The terrestrial furbearer study has been developed by Laura Prugh at the University of Alaska Fairbanks and generally approved by ADF&G, with some minor suggestions for improvement. Spatially explicit capture/recapture (SECR) methods for population estimation have been incorporated into the study plan, as recommended by ADF&G.

Aquatic Furbearers

The USFWS is concerned the risk of post-construction bioaccumulation of mercury in piscivorous (fish-eating) wildlife, including river otter and mink. ADF&G agrees that mercury bioaccumulation is a concern. The study plan describes a proposed literature review of the food habits of mink and river otters to gain insight for the mercury risk assessment study, and to obtain hair samples for mercury analysis.

Winter tracking surveys by helicopter are proposed to obtain information on the presence and relative abundance of these two species. The track surveys would estimate the minimum number of otters and the plan was revised to deemphasize mink as a focal species. Efforts to record mink tracks will be made during winter track surveys of otters. Mark said he thought the mink survey should be more than casual observation and would like to revisit the matter after Brian consults further with Merav Ben-David at the University of Wyoming regarding potential survey methods.

The details of hair sampling are still unresolved, but sampling fur from individuals harvested by trappers is a potential way to get samples, as is field deployment of hair-snap stations. The difficulty is that the small number of trappers would result in a small sample size, and that the low population density of these animals will reduce the probability of obtaining hair-snap samples.

** David Turner left the call at this point.*

Beaver surveys will be conducted in the fall when leaves have fallen by looking for food caches and lodge locations. Data from the instream flow study will be needed to draw conclusions about the potential Project effects on habitats used by beavers and other aquatic furbearers in the area downstream from the proposed dam.

** Broke for lunch, 12:05–1:00 pm.*

Habitat Evaluation

The wildlife habitat evaluation study has been revised to include a preliminary list of bird species of conservation and management concern for the Project area, in keeping with the FERC–USFWS MOU regarding migratory birds.

The study plan has been updated to note that, in the study report, more information will be presented on how the rankings of habitat value were determined for each species. Individual species-account sections of the study report will be prepared to help the reader understand how habitats were ranked as being of high, moderate, or low value.

Per recommendations from ADF&G, the study plan also has been updated to note that a “crosswalk” between the fine-scale habitats mapped in the Project area and the coarser scale habitats mapped by the Alaska Gap Analysis Project (GAP) will be prepared. The habitat-value rankings for birds and mammals in the Project area also will be crosswalked to the coarser scale GAP habitats.

Wildlife Harvest Analysis

No comments have been submitted to date.

Little Brown Bat

Anabat ultrasonic detectors will be placed in the infrastructure and reservoir area to detect flying bats, and searches will be conducted in an attempt to locate roost sites and hibernacula. These detectors will not be placed in the access and transmission corridors.

The study plan has been revised to include seasonal adjustments in acoustic sampling periods to account for changes in night length.

Kirby confirmed with Mark that ADF&G was in agreement with the sampling plan for bats.

Small Mammals

No comments have been submitted to date.

Extensive field sampling was done in the area in the 1980s. One new species, the Alaska tiny shrew, has been described since then and the first specimen actually was taken in the study area. Since it was described, the species has been trapped throughout the state, so it is widely distributed, but does not appear to be abundant anywhere it occurs. Pitfall trapping is the preferred method of sampling for small mammals, but it is almost always fatal to the animal and Brian said he is not sure if the data to be collected in a new field effort will provide much new information beyond the present knowledge obtained from the 1980s study and other regional

information. There is also not much that can be done to mitigate the effects of habitat lost once the reservoir is inundated. For these reasons, Brian suggested that the small mammal study could be changed to a “desktop” analysis, rather than undertaking field sampling that is likely to confirm the results of the original study in the 1980s. Mark will inquire at ADF&G whether a desktop study would be sufficient and Brian will confer with the USFWS and BLM to ask if a desktop study is acceptable to them. Wayne stated that FERC has accepted desktop studies in the past for other issues and it did not come up as an issue in the scoping document. Marie Steele (OPMP) asked if mortality from pitfall surveys was really an issue as flooding the habitat will kill them anyway. She said since the existing data was 30 years old there may be some climate change effect that would not show up in a desktop study. Brian replied that climate change effects would most likely be expressed in terms of habitat changes, which will be revealed by the vegetation and habitat mapping study. Kirby advised that agencies be consulted on their thoughts.

Terry said that, for all species of concern, habitat-loss and habitat-alteration assessments can be done in the inundation zone and infrastructure areas, and habitat-alteration assessments can be done in areas downstream of the proposed dam, using the results of the wildlife habitat mapping study.

Comment-Response Review for Botanical Studies (Terry Schick, ABR)

** This portion of the meeting began earlier than scheduled, around 1:40 p.m. Bob Henszey and Janet Kidd called in to join the meeting around 2:30 p.m., which was the scheduled time on the agenda.*

Vegetation and Wildlife Habitat Mapping Study

For the vegetation and wildlife habitat mapping study area, originally a 5-mile buffer was proposed on each side of the Project footprint. This has since been reduced to a 4-mile buffer study area, which is still double the area of the buffer being used in the landbird/shorebird and wetland mapping studies.

In an earlier meeting, Bob Henszey (USFWS) had suggested a comparative analysis between the 1980s vegetation mapping data and current conditions. The Alaska Vegetation Classification (AVC) system used in the 1980s has changed slightly from the final version (Viereck et al. 1992), but more importantly, a historical/current vegetation comparison will not help with the primary focus of the study, which is to assess impacts from the currently proposed Project on vegetation and wildlife habitats. Bob would like the data from the 1980s in case such a comparison is needed in the future. Terry said that they do not have the aerial photography from the 1980s, but they do have the GIS polygons for the 1980s mapping. Without the photography used in the 1980s, however, they will not know if real changes have occurred or if the area was just not well-delineated in the 1980s. Wayne is going to check Juneau to see if the aerial photography is among the archives in Juneau. Terry said the comparative study would be interesting, but that it would be time-consuming and could not be started until the current mapping was complete, which is not expected until late in 2014. Terry indicated there are other studies that should take precedence given the short timeline for this project. Wayne clarified that

he was not suggesting the comparative study be done, but he just wants to pull the information together in case, down the road, if ever needed to be done. Bob agreed that was reasonable.

Concern was expressed over the classification system proposed for wildlife habitat mapping, and Kessel's (1979) bird habitat classification system for Alaska was proposed by the USFWS. One primary difference between Kessel's classification and the AVC (Level IV), which would be used as the vegetation data for the Project habitat map, is in the definition of shrub types: Kessel uses four classes (dwarf, low, medium, and tall) and the AVC uses three (dwarf, low, and tall). Unfortunately, it is not possible to accurately map shrub habitats from aerial imagery using Kessel's system because the distinction between medium shrub types and low and tall types will be difficult to map consistently. Kessel's system will work fine for mapping small survey plots on the ground, but it will result in lots of errors when attempting such a detailed shrub-height discrimination from the interpretation of aerial imagery. Additionally, recent survey data in Alaska indicate that the differences in use of low, medium, and tall shrubs by landbirds are not as nice and clean as Kessel's paper indicates. A crosswalk between Kessel's habitat types the AVC Level IV vegetation types that are likely to occur in the Project area will be prepared so that ABR can discuss the proposed habitat classification approach for the Project and make sure it addresses the concerns from the USFWS. The habitat classification approach does not rely solely on Level IV vegetation data from the AVC, but will include data on physiography, surface forms, disturbance level, and soil moisture regimes, as needed. The study will produce a wildlife habitat map, not a vegetation map. Wayne confirmed with Mark that ADF&G was okay with this approach. Terry will follow up with Maureen.

Riparian Vegetation Mapping Study

The lateral boundary for the riparian vegetation study needs to be determined. Originally, it was proposed that the 100-year floodplain limit be used, but there had been concern from the agencies over how this flood limit would be determined. In the RSP, it is noted that riverine physiography will be mapped and used to determine the limits of the active floodplain of the Susitna River downstream of the proposed dam. This then will be proposed to serve as the study area for the riparian vegetation study. The mapping of riverine physiography will be done before the study area boundary is described in the RSP. Once the riverine physiography mapping has been done, the proposed boundary will go out to the agencies for comments. The timeframe is short on this. The mapping is in progress now and is expected to be completed in late October/early November 2012, and to be ready for agency review by mid or late November.

The downstream boundary for the riparian vegetation study area will be determined to be that point at which the effects of the altered flow regimes in the Susitna River are no longer considered significant. At some point downstream the altered flow regimes will not be substantial because their effects will be overridden by the flow inputs from other streams and/or the effects of tides from the Cook Inlet. This information will come from the modeling of stream flow to be done in the 2012 instream flow study. Wayne said we need to define the characteristics of what is considered "significant." Jan said the changes in flow regime may have a different effect in winter versus summer. Wayne said a freeze-up flow assessment is being conducted. He said that some years have high flows naturally, and that those flows likely will be tempered substantially with development of the Project. Robin Beebe (HDR) can speak to this

more next week. Terry said effects on riparian vegetation succession may be driven largely by high summer flows. Wayne said springtime flows also can have substantial effects with large ice pack jams that build up high backwater. Under a post-project scenario, these large ice effects may be less common, but the ice processes study will address this.

Wetland Mapping

Wetland functions will be determined for all mapped wetlands in the study area.

Based on comments received, a spatially explicit wetland function component will be included to show which waterbodies provide a fish habitat function. This will be accomplished using fish occurrence data from the Project fish distribution and abundance studies.

The consumptive use function will be evaluated, if possible, with data from the recreation and subsistence studies. Specific wetland polygons will be attributed, where possible, to identify those specific wetlands that may be used currently for recreation and subsistence activities. Similarly, wetlands adjacent to proposed roads and corridors that could potentially be used for consumptive purposes will be attributed accordingly. Mark asked if any observations will be made to see what people may be currently using in these areas. Kirby explained that no surveys will be conducted to look for recreational or subsistence activities, but surveys will be conducted to document areas known to be used, and the current uses documented in the area could give insights into potential human activities following development of the Project. There was discussion that there may be some consumptive use activities that may not be uncovered through this process. Terry will revise the wetland study plan to indicate that fine-scale information on consumptive uses for wetlands likely will not be available, but that the wetland functional analysis will strive to indicate which wetlands are currently being used and which wetlands could potentially be used in the future (within the limits of the data obtained from the recreation and subsistence studies).

Wetlands will be categorized as being associated with permafrost or not. The functional capacities of permafrost and non-permafrost wetlands will be addressed directly in the classification of wetland types.

Interdependency Charts

New flow charts showing interdependency inputs and outputs between various Project studies are being created, but are not yet posted to the website for terrestrial resources.

Terry showed the preliminary study interdependency flow chart for the wetland mapping study. Some of the additional inputs needed on the wetland mapping study chart include upwelling and spring data from the groundwater study as well as consumptive use data from the subsistence and recreation studies (which was recognized by the group as possibly not being available at the needed spatial scale). Brian pointed out that the wildlife occurrence information needed to be added to this interdependency chart as well.

Bob suggested revising the title of the wetland mapping study or adding a supporting sentence to the study interdependency chart to indicate that the wetland mapping required by the US Army

Corps of Engineers is specific to the inundation/infrastructure zone and the transmission line/access road corridors (in the upper and middle Susitna basin). This is because there is another flow chart, for the riparian study, which illustrates study interdependencies for the wetland mapping that will occur downstream of the proposed dam. Kirby and Terry accepted this idea.

The invasive plant study interdependency chart was reviewed. Janet said that, in that study, common use trails in and near the Project area would be surveyed for invasive plants, and that data on invasive plants from sites surveyed along the Parks Highway was available from the Alaska Natural Heritage Program.

For the riparian study interdependency chart, the graphic showed the inputs needed by that study were ice processes data in the Susitna River, fluvial geomorphology data, and riparian instream flow data. Bob pointed out that groundwater flow data would also be helpful to have.

Wayne said to keep in mind that the charts were iterative. Kirby said he hoped the charts made sense to everyone as they will be used a lot. The group recapped action items and closed the meeting.

Action Items:

Wildlife

- Determine the minimum size of waterbodies to be surveyed for waterbirds.
- Clarify that the waterbird “eastern block” transect area is a separate survey block.
- Confirm with USFWS whether the proposed bird migration study, using a combination of radar and visual survey methods in the river corridor near the dam site, addresses their concerns.
- Include language as to why the river corridor, as opposed to the upland terrain, was chosen for the radar/visual bird migration study.
- Mark Burch to verify with David Tessler that having only a single observer record data is acceptable for the landbird/shorebird point-count surveys.
- Check with Sarah Bullock to see if her concerns regarding the ptarmigan study have been addressed.
- Distribute past meeting notes to ensure important issues were raised, keeping in mind that meeting notes should be substantive and content-focused.
- Determine with David Tessler if there is a standardized USGS protocol for frog occupancy surveys that would be applicable to the Project area.
- Obtain more details from Meg Perdue on the methods for sampling and analyzing the chytrid fungus in wood frogs.
- Revise the caribou study plan to clarify that it is not known conclusively whether the Delta herd migrates through the proposed inundation zone.
- Update the caribou plan to show the spring and fall capture frequencies have been changed to twice a month during those migration periods, as opposed to once a week.
- Update the Dall’s sheep study plan to clarify that time-lapse camera monitoring of mineral licks and telemetry studies will not be included.

- Follow up with Laverne Beier on the feasibility of hair traps as opposed to hair snags for obtaining samples of bear hair.
- Update the large carnivore plan to include information on the spatial density modeling by ADF&G, working with the University of Rhode Island.
- Update the wolverine plan to include sampling 12–36 hours after snowfall in February and March.
- Update the wolverine plan to state that ADF&G is interested in conducting the survey with the expectation that contractors can provide additional personnel if needed.
- Update the wolverine plan to show that occupancy modeling and a SUPE survey method will both be used.
- Consult with Dr. Merav Ben-David regarding survey methods for mink.
- Confirm with the agencies that a “desktop” study for small mammals will be sufficient.

Botanical

- Discuss with USFWS the crosswalk between the Viereck et al. (1992) AVC Level-IV vegetation types and Kessel’s (1979) habitat types, along with a likely set of habitats to be mapped in the Project area, and make sure that concerns regarding the classification of wildlife habitat types will be addressed in the vegetation and wildlife habitat mapping study.
- Finish the mapping of riverine physiography downstream of the proposed dam to help with defining the lateral boundary of the study area for the riparian study, and distribute to the agencies for review.
- Reconfigure the language for the consumptive use function in the wetland mapping study RSP to describe the sources and types of information available.
- Wayne to check with Juneau to see if aerial photography from the 1980s vegetation mapping study is available in the event that a comparative vegetation study needs to be done in the future.
- Include the wildlife occurrence data as an input on the wetland functional assessment interdependency chart.
- Include groundwater flow data as an input on the riparian study interdependency chart.
- Revise the titles of the wetland mapping study and riparian study to avoid the confusion between the wetlands mapping that will be conducted in each study.



SUSITNA-WATANA HYDRO

**Meeting Summary- Draft
Susitna-Watana Hydroelectric Project Licensing
Alaska Energy Authority Main Office
813 West Northern Lights Blvd, Anchorage, AK**

**Recreation and Social Sciences Technical Workgroup Meeting
October 17, 2012, 8:30 am – 4:00 pm**

Attendees:

Organization	Name
ADF&G	Joe Giefer
ADNR-DMLW	Wendy Steinberger*
ADNR	Marie Steele
AEA	Justin Crowther
AEA	Wayne Dyok
AEA	Betsy McGregor
Ahtna	Bruce Cain
CIRI	Dara Glass
Charles M. Mobley & Associates	Chuck Mobley
Coalition for Susitna Dam Alternatives	Becky Long*
DOWL HKM	Maryellen Tuttell
FERC	David Turner*
HDR	Tracie Krauthoefer
Louis Berger Group	Lisa McDonald*
McDowell Group	Donna Logan
MWH	Sarah Callaway
MWH	Kirby Gilbert
National Heritage Institute/ HRI	Jan Konigsberg*
Newfields	Gary Krieger
Newfields	Kathe Boucha
NLUR	Justin Hays*
Northern Economics	Pat Burden
Northern Economics	Don Schug*
Northern Economics	Jonathan King
NPS	Cassie Thomas
NPS	Harry Williamson*
SHPO	Richard Vanderhoek
URS	Patti Kroen*
URS	Bridget Easley
URS	John Gangemi*
URS	Louise Kling*
URS	Tim Kramer
URS	Amy Rosenthal*
Van Ness Feldman	Chuck Sensiba

Organization	Name
URS	Taylor Brelsford

*By telephone

Introduction and Meeting Overview

Kirby Gilbert (MWH) facilitated introductions and gave an overview of the meeting objectives, overall study plan schedule and updates on the Susitna-Watana Project engineering studies and facilities plans. The objective of the meeting was described to be a meeting to update parties on the status of social sciences revised study plans, focusing specifically on responses to comments received (to date) on the July 14th study plans, and any outstanding, or unresolved issues. The overall Integrated Licensing Process (ILP) study plan schedule was presented.

Kirby described how the revised study plans (RSP) are going to include interdisciplinary interdependency charts, to graphically depict how outputs from some studies are necessary inputs for others.

Cassie Thomas (NPS) expressed a general frustration with AEA and consultants mentioning dates for having documents available for review, but then not always having them available as hoped. Regarding the upcoming revised study plan, Cassie noted she would need the draft RSP by 10/25/2012, so she could use it to prepare her comments on behalf of the NPS, due to her travel schedule.

Transportation, Air Quality and Health Impact Assessment (HIA)

Maryellen Tuttell (DOWL HKM) presented an update to the transportation study plans. Few comments have been received to date, but those the study team have received to date focused on: 1) how to document existing river use for transportation, and 2) how to get useful information from local landowners or others in the area knowledgeable about local transportation use. Those considerations are addressed in the revised study plan. Some of the information that will be used in the transportation analysis will come from the other studies (e.g. recreation).

No comments were received on the air quality study to date, but the study team has reached out to EPA and ADEC staff, who indicated they would take a look at the PSP to see if they had any comments.

Gary Krieger (Newfields) presented the status of the HIA study plan. He described how the health-related data comes largely from the other technical studies, to avoid duplication and maximize efficiency in data collection. There are some health-related questions integrated into the subsistence study surveys. Field data gathering for the HIA, specifically, is typically minimal. The Social Goods and Services study can perhaps help with demographic information such information about consumer-durable assets in by household, as these kinds of statistics can be predictive of wealth quintiles; which, in turn, are related to health. Gary described that there is often a time lag between regulatory standards and the “science of today.” But standards are standards, and that is what is used in the HIA analyses. From a health perspective, particulates (PM_{2.5} particularly) are a focus.

Regional Economics and Socioeconomics Studies

Pat Burden (Northern Economics) – Pat went over the major comments received to date as outlined in the posted comment response table. Pat noted that the NPS has requested a full accounting of Project-related impacts on the social environment. Some effects are not quantifiable, and limited to qualitative discussion, and thus will rely heavily on surveys. Additionally, in response to a comment that noted there are some potentially, directly affected residents along the Alaska Railroad north of Chase, a “railroad community” has been added to the study area to try and characterize this community of people and possible effect mechanisms resulting from development of the Project.

Pat also noted that there were a few comments on survey methodologies and reviews. The study team has prepared draft protocols for the executive interview surveys which will be conducted, and the team with AEA still needs to decide about other surveys and if a Random utility model (RUM) will be used.

Lisa McDonald (Louis Berger Group) asked for definition of “knowledgeable person” to be included, and also explanation of how the organizations/persons will be selected for interviews. Pat noted that the list of persons and basic criteria will be in the Revised Study Plans.

Bruce Kane (Ahtna) asked if the studies assume there will be an intertie transmission line between the Susitna-Watana Project and the Copper Basin. If not, it could be an important consideration to evaluate. Bruce noted that power costs are three to five times higher in the Copper Basin than elsewhere in the Railbelt. Wayne Dyok (AEA) stated that the feasibility and cost of the intertie is being investigated as an independent effort within AEA; but at this time such an intertie transmission line is not part of the Susitna-Watana Project. Wayne suggested a follow-up meeting between Ahtna and Sara Fisher-Goad of AEA.

Pat noted that the effects of an intertie could be discussed in the cumulative effects analysis within the license application and FERC NEPA analysis. But right now, the population of the Copper River valley is not part of the socioeconomics study area. Study areas are those which will receive the power benefit of the Project (i.e. the Railbelt).

Wayne Dyok (AEA) noted that the RUM model is very costly, and data intensive. He went on to say that AEA is currently looking at how the information that might come out of the model would be used in decision making. Wayne discussed that AEA wants relevant information related to understanding the baseline but is interested in the type of information that really helps understand potential Project impacts and is most usefulness in decision making. AEA is determining what level of analysis is appropriate and has not made a final decision on the use of the RUM model at this time, and it will not be reconciled by the time the draft Revised Study Plans are posted next week. It will be reconciled by the 12/14/2012 deadline for filing the RSP.

Cassie Thomas (NPS) asked how the power- and non-power uses of the river will be balanced without fully understanding its economic value. David Turner (FERC) replied that putting an economic value on resources (like a dollar of energy equals x amount of fish habitat) is difficult and so the analysis may need to be more qualitative in some instances.

Lisa McDonald (Louis Berger Group) stated that the RUM may not be the only option; at this point it is difficult to judge whether the RUM is the appropriate path. Jonathan King (NEI) stated that the RUM model is very data intensive. It requires an understanding of where people are going and why, and over a period of time. It is also important to understand where they fit into the broader, regional picture of recreation for the whole population. The RUM is powerful because it incorporates data that is collected from the individuals using the area, while they're using it, over a period of time. Also the RUM output helps to understand how distance, site attributes, trip experiences all fit together, and the tradeoffs that individuals are making compared to recreational site choices. The RUM can give a "picture" of recreation in the study area in the context of the broader choice of recreational opportunities and choices, beyond the Railbelt. The RUM can also help inform choices on Project road corridors based on recreation attributes, not just how the different alternatives might affect users.

Subsistence Study

Tracie Krauthoefer (HDR) presented information on updates to the subsistence study plan. She noted that not many comments have been received to date. As with other social sciences studies they were asked by FERC in previous meetings to include survey instruments, so those have been added. The other comments that the study team has noted are in regards to traditional knowledge (TK) interviews and how that information could be integrated into the HIA. Bruce Cain (Ahtna) stated that it will be important to have elders in the TK interviews. Tracie noted that the interviewees are selected by the community working with the study team.

Tracie reviewed the subsistence study schedule, which begins in January 2013. She noted for Bruce that household surveys for Copper River communities will be conducted in the first quarter of 2014 but TK interviews will actually occur in first quarter of 2013. The 10-year mapping studies will be conducted in first quarter of 2014.

Recreation, River Flow, and Aesthetic Studies

Bridget Easley (URS) provided an update on the status of the recreation and aesthetic studies. She noted that over 100 comments were received. She summarized some of the main comments as follows:

- There were comments about the need to identify interdependencies with other disciplines and timing of results so they can be used by other disciplines
- Comments regarding the timing of surveys and study implementation with respect to the desire for participants review and input during the study process. Bridget noted that the draft RSP now makes note of how the study team expects the technical workgroup meetings to continue and plan to meet quarterly to get input and reviews of study progress.
- There were comments about the study areas along with recommendations for adjustments that have been mostly incorporated into the updated study plan.
- There were comments about the survey methodology and survey instruments. Bridget noted the survey is planned to consist of 10,000 mail out surveys to Alaska residents and coupled with the intercept survey program and executive interviews

- Dara Glass (CIRI) inquired about who the surveys would be sent to. She noted that as a majority landowner, CIRI is very concerned about who will be included in the survey, as well as potential trespass issues. Donna Logan (McDowell Group) stated that the (mail) survey will include a random sample from voter registration lists. For the intercept survey, there are several locations (e.g. Parks Highway, Denali Highway, Talkeetna). These are directly targeting area users across all seasons, so it could be Alaska residents or visitors.
- Cassie Thomas (NPS) noted that if the Project moves forward, it is assumed that there will be a recreation management plan and that could be a means to help manage trespassing issues (using the information gathered from the surveys).
- There were questions about how the study team will select key observation points and soundscapes in the Aesthetics study.
- There were also some comments related to making sure the studies addressed the quality of experience in addition to the quantitative information being gathered with respect to recreation uses.

Bridget noted that the revised study plan includes a draft boating survey. John Gangemi (Oasis) stated that the October 3rd, 2012 meeting resulted in a revised survey instrument that includes recreation reaches 1, 2 and 3. The draft survey is currently a bit little lengthy and may be revised. He noted this is not intended to be a random survey because the user group is so small, it will need to be “pushed onto” as many users as possible based upon word of mouth and networking.

Cultural Resource Study

Chuck Mobley (Charles M. Mobley & Associates) provided an update to the cultural resources study plan. He noted the comments and revisions mostly centered on the definitions/extent of the preliminary direct and indirect areas of potential effect (Direct and Indirect APE).

Chuck noted after many meetings and much collaboration the Direct APE is focused on what it proposed as the Project “footprint” including the impoundment area up to elevation 2,075 feet. It also is to include the Watana Dam construction site as well as the Chulitna, Denali and Gold Creek access/transmission corridors.

Chuck described the Indirect APE as the area just outside of direct APE in areas that may experience Project-induced recreational or other increased human activity, such as: existing trails, ATV trails and popular hunting areas as well as areas determined to be of high cultural resource potential that are near the trails, recreational areas, or areas near or related to known cultural sites.

The basic premise for defining the indirect APE is that areas that have seen historical use are more likely to see future use possibly increase with the Project in place and areas of higher cultural site density can be more easily impacted than areas with lower cultural site density.

Chuck presented revised maps. Wayne Dyok (AEA) recommended that 1980s mass wasting data be utilized to help identify locations around the reservoir susceptible to disturbance.

Regarding study interdependencies, Chuck stated that a lot of data will be collected in the cultural resource studies, but not a lot of it will be “distributed” to other study areas. Most of the other studies do not need the detailed cultural resources information, and much of the information collected will be restricted from distribution.

Bruce Kane (Ahtna) stated that Ahtna’s elders could be valuable in implementing this study plan, as they have lived an annual migratory lifestyle. He noted that it may save some work on radio collaring wildlife by gathering anecdotal information directly from native elders who know wildlife migration patterns. This could also help narrow down locations, or potential locations, for cultural sites. Dara Glass (CIRI) stated that CIRI elders have this type of valuable information as well. It was noted that this information would also be used for the wildlife and subsistence studies. Tracie Krauthoefer (HDR) noted that elders would likely be interviewed in the TK interviews associated with the subsistence study plan.

Action Items

- Air quality – add modeled emissions to interdependencies chart
- Update the river boating survey instrument to reduce length
- Regional Economics & Socioeconomics
 - Revise draft survey instruments
 - Pat Burden (Northern Economics) – define knowledgeable persons criteria
 - Determine if the RUM or benefit transfer method will be included in the RSP.
- Fix a small edit need on the Cultural resources comment response table where “ANILCA” should be “ANCSA”.



SUSITNA-WATANA HYDRO

DRAFT Meeting Summary

**Geomorphology, Fluvial Geomorphology, Ice Processes, Water Quality,
Mercury Bio Accumulation, Geology/Soils
Technical Workgroup Meeting
23 October 2012**

LOCATION: Alaska Energy Authority Main Office
813 West Northern Lights BLVD
Anchorage, AK 99503

TIME: 8:30am – 4pm (AKDT)

SUBJECT: **Water Resources Studies & Geology and Soils Study Plan Updates**

ATTENDEES: **Rob Plotnikoff** Tetra Tech, **Harry Gibbons** Tetra Tech, **Paul Dworian** URS, **Felix Kristanovich** ENVIRON, **Charlie Wisdom** ENVIRON, **Roy Ireland** DNR, **Kathryn Toews** Long View Associates, **Dave Meyer** USGS, **Mike Buntjer** USFWS, **Bill Fullerton** Tetra Tech, **Marie Steele** DNR, **William Ashton** DEC, **Tim Bailey** Stephan Lake Lodge, **Brian Bjorkquist** AGO, **Jan Konigsberg** Hydropower Reform Coalition, **Michael Lilly** GWS, **Dave Brailey** Brailey Hydro, **Dudley Reiser** R2, **Robin Beebee** HDR, **Laura Noland** ENVIRON, **Eric Marchegioni** USDA, **Bryan Carey** AEA, **Catherine Berg** USFWS, **Justin Crowther** AEA, **Matt Love** VNF, **Betsy McGregor** AEA, **Keith Fetherston** R2, **Brian Carey** AEA

ON PHONE: **Richard Leo** Coalition for Susitna Alternatives, **David Turner** FERC, **Stormy Haught** ADF&G, **Bob Mussetter** Tetra Tech, **John Haapala** MWH, **Fred Winchell** Louis Berger, **Ken ?** Louis Berger, **Dirk Peterson** Stillwater, **Jay Stallman** Stillwater, **Paul Makowski** FERC, **Eric Rothwell** NMFS, **Gary Vandervine** NHC, **Wayne Dyok** AEA, **Becky Long** Coalition for Susitna Alternatives, **Sue Walker** NMFS, **Steve Padula** Long View Associates, **Hal Shepard** CWA

AEA PSP and ILP Study Plan Process (Matt Love, VNF)

The purpose of today's meeting was to provide an overview of to-date revisions made to select PSPs. Matt Love reviewed the RSP schedule, Project updates and today's purpose as explained in the "Overview of AEA Draft Revised Study Plans" presentation (available at http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/AEA_overview_revised_study_plans_Geo.pdf). He informed everyone that a spreadsheet of the status of each study plan is available on the AEA website (<http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Study-Table.pdf>). This sheet informs the reader whether a draft RSP is available for review or changes to the PSP have not been significant based on comments received to date and thus only the original PSP is available. Live links to these documents are imbedded in the spreadsheet. Within each draft RSP is an updated schedule, a figure showing interdependencies amongst studies and a consultation table showing comments to-date along with AEA's responses.

Ice Processes in the Susitna River Study (Robin Beebee and Bob Butera, HDR)

Robin Beebee began her presentation discussing changes made to the Ice Processes PSP. The presentation can be found at <http://www.susitna-watanahydro.org/wp->



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content/uploads/2012/10/Susitna-Watana-TWG1023-Ice-1.pdf. Robin reviewed three comments and the responses associated with them in subsequent slides. In response to a question, Robin indicated that the ice processes modeling results would not be available in 2013 and therefore would not be incorporated into the Focus Area site selections. When discussing study deliverables (slides 5-7) Robin explained that data from the 1980s and the data from the Ice Study will be compared to capture any differences in observed ice processes. She presented a sample diagram of ice cover and photographs from the Susitna River showing recent frazil ice formations. An interdependency diagram was provided on slide 10 showing the data required from other studies to complete deliverables for the Ice Study. It also lays out which other studies employ particular deliverables of the Ice Study. An input to be added to the diagram is the Water Quality Study providing modeled outflow temperatures from the reservoir.

The Ice Study presentation was followed by questions from the licensing participants:

Gary Vandervine asked if there was enough data to develop reliable 1-D modeling after one season of data. Robin Beebee said that data from the 1980s may be incorporated to add years for parameters such as temperature, meteorological data and ice cover. Break up and freeze up information will be continuously collected and added to the model as available. Robin will adjust the schedule to represent this extension of data input. Gary questioned the variability observed in the 1980s and Robin explained that in the years when data were collected, one was colder than average, one was warmer than average and the other three years were generally average. Data was collected from 1979 to 1985, with detailed data collection beginning in 1980.

Felix Kristanovich asked if climate change would be considered in the model. Robin Beebee said that such detail is out of the current study scope. Richard Leo suggested Glen Juday of UAF be contacted regarding climate change in the Susitna Valley. He would like to see climate change consideration included in the ice modeling.

Geomorphology Study/Fluvial Geomorphology Modeling (Bill Fullerton, Tetra Tech)

Bill Fullerton began his presentation discussing changes to the Geomorphology Study and Fluvial Geomorphology Modeling below Watana Dam Study (Geomorphology Modeling Study) PSPs. The presentation can be found at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Geomorphology-TWG-2012-10-23.pdf>. Bill found that many comments from multiple licensing participants were similar so he grouped alike comments into eight categories (slide 2). Geomorphology work began in 2012 so other studies could use the data in considering 2013 site selection. Currently ten candidate Focus Areas are being considered. With the updated LiDAR and 2012 aerial images (available in December, 2012) updated habitat mapping can be applied in final site selection. The focus for 2013 is to collect data for the 1-D/2-D models and hydraulic model. 2014 provides an opportunity for the Geomorphic Study to collect more data if needed. While reviewing the integration figures, Bill agreed to add Water Quality (Geomorphology included in Water Quality Interdependency Table) as a resource using the Geomorphic Study deliverables.

Slide 15 shows the five hierarchical levels applied to habitats for mapping. The first two levels are geomorphic related while the remaining three levels are habitat related. The river segments are separated by distinct hydrologic features. Separating the upper and middle segments is the proposed dam. Separating the middle and lower segments is the Three Rivers confluence of the Susitna River, Chulitna River and Talkeetna River. At this location, the Susitna River flow approximately doubles and the Chulitna influences the Susitna River with high sediment contribution.



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Bill Fullerton explained that 1-D modeling is currently being proposed from the Project dam site downstream to river mile 75 while 2-D modeling will be utilized in smaller sections referred to as Focus Areas. Based on results of 1-D modeling in 2013, the downstream extent of Project effects will be reevaluated by early 2014, and if it is found that the Project may substantially affect geomorphology downstream of river mile 75, AEA is open to reconsidering the downstream extent of the geomorphology and other related studies. Bill presented aerial maps on slide 23 of river mile 75. He explained that this area acts as a buffer for sediment transport. This is one of the main reasons, along with the relatively small proportion of sediment load contributed from the Susitna compared to the Chulitna, for the modeling portion of the Geomorphic Study to initially be limited to above river mile 75.

Bill Fullerton continued the presentation and reviewed some field data collection methods in Focus Areas (slide 27-28). Some methods are condition specific. Depending on the environmental conditions, the field crew may choose the equipment that will best suit the study needs.

Felix Kristanovich requested more detail on the parameters used both in water quality and geomorphology studies. A complete list of water quality parameters for each type of monitoring program are included in the RSPs Section 5.5 through Section 5.7 and also included in the QAPP/SAPs.

When viewing the maps on slide 31, Bill Fullerton explained that the red lines represent cross sections for the hydraulic routing model. The sediment transport model requires more cross sections than shown currently on this slide. After evaluating existing cross sections, the study leads will determine if, and where, more cross sections are necessary.

Bill Fullerton discussed the request for 2-D mesh size specifications. He explained that each site may consist of multiple mesh sizes. Depending on the processes present in a specific area, the mesh size varies depending on the detail needed/requested of that area. More specifics on mesh sizes will be available in 2014 (after field observations). An example of mesh sizes over Whiskers Slough was presented on slide 34. Bob Mussetter mentioned that the model flexibly allows for mesh size refinement as needed.

Baseline Water Quality Monitoring/Modeling (Rob Plotnikoff and Harry Gibbons, Tetra Tech)

Baseline Water Quality Monitoring

Rob Plotnikoff explained that the changes to the Baseline Water Quality Monitoring / Modeling PSPs were in response to a data gap analysis of historic data as well as comments provided by licensing participants. Rob reviewed the goals and objectives of the Baseline Water Quality Study. He then presented a selection of comments and AEA's responses. The information provided by Rob is available in the Baseline Water Quality presentation (http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Baseline_WQ_Monitoring_TWG_2012_10_23.pdf).

In slide 5, Rob mentioned the use of a combined QAPP/SAP to ensure defensible data. These documents were combined for efficiency since they both address many similar topics. In areas reliant on pending data, such as specific site selections, a place holder will be present in the QAPP/SAP. Rob asked the licensing participants if they preferred the state or federal guidance addressing this document, and it was a general consensus of the group that state guidance is acceptable (Alaska Department of Environmental Conservation QAPP Guidance Manual).



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Charlie Wisdom asked if study efforts would be intensified during pulses of ice flowing through the system, for example an ice jam breaking loose. Paul Dworin explained that water quality data will be collected continuously via permanent sensors (temperature probes), and crews will be collecting data as soon as safely possible after break up. Harry Gibbons explained that the models will simulate activity during the times that it is unsafe to manually sample. Rob Plotnikoff added that through-ice sampling for water quality may risk contaminating the sample. He said that winter sampling is planned, but may be opportunistic depending on conditions. Frazil ice restricts most boat access, light is limiting and ice thickness can be deceiving, making falling through the ice a risk.

The two final slides briefly describe the accomplishments of the Water Quality Study 2012 field efforts. For all MET stations, data streams live for easy access and backup (telemetry system capability also serves as a check that stations are operating properly). Some in-channel temperature monitoring sites are being winterized to avoid ice encasement and the risk of probes traveling downstream with that ice. The September 2012 flood caused the loss of only 4 (out of 39) temperature probe stations. Catherine Berg asked if pop-up tags were considered as a sampling apparatus. These instruments collect the data and once complete, a tag pops up and relays the information via satellite. Rob Plotnikoff mentioned the need to regularly visit sites for precipitation measurements, maintenance and to ensure that equipment is in good working condition obviate the need to use pop-up tags.

Water Quality Modeling

Rob Plotnikoff began the presentation (available at http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Baseline_WQ_Monitoring_TWG_2012_10_23.pdf) which covered the study's goals and objectives and any significant changes thus far to the Water Quality Monitoring Study PSP.

For all toxicity modeling, the QAPP/SAP will address specifics to the detail of algorithms, calibration information and clean hands/dirty hands procedures, as examples. Toxic modeling will be conducted and include a pathways analysis based on EPA's recommended methods. Collection of mercury data, in multiple forms, was added to the water quality studies. Maya Singer asked if the models can produce an hourly output if calibrated on a longer time frame. Rob Plotnikoff explained that if calibration issues arise, they will do so within a relatively short time frame. This allows time for additional data collection in 2014. Harry Gibbons added that there will be no way to generate direct information for calibrating a model for the proposed reservoir, but using input data upstream and within the proposed reservoir will enable construction of a "virtual" reservoir.

Determining toxicities (slide 6) will be performed by using Alaska state criteria. However, this does not address all screening levels so SQuiRT tables will be used to fill in gaps. Models (slide 7) will be used with a finer resolution throughout the Focus Areas and may identify groundwater input.

Charles Wisdom asked if toxicity of mixtures (synergistic/additive effects) will be evaluated. Rob Plotnikoff explained that synergistic/additive toxicities can be determined by using mixtures in lab bioassays. However, results have a great deal of associated uncertainty. He added that bio assays examining synergistic effects are beyond the current study plan.

Rob Plotnikoff presented a pathways analysis example on slides 10-11. Figures show possible paths for movement of mercury throughout the system and reservoir. Although it is not possible to predict



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the pathway details of an entire virtual reservoir, Paul Dworian said that this analysis can inform site selection within the inundation zone for monitoring. Charles Wisdom agreed it is important to use pathways to identify locations for mitigation and monitoring. Rob explained in detail the capabilities of the EFDC modeling in relation to a virtual reservoir. He said that the model can take into consideration wetlands, bathymetry/topography, climate data, and upstream input to create a virtual reservoir. It can also address inputs from the terrestrial environment into the aquatic environment.

Interdependencies were reviewed at the final slide of this presentation. It was agreed that sediment modeling from the Water Quality Monitoring Study would be added to the figure as an input. Dudley Reiser also corrected the Hydraulic Routing Model date as 1st quarter of 2013, rather than 4-Q 2013 as stated in the presentation. Also, wetlands and riparian studies will be added as an input for the reservoir modeling.

Mercury Assessment and Potential for Bioaccumulation (Paul Dworian, URS)

Paul Dworian reviewed updates to the Mercury Assessment and Potential for Bioaccumulation Study PSP. Paul reviewed these changes in a presentation available at http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Mercury_presentation_October_23.pdf. Modeling was also added to the Mercury Study to supplement the modeling already proposed by the Water Quality Modeling Study.

Paul Dworian explained that the Harris and Hutchison Model can be applied relatively early in the study process. Paul also stated that Phosphorous Release Modeling calculates the maximum concentration of mercury in fish (the peak seen in graphs on slides 7-8).

Paul presented the interdependency chart on slide 9 and added that the detailed ADEC mercury data (regarding human consumption and health risks focusing on mercury in resident and anadromous fish) is pending. He currently has been provided averages, but needs the size, age and location of fish to apply the data accurately.

Project Hydrology (Bryan Carey, AEA)

Bryan Carey presented some new information regarding predicted post-Project Susitna River flows and stages (available at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Downstream-Stages-TWG-Oct-16-2012-R1-pptx.pdf>). The first group of stage slides are based on a conservative assumption that the Project would be utilized to provide all the load following capability needed for the entire Railbelt. This is a very conservative assumption as it is likely that other hydroelectric projects in the Railbelt system will be utilized to meet portions of load following needs. When viewing these graphs one must take into consideration that they are based on USGS gages placed in constrained areas of the Susitna River and during ice-free, open water conditions. The stage effects are more extreme in the confined reaches where the USGS gages are located and would dissipate in wider neighboring reaches. The second group of slides shows daily stage and flows with load following at various gage locations; stage changes are less than one foot at each location. The August flows and stages at locations on the Susitna, Talkeetna, and Chulitna Rivers show that the rivers are currently seeing daily stage swings from snow/glacial melt. Last group of slides shows the stage with and without the Project using 1984 flow data.

Additional Discussion



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Sue Walker indicated that she does not agree with AEA's distribution of draft RSPs. She said that this is a change in the FERC ILP protocol. She added that many agencies have internal comment review processes that prevent them from reviewing and providing comments on the draft RSPs and still meet the November 14th deadline for comments. David Turner said that comments on the PSP will be accepted until November 14, 2012 and addressed by AEA in the RSP, to be filed by December 14, 2012. David encouraged those who can to take into account the additional information contained in draft RSPs in their November 14th comments. Draft RSPs allow licensing participants to view changes in study plans prior to the RSP filing in mid-December, which should help with resolution of any remaining disagreements. Comments on the RSP will be accepted until January 18, 2013. A detailed calendar can be found at <http://www.susitna-watanahydro.org/project/schedule/> and an update schedule is on slide 3 of the "Overview of AEA Draft Revised Study Plans" presentation (available at http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/AEA_overview_revised_study_plans_Geo.pdf).

Action Items

Revise the Ice Processes Study interdependency figure to add data input (modeled outflow temperatures from the reservoir) from the Water Quality Study.

Revise the Ice Processes Study schedule to reflect that break up and freeze up information will be continuously collected and added to the model as available.

Revise the Geomorphology Study interdependency figure to add data output (sediment modeling) to the Water Quality Study.

State guidance (Alaska Department of Environmental Conservation QAPP Guidance Manual) will be used as guidance addressing the QAPP/SAP for the Water Quality Study.

Revise the Water Quality Study interdependency figure to add data input from the Wetlands Study, the Riparian Study, and sediment modeling from the Geomorphology Study.

Revise all of the interdependency figures to include RSP section numbers and include a narrative in the RSP explaining each the figure.

Draft Meeting Summary
Instream Flow, Riparian Instream Flow, Groundwater, Glacial Runoff
Technical Workgroup Meeting
October 24, 2012

LOCATION: Alaska Energy Authority Main Office [Note New Meeting Location]
813 West Northern Lights BLVD
Anchorage, AK 99503

TIME: 8:30am – 4:15pm (AKDT)

SUBJECT: Instream Flow, Riparian Instream Flow, Groundwater, Glacial Runoff

ATTENDEES: Rob Plotnikoff Tetra Tech, Harry Gibbons Tetra Tech, Paul Dworian URS, Roy Ireland DNR, Kathryn Toews Long View Associates, Dave Meyer USGS, Mike Buntjer USFWS, Bill Fullerton Tetra Tech, Marie Steele DNR, Brian Bjorkquist AGO, Jan Konigsberg Hydropower Reform Coalition, Michael Lilly GWS, Dudley Reiser R2, Robin Beebee HDR, Eric Marchegioni USDA, Bryan Carey AEA, Justin Crowther AEA, Matt Love VNF, Betsy McGregor AEA, Kevin Fetherston R2, Hannah Ramage ARRI, Gabe Wolken DGGS, Michael Barclay HDR, Stormy Haught ADF&G, Joe Klein ADF&G, MaryLouise Keefe R2, Sandie Hayes AEA, Dave Brailey Brailey Hydro, Scott Crowther Ratepayers

ON PHONE: Richard Leo Coalition for Susitna Alternatives, David Turner FERC, John Haapala MWH, Fred Winchell Louis Berger, Dirk Peterson Stillwater, Terry Schwarz DNR, Paul Makowski FERC, Eric Rothwell NMFS, Gary Vandervine, Wayne Dyok AEA, Becky Long Coalition for Susitna Alternatives, Sue Walker NMFS, Steve Padula Long View Associates, Hal Shepard CWA, Phil Hilgert R2, Kim Sager DNR, Chiska Derr NMFS, Bob Henszey USFWS

Action items are underlined

AEA PSP and ILP Study Plan Process

Matt Love, VNF

The purpose of the meeting was to provide an overview of to-date revisions made to select PSPs. Matt Love reviewed the RSP schedule, Project updates and meeting purpose as explained in the “Overview of AEA Draft Revised Study Plans” presentation (available at http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/AEA_overview_revised_study_plans_Geo.pdf). He informed everyone that a spreadsheet of the status of each study plan is available on the AEA website (<http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Study-Table.pdf>). This sheet informs the reader whether a draft RSP is available for review or changes to the PSP have not been significant based on comments received to date and thus only the original PSP is available at this time. Live links to these documents are imbedded in the spreadsheet. Within each draft RSP is an updated schedule, a figure showing interdependencies amongst studies and a consultation table showing comments to-date along with AEA’s responses.

Fish and Aquatics Instream Flow

Dudley Reiser, R2
Phil Hilgert, R2



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Dudley Reiser presented information on the Fish and Aquatics Instream Flow Study (IFS) (presentation available at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/TWG20121023DR.pdf>). Throughout slides 3-31 Dudley presented an overview and photos of the recent site tour. Three candidate Focus Areas were visited by multiple water resource study leads and licensing participants. Those Focus Areas are located at Whiskers Slough, Slough 8A and Slough 6A.

There have been 48 comments directed towards the IFS. Dudley Reiser grouped many of them in 5 recurring themes as presented on slides 33-37. The themes are listed below with a brief explanation of AEA's response.

1. **Habitat Site Selection.** The IFS is incorporating three approaches in site selection. A number of *representative* sites will be chosen to characterize habitats. *Critical* sites will be chosen based on all available data and information suggesting that specific areas are important from a fish use perspective; additional sites may be added as more data become available. *Random* site selection may be used to select sites within specific mesohabitat types.
2. **Habitat Model Selection.** The proposed modeling techniques are explained briefly in the consultation tables and in more detail in the draft RSP.
3. **Study Integration.** Phil Hilgert explained the two types of integration as 1) integration of results for different water resources within a Focus Area to get effects analysis and 2) integration within the study area (including results from terrestrial studies).
4. **Winter Fish Habitats.** The 1980s studies put substantial effort into winter studies and the results provide important background information on fish use and behavior during the winter periods. The Focus Areas at Whiskers Slough and Slough 8A will be studied in a winter pilot study this winter (2012-2013) with the possibility of expansion in later years. Joe Klein suggested that fish tagging may be useful in evaluating fish winter behavior. Dudley indicated there were a number of fish sampling and observation methods being considered including tagging. Information obtained from the winter pilot studies will be used to refine methods and techniques applied in subsequent years and will also provide important information regarding site access and sampling logistics. Stormy Haught (ADF&G) mentioned that a Habitat Use permit will be required from ADF&G for installation of any instruments in the river and indicated he would provide R2 with the necessary permit application.
5. **Stranding and Trapping.** Dudley referred to Section 8.5.4.5.4 in the draft RSP.

Slides 39-43 list the IFS section headings in the PSP with newly expanded sections contained in the draft RSP in green text. Dudley noted that overall; much more detail is included in the draft RSP than was presented in the PSP.

Jan Konigsberg asked if Habitat Suitability Criteria (HSC) will be considered for all species throughout all life stages. Dudley Reiser explained that although the RSP will consider all species, there will be specific target species for which HSC criteria data will be collected and analyzed. It is simply not logistically feasible to cover all species and all life stages throughout the entire year. The RSP will discuss data collection, a schedule and the process used for selecting target species. Data collected in the 1980s will help in the selection of target species. Joe Klein agrees with that approach and added that applying HSC curves from other areas may not be applicable.



SUSITNA-WATANA HYDRO

Dudley Reiser reviewed the revised schedules on slides 45-53. Joe Klein requested that the application of models be decided prior to data collection. Matt Love suggested that “Preliminary and final review of weighting factors” be added to the schedule. Dudley added that an additional TWG meeting could be scheduled to discuss the area weighting process and Sue Walker agreed. Phil Hilgert said that a dashed line will be added to “study area selection” and “model selection” to represent the opportunity for follow-up. Dudley will also add a dashed line to “Identify need for additional data” in Hydraulic Routing for follow-up.

Joe Klein asked what time steps are being proposed for the routing model. Phil Hilgert said that the model will be developed with analysis possible at three minute time steps. He said that a one hour time step is common practice for presenting the model output, and Joe mentioned that something shorter than a one hour step may be necessary when evaluating stranding and trapping.

The IFS integration figure is on slide 55. Slide 56 includes the integration of models originally presented in the PSP. This figure will be included in the RSP as well.

Dudley Reiser continued the presentation and explained the stratification approach with a map of the geomorphic reaches and candidate Focus Areas in the Middle River. The Lower River will likely contain at least one Focus Area, but the specifics are still under discussion.

Riparian Instream Flow

Kevin Fetherston, R2

Kevin Fetherston presented the changes made to the Riparian Instream Flow Study (Riparian Study). The presentation is available at http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/V_3_Riparian_IFS_TWG_Presentation_10_24_2012.pdf. After reviewing the meeting objectives (slide 2), Kevin presented the interdependency figure for the Riparian Study (slide 3). The line showing input from the Riparian Botanical Study represents the strong relationship between the studies. Kevin agreed to add the Large Woody Debris component (6.5.4.9) of the Geomorphology Study and the River Productivity Study as recipients of data from the Riparian Study.

Kevin Fetherston reviewed the section headings of the draft RSP which were reorganized from the PSP to better represent the study request of USFWS (slide 5). Throughout slides 6-7 Kevin reviewed the components of the Riparian Study.

Slides 8-38 addressed some comments received since AEA’s filing of the PSP and AEA’s responses to those comments. Pseudoreplication was referenced in slide 10 in response to USFWS’s comment regarding replication. Kevin Fetherston explained that pseudoreplication is addressed in the Riparian IFS with sampling conducted at the Focus Area modeling sites. Also, riparian plant community and soils sample replicates are being taken throughout the entire Project Area as the primary objective of the Riparian Botanical Study. Although groundwater characteristics will not be measured throughout the entire Project riparian area, but will be at Focus Areas. Bob Henszey asked how the data will be extended to other areas with confidence. Kevin said that the Focus Area modeling results will be used to “scale up” to the larger riparian process domain and Project Areas. Michael Lilly said that with groundwater process and scale understood, one may infer those data elsewhere within the Project Area. Kevin added that if the relationship between riparian plant communities and groundwater-surface water regime is identified, one may be able to assume that those relationships are consistent in similar conditions.



SUSITNA-WATANA HYDRO

Kevin Fetherston addressed USFWS's comment on slides 12-17 regarding seedling establishment by explaining seedling establishment requiring specific timing, surface and groundwater conditions, and sediment type. By applying fluvial geomorphology sediment transport, groundwater / surface water, and ice process models, and operational projections, one may obtain an understanding of the possible Project effects on seedling establishment. An approach to addressing study length limitations is to age established seedlings, using dendrochronology techniques, and statistically model the hydrologic, sediment type and establishment relationship.

USFWS questioned the sensitivity of MODFLOW in quantifying hydroperiod relationships for seedlings (slide 14). Michael Lilly said that data will be evaluated for accuracy and wells will be added if deemed necessary for calibration and validation of models. Kevin added that wells will be located in specific riparian plant communities, including sites critical to riparian vegetation establishment and recruitment. Bob Henszey requested that a schematic diagram of proposed well placements be included in the Riparian Study Plan as well as the Groundwater Study Plan.

Kevin presented photographs of the Susitna River on slide 24-30 to show the sediment deposition from ice and/or flooding with the river location identified on each slide.

Jan Konigsberg asked if nutrients will be evaluated in sediment depositions. Kevin Fetherston said that nutrients are not a parameter proposed to be studied. Slides 33-36 explained what will be characterized of sediment depositions.

Kevin Fetherston concluded his presentation with an updated schedule on slides 39 and 40.

Groundwater – Related Aquatic Habitat Study

Michael Lilly, GWS

Michael Lilly reviewed comments to the Groundwater-related Aquatic Habitat Instream Flow Study (Groundwater Study) PSP as well as AEA's responses, an updated schedule, an interdependency figure, and recent field observations. Michael's presentation is available at http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Groundwater_IFS_TWG_Presentation_10_24_2012.pdf.

All notable comments requested more detail in particular topics. Those topics are listed on slides 3 and 4 with checks representing that those comments were addressed and detail was added to those sections. Michael Lilly explained that the completed consultation tables, located in the draft RSP, will include an overview of AEA's response with an associated section number to reference for further detail.

Michael Lilly said that groundwater wells will be placed at Focus Areas and data from functioning private water source wells will be collected as permitted by well owners. He predicts that private water-source wells are generally drilled to depths to be unaffected by relatively low winter stages. This will be confirmed as wells are incorporated into study efforts and water levels will be measured. Bob Henszey asked if raw data will be provided for use in other studies. Bob wanted to ensure that Michael was responsible for the quality control. Michael explained that he will evaluate the quality of the data before providing it to the other studies. Joe Klein asked if piezometers will be placed to confirm that upwelling is occurring where it is visually identified. Michael said that piezometers will be used as much as it is practical, but additional visual data and observations will be collected as possible from all relevant field crews. Joe asked how field crew will be confirming the presence of upwelling if piezometers are not applied to those locations. Dudley Reiser explained that temperature readings may be taken. He said

that visual observation will be the means of identifying upwelling outside of Focus Areas. With an understanding of upwelling and the associated habitat conditions, one may be able to confirm upwelling by relating it to the conditions in which it is visually observed. Joe Klein asked if upwelling would be considered not present if not observed or only weak signs are observed. Michael Lilly said that the surface observation of upwelling is only the “tip of the iceberg” so if any signs are observed in sloughs and other surface-water bodies, one must assume it is present in the area. He also added that if visual signs are not observed, it cannot be concluded that it is not present.

Slide 5 explains additional changes to the PSP including the updated schedule and interdependency figures (slides 6-9). Michael Lilly noted a correction to be made on slide 6. A “7” must be added to the beginning of “.5.4.5 Riparian Vegetation....”. Also, the “•” needs to be added to the schedule’s legend.

Michael Lilly presented his interdependency figure over three separate slides (7-9) focused on separate elements of the study. Michael Lilly clarified that the “Watana Dam/Reservoir” element feeds into the construction aspect of the proposed Project in that any underground water exchange between the area of the proposed reservoir and river downstream of the Project would be reduced to stop leakage, which is meeting the intent of the engineering designs.

Michael Lilly finished his presentation by updating licensing participants of recent field observations on slides 10-22.

Glacial and Runoff Changes Study

**Paul Dworjan, URS
Gabe Wolken, DGGs**

Brian Carey explained that all current comments pre-date the PSP filing, and he anticipates further consultation with agencies fairly soon.

Gabe Wolken provided background of the Glacial and Runoff Changes Study (Glacial Study) in a presentation available at http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Glacier-and-Runoff-Changes_Susitna-Watana_10-24-2012.pdf. Gabe explained that the main purpose of the Glacier Study is to analyzing the potential impacts on flow into the reservoir due to glacial reactions to climate change. A model will be utilized to evaluate the surface mass balance of glaciers on an annual, decadal and century time scale. Gabe explained that approximately 40 glaciers are in the Susitna watershed, but this study focuses on 5. This is the largest scale of this type of study yet to be conducted in the state of Alaska.

In 2012, crews were able to install all off ice stations, with on-ice stations being added in 2013. A map of the stations can be seen on slides 9 and 11. The field season started in April 2012 and due to the large study area, the Glacier Study is expanding beyond traditional field methods and employing high tech options such as ground penetrating radar from a helicopter for the first time in Alaska. This has proven successful, and the apparatus as well as results can be seen on slide 12. The results are graphed on slide 13 (X axis being elevation). Gabe Wolken pointed out that the Maclaren glacier (pink) has been shown to have a higher snow depth although it is located at a lower elevation than the other surrounding glaciers.

Slide 14 consists of photos of ablation stakes (upper left and lower right) as well as tundra weather stations (upper right and lower left). The tundra weather stations provide data on surrounding non-ice terrain which can be used to calibrate the hydraulic model.



SUSITNA-WATANA HYDRO

Gabe Wolken explained the WaSiM model on slide 16 saying that it is physically based and considers changes in glacier size over time. Application of the model is presented on slide 18; the model must be calibrated with in situ data. Gabe explained that when a model is developed and calibrated, future scenarios to year 2100 can be created with different assumed climate conditions.

The final slide of Gabe Wolken's presentation (slide 19) shows the Glacier Study's schedule. Gabe said that it is a work in progress and updates will be provided periodically.

Gabe Wolken's discussed the current status of Upper Susitna glaciers. He said that a reduction of glacier volume is apparent when comparing historic and current data. The Glacier Study is utilizing information retrieved from historic photos. Paul Dworian noted the time gaps between years photographed. Gabe confirmed that there are four time stamps on photos prior to year 2000 and about three time stamps after that. Earlier photos are basin-wide.

Sue Walker asked the current state of the studied glaciers in regard to their water retention capabilities (the Run-off section of the graph on slide 6). Gabe Wolken said that this detail is not within the Glacier Study's scope.

Project Hydrology

Bryan Carey, AEA

Bryan Carey presented some new information regarding predicted post-Project Susitna River flows and stages (available at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Downstream-Stages-TWG-Oct-16-2012-R1-pptx.pdf>). The first group of stage slides is based on a conservative assumption that the Project would be utilized to provide the entire load following capability needed for the entire Railbelt. This is a very conservative assumption as it is likely that other hydroelectric projects in the Railbelt system (Bradley, Eklutna and Cooper lakes) will be utilized to meet load following needs. When viewing these graphs one must take into consideration that they are based on USGS gages placed in constrained areas of the Susitna River. This implies that the stage effects are most extreme in these areas and would dissipate in wider neighboring reaches. Second group of slides shows daily stage and flows with load following at various gage locations. Stage changes are less than one foot at each location. The August flows and stages at locations on the Susitna, Talkeetna, and Chulitna Rivers show that the rivers are currently seeing daily stage swings from snow/glacial melt. Last group of slides shows the stage with and without Project based on 1984 flows.

Additional Discussion

Sue Walker asked where differences between the study requests and PSP are being identified. David Turner responded by explaining that the PSPs should have addressed all concerns stated in the study requests. Comments should be provided to address specific differences in the two so they can be discussed and resolved. David promoted the sharing of informal comments as soon as they are conceived for maximum time available to reach a resolution. Sue Walker stated that it is difficult to compare the two documents because the organization changed from the study requests to the PSPs. Sue Walker requested a crosswalk to be provided to compare organization of the study requests and PSPs. David said that a crosswalk would be helpful, but if unavailable, one must identify differences by thorough review. Betsy McGregor located a crosswalk previously created to compare the fisheries study requests and PSPs, which were substantially reorganized. She forwarded that document to Sue Walker.

Action Items

IFS Fish and Aquatics

Joe Klein finds fish tagging beneficial in the winter season. Dudley will consider adding this to the RSP Section 8.5.4.5.1.1.

Joe Klein requested that the application of models be decided prior to data collection. Matt Love said that “Preliminary and final review of weighting factors” would be added to the schedule. Dudley added that an additional TWG meeting would be scheduled to discuss the area weighting process.

Regarding the IFS Fish and Aquatics schedule: Phil Hilgert said that a dashed line will be added to “study area selection” and “model selection” to represent the opportunity for follow-up. Dudley will also add a dashed line to “Identify need for additional data” in Hydraulic Routing for follow-up.

Riparian

Kevin agreed to add the Large Woody Debris component (6.5.4.9) of the Geomorphology Study and the River Productivity Study as recipients of data from the Riparian Study.

Bob Henszey requested that a schematic diagram of proposed well placements be included in the Riparian Study as well as the Groundwater Study.

Groundwater

Schedule: A “7” must be added to the beginning of “.5.4.5 Riparian Vegetation....”. Also, the “•” needs to be added to the schedule’s legend.

**Draft Meeting Summary
Fish and Aquatic Resources
Technical Workgroup Meeting
October 25, 2012**

LOCATION: Alaska Energy Authority Main Office
813 West Northern Lights BLVD
Anchorage, AK 99503

TIME: 8:30am – 4pm (AKDT)

SUBJECT: **Water Resources Studies & Geology and Soils Study Plan Updates**

ATTENDEES: **Dudley Reiser R2, Betsy McGregor AEA, Kathryn Toews LVA, Joe Klein ADF&G, Hannah Ramage ARRI, Michael Barclay HDR, MaryLouise Keefe R2, Justin Crowther AEA, Sandie Hayes AEA, Bill Fullerton Tetra Tech, Leslie Jensen ARRI, Rob Plotnikoff Tetra Tech, Harry Gibbons Tetra Tech, Dani Evenson R2, Keri Lestyk HDR, Brian Bjorkquist AGO, Jack Erickson ADF&G, James Brady HDR, Mike Buntjer USFWS, Eric Marchiegioni USDA, Tim Sundlov BLM, Stormy Haught ADF&G, Michael Lilly GWS, Jan Konigsberg HRC, Marie Steele DNR, Mandy Migura NMFS, Brian Lance NMFS**

ON PHONE: **David Turner FERC, Fred Winchell Louis Berger, Dirk Peterson Stillwater, AJ Keith Stillwater, Chuck Sensiba VNF, Kim Sager DNR, Steve Padula LVA, Ethan Bell Stillwater, Wayne Dyok AEA, Sue Walker NMFS, Angela Percival Stillwater, Mark Birch DWC, AJ Keith Stillwater, Tim Nightengale R2**

AEA PSP and ILP Study Plan Process (Dudley Reiser, R2)

The purpose of today's meeting was to provide an overview of to-date revisions made to select PSPs. Dudley Reiser reviewed the RSP schedule, Project updates, and today's purpose as explained in the "Overview of AEA Draft Revised Study Plans" presentation (available at http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/AEA_overview_revised_study_plans_Geo.pdf). He informed everyone that a spreadsheet of the status of each study plan is available on the AEA website (<http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Study-Table.pdf>). This sheet informs the reader whether a draft RSP is available for review, or, if changes to the PSP have not been significant based on comments received to date, only the original PSP is available. Live links to these documents are imbedded in the spreadsheet. Within each draft RSP is an updated schedule, a figure showing interdependencies among studies, and a consultation table showing comments to-date along with AEA's responses.

Habitat Characterization Study (MaryLouise Keefe, R2; Michael Barclay, HDR)

MaryLouise Keefe introduced the Habitat Characterization Study (Habitat Study) presentation available at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Aquatic-Habitat-Characterization.pdf>. Many of the comments received to date and responses are included in Slides 2 and 3. MaryLouise explained that many comments received on the Habitat Study ask for further

detail. AEA has been working on additional details which are provided in the draft RSP. One commenter inquired why the USFS protocol will be used to characterize the habitat. MaryLouise explained that this is a standard protocol used widely in Alaska, and it generates a comparative data set based on a consistent set of parameters to characterize riverine habitats. AEA has also added the edge habitat concept to the Susitna-Watana habitat classification system for use in this study.

Michael Barclay said that lessons-learned from 2012 field efforts have prompted some detail changes to the PSP. On Slide 6, Michael Barclay showed that the red text indicates items not included in the PSP but present in the draft RSP.

Michael Barclay explained that the advantage of using aerial video is the ability to access areas that would not be accessible by foot or by boat. The 2012 videography efforts took place in excellent conditions and the result is good quality video at approximately 100-400 feet elevation above the ground and traveling about 15-40 miles per hour, depending on stream size. Michael Barclay explained that generally at these speeds and elevation, habitat will be sampled about every 80-150 feet. These samples will be taken from the video using a frequency analysis where habitats are characterized along systematically delineated video transect habitats. Hannah Ramage asked if the mesohabitat characterization will be accurate when sampling at only one flow. Michael Barclay explained that when mapping mesohabitats, a low to moderate flow is ideal because the driving factors of underlying channel morphology can be identified to infer the habitat at that location. If the river flow is higher than average, the mesohabitats may become uniform and cannot be differentiated. If the river is at an especially low flow, the aquatic habitats may not be present and only substrate may be seen. MaryLouise Keefe added that low flow often is considered a limiting condition for fish populations and thus low flows have additional value when characterizing aquatic habitat. Michael Barclay said that the fish sampling would be conducted at a low to moderate flow, so mapping at a similar flow is most useful. Bill Fullerton added that the Geomorphology Study will be delineating habitat at three flows.

Michael Barclay explained the process of characterizing mesohabitats. Multiple (approximately 5-12) photo examples of each mesohabitat will be used as a type index and referenced when determining a particular sample's classification. There will be variability within each habitat type and that variability will be captured in the type index photographs. Slide 8 lists all tributaries and mainstem river miles videoed in 2012. Michael Buntjer asked about the differentiating feature between a cascade and rapid, and Michael Barclay identified it to be primarily the slope. The specifics are available in the draft RSP.

Slides 9-13 consist of photo examples of numerous mesohabitat types in the Susitna River. Slide 13 shows the results of a test to see if it is feasible to map the lower river using aerial video. Michael Barclay said that to contain the entire main channel and lateral habitats, one would need to fly at over 2,200 feet above the ground. If traveling at the preferred 400 feet, at least five passes would be required to cover the entire river width (including lateral habitats), adding room for mistakes in overlapping the images. MaryLouise Keefe said that because of the complexity it is not practical to map the lower river to the mesohabitat level; instead, the lower river will be mapped to mainstem habitat level using aerial imagery.

Slides 14 and 15 show a revised nested habitat type classification system for tributaries. Some areas will be sampled using aerial video as well as ground sampling to verify mesohabitat types. Slide 17 includes a similar classification system for the Susitna River mainstem. MaryLouise Keefe agreed to

add “rapids” to the mainstem classification system. She explained that if encountered, additional mesohabitat types can be added. Per Joe Klein’s request, Michael Barclay will be looking into the necessity of differentiating between alcove and backwater habitat types.

A sample of line mapping is included in Slide 18. Michael Barclay said that a new identification number will be given every time the habitat changes along the river. The results for the middle river will be available to the Instream Flow Study prior to 2013. In addition, he noted that edge habitat would be quantified from the video. The length of edge habitat will be calculated as double the unit length but may be refined once the Geomorphology Study creates polygons for each segment, by calculating the actual edge length. Bill Fullerton said that the actual edge length will not be available prior to 2013 so the current numbers will remain as placeholders until refinement is possible.

Slide 19 shows an example of how data could be presented. Hannah Ramage mentioned the difficulty of classifying habitats that may change with changes in flow/stage and asked how that will be addressed. In particular, Hannah mentioned a side slough becoming a side channel at higher flows. Dudley Reiser clarified that the Habitat Study will be identifying such a situation as a side slough that is overtopped at high flow, as opposed to changing the nomenclature under different flow conditions. Michael Barclay added that the video was taken at 10,000-11,000 cfs which will be the reference condition for habitat mapping and characterization. MaryLouise Keefe mentioned that distinctions between sloughs and side channels will also be verified by field crews during sampling. Betsy McGregor indicated that the video will be publicly available at DNR’s website in multiple files (total play time combined is three to five hours). Also, in the draft RSP, a link is provided to Michael Barclay’s preferred video viewing software for free download.

Fish Distribution and Abundance Middle/Lower River (MaryLouise Keefe and Dani Evenson, R2)

MaryLouise Keefe introduced the Fish Distribution and Abundance in the Middle and Lower Susitna River Study presentation, which is available at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Fish-Distribution-and-Abundance.pdf>. She explained that there were many comments addressing both upper and middle/lower river studies, so the comment/response tables were combined. MaryLouise summarized some of the key comments and AEA’s responses in Slides 3-10. She explained the habitat-based sampling approach in sites randomly selected within a habitat classification. She said that graphics and detailed text had been added to the draft RSP to further explain the study.

MaryLouise Keefe explained that AEA has added an objective (black text on Slide 12) addressing salmon early life history, timing, and movements. This objective links directly with the varial zone modeling in the Instream Flow Study. Also, MaryLouise explained that an objective was added for the winter-spawning species such as burbot. She added that it is no longer proposed to sample for population estimates based on discussion with USFWS and ADF&G. This decision was made at a workgroup meeting where licensing participants found it more advantageous to add effort to other objectives of the fish distribution and abundance studies.

Dani Evenson reviewed PSP revisions in Slides 13-18. Emergence timing sampling (Slide 13) will be conducted in areas known for chum and sockeye spawning. These areas will be sampled monthly until temperatures reach a level associated with emergence, when sampling will increase to bi-weekly.



SUSITNA-WATANA HYDRO

When reviewing Slide 14, Jack Erickson questioned if DIDSON will capture individuals less than 50 mm. Dani Evenson said that will be determined in the pilot study this winter. Joe Klein said that this size criteria may be too limiting and larger individuals may be at risk of trapping/stranding equally to those less than 50 mm. Dudley Reiser explained that fish smaller than 50 mm are known to burrow into the gravel as down ramping occurs. This makes them very susceptible to stranding and trapping. He added that other size classes will not be ignored if observed.

When discussing day/night activity of fish (Slide 15), MaryLouise Keefe explained the lack of previous studies in ice-prone areas regarding salmon activity.

MaryLouise Keefe explained that prior to field work, periodicity charts will be created using existing data for all species. Dani Evenson added that all 1980s procedure manuals will be reviewed as well as information from ADF&G regarding successful and failed methods to gain a better understanding of how to approach fish collection.

Slides 21-24 provide a visual representation of site selection by strata. MaryLouise Keefe explained that it is currently unknown if all mesohabitats are present in each reach of the river. The number of sampling sites (in parentheses) may be redistributed at the mesohabitat level to a ratio representative to the applied reach. MaryLouise said that the goal is to have six sample sites at each main channel habitat with the sampled mesohabitats distributed proportionately.

Jack Erickson asked how “hard to catch” species, such as lamprey and sculpin, will be addressed and if specific gear will be chosen to focus on them. MaryLouise Keefe said that with the extensive sampling program planned, over 150 sites sampled monthly, she would expect they would encounter all fish present even if only in small numbers.. She said that the planned intensity of sampling is high, and the crews will be in the water most days of the year, making the collection of such species probable. However, if a certain species warranted specific consideration, it should be brought forth and a specific objective considered, similar to the winter spawning species objective mentioned earlier.

While reviewing the schematic for lower river site selection (Slide 24), MaryLouise Keefe explained the limitations of habitat classification in the lower river. She said that there is less understanding of potential Project effects in this area and that the mapping is less precise due to the area’s complexity. MaryLouise said that because of this, it may be better to focus sampling sites in lateral habitat in the upper portion of the lower river. This aspect of the plan is still under consideration but will be made clear in the RSP.

Dani Evenson explained that sampling is proposed in the upper river in 25% of the accessible tributaries, with an initial preference for those sites being within the known as Chinook salmon distribution. She added that if spawning areas in the inundation zone are identified, species-specific efforts may be added as necessary. Radiotelemetry will be conducted in the Upper River. MaryLouise Keefe added that there may be a need for smaller, shorter-life tags for seasonal tagging efforts. Currently, multiple tagging events are proposed for both the upper and lower river sections. Mike Buntjer asked the value of tagging fish in the Upper River since that habitat will be converted to a reservoir post-Project. MaryLouise added that the Fish Passage Feasibility Study will use information from telemetry studies conducted above the Project.

Tim Sundlov asked if lamprey should be included as a targeted rare species. He explained that electrofishing can be used to target lamprey if that need occurs. Hannah Ramage said that an

objective may be needed to address the presence of lamprey. Little is known of them, and because they seem to require specific sampling methods, they may be overlooked with more general fish collection. MaryLouise Keefe said that the need for lamprey-specific sampling will be considered by AEA.

Slides 1 and 2 of the fisheries interdependency flow chart (available at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Fisheries-Interdependnecy-Flow-Charts.pdf>) include the interdependency figures for the fish distribution and abundance studies. It was agreed that for both figures, “Mercury Assessment and Potential for Bioaccumulation Study” should be added to the bottom right as a recipient of fish distribution and abundance data. It was also agreed that “Cross Disciplinary Studies” on the top row should be replaced with “Fish and Aquatics Instream Flow Study”.

Jan Konigsberg asked if an estimated mortality of egg-to-fry and fry-to-smolt will be calculated based on Project effects. MaryLouise Keefe explained the purpose of this study is to provide baseline data and it does not include such an objective. She added that it would be very complicated and likely not possible to develop a specific prediction of mortality by life stage.

River Productivity (MaryLouise Keefe and Tim Nightengale, R2)

MaryLouise Keefe introduced the River Productivity Study presentation (available at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/River-Productivity.pdf>). She explained that Mark Wipfli of UAF will assist AEA with the River Productivity Study Plan. MaryLouise summarized comments and responses on Slides 2-9.

MaryLouise Keefe explained that the use of a surrogate system had been requested. A surrogate system is one which would later represent the Susitna River as if the Project were present. After much consideration and research it has been concluded that a system does not likely exist in Alaska with the necessary characteristics to allow it to be considered as a surrogate to the Susitna River. Synthesis of existing literature will cover this concept.

Study of the stream’s metabolism was requested. Although stream metabolism is not being directly studied, MaryLouise Keefe explained that a rigorous approach will be undertaken to evaluate river productivity, including bioenergetics modeling and isotopic analysis of prey species.

Tim Nightengale explained AEA’s response to ADF&G’s request for reference sites on Slides 10 and 11. Reference sites are sites similar to areas in the Project-affected area of the Susitna River that can be monitored before, during, and after Project construction. Parameters of a reference site can be compared to an associated site on the Susitna River to monitor possible change. He explained that the Talkeetna River includes areas most like the middle river portion of the Susitna River. Tim explained that these sites will studied in the spring, summer, and fall using the same methods that are applied to the Susitna River. Discussion ensued regarding the request for a Before After Control Impact (BACI) design. MaryLouise Keefe explained that BACI designs are now requiring many more years of data than originally thought to be reliable. She added that sample sites in the upper river area of the Susitna River will also be sampled and may continue to be sampled as reference sites if needed. Rob Plotnikoff indicated that the proposed design would be adequate if a BACI approach was desired.



SUSITNA-WATANA HYDRO

Tim Nightengale presented Slide 13, which explains the growth rate potential (GRP) model. Stormy Haught suggested changing northern pike to sculpin. He said that northern pike may be difficult to locate in the middle river area due to a velocity barrier downstream that limits their distribution. MaryLouise Keefe said that she would consider that and noted the need to review available literature for whatever species is chosen.

Tim Nightengale explained that stable isotope analysis can identify the contribution of marine-derived nutrients as well as freshwater-derived nutrients. This analysis can be conducted on terrestrial drift, algae, fish, and possibly fish stomachs. Stormy asked if tissue plugs will be taken from juvenile fish and if so, AEA should consider mortality and permitting requirements. MaryLouise Keefe agreed to look into that.

Emergence traps are explained on Slide 14 with a photo. Tim Nightengale explained that this instrument collects emerging aquatic insects, a product of aquatic insect production from the stream, which will serve as a surrogate measure for actual production. Checking and resetting the traps monthly from April through October is proposed.

MaryLouise Keefe explained that the number of stations changed from nine in the PSP to six in the draft RSP due to a shift in focus on more rigorous sampling at fewer stations. Joe Klein asked what UAF's perspective on the fewer stations was. MaryLouise said that Mark had indicated that sampling four sites (two above the proposed Project and two below) would be sufficient. Stormy Haught said that he may prefer more stations below Devils Canyon due to the added presence of fish there. MaryLouise asked if it would be adequate to conduct community-based sampling only, and Stormy agreed it would be adequate.

Stormy Haught asked how the crew would conduct benthic sampling in high flows. Tim Nightengale explained that newly inundated areas are not colonized immediately and sampling would wait until that area is inundated for the necessary time for colonization (estimate is one month until site specific colonization rates are available). MaryLouise Keefe said that details will be added to the RSP.

Cook Inlet Beluga Whales (Keri Lestyk, HDR; Michael Link, LGL)

MaryLouise Keefe summarized the comments addressing the Cook Inlet Beluga Whales Study (Beluga Study). She said that most comments request a reevaluation of the study area, additional and more frequent aerial surveys, and passive acoustic monitoring for beluga presence in the winter. Keri Lestyk said that passive acoustic monitoring may prove difficult because the equipment would need to be installed far from the belugas due to ice scour. She said that during the winter, belugas will be assumed as present and foraging.

Keri Lestyk explained that the objectives of the Beluga Study (Slide 3) have not changed since the PSP, but many details have been added to the draft RSP. Keri explained that the study area has been reduced to the Susitna River delta (Slide 5 provides a map showing that area), based on previous meetings held with NMFS and ADF&G. She specified that the Beluga Study will be collecting data up to river mile 50. By reducing the study area, Keri explained that survey times were shortened. The survey frequency was increased, allowing for additional surveys in critical months for belugas. These times include May/June for feeding as well as July/August for calving and breeding. Keri explained that four-hour surveys will be broken up with two hours during high tide and two hours during low tide, if possible.



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Slide 8 addresses the remote live-feed camera system. Keri Lestyk explained that these cameras provide information on an individual's behavior and feeding activities, while aerial surveys focus more on the group behavior. These cameras may capture group composition better than aerial surveys in regard to calves. Aerial surveys will be conducted simultaneously for cross-checking. Aerial surveys will be conducted visually at a 1,000-foot elevation above the ground. A camera and camcorder will be available if found necessary and multiple passes may be needed for large groups.

Keri Lestyk introduced a proposed model presented in the draft RSP on Slide 9. She explained that the Ezra model, which had been previously considered, is not predictive. Mandy Migura asked if the proposed model would address potential Project effects to the substrate in the delta. She explained that beluga whales utilize channel morphology to ambush their prey and could potentially be affected by changes in the channel. Bill Fullerton said that the sediment transport model will be using river mile 75 as the downstream boundary. He added that if effects are seen to possibly extend past river mile 75, the model may be extended as well. Bill explained that the Chulitna River and Talkeetna River have such high sediment input that any changes in the Susitna upstream of the Three Rivers Confluence may have a relatively small effect, especially as far downstream as the delta. This is why the current downstream boundary of the modeling effort for Project effects on sediment is just downstream of the Three Rivers Confluence. Also, the geomorphology in the delta relied on by the belugas may be due to a localized phenomenon such as tides, which will not be affected by the Project.

Keri Lestyk presented the interdependency chart for the Beluga Study (Slide 13 of the fisheries interdependency flow chart available at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Fisheries-Interdependnecy-Flow-Charts.pdf>). Mandy suggested adding the Salmon Escapement Study as an input.

Angela Percival suggested that Keri Lestyk reference Hansen and Hubbard (1999) and Rugh (2000). Keri agreed to look at those papers.

Hydrology Update (Bryan Carey, AEA)

Bryan Carey presented some new information regarding predicted post-Project Susitna River flows and stages (available at <http://www.susitna-watanahydro.org/wp-content/uploads/2012/10/Downstream-Stages-TWG-Oct-16-2012-R1-pptx.pdf>). The first group of stage slides are based on a conservative assumption that the Project would be utilized to provide all the load following capability needed for the entire Railbelt. This is a very conservative assumption as it is likely that other hydroelectric projects in the Railbelt system will be utilized to meet portions of load following needs. When viewing these graphs one must take into consideration that they are based on USGS gages placed in constrained areas of the Susitna River and during ice-free, open water conditions. The stage effects are more extreme in the confined reaches where the USGS gages are located and would dissipate in wider neighboring reaches. The second group of slides shows daily stage and flows with load following at various gage locations; stage changes are less than one foot at each location. The August flows and stages at locations on the Susitna, Talkeetna, and Chulitna Rivers show that the rivers are currently seeing daily stage swings from snow/glacial melt. The last group of slides shows the stage with and without the Project, using 1984 flow data.

Action Items

AEA Consultants will add "rapids" to the mainstem classification system.



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Michael Barclay will look into the necessity of differentiating between alcove and backwater.

AEA will consider the need for lamprey-specific sampling.

AEA Consultants will add “Mercury Assessment and Potential for Bioaccumulation Study” to the bottom right of the interdependency figure for both fish distribution and abundance studies as a recipient of fish distribution and abundance data.

AEA Consultants will replace “Cross Disciplinary Studies” with “Fish and Aquatics Instream Flow Study” at the top of the interdependency figure for both fish distribution and abundance studies.

AEA will consider replacing northern pike with sculpin in the growth rate potential (GRP) model.

The Salmon Escapement Study will be added as an input in the interdependency figure for the Beluga Study.

AEA requested a meeting be scheduled with licensing participants regarding the Eulachon Distribution and Abundance in the Susitna River Study and the proposed model to evaluate potential Project effects in the delta. Mandy Migura requested it be on Friday, November 2.

DRAFT

**Draft Meeting Summary
Fish and Aquatic Resources
Agency Meeting
November 2, 2012**

LOCATION: Alaska Energy Authority Main Office
813 West Northern Lights Blvd
Anchorage, AK 99503

TIME: 10:00 am – 12:00 pm (AKDT)

SUBJECT: **Cook Inlet Beluga Whale (CIBW) and Eulachon Revised Study Plans (RSP).**

ATTENDEES: **Betsy McGregor (AEA), Keri Lestyk (HDR), Michael Link (LGL), James Brady (HDR), Michael Barclay (HDR) and Mark Burch (ADF&G)**

ON PHONE: **Mandy Migura (NMFS), Kate Savage (NMFS) and Matt Love (VanNess Feldman)**

Materials distributed before meeting: Agenda and Presentation.

- The meeting began with introductions and a brief review of the CIBW and eulachon study plans (SP). Originally, eulachon studies were incorporated into the CIBW SP because eulachon are a PCE prey species for belugas. The SPs were subsequently separated for the Proposed Study Plans (PSP) that were filed with FERC in July 2012. Since the PSPs were filed, there have been several internal AEA conversations regarding the most effective methodology to address baseline data needs. AEA believes that the proposed changes to the RSPs will collect data which will be more relevant and easier to interpret for the Impact Analyses and Biological Assessment.
- Mandy commented that NMFS has not reviewed the draft RSP and that written comments submitted November 14th will be on the PSPs.
- Mandy commented that she and Kate are marine mammal biologists, and therefore, will only comment on beluga whale issues and that comments given during this meeting are preliminary and may not reflect the written comments on the RSP. In addition, since fisheries biologists and hydrologists were not present at the meeting, NMFS would not provide comments on these topics.

Eulachon Revised Study Plan

- In the Eulachon PSP, Objective 3 included collecting data on eulachon densities because of agency comments that density of fish may be important to beluga foraging success. To address this issue, it would be best to obtain density information on the foraging grounds. However, this would be extremely time consuming, expensive and not very practical given that the “ambush” terrain may be changing drastically due to the large tidal influence on the mudflats. Therefore, the PSP proposed to measure density on the spawning grounds as a



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proxy for the densities in the mudflats (foraging grounds). After many conversations, AEA decided that this was not the most appropriate method for determining potential Project effects on eulachon densities.

- In the RSP, directly measuring eulachon densities was removed. Instead, a modeling effort to evaluate the tidal influence on the mudflats was included in the CIBW RSP (see below).

Cook Inlet Beluga Whale Revised Study Plan

- To address potential Project effects to eulachon densities in the beluga foraging grounds, a Water Surface Elevation (WSE) model was added to the CIBW RSP. Since direct measurements of eulachon densities are not practicable, this model will help assess indirect impacts to the mudflats which may affect fish densities. If the model shows that the tidal influence is much stronger than river input, there is less potential that the Project would impact the mudflats, and by extension, fish densities.
- NMFS expressed concern that WSE was the only metric being used to address impacts to fish densities. AEA explained that data from several other studies will be used in the beluga whale assessment including geomorphology, water quality and instream flow studies. AEA reminded NMFS about the Interdependency figures that are included in the RSPs and were presented at the Technical Workgroup Meeting in October.
- NMFS acknowledged that they understood the concept behind the WSE model, but it is not the responsibility of NMFS to determine which methods AEA should use during their baseline studies.

Passive Acoustic Monitoring (PAM)

- Mark asked to revisit the topic of using PAM in combination with aerial and live-feed video studies to collect information on CIBW presence in the delta and behavior.
- AEA explained that PAM has been considered as a method to document CIBWs. However, as previously discussed, several factors would limit the efficacy of an acoustic array, including sufficient range/coverage of the survey area, high in-water noise, and, most importantly, a high probability of false negatives regarding presence of whales.
- AEA believes that the data collected through aerial surveys and video studies are sufficient to document the distribution, movement patterns and behavior of CIBWs in the delta to effectively assess potential Project impacts.
- AEA requested literature from ADF&G pertaining to PAM being used to document behavior, in particular feeding behavior.

Miscellaneous

- Mandy informed the group that recent NMFS ESA training has advised personnel that during the Section 7 consultation process, it is the applicants' responsibility to prove that the Project will not jeopardize the conservation and/or recovery of CIBWs rather than NMFS deciding whether there is jeopardy or not.



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- There was a brief discussion on what would be considered “significant” impacts to CIBWs. The group collectively decided that this would be difficult to determine prior to collecting and analyzing the baseline data. AEA and NMFS agreed to keep an open dialogue about significance throughout the baseline studies and impact analyses.

DRAFT



SUSITNA-WATANA HYDRO

**Agenda and Schedule
Beluga and Eulachon Meeting
Agency Meeting
November 2, 2012**

LOCATION: Alaska Energy Authority– Aspen Room
813 West Northern Lights Blvd.
Anchorage, AK 99503

TIME: 10:00 am – 11:00 am (AKDT)

SUBJECT: Beluga Whales and Eulachon Revised Study Plans

GoTo MEETING: <https://www2.gotomeeting.com/join/688012946>
Call-in number: 1-800-315-6338 Code# 3957

Agenda Items

Beluga Whale - Impact Assessment

- Habitat
- Forage Fish Abundance

Eulachon Study

- Overview
- Water Levels

Modeling Water Levels

Susitna-Watana Hydro Project

Cook Inlet Beluga Whale and Eulachon Revised Study Plans

November 2, 2012



Goals of this Meeting

Describe and seek input on modified approaches to parts of the RSPs for Cook Inlet beluga whales (CIBW) and eulachon

Obtain agreement in principle on the approach to provide information for the impact assessment



Approach to Impact Assessment

Principal Constituent Elements (PCEs) for CIBW that may be affected by the Project:

1. Tidal flats of salmon bearing rivers for feeding on salmon and forage fish
2. Forage, including eulachon and juvenile and adult salmon

Mechanisms to affect PCEs and the recovery of CIBW

1. Physically alter habitats to negatively affect CIBW foraging success
2. Alter the abundance of forage fish by changing habitat



Physically Altering Foraging Habitat

What are the changes in the physical features of the foraging habitat in the lower river and adjacent Susitna mudflats due to Project operations?

Baseline information

Characterize Project effects on **daily and seasonal water levels** in the lower river and adjacent mudflats



Altering Abundance of Forage Fish

Salmon: Effects on adult and juvenile salmon are being addressed via numerous studies in the upper, middle, and lower river

Potential project effects on eulachon:

- Alters **access** to spawning habitat
 1. Stage height and water velocity
 - Ability to reach spawning habitat; timing of access
- Alters **spawning success** and subsequent recruitment
 2. Reduce quality and quantity of spawning and incubation habitat



Eulachon Baseline Study

Characterize the timing and distribution of eulachon migration, spawning, and incubation

This feeds into the impact analysis via predicting Project impacts on eulachon recruitment from the Susitna River (i.e., abundance)

Will the Project significantly reduce or increase quantity and quality of spawning habitat, and thereby eulachon abundance?*

- Eulachon work documents current eulachon spawning distribution and the key habitat features potentially affected by the Project (depth, velocity, substrate)
- MWE model predicts changes in stage height and velocity (access, habitat quantity, incubation success)



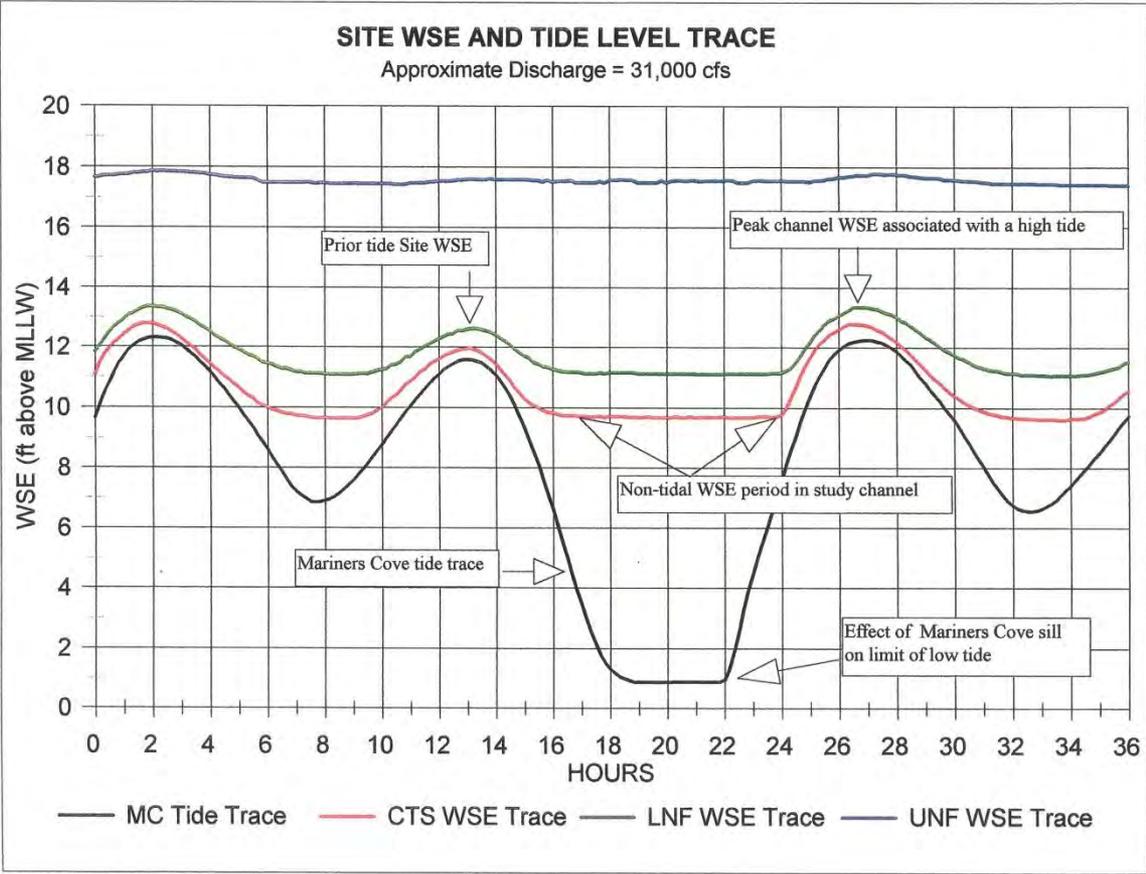
Model the Effect on Water Levels

- The model must be predictive of daily and seasonal water levels over the range of possible instream flow alternatives under Project operation;
- The model must be predictive of water levels under Project operation accounting for the temporal and spatial complexities and interaction of tide and discharge in the lower Susitna River and estuary;
- The model must be based on empirical, site specific data;
- The model must extend up the Susitna River to the upper limit of tidal effect;
- The model will not only predict changes in channel depth, but other hydraulic parameters such as channel wetted width and water depth over substrate types that may be important to eulachon migration, spawning, and incubation.

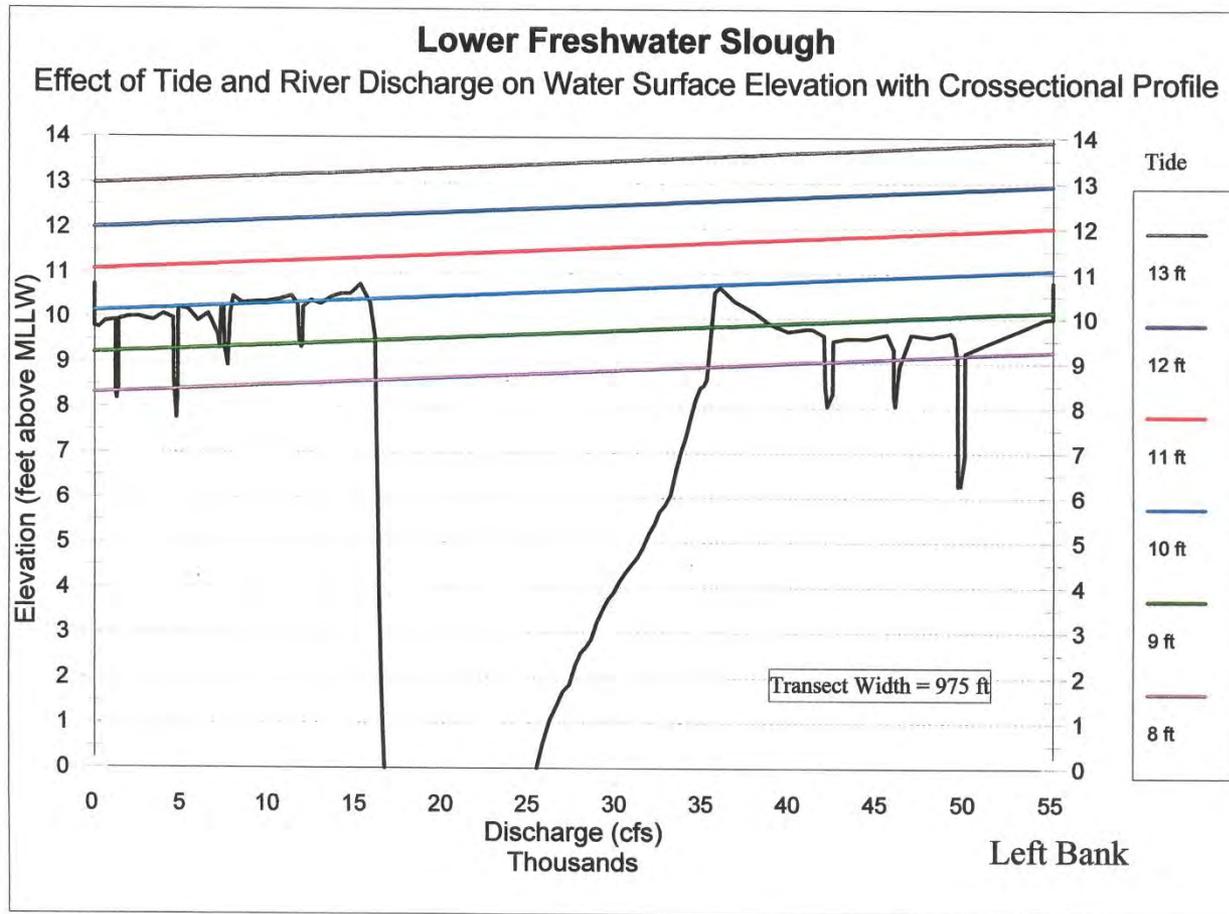


Example Discharge/Tidal Hydrodynamics from Skagit River Estuary Study

(this location was at the lower end of the estuary)



Example Model Output from Skagit River Estuary Study



How the WSE approach affects RSPs

Change: Characterize effect on foraging habitat in CIBW study plan and eliminate Objective 3 in eulachon study plan.

- In the Eulachon PSP, we had planned to estimate eulachon spawning ground density as an indicator of forage density.
- In the CIBW RSP, we added a way to directly assess effects on habitat in the CIBW forage zone.
- We thus removed the Eulachon density in spawning habitat (Objective 3) from the Eulachon RSP.
- The Eulachon RSP focuses on delineating and characterizing spawning habitat, the value of which is greater by the addition of the forage habitat objective to the CIBW RSP.



Significantly affect habitat, eulachon, and CIBW recovery?

From a study design and analysis perspective, it is important to clarify that we are attempting to characterize a reasonably large effect on beluga forage fish abundance and availability

Two Key Assumptions

1. A forage fish with significant inter-annual and inter-decadal variability
2. A schooling fish and therefore effects on predation success will *not* linearly decline with fish abundance (may be able to test with data collected)



“Significance of Effect”

1. Power to detect an effect.

Impossible to accurately predict small effects on eulachon abundance (technically infeasibility).

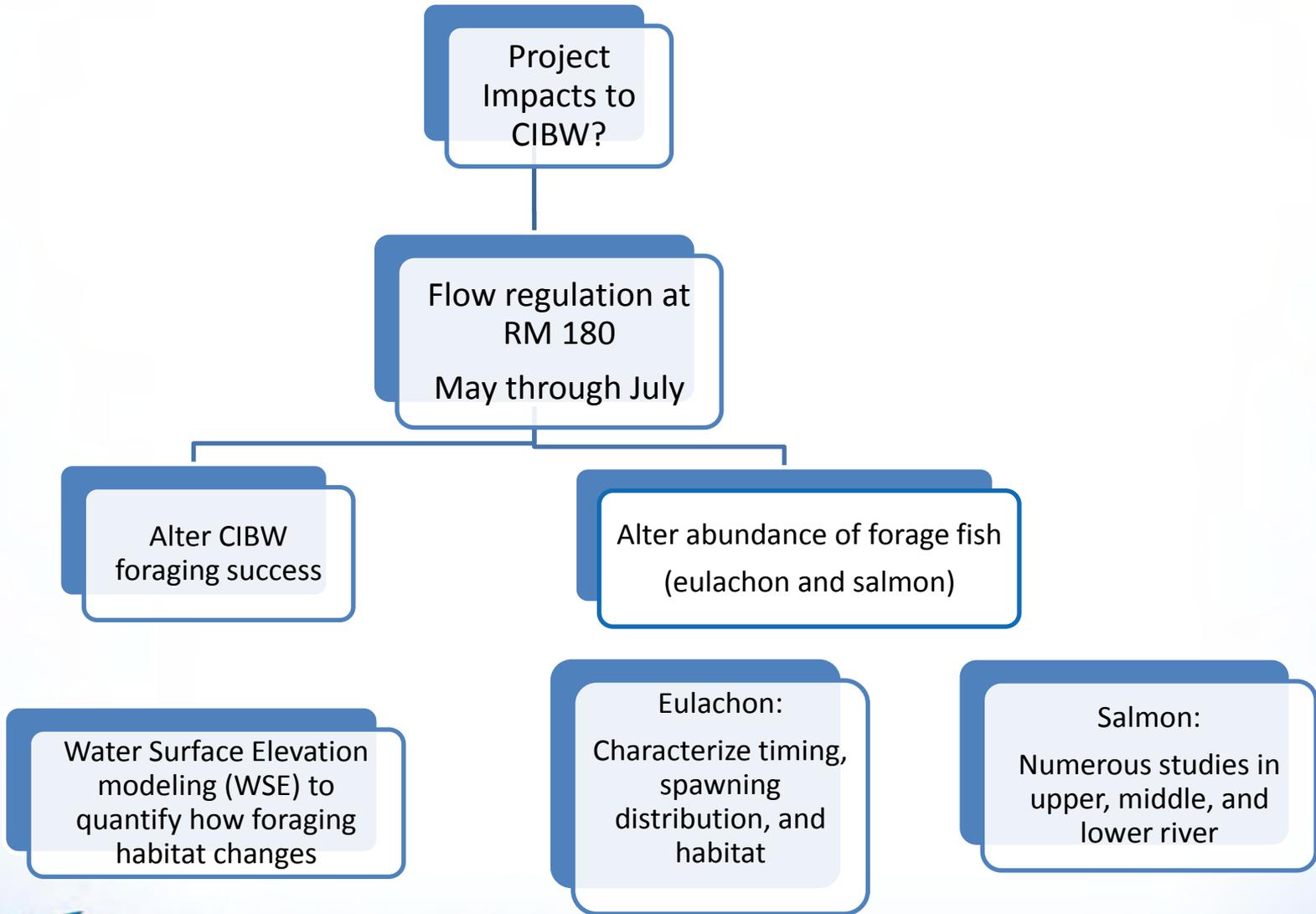
2. More importantly, we are interested in a meaningful effect on the recovery of CIBW (jeopardy)

What effect on Eulachon abundance might have a significant effect on CIBW?

Not 5-15%

Probably on the order of 20-30% or more?





APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION

GENERAL / GLOBAL

From: Klein, Joseph P (DFG) [mailto:joe.klein@alaska.gov]
Sent: Thursday, September 06, 2012 1:58 PM
To: Betsy McGregor
Subject: RE: Follow up Meeting Notes-additional comments

Betsy- Per a follow up to our River Productivity comment below, we wish to revise our statement to read:

We support the effort to provide a means to evaluate future changes in the Susitna River under different operation scenarios and also recommend identifying a reference reach in a similar Alaska river for using a BACI design monitoring program to assess post project impacts.

Regards, Joe

From: Klein, Joseph P (DFG)
Sent: Thursday, August 23, 2012 2:48 PM
To: McGregor, Elizabeth A (AIDEA)
Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); [Michael Buntjer@fws.gov](mailto:Michael.Buntjer@fws.gov); [Betsy McCracken@fws.gov](mailto:Betsy.McCracken@fws.gov); Eric Rothwell (Eric.Rothwell@noaa.gov); Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)
Subject: RE: Follow up Meeting Notes-additional comments

Following are additional comments

Baseline Water Quality

5.5.4.3.2 In-Situ Water Quality Sampling The sampling protocol currently calls for monthly in-situ water quality monitoring for the 4 summer months. It should be revised to include continuous (hourly or so) water quality measurements for basic parameters (pH, DO, conductivity, turbidity), year-round if possible using in-situ semi-permanent sensors (e.g. sondes). The technology is readily available and would provide very useful baseline information to assess any post project impacts.

River Productivity

7.8.4.4 Conduct a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River. We recommend supplementing or substituting this section using a reference reach in a similar Alaska river using a BACI design monitoring program in order to assess post project impacts.

From: Klein, Joseph P (DFG)
Sent: Thursday, August 23, 2012 10:42 AM
To: McGregor, Elizabeth A (AIDEA)
Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); [Michael Buntjer@fws.gov](mailto:Michael.Buntjer@fws.gov); [Betsy McCracken@fws.gov](mailto:Betsy.McCracken@fws.gov); Eric Rothwell (Eric.Rothwell@noaa.gov); Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)
Subject: Follow up Meeting Notes

Betsy-

Thank you for the opportunity to discuss the proposed study plans for the Susitna-Watana Hydroelectric project. We look to further discussions to continue to clarify study plan details.

To assist in you and your consultants in this process, below are brief notes by ADF&G staff. We may have additional comments/or clarifications. Please feel free to contact me if you have any questions.

Regards, Joe

Fish Distribution and abundance in Upper, Middle and Lower Susitna River

- Trot lines should be considered during the winter to target appropriate fish species.
- Minnow trapping under ice should be used during the winter, in all habitat types.
- Should evaluate the feasibility of under ice videography.

Salmon Escapement

- Identify locations of adult fish weir locations described on tributary streams (7.7.4.1.5, page 7-39). Consider placement of adult fish weir upstream of the proposed dam on prominent Chinook salmon streams.

Instream Flow

- What is the sampling strategy (e.g. representative reach, mesohabitat typing) for the defined habitat types?
- How many and at what range will discharge-calibration sets be collected for each sampling method?
- Will 2D modeling include side channels and sloughs within study area?
 - Based on comments at the meeting it was my understanding it would.
- What criteria will be used to identify cover types and substrate sizes?
- For PHABSIM, will transects be independent, dependent or a combination and accordingly, what WSE models and composite suitability index will be used?
- What criteria will be used to select and weight transect-derived models?
- Per the description of study sites for fish passage/off-channel connectivity (§6.5.4.5.5), what criteria will be used to identify "a representative number" of different habitat types?
- HSI data is needed for identified target species for each defined habitat type, over 2 years.
- How will the data be aggregated to evaluate single flow recommendation?
- Will a DSS-type program be available to review study results and if so, information is needed on it.
- How do you envision the "collaborative process" will work? When will major decisions be made (e.g. site and transect selections) and how often do you envision the work group will get together?
- What equipment will be used and how will they be calibrated?
- For the eulachon and boating studies, similar information is needed on what is the study area, what sampling strategy will be used, how many and what range of calibration-discharge sets if appropriate, and how will HSI curves will be developed?
- Variational zone modeling, may need more defined time steps during analysis phase (possibly down to 15-minute increments) depending on the rate of flow change over time.

Groundwater

- What are the monitoring well placement sampling approach (e.g. equal spacing along linear transects, etc.) and location (e.g. for instream flow, in all habitat types?) for the various resource studies (i.e.

instream flow, riparian instream flow, water quality). Also, a description of sampling intensity would be helpful (i.e. for instream flow purposes, will the objective be to characterize entire gw/sw interaction throughout entire intensive study site or only at select microhabitats).

- What is the duration for monitoring (I believe at the meeting it would be from installation until winter 2013-14?)
- How often will monitoring wells be calibrated for various parameters to be sampled pre- post- and during field monitoring?
- For each resource discipline, what parameters will be sampled and what are range of accuracies (e.g. for water level +/- 0.1 ft?, water temp +/- 0.2 C?, etc.).

Water Quality

- Information on availability of the Sampling and Analysis Plan and Quality Assurance Project Plan is needed.
- GW Quality in Selected Habitats (Section 5.5.4.7) - need more information on study. For example, sampling intensity/number of site measurements per slough or criteria for how they will be determined. Will ground water level monitors be installed if so, what is the sampling intensity (numbers per habitat type) and duration of monitoring (e.g. continuous year-round/ point samples during field visits, etc.). If not, it is strongly recommended groundwater monitoring be performed concurrently with water quality monitoring in this study.
- Any monitors should be calibrated pre- and post-monitoring along with multiple field measurements for post monitoring calibration.

From: Betsy_McCracken@fws.gov [mailto:Betsy_McCracken@fws.gov]

Sent: Friday, September 07, 2012 4:02 PM

To: Betsy McGregor

Cc: Bryan Carey; 'Fullerton, Bill'; Betsy McGregor; Bob_Henszey@fws.gov; eric Rothwell; 'Klein, Joseph P (DFG)'; 'Kevin Fetherston'; 'Matthew LaCroix'; 'Laura Arendall'; 'Mike Buntjer'; 'MaryLou Keefe'; 'Michael R. Lilly, GW Scientific'; PHilgert@r2usa.com; rob.plotnikoff@tetrattech.com; 'Benkert, Ronald C (DFG)'; susan walker; 'William Rice'; matt.cutlip@ferc.gov; Lori_Verbrugge@fws.gov; Catherine_Berg@fws.gov; Jennifer_Spegon@fws.gov; dreiser@r2usa.com

Subject: Follow up comments from August 15-17 ILP meetings

Hi Betsy,

Thank you and AEA for hosting the August ILP meetings. We all gained a lot of insight from the meetings, and we were pleased to be updated. Like others, as a result of the meetings, the Service has a few comments and concerns to share with the group.

In addition to these below, other staff from the Service may provide comments relative to their study area expertise. We hope that our collective comments will be helpful toward gaining concurrence on proposed studies, and as we move forward with the review process of the proposed Watana dam.

Thank you,
Betsy

September 7, 2012

Notes from ILP Formal Study Meetings August 15-17, 2012:

At the request of AEA and its consultants, the USFWS (Service) submits this brief summary of concerns regarding the Susitna-Watana hydropower dam formal ILP Formal Study meetings that were held August 16-17, 2012. The Service's concerns in this informal correspondence, along with other remaining concerns will be further articulated in the Service's formal response letter on AEA's ILP Proposed Study Plan (PSP) review, due to FERC October 15, 2012. Additional informal comments from the Service may be provided under separate cover before the October due date.

FWS concerns highlighted during meetings relative to Instream Flow, Habitat Utilization and the Geomorphology proposed study plans:

Overall, the Service finds that AEA's proposed study plans for instream flow, habitat utilization and geomorphology do not fully address agency's resource management concerns. During the three days of ILP study meetings, sequencing and integration of the proposed biological resource studies and the physical process studies was not described and is still a significant outstanding information need. It is necessary to describe the integration of these inter-related studies and how that integration will result in a comparison of the baseline biological information and the resulting effects to biologic resources caused by the proposed project operations. Study results must be quantifiable in order to assess potential losses to aquatic resources and their habitats, to review the project under our relevant fish and wildlife resource conservation authorities, to inform fishway prescription authority under Section 18 of the Federal Power Act, and to eventually develop recommended protection, mitigation, and enhancement for the project license. We do not believe that the current study plan proposals will yield sufficient information to allow us to adequately assess proposed project impacts to the Nation's fish and wildlife resources and develop adequate PME's.

The Service has repeatedly articulated concerns about the lack of study sequencing, connectivity and integration between the biological studies and the other proposed engineering and physical processes studies. We reiterate and highlight the need for the collection of adequate temporal and spatial baseline biological and fish habitat data to provide direct input to some of the proposed physical modeling efforts. Many of our concerns, below, are related to the temporal mismatch of biological data collection with the forward momentum of the physical modeling efforts.

-Habitat Mapping

Hierarchially-nested aquatic habitats- HDR stated at the meeting that the “habitat mapping” will be started in September; and that the sampling will be stratified by meso-habitat type as identified in the 1980’s study reports.

The 1980’s studies did not hierarchically nest the habitat types. The Service specifically requested hierarchially nested habitat mapping (e.g., Frissel et al, 1986). We are concerned with the proposal to use the 1980’s study sites, which focus on the side sloughs, and do not consider the full breadth of fish habitats, which is currently unknown and the subject of ongoing study that has not been completed or submitted for agency review and comment. We do not endorse the use of the 1980’s sites without first completing and then applying a hierarchal assessment of the river reaches as a study framework. The hierarchally nested aquatic habitats framework is needed to structure fish distribution surveys, the instream flow study and other physical process studies. Without it, the fish surveys will be too narrowly constrained and the instream flow studies will not represent all habitats that may be affected by the proposed project. The Service recommends the following habitat hierarchy for the Susitna River be used for habitat mapping purposes and integration of studies:

Large River Floodplain Habitat Hierarchy

1. **Geomorphic units:** Large-scale geomorphic and hydraulic controls.
 - a. Bedrock controlled, single-channel units with shallow hyporheic exchange and thermal homogeneity.
 - b. Unconfined, multiple channel floodplain units with expansive hyporheic exchange and thermal heterogeneity.
2. **Macrohabitats:** Primary, flood, and spring channel networks.
 - a. Primary channels—Perennial channels.
 - b. Flood channels—Seasonally connected channels.
 - c. Spring channels—Disconnected sloughs that discharge groundwater.
 - d. Floodplain ponds—Ponded spring channel networks.
3. **Mesohabitats:** Bed and bank morphological controls; hydraulic features.
 - a. Riffle-pool sequences—Run, riffle, pool, glide, tailout.
 - b. Backwaters, alcoves, shallow meander margins.
4. **Microhabitats:** Hydraulics, water quality, substrate, cover.
 - a. Water depth, velocity, bulk flow characteristics (e.g. Reynolds and Froude #'s).
 - b. Vertical hydraulic exchange (ground and surface water exchange).
 - c. Bed, or intragravel temperature and dissolved oxygen.
 - d. Substrate size, heterogeneity.

e. Elements of wood, vegetation, and rock structure.

-Fish distribution: A first step is to assess the seasonal distributions of target species and life stages and the physical habitat criteria that influence habitat selection and suitability. As a first step, target species have to be identified, agreed upon, and their life history and habitat use similarities to other, unstudied species (i.e., non-target species) need to be determined and described. In the study requests of the Service and other agencies, we recommended studying the baselines of all affected fish species and life stages, including all five species of anadromous salmon and all resident fish.

Fish distribution data are needed to describe the baseline data to support and compliment other proposed study objectives, including those related to fish habitat selection and utilization. A first step to acquiring adequate fish distribution is to assess the full lateral and longitudinal profile of seasonal fish distribution, life stage periodicity, and suitable used and unused habitats that are influential in fish habitat site selection. The fish distribution data is needed to provide the base data layer that will support and compliment other proposed study objectives, including those related to fish habitat selection and utilization, and instream flow (ISF) needs. This information is also needed for resource agencies' fishway prescription decisions under the Federal Power Act. Baseline biological information is critical input necessary for integration with physical studies. Accordingly, the Service is reiterating the need for multiple and continuous years of biologically relevant data in order to provide robust integration with the physical modeling studies, and decision-support relative to fish and wildlife resources of the Susitna River basin.

-Habitat site selection criteria: Criteria that influence habitat selection and suitability need to be identified using statistically powerful and robust methods and current models of fish distribution including bioenergetics and not exclusively physical habitat models (Lovtang 2005). The Service remains opposed to the proposal to repeat the 1980's approaches to fisheries studies. The 1980's studies do not determine the habitat criteria influencing fish habitat site-selection, they simply report utilization functions for water depth and velocity, or depth and substrate. They also lack a fundamental baseline assessment of all available fish habitat and instead focus on study of habitats that had high fish use density. The habitats that were apparently suitable but unoccupied or underutilized by fish need to be assessed, and the entire range of habitat availability and habitat use data need to be assessed prior to habitat study site selection.

More comprehensive data collected on nearby glacial rivers may be used to demonstrate that habitat selection by salmon in side-sloughs can be independent of water depth and velocity and should be compiled.

Fish habitat study sites should be surveyed and identified using the full range of habitats seasonally utilized by agreed-upon target species and life stages. The objective is to identify the bioenergetics and physical factors that control fish habitat selection. The Service considers the assessment of habitat influential to fish habitat site selection to be an objective of the Instream Flow and Habitat Utilization Study request. In the resource agencies Instream Flow and Habitat Utilization Study Plan requests, this is a specifically stated objective.

Sequentially, appropriate flow-habitat models can be selected *after* assessment and validation of 1) the full seasonal distribution of target species and life stages, 2) the physical factors (e.g., micro-habitat data) that influence habitat selection and suitability, and 3) the bioenergetic factors affecting fish habitat suitability and productivity.

Thus, field visits proposed for the end of September (2012) should be considered as reconnaissance and for discussion purposes, and not for the purpose of actual study site-selection.

-Habitat Suitability Indices: Methods for collecting site-specific habitat criteria for the glacial Susitna River need to be collaboratively identified. (As recommended in the resource agencies study plan request for Instream Flow and Habitat Utilization). These criteria also need to be evaluated in the context of the hierarchical habitat model, such that habitat criteria are determined and evaluated in all habitats of importance to each agreed-upon target species and life stage.

The 1980's studies were inconclusive in demonstrating a relationship between fish habitat criteria and fish distribution, and they were also narrowly focused on associations of spawning and rearing salmon with water

depth and velocity in spring channels (side sloughs). Not only is this not representative of existing habitat and the distribution of fish within those habitats, habitat data collected from nearby glacial rivers demonstrates that spawning habitats selection is independent of flow depth and velocity in side sloughs and may be profoundly influenced by bioenergetics and the input of organic matter .

This indicates that traditional hydraulic modeling (e.g., PHABSIM), as proposed, may be an insufficient fish focus/tool. So, first we need to identify criteria that are influential to habitat selection, within the full seasonal distributions of agreed-upon target species and life stages. Only then, after this has been adequately determined, can we begin to develop utilization functions (curves or HSC) for those criteria.

The Service has previously expressed concern with the approach of repeating the 1980's study effort, and we have repeatedly asked for both a complete compilation of available data, and a review of the 1980's information prior to accepting its use for the proposed project. Lacking that review, we independently note that, in the 1980's sites were selected that were, presumably, heavily utilized by spawning sockeye and chum (qualitative). Study sites need to be based on relevant criteria related to physical habitat site selection as documented by fish distribution and lack thereof.

-Groundwater- The integration of the groundwater study efforts with the biological studies is not clear. Specifically, how will the groundwater study be made relevant to the scale of fish habitat and fish habitat site selection in the Susitna River? The objectives of the groundwater study should include relevance to the hierarchially nested habitats, including macro-, meso-, and micro-habitats that are influential to fish habitat selection. The groundwater study sampling design should be relevant to fish habitat and site selection. A specific objective needs to be measuring the hydraulic gradient/head (upwelling or downwelling) under the existing hydrograph and under the proposed project hydrograph release flow schedule.

-Model selection: We need to first determine what criteria are important to fish habitat site/suitability and selection before we can choose an appropriate flow-habitat model. ADFG Marine Mammals biologist, Dr. Bob Small also reiterated this very same point regarding model selection for the beluga whale studies. Again, the Service notes our concern about the limited focus of the 1980's studies and using PHABSIM. Our concerns stated in earlier correspondence to AEA remain unaddressed and are reiterated here for emphasis.

Model sensitivity and relevant criteria (inputs) are critical to achieving statistically valid outputs. At this point, it is premature to select a model until we have known 1) fish distribution, and 2) identification of variables influential to fish habitat site selection.

-Biometric Review- The Service previously requested a biometric review of the 1980's findings. This request is remains outstanding and should be conducted prior to basing any study plans on 1980's studies or results. In all cases, including the usage of the 1980's Su-hydro data results and for the Susitna-Watana study plans, estimates of precision and accuracy of study results is required to evaluate the power of any study plan. Details of proposed study plan sampling and design methods need to be explicit and statistically valid with a priori determination of levels of precision and accuracy of model outputs.

-Fish genetics- During the August 15-17 meetings, AEA stated that genetic samples from the Chinook above the proposed dam site would not be collected. The stated rationale was due to the desire to minimize the handling of the fish after subsequent tagging of fish. Genetic samples of Chinook at locations above the proposed Susitna-Watana dam site are crucial to informing the Service's management goals specific to recommending licensing conditions under the Federal Power Act, and to conservation recommendations under the Fish and Wildlife Coordination Act, and the Anadromous Fish Act. As such, we consider our request for collection of genetic samples from Chinook salmon, and other fish species to be necessary for our resource evaluation of the Susitna-Watana hydropower project. Because of this information need, if AEA does not plan to collect the information, AEA should document how this study request is being addressed.

Fish species genetic samples used for comparisons should be less than ten years old to reflect current gene frequencies among the sampled fish populations. Genetic samples for salmon exist for some tributaries in the

lower and middle Susitna River. Some of these samples are greater than ten years old.

Fish genetic samples should be current and include samples of the Chinook migrating above the proposed dam location. Because gene frequencies change over time, all genetic samples should be within the most recent ten years to allow for valid comparison. Genetic analysis should analyze the existing extent of genetic differentiation within and between fish using distinctly different habitats. We request genetic analysis of Chinook above the proposed dam site relative to those at other upper, middle and lower river and tributary sample locations.

-Fish Passage/fishway prescription- The Service is concerned with the lack of transparent discussion about the potential for fish passage alternatives at the proposed Susitna-Watana dam. If fish passage is required, how will that be accomplished? If it is not feasible, what is your alternative proposal? Where is your project assessment of the fish passage feasibility? What are the design criteria being considered/evaluated?

-Compensatory Mitigation- Compensatory mitigation is determined as part of a mitigation sequence after avoidance, and minimization efforts. The Service has inquired about potential compensatory mitigation for project impacts during several meetings. To date, this concern has not satisfactorily been addressed by the project sponsors or project consultants. Because compensatory mitigation is a requirement in order to offset unavoidable projects impacts to fish and wildlife resources and their habitats, it is should be considered throughout the review process. Please explain how you plan to quantify existing habitats, and quantify primary, secondary and cumulative (40cfr Part230 of the CWA) losses to those habitats under the proposed operational flows over the temporal scale of the license period. How will habitats change proportionally under project operations?

-Lower river- The Service is concerned with AEA consultants' proposal to establish a lower boundary for the physical studies (e.g., geomorphology, instream flow) at a location "downstream of Sunshine" at approximately river mile 75, and not extend the study efforts further down into lower river to inform the biological studies. There are many biological resource studies that would necessarily be informed by establishing a consistent study boundary between the physical and biological studies. For example, studies related to the federally listed Cook Inlet beluga whale, fish species and habitats, including the resident species, and anadromous salmon and eulachon (beluga whale prey species). The lower river also includes the Susitna Flats State Game Refuge. If the physical studies boundary is terminated at river mile 75, there will be no ability to relate or integrate biological data to those studies (e.g., geomorphology, ISF, ice processes, flow routing). Resource agencies management goals would effectively not be addressed below river mile 75, if project effects are not assessed to the mouth of the river.

According to USACE (1966), 80% of the ability to produce accurate model results depends on using appropriate bathymetry data, mesh design, and boundary conditions. The amount of time needed to collect this information, particularly the bathymetry data, depends on the complexity of the channel's geometry, which is known to be complex in the lower Susitna River. Because data collection in the lower river will likely require rigorous field collection due to the channel complexity, it is critical to initiate these efforts in a time sensitive manner. The proposal to delay work in the lower river pending analysis at an arbitrary, and certainly non-biologically relevant location, does not meet resource agencies objective of evaluating the potential project impacts to fish and wildlife resources in the lower Susitna River. This is particularly true under the FERC ILP process timeline specific to the Susitna-Watana dam project.

-Studies integration: A "map" or chart of how studies are proposed to be integrated is needed. AEA sponsors and consultants, committed to providing this by September. Biological resource components are currently not integrated or connected to the other studies, and appear as being treated independently of the rest of the study requests. Study proposals must demonstrate how they will be integrated to provide needed resource information.

Studies/components not address from the Non salmon anadromous, resident and invasives fish species study request: During the August ILP meetings, the follow Service requests were preliminarily noted as not being addressed or adequately addressed by AEA's PSPs.

1) **Marine derived nutrients** contribution from non salmon anadromous species. The Service requested information in our non-salmon anadromous, resident and invasive study plan request. It is not clear which study proposal it is addressing this request, or IF it is being addressed. During the August 15-17 meetings, it was indicated that it may be addressed in either the riparian instream flow, the terrestrial wildlife, the river productivity or elsewhere. However, AEA's consultants were unable to specifically "point to it" when asked. It does not appear to have been included in the PSPs.

2) **Resource valuation** of non-salmon anadromous and resident fish resources. During the meeting, AEA consultants stated that a resource valuation would not be provided, as requested in the Service's study request for non salmon anadromous, resident and invasive fish study. An explanation of why this assessment will not be addressed was not provided. We request that an explanation be provided that describes the rationale for this determination and urge reconsideration of our study request.

3) **Trophic ecology**- The Service requested information on trophic ecology in the non salmon anadromous, resident and invasive species study request. Michael Link stated that there are "significant predator-prey dynamics" particular once fish move out of the mainstem; using this behavior to explain why fish hold there until they are ready to dash to tributaries. He noted that the creeks are heavily preyed upon by bears, for example. Dr. Bob Small (ADFG) recommended trophic ecology and/or foraging ecology information for the Cook Inlet beluga whale studies. For fish, coordination with Tim Nightengale (AEA's consultant; via teleconference) stated that he would take gut samples from fish to see what macro-invertebrates they are eating, and when, and will work with fish study teams to do some trophic analysis. The trophic ecology component needs to be clearly spelled out in a study plan identifying any aspects that will and will not be addressed explained and with appropriate rationale.

References:

Frissell, C. A., W. J. Liss, C. E. Warren, and M. D. Hurley. 1986. A hierarchical framework for stream habitat classification: viewing streams in a watershed context. *Environmental Management* 10:2. Pp. 199-214.

Lovtang, J. C. 2005. Distribution, habitat use, and growth of juvenile Chinook salmon in the Metolius River Basin, Oregon. M.S. Thesis, Oregon State University. March 2005.

USACE 1966. (Full citation will be provided in follow-up correspondence)

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Subject: PSP 6.6 Riparian Instream Flow Study Plan - Interim Comments

Kevin,

The following are some of the key differences the USFWS sees between our study plan request (USFWS 10.1, Instream Flows for Floodplain and Riparian Vegetation Study) and AEA's proposed study plan (PSP 6.6, Riparian Instream Flow Study). The differences and comments listed below are likely not inclusive, since we have not had a chance to fully evaluate the PSP.

Many of the PSPs rely upon or provide data from/for other studies. Recognizing these relationships is an important part of the Integrated Licensing Process (ILP); however, the study providing the data should describe the methodology and oversee the data collection and analyses, while the study requiring the results should restrict its discussion to the types of data/results required from other PSPs. Repeating the methods in a study not responsible for the data collection and analyses is unnecessary and risks confusion if the methods differ or are inadequate in one of the studies. Since the Riparian Instream Flow PSP will rely upon data from the Groundwater PSP, the Riparian Instream Flow PSP should describe only the results required from the Groundwater PSP, and then describe how those results will be used in the Riparian Instream Flow PSP (e.g., 5.7 Groundwater PSP should be the only PSP that describes the groundwater methods). This applies to other PSPs, such as the habitat mapping studies that may be providing data for this PSP.

Study Goals and Objectives: The USFWS requested a specific goal that included quantifying the frequency, timing and duration of surface-water and groundwater levels required to establish, maintain, and promote floodplain and riparian plant communities. Two ancillary goals were also requested to quantify the frequency and rate of sediment deposition required to promote soil development, and to quantify the effect of river ice on the establishment and persistence of riparian plant communities. Section 6.6.1.1 of the PSP has no stated goal, and only a general approach is provided. An "overarching goal" is provided in the Section 6.6.4 Study Methods, but this goal is also very general. While goals can be very general in nature, the specifics in our goal set the stage for a rigorous study plan to evaluate potential project-related effects on floodplain plant communities.

The USFWS requested six objectives to help meet our goal. Three of the PSP objectives are similar to our requests {1) Synthesize 1980s data, 2) Study sites, and 6) Seed dispersal}, but they lack the additional specifics stated in our requested objectives. Two of the PSP objectives appear to be wholly or at least partially the objectives for other PSPs and not appropriate as stated {3) Map riparian vegetation, and 10) Impacts to shallow groundwater well users}. What the PSP objectives lack, however, are our specific requests for river ice, sediment deposition, and water-level regime (USFWS Objectives 4, 5, and 6). These missing objectives may be studied under AEA's PSP objectives, but the USFWS prefers they be considered as standalone objectives, and possibly integrated into a single modeling objective after they have been studied individually. The USFWS is particularly interested in our Objective 6 to characterize the water-level regime required to maintain floodplain and riparian plant communities. Much of the discussion so far has focused on floodplain plant succession, but little or no discussion so far has involved maintenance flows. Succession is important, but without maintenance flows whole floodplain plant communities may collapse or the direction of succession changed to an unnatural target (e.g., non-floodplain plant communities).

Study Area: The USFWS agrees with the PSP study area and four river segments, with the following additional comments. The width of the active valley should also include the distance from the River that the River influences groundwater, as well as define the return interval for both groundwater and flooding (e.g., 100-year event under current or climate-change induced conditions). Much discussion has centered on the downstream

influence of the Project. The PSP study area Lower Reach would extend to RM 0. Will this lower extent remain even if all agree that the Project influence on surface- and ground-water becomes indistinguishable from normal environmental variation?

Study Methods: The methods need to follow the order of the objectives and use section headings that refer to the intent of the objectives. Few methods are referenced, and some references that are cited are not included in the literature cited. The relationship with other PSPs often seems confusing. It would be more helpful to state what results will be required from PSP "x" to evaluate a Riparian ISF objective, and potentially what results from a Riparian ISF objective will be required by PSP "y." It is not necessary to repeat coordination for every objective, only state the inputs required and the outputs provided by an objective. This applies across PSPs and among a PSP's objectives. The following comments on methods follow the order of the Objectives requested by the USFWS:

RIFS-1 Synthesize Historical Data: In addition to other North American hydro-projects, this review should also include a review of relatively undisturbed riverine systems.

RIFS-2 Select and Design Study Sites: The number of study sites should provide sufficient replication to address the needs of the objectives, and should include sites where Project operation is expected to cause early channel bed degradation or aggradation. The casual reference to pseudoreplication in one of the other objectives needs to be addressed at the study-site level. Study sites are typically the experimental unit where replication is used for true statistical analysis. All other sampling (e.g., within the study site) is really subsampling used to obtain a better average value for that one replicate. As envisioned by many of the PSPs, the "representative" study sites are really only one replicate for each process-domain. For more on pseudoreplication see:

Hurlbert, Stuart H. 1984. Pseudoreplication and the Design of Ecological Field Experiments. Ecological Monographs 54:187–211. <http://dx.doi.org/10.2307/1942661>

RISF-3 Characterize Seed Dispersal and Frequency of Establishment: Not sure where this objective is addressed in the PSP. It appears to be scattered across several sections in the methods. If the methods have been described by other similar projects, then cite their methods if appropriate and include enough details to help others understand the methods that will be used. How will the Susitna River bimodal peak flows be addressed? On a float trip down the Susitna 27-29 July 2012, there were newly emerging dicot seedlings on the sandbars. How will the fate of these "second peak" seedlings be addressed? How will the role of precipitation in maintaining favorable soil moisture conditions be evaluated? Will soil texture be considered? If so, how will the soil profile be described?

In Section 6.6.4.3.1.4: Is "abundance" density or some other metric? What is "elevation" referenced to: ASL, an arbitrary datum, or some elevation that can be linked to the local river or groundwater stage (keep in mind the river drops downstream, so that must be accounted for also)? Is there a citation for others using 2-meter square plots? What is the shape of these plots? A square plot may not be appropriate for a narrow band of seedlings along a specific elevation in the gradient above the river. MODFLOW is a groundwater model, and many not be sensitive enough to quantify hydroperiod relationships for seedlings. What other metrics will be used to quantify/separate surface water, groundwater, soil moisture, precipitation, and other potential hydrological process that support seedling establishment and recruitment?

How will the results from this objective be used to predict potential Project-related changes in seedling establishment and recruitment into the population?

RISF-4 Characterize the Role of Ice in the Establishment, Survival and Recruitment of Riparian Species: The discussion on ice processes (Section 6.6.4.4.1) seems unfocused, and essentially provides no discernible methods: "Final details of the geomorphology and ice processes modeling ... will be developed as the 2012 studies are obtained." The goal of this study should be to characterize the role of river ice in the establishment (colonization), survival (first 3 years) and recruitment into the future reproductive population of dominant riparian species (e.g., balsam poplar, willows). Have others investigated the role of ice on riparian plant communities?

If so, can their methods be used here? How will the magnitude, frequency, and longitudinal distribution of ice events affecting dominant riparian species/communities be evaluated?

RISF-5 Characterize the Role of Sediment Deposition in the Formation of Soils: The proposed soil sampling techniques are included in Section 6.6.4.3.1.5, but based on these techniques it is unclear how the USFWS requested objective to characterize the role of sediment deposition in the formation of floodplain and riparian soils, and how sediment deposition affects the rate and trajectory of plant community succession. This objective should investigate the rate of deposition, depth of sediment, and soil profile development required for natural floodplain plant community succession, and then use the predicted sediment deposition characteristic from the Fluvial Geomorphology Study to predict the effects of Project operation on floodplain plant communities.

Sampling to only a depth of 50 cm, and describing cumulative thickness of all organic horizons and loess (windblown material?) without stratigraphy will likely be insufficient to meet this objective. Soil texture by feel should follow standard techniques (e.g., Thien 1979, <http://soils.usda.gov/education/resources/lessons/texture/>).

RISF-6 Characterize Water-Level Regime Required to Maintain Floodplain and Riparian Plant Communities:

This is a critical objective that has not been sufficiently discussed in past workgroup meetings, possibly due to lack of time, and the PSP methods are insufficient to evaluate if the USFWS requested objective will be met.

Suggest this objective be discussed near the beginning of future meetings to allow sufficient time for discussion.

Objective 6 combines hydrologic information from the groundwater study (PSP 5.7) and the plant community information from this study (PSP 6.6) and possibly the habitat mapping studies (PSPs 9.6 and 9.7) to produce plant species/community response curves. The USFWS's Objectives RISF-3 to RISF-5 target critical stages in plant community succession, while RISF-6 targets critical instream flows required for maintaining plant communities as succession progresses (i.e., both succession and maintenance are important).

The methods for groundwater belong in the Groundwater PSP, and not in this PSP for reasons discussed above. This PSP should request the required hydrologic information from PSP 5.7 and begin the discussion from that point. The following comments, however, include the pertinent groundwater methods that should be discussed in PSP 5.7.

Section 6.6.4.5 (Groundwater): The suggested four to six intensive study reaches instrumented with groundwater and surface-water recording instruments may be insufficient to address this objective if plant response will be described by process-domains (see pseudoreplication discussion above). However, hydrology is likely the most dominant physical factor required for maintaining floodplain plant communities across the various process-domains, and barring some other dominant physical factor (e.g., soil parent material, weather, etc.) it may be possible to use data from the individual intensive study-site transects to build response curves (see Henszey et al. 2004 {ne.water.usgs.gov/platte/reports/wetlands_24-3.pdf}, Figure 7 for an indication of the number of data points required to build a response curve).

One-and-a-half growing seasons (July 2013 to September 2014) will likely provide insufficient groundwater hydrology data to fit individual species response curves (especially for annual species), and may not be enough data to reasonably predict groundwater relationships with river stage and to verify the model predictions with independent data. Precipitation may also dramatically affect transient but critical groundwater levels (a few days to a week or more of elevated water levels), which would be difficult to evaluate with limited data. How will these potential problems be addressed?

What are the "project accuracy standards used for water-level measurements" for horizontal, vertical and temporal measurements?

In addition to the Work Products described in Section 6.6.4.5.2, the products should provide water-level summary statistics for each location (e.g., point, plot, or transect) that will be used to test and fit plant response curves, such as growing season cumulative frequency, 7-day moving average, 10-day moving average, 14-day moving average, and arithmetic mean (see Henszey et al. 2004 {ne.water.usgs.gov/platte/reports/wetlands_24-3.pdf}, Table 1).

Section 6.6.4.7 (Succession Models and Flow Response Guilds) appears to potentially address the USFWS's Objective 6 request; however, two critical referenced papers (Merritt et al. 2010 and Pearlstine et al. 1985) were not included in the Literature Cited. These references were not provided until 8/28/2012, and the USFWS has had insufficient time to review these papers in detail. The concept of the PSP response guilds is similar to the USFWS's request to develop plant community response curves, but the PSP methods are insufficient to evaluate if our requested Objective 6 will be met. The USFWS requested evaluating specific water-level summary statistics (see above discussion for groundwater) with a rigorous curve-fitting technique similar to Henszey et al. (2004). The methods should provide sufficient detail to show how quantifiable (not qualitative) hydrologic (surface-water and groundwater) gradients will be constructed to show the optimum and range of favorable water levels required for maintaining floodplain species/communities.

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Subject: Follow up from August and September ILP meetings

Hi Betsy,

Can you please provide a timeline for when resource agencies can expect AEA to provide meeting minutes from the August and the September ILP TWG meetings? Also, requested is the documentation of how AEA will address agencies identified discrepancies and concerns related to proposed approaches that were presented during the meetings. We intend to have follow up related to these outcomes, and need to make concerted efforts toward this goal. Resource agencies have many outstanding and complex resource concerns yet to resolve with AEA consultants related to the Susitna River basin resources and their habitats; particularly under AEA's proposed approaches within the study requests, and would appreciate receipt of the follow-up information.

NMFS previously requested the August meeting minutes, a few weeks ago. We are following up with this secondary request, along with the additional request for the September meeting materials.

Thank you,
Betsy

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APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION

SECTION 5 – WATER QUALITY

Evaluation of Su-Watana Study Plans related to Water Quality and Mercury

Working draft of Lori Verbrugge, August 2012

Study 5.12 Mercury Assessment and Potential for Bioaccumulation Study

Objectives analysis:

- 1) Mercury modeling aspect is absent in all studies. We need them to model mercury inputs into the reservoir, amounts of mercury methylation, uptake and biomagnification of methylmercury in reservoir organisms including concentrations at each trophic level, and transport of mercury downstream from the reservoir, from date of initial flooding until 20 years post-impoundment.
- 2) Avian piscivores – need to analyze feathers for mercury content to determine baseline. This objective is absent from the bird studies.
- 3) Actual risk assessment step is missing. We need them to perform an ecological risk assessment for each piscivorous species. Estimate the amount of mercury ingested by individuals of each piscivorous species, based upon dietary information and modeled mercury levels in food items post-impoundment. Compare ingested mercury amounts to toxic levels, based on species-specific data from the scientific literature. Note: this step is missing in the study plans for avian species and aquatic furbearers.

Methods/Analysis Evaluation:

- 1) Page 5-164, first paragraph: discussion does not make sense. The State of Alaska (SOA) measured total mercury in salmon and other freshwater fish species from the Susitna River drainage. Contrary to the discussion, the SOA does not compare fish mercury concentrations to water quality standards. Unlike some other states such as Oregon, SOA does not base mercury water quality standards on fish concentrations. Table 5.12-1 reveals mean concentrations of mercury in several species of fish (arctic char, northern pike, pink salmon and lake trout) that are above levels deemed safe for unlimited consumption by women of childbearing age, as determined by the Alaska Division of Public Health.
- 2) Page 5-163, paragraph 5: The report states “At Costello Creek only 0.02 percent of the mercury detected (*in what – sediments?*) was found to be methylated. This study suggests, based on limited data, that mercury concentration varies significantly between separate drainages, and that methylation is also tributary specific”.
 - a. This may be true for sediments, but is very unlikely to be true for fish. As a general rule, mercury in fish tissue is nearly 100% methyl mercury.

- 3) Page 5-168, Section 5.12.4.3.2 "Fish Tissue": The report states, "Body size targeted for collection will represent the non-anadromous phase of each species life cycle (e.g., Dolly Varden; 90 mm – 125 mm total length to represent the resident portion of the life cycle.)
 - a. This makes some sense, in order to understand the amount of mercury in the fish that is clearly attributed to the local environment. However, for risk assessment purposes it is also important to sample fish that are representative of those taken for consumption by humans and wildlife receptors. Specifically, large adult fish that are targeted by anglers (and bears) should also be sampled, to determine how much additional mercury can "safely" be added from the project before consumption advisories are warranted.
- 4) Page 5-170, Section 5.12.4.5, "Pathway assessment of mercury into the reservoir..."
 - a. The water quality modeling this section refers to (from Section 5.6) does not have the capacity to predict mercury inputs from inundated bedrock, soils and vegetation, mercury fate and transport, mercury methylation, or mercury uptake by biota. Studies 5.6 and 5.12 point to each other, but neither actually does this critical mercury modeling work. A concerted, specific mercury modeling component is essential and must be added.
- 5) Section 5.12.6 Schedule: Two additional monitoring activities needs to be added to this table and scheduled.
 - a. Quantitative modeling of mercury inputs, rates of methylation, and uptake by biota; and
 - b. Ecological risk assessment for mercury exposure to avian and mammalian piscivores in the study area

I don't have the expertise to opine on the discussion regarding the choice of model to use.

- 1) Page 5-37, paragraph 4: the report reads, "Organic carbon content from inflow sources will be correlated with mercury concentrations determined from the Baseline Water Quality Study discussed in Section 5.5. Predicted water quality conditions established by Project operations and that promote methylation of mercury in the bioaccumulative form will be identified by location and intensity in both riverine and reservoir habitats."
 - a. Nowhere in Section 5.5 or elsewhere does it indicate how mercury inputs will be estimated based on the specific vegetation, bedrock and soils in the area to be inundated. Likewise, a specific model has not been proposed to predict mercury inputs, concentrations, or rates of methylation in the reservoir. Neither the underlying data collection nor the modeling activity necessary to quantify future mercury levels in biota are contained within any of the current study plans.

area inundated, and the pH, calcium concentration and water hardness of the reservoir...among other factors.

22) Page 5-17, paragraph 5: the report states, "Detection of mercury in fish tissue and sediment will prompt further study of naturally occurring concentrations in soils and plants and how parent geology contributes to concentrations of this toxic (sic) in both compartments of the landscape".

- a. The study of "naturally occurring concentrations of mercury in soil and plants and how parent geology contributes to concentrations of this toxicant" must be undertaken, regardless of whether it is currently present in fish and sediment. Vast surface areas and vegetation will be inundated, that are not currently part of the system. There is not the need to prove current presence before proceeding to predict the addition from the project. In any case, if adequate detection limits are used it is a given that fish and sediments will contain mercury; unfortunately they do everywhere. There is no reason to delay this "further study", particularly as the ILP process is so compressed. This study needs to be planned and implemented NOW. Likewise, macroinvertebrates need to be added to the current study plan.

23)Page 5-19, section 5.5.6 Schedule: Several needed elements are missing, including the collection of geomorphology, geology, vegetative type and quantity, etc. needed to estimate mercury inputs to the reservoir. Then modeling is needed to incorporate baseline conditions, estimate new mercury inputs and rates of methylation, and predict mercury levels in biota post-impoundment. Several study plans point to each other regarding this topic, but none actually undertake these tasks.

Study 5.6 – Water Quality Modeling Study

Objectives Analysis: Two objectives contained in our study request are not included in the AEA study plan. These are:

- 1) Model mercury inputs into the reservoir, amounts of mercury methylation, uptake and biomagnification of methylmercury in reservoir organisms including concentrations at each trophic level, and transport of mercury downstream from the reservoir, from date of initial flooding until 20 years post-impoundment.
- 2) Model changes in toxicity to aquatic organisms in the project area and downstream, due to changes in trace element concentrations, pH, hardness, dissolved organic carbon, and interactions between these parameters.

Method/Analysis Evaluation:

plants would be far more useful to assess transport from sediments to biota.

18) Our study request Page 19, paragraph 1, calls for sediment metal data to be compared to appropriate NOAA SQUIRT values to assess whether metal levels exceed acute and/or chronic toxicity benchmarks for aquatic organisms. This paragraph does not appear in the AEA study plan.

19) Page 5-17, paragraph 2 in total: the report states, "Body size targeted for collection will represent the non-anadromous phase of each species life cycle (e.g., Dolly Varden; 90 mm – 125 mm total length to represent the resident portion of the life cycle.)

- a. This makes some sense, in order to understand the amount of mercury in the fish that is clearly attributed to the local environment. However, for risk assessment purposes it is also important to sample fish that are representative of those taken for consumption by humans and wildlife receptors. Specifically, large adult fish that are targeted by anglers (and bears) should also be sampled, to determine how much additional mercury can "safely" be added from the project before consumption advisories are warranted. Similarly, for ecological risk assessment purposes it is important to sample fish representative of those in the diet of avian and mammalian piscivores in the project area. Our study request (Page 19 paragraph 3) contains a more robust description of the types and sizes of fish that should be sampled.

20) Page 5-17, paragraph 4: the report states "Results will be reported with respect to applicable Alaska State and federal standards".

- a. The comparison values must be specified and agreed to up front. For human risk assessment purposes, US EPA guidance for fish consumption advisories is most appropriate. For ecological risk assessment purposes, risks should be interpreted using published scientific literature, based on both field observational studies and controlled laboratory experiments, using the same or comparable piscivorous avian and mammalian species.

21) Page 5-17, paragraph 5: the report states "Results from fish tissue analysis will also be used as a baseline for determining how the proposed Project may increase the potential of current metals concentrations to become bioavailable".

- a. This doesn't make sense. Results from fish tissue analysis will be used as a baseline for fish metal concentrations prior to development. In order to understand how the Project may increase the potential for current metal concentrations to become bioavailable, you need to predict how mercury methylation rates may change in response to the Project. This would entail prediction of organic carbon stores, amount of wetland or peat surface

this context, because water levels do not relate directly to fish levels. Let's discuss.

- 11) Page 5-13, paragraph 3: the report states, "The criteria that will be used for comparison with sampling results are the drinking water primary maximum contaminant levels".
 - a. That may be OK for the purpose of protecting human health from drinking water contaminants. But it does not address drinking water aesthetic issues (ADEC secondary standards), nor does it protect ecological receptors. Results must also be compared to NOAA SQiRT tables for surface freshwater, to assess whether metal levels exceed acute and/or chronic toxicity benchmarks for aquatic organisms.
- 12) Page 5-14, Section 5.5.4.3.2 Sampling Protocol, paragraph 3 in total:
 - a. Our study request called for monthly sampling year-round. We are especially interested in winter data, and coordination of that with the Ice Processes study. AEA's study plan is a major departure from this recommendation, as it calls for 4 monthly samples during the summer months, and only 2 other samples collected during the winter months.
- 13) Page 5-14, Section 5.5.4.3.2 Sampling Protocol, paragraph 4 in total:
 - a. This paragraph calls for using specific conductance as a surrogate measure for transfer of metals from groundwater to surface water. This might have some utility for major ions such as iron, but would be completely ineffective for toxic inorganic elements present in relatively "trace" concentrations.
- 14) Page 5-15, paragraph 2: the report states, "It is possible that a flow-integrated sampling technique.....will be used".
 - a. Isn't this a study plan? The plan should definitively state whether this will happen or not.
- 15) As a general note, reference to USGS guidance for conducting water quality sampling has been deleted throughout the AEA study plan.
- 16) Page 5-16, paragraph 6: the report states, "Toxics modeling will be conducted to address potential for bioavailability in resident aquatic life."
 - a. More detail needed here. Which model; how?
 - b. Toxics modeling must also evaluate the potential for direct toxicity to aquatic life, and for mixture toxicity (the elements are not present in isolation). Metals do not have to bioaccumulate to have a toxic effect.
- 17) Page 5-16, paragraph 6: the report states, "Comparison of bioaccumulation of metals in tissue analysis with results from sediment samples will inform on potential for transfer mechanisms between source and fate".
 - a. You probably won't get this information from fish sampling, unless it is a very resident/non-mobile fish. Sessile organisms such as mussels or

- 4) There are a number of differences, both in total number and in locations, between the proposed meteorological stations specified in the study request (Table 2) vs. study plan (Table 5.5-2). These should be discussed.
- 5) USFWS Study Request, page 10 (compared to study plan page 5-11, paragraph 4) – many of the specifics added by federal hydrologists regarding MET station placement were not included in the Study Plan. Eric or Bill will need to weigh in here.
- 6) Three MET station parameters were requested by us but not included in the Study Plan. These are solar radiation (long and short consistent with ice process study needs), snow depth, and evapotranspiration. Bill or Eric need to weigh in here.
- 7) Page 5-13, paragraph 1: Our study request included a requirement for a Quality Assurance Project Plan (QAPP) for water sampling and analysis, and a requirement that all studies be conducted in accordance with applicable USGS and EPA methodology. None of this language appears in AEA's study plan, which only specifies that the analytical laboratory will be NELAP-certified.
 - a. Useful, quality data cannot be assured by a quality analytical laboratory alone. Other aspects of the study, including sample locations and timing, sample collection methods, sample preservation and shipping methods, etc., are critical to project success. We reiterate our request for a project QAPP and compliance with applicable USGS and EPA methodology, as cited in our study request.
- 8) Page 5-13, paragraph 2: The report reads, "The initial sampling will be expanded if general water quality, metals in surface water, or metals in fish tissue exceed **criteria or thresholds.**"
 - a. The applicable criteria and thresholds for each analyte and matrix must be specified and agreed to up front, before sampling occurs. This information should be contained in the project QAPP.
- 9) Table 5.5-3: AEA's study plan differs from our study request in the number of elements to be analyzed in sediment samples. AEA proposes far fewer elements; specifically barium, beryllium, cobalt, magnesium, manganese, molybdenum, nickel, thallium and vanadium are all absent from AEA's analyte list for sediment.
- 10) Page 5-13, paragraph 3: the report states "Metals monitoring for total and dissolved fractions in surface water include the full set of parameters **used by ADEC in fish health consumption screening**".
 - a. What does this mean? Does it mean, the elements ADEC measures in fish fillets in its Fish Monitoring Program? In that program, ADEC shares the fish tissue data with the state health department, which uses the data to develop fish consumption advice. This doesn't make much sense in

Evaluation of Su-Watana Study Plans related to Water Quality

Working draft of Lori Verbrugge, August 2012

Study 5.5 – Baseline Water Quality Study

Objectives Analysis:

Note that our requested water quality (WQ) study combined the baseline WQ and WQ modeling components, but the applicant divided them into two separate study plans. Therefore, comments on study plan 5.6 “water quality monitoring” are provided separately below.

There are only a few differences between our requested objectives vs. the applicant’s study plan objectives for study 5.5:

- 1) We requested that the applicant determine the source(s) of parameters exceeding Alaska’s water quality standards. This objective is not in the applicant’s study plan. Further discussion warranted here.
- 2) Applicant has an objective to “measure baseline metals concentrations in sediment and fish tissue **for comparison to state criteria**”. More specificity is needed here...which state criteria?

Method/Analysis Evaluation:

- 1) Page 5-9, paragraph 3: The report reads, “An initial screening survey has been proposed for several other toxics that might be detected in sediment and tissue samples (Table 5.5-4). The single surveys for toxics in sediment, tissue, or water will trigger additional study for extent of contamination and potential timing of exposure if results exceed criteria or thresholds...”
 - a. More detail is needed here. How many samples, at how many sites? Study plan must identify the specific comparative standards for each analyte and matrix, and get agreement on them up front.
- 2) Our study request indicated that “Additional temperature monitoring locations will be identified in cooperation with Fish Studies, the Groundwater Study, and the Instream Flow study to identify areas of thermal refugia for fish”. This sentence does not appear in the study plan.
- 3) We have requested water temperature data collection throughout the year. The study plan only includes temperature data collection between late June and late December of 2012, 2013 and 2014. Temperature data is critical during winter and spring seasons, as project operations are expected to significantly alter conditions during these seasons.

From: Klein, Joseph P (DFG) [mailto:joe.klein@alaska.gov]

Sent: Thursday, August 23, 2012 2:48 PM

To: Betsy McGregor

Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); Michael_Buntjer@fws.gov; Betsy_McCracken@fws.gov; eric Rothwell; Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)

Subject: RE: Follow up Meeting Notes-additional comments

Following are additional comments

Baseline Water Quality

5.5.4.3.2 In-Situ Water Quality Sampling The sampling protocol currently calls for monthly in-situ water quality monitoring for the 4 summer months. It should be revised to include continuous (hourly or so) water quality measurements for basic parameters (pH, DO, conductivity, turbidity), year-round if possible using in-situ semi-permanent sensors (e.g. sondes). The technology is readily available and would provide very useful baseline information to assess any post project impacts.

River Productivity

7.8.4.4 Conduct a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River. We recommend supplementing or substituting this section using a reference reach in a similar Alaska river using a BACI design monitoring program in order to assess post project impacts.

From: Klein, Joseph P (DFG)

Sent: Thursday, August 23, 2012 10:42 AM

To: McGregor, Elizabeth A (AIDEA)

Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); Michael_Buntjer@fws.gov; Betsy_McCracken@fws.gov; Eric Rothwell (Eric.Rothwell@noaa.gov); Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)

Subject: Follow up Meeting Notes

Betsy-

Thank you for the opportunity to discuss the proposed study plans for the Susitna-Watana Hydroelectric project. We look to further discussions to continue to clarify study plan details.

To assist in you and your consultants in this process, below are brief notes by ADF&G staff. We may have additional comments/or clarifications. Please feel free to contact me if you have any questions.

Regards, Joe

Fish Distribution and abundance in Upper, Middle and Lower Susitna River

- Trot lines should considered during the winter to target appropriate fish species.
- Minnow trapping under ice should be used during the winter, in all habitat types.
- Should evaluate the feasibility of under ice videography.

Salmon Escapement

- Identify locations of adult fish weir locations described on tributary streams (7.7.4.1.5, page 7-39). Consider placement of adult fish weir upstream of the proposed dam on prominent Chinook salmon streams.

Instream Flow

- What is the sampling strategy (e.g. representative reach, mesohabitat typing) for the defined habitat types?
- How many and at what range will discharge-calibration sets be collected for each sampling method?
- Will 2D modeling include side channels and sloughs within study area?
 - Based on comments at the meeting it was my understanding it would.
- What criteria will be used to identify cover types and substrate sizes?
- For PHABSIM, will transects be independent, dependent or a combination and accordingly, what WSE models and composite suitability index will be used?
- What criteria will be used to select and weight transect-derived models?
- Per the description of study sites for fish passage/off-channel connectivity (§6.5.4.5.5), what criteria will be used to identify "a representative number" of different habitat types?
- HSI data is needed for identified target species for each defined habitat type, over 2 years.
- How will the data be aggregated to evaluate single flow recommendation?
- Will a DSS-type program be available to review study results and if so, information is needed on it.
- How do you envision the "collaborative process" will work? When will major decisions be made (e.g. site and transect selections) and how often do you envision the work group will get together?
- What equipment will be used and how will they be calibrated?
- For the eulachon and boating studies, similar information is needed on what is the study area, what sampling strategy will be used, how many and what range of calibration-discharge sets if appropriate, and how will HSI curves will be developed?
- Variational zone modeling, may need more defined time steps during analysis phase (possibly down to 15-minute increments) depending on the rate of flow change over time.

Groundwater

- What are the monitoring well placement sampling approach (e.g. equal spacing along linear transects, etc.) and location (e.g. for instream flow, in all habitat types?) for the various resource studies (i.e. instream flow, riparian instream flow, water quality). Also, a description of sampling intensity would be helpful (i.e. for instream flow purposes, will the objective be to characterize entire gw/sw interaction throughout entire intensive study site or only at select microhabitats).
- What is the duration for monitoring (I believe at the meeting it would be from installation until winter 2013-14?)
- How often will monitoring wells be calibrated for various parameters to be sampled pre- post- and during field monitoring?
- For each resource discipline, what parameters will be sampled and what are range of accuracies (e.g. for water level +/- 0.1 ft?, water temp +/- 0.2 C?, etc.).

Water Quality

- Information on availability of the Sampling and Analysis Plan and Quality Assurance Project Plan is needed.
- GW Quality in Selected Habitats (Section 5.5.4.7) - need more information on study. For example, sampling intensity/number of site measurements per slough or criteria for how they will be determined. Will ground water level monitors be installed if so, what is the sampling intensity (numbers per habitat type) and duration of monitoring (e.g. continuous year-round/ point samples during field visits, etc.). If not, it is strongly recommended groundwater monitoring be performed concurrently with water quality monitoring in this study.
- Any monitors should be calibrated pre- and post-monitoring along with multiple field measurements for post monitoring calibration.

APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION

SECTION 6 – GEOMORPHOLOGY

NPS Preliminary Comments on Proposed Study Plans for Susitna-Watana Project

These informal comments focus on the three recreation-related study plans released by AEA on July 15th 2012, i.e., the Recreation Resources, Aesthetics Resources, and Recreational Boating/River Access study plans.

Overall Comments

Common to all three PSP's:

- **Gap Analyses/PAD:** Contrary to the opening language of the three PSP's, the Gap Analyses for Recreation and Aesthetics Resources were not included in the PAD and were made available only after numerous complaints from NPS, other agencies, and stakeholders shortly before our original comments on the PAD and study requests were due.
- **Disciplinary/Study Interdependencies:** NPS and others have repeatedly requested AEA to develop a schedule that ensures coordination between the numerous interdependent resource studies associated with the Watana project. Of particular interest to NPS are the recreation and aesthetics studies, which are dependent on the results of other biophysical resource studies such as the hydrology, instream flow, fluvial geomorphology, ice processes, fisheries and game studies. Despite these requests, the July 2012 PSPs make only vague references to the issue. There remains no visible sign that this coordination is being conducted at a project-wide, discipline-wide level. For example, none of the tables depicting the various study schedules includes any reference to when the results of the "input" studies will be available, or how the dependent studies might be modified if these input studies reveal and need to change the dependent studies' substantive, temporal or geographic scopes.

Critical Path Method or some comparable project management mechanism should be a key element of this project, especially with some 58 studies in play, many occurring concurrently. There should be a transparent process for tracking the critical milestones and progress of the PSP's with the interdependencies identified in each study plan. A summary of the overall critical path schedule should be included as a separate plan, and made available on the project website for the stakeholders to access.

- **Availability of 2012 Study results and schedule:** According to the current published schedule, comments on the July 2012 PSP's are due on 10/15/12; AEA files revised PSP's on 11/14/12; comments on the revised PSP's are due on 11/29/12; and FERC will make final determination on study plans on 12/14/12. This schedule means that agencies and stakeholders will not have the results of critical 2012 reconnaissance and baselining studies that are key to determining the scope and adequacy of the 2013-14 ILP studies before our final opportunity to comment on the ILP studies. We are being asked to take the Applicant's word that if the results of 2012 studies indicate a need to modify the ILP studies, such modifications will be made voluntarily.

- **Socioeconomics** – NPS maintains that the metrics and analyses regarding the socioeconomic costs and benefits of the project should extend beyond the estimated value of increased recreation and tourism. We recognize that it is less straightforward to determine some non-market values, e.g. ecosystem services and existence values, than it is to estimate the future value of commercial tourism in the project area. That does not mean that these non-market values are zero, however. NPS continues to assert that a full accounting of all project-related impacts on the social environment must include an estimate of these values. While it will of course be up to FERC to decide how reliable the various economic value estimates are (just as the uncertainty associated with the future value of energy production v. project construction and operation costs must be accounted for), and thus to determine much weight to give the various types of estimated socioeconomic values in its “equal consideration” analysis, nowhere does the FPA as amended by ECPA instruct FERC or license applicants to ignore such values outright, especially in light of emerging valuation methodology.

With respect to Benefits Transfer methodology, this method is most reliable when the reference and study sites and projects are very similar, and when the economic impact valuation study at the reference site was performed at the highest standard. Given the dearth of large original hydropower projects licensed on free-flowing rivers in remote locations in recent decades, NPS believes it will be challenging to identify an appropriate reference project for Watana. Just as with ecosystem services valuation methods, there will be numerous assumptions and approximations associated with application of the benefits transfer method to this project. In contrast to the lack of appropriate reference sites for a benefits transfer analysis, however, the value of ecosystem services – including services associated with the Susitna River -- is currently being studied with some rigor in Mat-Su Borough.

From the “Socioeconomic and Transportation Study, Regional Economic Evaluation Study,” p. 263 of the PSP document:

“The economic impact of the Project on local tourism establishments (e.g., river sport fishing, whitewater boating) and the regional economy will be estimated using the results of the Recreation and Aesthetics study. Calculations will be based on information obtained from the recreation survey, including the estimated recreation-related expenditures per recreational day or trip and changes in the number of days or trips per year. The regional economic impact of changes in subsistence-related expenditures due to the proposed Project will be estimated using the results of the Subsistence study. Approximate cash expenses to generate each pound of subsistence harvest will be based on published information (Goldsmith 1998).

In addition, the benefits transfer approach will be used to supplement or compare unit values (e.g., value per-day of sport fishing) for recreational goods and services obtained from primary valuation methods. Benefits transfer involves the application of unit value estimates, functions, data, and/or models from one or more previously conducted valuation studies to estimate benefits associated with the resource under consideration (Black et al. 1998). The basis of the method is the assumption that the recreational experience is enhanced by high quality sites (e.g., clean water, abundant recreational

fisheries), hence the net willingness to pay for, and hence the value of, recreational trips depends on site quality.

Different model specifications can be used to value specific qualities of the resource and attributes of the recreational experience. To value these types of amenities, economists typically rely on a variant of the basic travel cost model referred to as a discrete choice or random utility model. Whereas basic travel cost models are most appropriate in analyzing the number of trips people make to a site, random utility models can be used to assess how people choose between multiple sites based on the qualities of the sites. Travel cost approaches require data on site visitation, place of residence, substitute sites, and user characteristics (such as income) (Black et al. 1998). These data will be obtained from the recreation survey conducted for the Recreation and Aesthetics Study.”

The PSP for Socioeconomics appears to rely largely on results generated through the Recreation and Aesthetics Resources studies. Having not seen the survey instruments and protocol, we don't know how socioeconomic data will be gleaned from those surveys. We would like to participate in reviewing the proposed survey methodology, ideally before our ability to comment on the ILP study plans expires.

Section by Section Comments

10. RECREATION AND AESTHETIC RESOURCES

10.1. Introduction

The Alaska Energy Authority (AEA) proposes a Recreation Resources Study, a Recreational River Flow Study, and an Aesthetic Resources Study in order to document baseline conditions and help assess potential impacts on recreation and aesthetic resources from construction and operation of the proposed Susitna-Watana Project (Project). The proposed Recreation Resources Study has been prepared in consultation with agencies and licensing participants.

The Recreation Resources Study (Section 10.5) will research, describe, and quantify recreation demand and capacity of facilities, and assess reasonably foreseeable recreation needs associated with development of the proposed Susitna–Watana Hydroelectric Project.”

NPS – The study is focusing on recreational uses and demand rather than recreational opportunities and experiences. Need to be qualitative, not just quantitative, because experiences are likely to change post project. We are relying on the recreation surveys to tease out qualitative information (quality of experience, preferences, etc.). Without seeing the survey instruments and protocol, we don't have assurance that they will be able to characterize these.

10.5. Recreation Resources Study

10.5.1. General Description of the Proposed Study

The Recreation Resources Study is designed to identify recreation resources and activities that may be affected by the construction and operation of the proposed Susitna-Watana Project (Project), and to help assess the potential impacts of Project construction and operation on those resources and activities. The specific goals of the study are to:

- Identify and document recreation resources and facilities that support both commercial and non-commercial recreation in the Project area;
 - Identify the types and levels of current recreational uses and future reasonably foreseeable future uses based on surveys and interviews, consultation with licensing participants, regional and statewide plans, and other data;
 - Evaluate the potential impacts of Project construction and operation on recreation resources, needs, and uses in the Project area; and
 - Use the results of analyses to develop an RMP for the Project.
- **NPS: Incorporate the results of the 2012 studies**

10.5.2. Existing Information and Need for Additional Information

Existing information was compiled in the Recreation Data Gap Analysis (AEA 2011a) and recreation resource descriptions and inventory presented in AEA's Pre-application Document (PAD) (AEA 2011b).

NPS - This claim that existing info was compiled in Rec Data Gap analysis and included in PAD is incorrect. Note that the claim was repeated (cut and paste) in the two other rec/aesthetic studies. The PAD was filed in December 2011 but we did not receive AEA's "2011" gap analysis until March 2012, after much pleading. To our knowledge, the 2011 publication date for this document is inaccurate since it was not made public until 2012. There was no project-specific info in the PAD on rec and aesthetics, just a regurgitation of the scanty, methodologically primitive information developed for a different hydro project thirty years ago, at a time when FERC did not have to give equal consideration to these resource values in deciding whether to license a project.

A recreation study was initiated in 2012 to gather data to inform the 2013-2014 study plan, including the following elements:

- Interviews with key representatives of agencies and organizations, including Alaska Native entities knowledgeable about regional and state recreation management and issues
- A compilation of existing recreation inventory and capacity information
- An inventory of Project area access
- Incidental Observation Survey Data (completed by field crews)
- Coordination with other study disciplines and incorporation of data
- Geo-referenced mapping
- Field reconnaissance

- Identification of future trends and issues
- A description of the management framework

Available information from the 2012 data gathering efforts will be used to develop the Revised Study Plan.

NPS- Agencies and stakeholders will not have the results from the “2012 data gathering efforts” until they are reported out in 11/5/12. We will not be able to incorporate any comments on them by the 10/15 due date for our PSP comments. It is also unclear how much of this information AEA and its consultants will have far enough in advance of their 11/14 RSP deadline to help inform the revised plans.

10.5.3. Study Area

The Project area is shown in Figure 1.2-1. The study area includes the Susitna River watershed, focusing on recreation opportunities and use patterns in and around the immediate Project area.

10.5.4. Study Methods

Both water-based and land-based recreation uses and access will be analyzed. Seasonal uses that relate to ice and snow conditions will also be analyzed. Specialized study of river flow-dependent activities will also be conducted, as described in Section 10.7. The Recreation Resources Study is interdependent with analyses conducted in other disciplines, both biophysical (e.g., aquatics and hydrology) and social (e.g., transportation and socioeconomics), and systematic coordination of data with those study groups will be required.

NPS – with respect to interdependent analyses, and the reliance of the rec and aesthetics studies on results from other disciplines, there is no detail in this PSP explaining how the timing will work. The schedule table at end of each PSP with study seasons and deliverables does not mention this, either. We need details of how the sequence will work. AEA can't just say it will happen when it does not appear that the results of other studies will be available before the delivery date for this one.

Methods for the components of the proposed Recreation Resources Study Plan for 2013-14 are described below.

Regional Recreation Analysis

NPS – This study plan should note, early-on, the distinction with subsistence hunting and fishing v. sport activities. May be confusing to some stakeholders and readers as the process goes on.

The regional recreation resources context will be defined in coordination with agencies, technical workgroups, and other participants, including Alaska Native entities. Regional and local data related to recreation use will be collected and analyzed, including examination of various land management regimes within the area. Existing resource management plans relevant to the recreational resources of the study area will be reviewed and compiled. The analysis will be

conducted in accordance with existing and proposed community and regional plans, and private sector plans. Plans that will be incorporated include:

NPS - "Existing resource management plans . . . will be reviewed and compiled." Isn't this being done in 2012?

- Alaska's Outdoor Legacy Statewide Comprehensive Outdoor Recreation Plan (SCORP) 2009–2014 (Alaska Department of Natural Resources [ADNR] 2009)
- Alaska Recreational Trails Plan (ADNR 2000)
- Chase Comprehensive Plan (MSB 1993)
- Cultural Resource Management Plan for the Denali Highway Lands (VanderHoek 2005)
- Denali State Park Management Plan (Alaska Division of Parks and Outdoor Recreation [DPOR] 2006)
- DPOR Ten Year Strategic Plan 2007–2017 (DPOR 2007)
- East Alaska Resource Management Plan (Bureau of Land Management [BLM] 2006)
- MSB Comprehensive Development Plan (MSB 2005)
- MSB Trails Plan (MSB 2008)
- MSB Comprehensive Economic Development Strategy (TIP Strategies Inc. 2010)
- MSB Parks and Recreation Open Space Plan (MSB 2000)
- South Denali Implementation Plan and Environmental Impact Statement (National Park Service [NPS] 2006)
- Susitna Area Plan (ADNR 1985)
- Susitna Basin Recreation Rivers Management Plan (ADNR 1991)
- Susitna Matanuska Area Plan (ADNR 2011)
- Talkeetna Comprehensive Plan (MSB 1999)

NPS - 2012 info will be used to develop RSP. Will we see this prior to the 10/15 due date for our PSP comments? If not, how will agencies and the public ensure that the 2012 data is applied correctly? Timing problem points to larger problem of trying to finalize study plans for a project before reconnaissance level work is complete. This applies to two other PSPs (Aesthetics and Instream Recreation), too.

Trails leading into and within the Project area will be identified using aerial imagery. These include multiple formal and informal trails and routes, several formally identified Revised Statute (RS) 2477 trails, and Alaska Native Claims Settlement Act (ANCSA) 17(b) trails. The trails will then be mapped, and "ground-truthed." This will identify trails that have historical use, and are legal under State "generally allowed uses," but have not been named or identified by ADNR. Management responsibilities for 17(b) easement trails will also be clarified wherever possible.

Recreation Activity Areas (per SCORP planning) and the Recreation Opportunity Spectrum (USFS 1979) “primitive” class will also be described as they relate to the study area. Scenic Byways, Wild and Scenic Rivers (WSR), and other special resource use designations will be identified and described. There are two river segments within the Project area that have been identified by BLM as eligible for inclusion into the WSR System: Brushkana Creek and the portion of the Susitna River from the headwaters to the confluence of Kosina Creek. BLM has stated that they will conduct a suitability determination for these eligible river segments (Social Sciences Technical Workgroup Meeting, April 3, 2012). The George Parks Highway between MP 132 and 248 is designated as an Alaska State Scenic Byway (ADOT&PF 2008; 2012).

Recreation Use and Demand

Currently, the recreation uses of the Project area are widely dispersed. Visitors to the area participate in a wide variety of activities; including sport hunting, sport fishing, recreational boating, skiing, snowshoeing, and snow-machining. The amount, extent, and potential impact of Project-related dispersed recreation use on the proposed Project area’s land and water resources is currently unquantified.

A baseline of developed and dispersed recreation uses, including types, levels, and access will be determined and described. High use locations will be identified by activity, along with daytime and overnight visits, and seasonal patterns. User preferences and opinions about the quality of recreation resources will also be described. Data will be collected through a literature review and a comprehensive survey and interview program. Salient existing data will also be incorporated.

Future recreation demand will be estimated, based on socioeconomic indicators, foreseeable non-Project recreation developments, and identified issues and trends. Effects of the Project features (e.g., reservoir and access roads) on hunting and trapping opportunities and on non-consumptive uses (bird-watching, hiking, camping, boating, etc.) in the vicinity and downstream of the proposed Project reservoir will be assessed. Additionally, the recreation effects of any Project-induced changes in ice formation the Susitna River will be evaluated. There are also potential effects of induced recreation along the Denali Highway and downstream from the Susitna River bridge on the Denali Highway to the proposed Watana Reservoir. The effects of Project construction and operational activities (e.g. noise, dust, limitations on access, and recreation activities of construction workers) on recreation will also be analyzed. Recreation demand within the study will be estimated within the study area in the reasonably foreseeable future.

NPS – AEA needs to analyze effects of project operations, not just “features.” Nowhere in the PSP is it explicitly acknowledged that the project may have effects on things like fish abundance (affecting sportfishing opportunities), moose, caribou, waterfowl and upland game bird populations due to migration barriers and alteration of habitat due to altered fluvial morphology and riparian vegetation.

Survey results and an inventory of current and projected recreation opportunities, commercial services, and facilities will inform the Socioeconomic Resource Study in regard to the economic contribution of recreation in the study area.

NPS - Socioeconomic study needs to determine value of rec., not just contribution to local economy. This value includes “consumers” outside the local market. AEA needs to expand their inquiry into alternative socioeconomic methods and models beyond “Benefits Transfer”. Also see our comment under “Overall Comments.”

Recreation Carrying Capacity

There are no existing developed recreation facilities on the Susitna River at the Watana Dam site. In the broader Project area, both public and private recreation facilities exist. These are primarily located along the road system.

The existing physical carrying capacity of recreation resources in the Project area will be estimated. Public facilities will be inventoried and described as to condition, capacity, adequacy and operational cost. Private facilities will also be inventoried to the extent practicable. Public access to recreation sites will also be described, including Americans with Disabilities Act (ADA) compliance, if appropriate.

NPS –Physical carrying capacity is just one of the four elements of “carrying capacity” (physical, ecological, social, and spatial). The area’s physical capacity may or may not be the most limiting, especially if the project results in greater access, which could cause use to exceed the area’s social carrying capacity. This is one reason why it’s so important to study the experiential aspect of pre- and post-project recreational use. On rivers in particular, social capacity is almost always more sensitive than other aspects of capacity, with concerns about group size and encounter rates; competition for space at put-ins, take-outs and campsites; and crowding at fishing holes, play boating features, etc.

The need for and capacity of additional reasonably foreseeable recreational facilities will be forecast. Carrying capacity guidelines and standards will be applied in order to develop recommendations for future recreation facilities and sites.

Data Collection

The collection of recreation user data will be accomplished through multiple survey processes. The study design will describe target respondents, geographic locations, target days and months, and questionnaire content; survey methods, in the context of consultation with agencies, workgroups, Alaska Natives, and others. Survey instruments will be designed to collect information typical of and compatible with other FERC efforts. This includes the survey conducted for the 1985 studies (Harza-Ebasco 1985b) and other surveys such as the SCORP (DNR 2009) and the Alaska Visitor Statistic Program (AVSP) (McDowell 2012).

Identification and Analysis of Salient Data from Existing Survey Research

Recreation supply and demand data from other recreation planning sources applicable to the region will be synthesized. Existing data can inform estimates of levels (e.g., “recreation days”) and types of participation in recreation uses. The estimates will include a discussion and comparison of participation rates in activities regionally, statewide, and nationally. Recreation trends, as forecast in other studies, will also be described.

NPS – The existing survey research appears to be biased towards “industrial tourism.” This is not the only population that uses the project area. This analysis needs to capture use by independent tourists, e.g. people driving up the AK Highway and on to Denali Hwy., and local (unguided AK resident) users, many of whom are able to access the area without relying on air taxis or heli boat charters.

The AVSP Survey (McDowell 2012) is a statewide research program commissioned by the Alaska Department of Commerce, Community and Economic Development that included 6,747 visitors to Alaska in the summer of 2011 and 1,361 visitors in the Fall/Winter 2011/2012. The SCORP (ADNR 2009) survey database will also be used quantify recreation uses and demand. In addition, Alaska Travel Industry Association research (GMA 2011) about nonresident travel to Alaska will be reviewed and summarized as it pertains to recreation and aesthetic appeal of Alaska’s visitor market. NPS– Excludes the Spring season

These data will be utilized to describe year-round nonresident (non-Alaskan) experiences by visitors in three major communities in the MSB (Palmer, Wasilla, and Talkeetna), passengers on the Alaska Railroad, and cruise passengers (visiting McKinley Princess Lodge).

The existing data include

- Lodging types
- Activities
- Length of stay
- Purpose of trip
- Previous travel to Alaska
- Modes of transportation used within the State
- Trip spending
- Communities visited (overall and overnight)
- Demographics (origin, age, income, party size)

This nonresident data will be evaluated along with existing data relating to recreation use by Alaska Resident, in the context of the overall study plan.

Incidental Observation Survey

The purpose of the incidental observation survey is to capture information from field researchers about dispersed recreational use. The survey will gather information on the date and time of day the activity was observed, the type of activity observed, number of people recreating, and the location of observed activity. This survey will not have statistical value, but will help identify types of recreational use in the study area. A protocol will accompany the survey to inform field crews how to complete and submit the survey. The survey will be used throughout the study.

Telephone Surveys of Railbelt Residents

The purpose of this survey is to interview a sample of residents about their recreation use in the area and to collect perspectives about recreational opportunities. The survey will be administered to a statistical sample of 600-900 randomly-selected Railbelt residents within a four-hour drive of the study area (Fairbanks, Denali Borough, Mat-Su Borough, and Anchorage). This survey will be central to the estimation of resident recreation demand. The SCORP survey instrument will be reviewed for any benchmark questions to be considered in the survey design. The overall sample size will be refined after considering desired subgroup samples.

NPS – We believe that the Phone survey has very little value. Given the sample size, very few subjects are likely to be familiar with the project area, and the SCORP questions are too general to yield useful information about the specific kinds of recreational opportunities in the area (SCORPs for states as large and geographically diverse as AK are a problem in and of themselves). Instead we suggest the resources be focused on “executive interviews” -- use snowball sampling method to find actual users of this area and others like it. Expecting great cooperation from vendors and outfitters, who are being asked to take the time and effort to hand over private info on “actual users,” may also be difficult. This underscores our need to review the survey instruments and protocols ASAP. Even though the project is unique, such survey templates are fairly standard and should already have been developed and disseminated to agencies and stakeholders.

The survey instrument design will capture

- Past and current recreation use within the study area
- Year-round seasonal, and day/night recreation use in the study area
- Nature of use or recreational interest, including, but not limited to, fishing, boating, camping, picnicking, hiking, off-roading, snowmachining, snowshoeing, skiing, horseback riding, biking, rock/ice climbing, dogsledding, photography, mushroom/berry picking, scenic touring, wildlife viewing, and hunting
- Guided or unguided uses
- Recreation preferences (such as pristine, primitive, semi-primitive, or developed)
- Expected future recreation use within the study area, including how use may change with Project development and operational alternatives
- Means of access to the study area
- Quality of the recreational opportunity
- Importance of and satisfaction with current recreation facilities (such as boat launches and trails)
- Attractiveness of the study area for recreational activities
- Accessibility and conditions/availability
- Visual quality of the scenery in the study area
- Distance that users are willing to travel for weekend recreational opportunities

- Demographics of household and respondents.

Questions that elicit information central to related disciplines, such as the Regional Economic Evaluation Study, may also be included.

Intercept Surveys and Structured Observation Visitor Counts

The purpose of these surveys would be to capture specific recreation use data from users accessing the area by boat, rail, air, snowmachine, or other modes. The survey would be conducted in person based on a sampling plan that captures peak seasonal uses.

Access points may include, but are not limited to, boat launches (e.g., Susitna Landing, Willow Creek, Talkeetna, Deshka Landing), railroad whistle stops, trail heads (e.g., East-West snowmachine trail head on the Parks Highway, along the Denali Highway), air strips, and campgrounds (e.g., Brushkana Creek).

NPS - Where is the detail on this and other methods? Again, we need to be developing instruments now, or at least deciding when they will be developed (prior to our last chance to comment in mid-Oct.).

The survey instrument design would capture, but would not be limited to

- Number in party and demographics
- Community of residence
- Participation in type and location of recreation activity
- Rating of quality of recreation experience
- Level of satisfaction with facilities/recreation activities, including aesthetics
- Guided or unguided use
- Past use and intention for future use
- Trip expenses
- Means of access to the recreation area
- Accessibility, conditions, and availability
- Other opportunities within same distance that offers similar experiences
- Preferences
- Interest in potential new recreation facilities and opportunities.

On sample days, the survey crews will observe key characteristics of recreation use (e.g., the number of people present, the number of vehicles entering/exiting the access site, types of recreation activities evident) and record this information on pre-printed forms. Users to be surveyed in person will be selected by availability and willingness to participate.

Executive Interviews

The purpose of the executive interviews is to gather specific information about commercial (e.g., guides, tours, etc.) and private recreation use the study area. It is anticipated that between 50 and 70 private sector recreation businesses, associations, and other entities will be interviewed. These interviews will be conducted by telephone. The executive interview process will be necessary to develop trust with businesses and organizations with recreation-related interests in the study area, in order to collect proprietary economic data for use in the Regional Economic Evaluation Study. The process of developing a list of potential respondents includes the identification of organizations, associations, government agencies, and businesses with recreation-related interests in study area. This list will be developed through existing and referred contacts, internet searches, and interviews. Contacts may include, but will not be limited to

- Mat-Su Borough Convention and Visitors Bureau
- Federal Agencies, such as BLM, NPS, etc.
- State Agencies, such as DNR, Alaska Department of Fish and Game (ADF&G), etc.
- Alaska Railroad
- Regional governments
- ANCSA corporations and tribal organizations
- Community councils
- Alaska Outdoor Council and other recreation organizations
- Alaska Outdoors Bulletin Board
- Citizen groups
- Environmental organizations

Business representatives to be interviewed may include those associated with

- Remote lodges/cabin rentals/accommodations/campgrounds
- Restaurants
- Airstrips and flying services/flightseeing
- Guide services
- Whitewater rafting/boat trips
- Tour operators (all modes)
- Recreational mining operations
- Transportation services, including buses and Alaska Railroad

The interview protocol (guide) may include, but is not limited to the following topics:

- Nature of business/service (e.g., guide, tour operator, accommodations, etc.)
- Employment

- Season of operation (e.g., year-round, summer, winter, hunting, etc.)
- Means of access to destination (e.g., fly-in, boat, road, etc.)
- Specific areas of operation within the study area
- Years of operation
- Estimated number of clients per year
- Client/membership information, including origin, party size, general perceptions of age, or other demographic features
- Fees charged
- Ways that use might change under the various operational alternatives identified and potential impacts on area image, fishing, hunting, and other recreation activities
- Past and current plans, programs, business operations, membership, activity, etc.
- Geographic areas of highest recreational interest (and reasons why)
- Recreation infrastructure used or needed
- Identification of any trends (anecdotal and data sources) in recreational use levels or patterns
- Information about other projects proposed in the study area that could directly or indirectly affect recreation, tourism, or access to the previously inaccessible areas
- Suggestions for prioritizing the highest potential recreation demand in the area
- Other data needed for socioeconomic baseline or other social science research

GIS Maps and Figures

Recreational sites, facilities, and access routes (RS 2477 rights-of-way, 17(b) easements, and other recreation use trails) will be identified and digitized in a GIS using existing agency and licensing participant datasets and aerial photography. These recreation features will be “groundtruthed” (via ground- and air-based observations) and geo-referenced where possible.

Focus group interviews, discussions with licensing participants, coordination with other resource study disciplines, and user intercept surveys will augment recreation facilities and trails mapping. Significant recreation facilities and access points will be photographed for inclusion in the Recreation Resources Report.

10.5.5. Consistency with Generally Accepted Scientific Practice

The methods and work efforts outlined in this Study Plan are the same or consistent with analyses used by applicants and licensees and relied upon by the Commission in other hydroelectric licensing proceedings. The proposed methodology for analysis for demand and capacity estimates and survey sampling are commonly employed in the development of hydroelectric project license applications.

10.5.6. Schedule

Upon approval for implementation, it is estimated that the term of the study would be approximately two years.

Table 10.5-1. Recreation Resources Study Schedule. Description Start Date Completion Date

Data Collection (including seasonal field visits and surveys)	January 2013	November 2014
Inventory	January 2013	October 2014
Analysis	November 2013	November 2014
Initial Study Report		December 2013
Updated Study Report		December 2014

NPS - Only one December (2013) will be sampled. There is no "wobble room" should weather or other conditions render the limited sample seasons inadequate to represent actual project area conditions. There is no mention of when results of other studies – ice, morphology, fish and game populations, etc. – will be in hand, and how these results will be incorporated in the rec study report. See our comment under Overall Comments regarding interdependent studies.

10.5.7. Level of Effort and Cost

The estimate of the two-year recreation study is \$570,000.

10.5.8. Literature Cited

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10.6. Aesthetics Resources Study

10.6.1. General Description of the Proposed Study

The goals and objectives for the Aesthetic Resources Study are to inventory and document baseline aesthetic (e.g., visual, auditory) conditions in the Project area and evaluate the potential effects on aesthetic resources, beneficial or adverse, that may result from construction and operation of the proposed Project.

10.6.2. Existing Information and Need for Additional Information

Existing information was compiled in the Recreation Data Gap Analysis (AEA 2011a) and recreation resource descriptions and inventory presented in AEA's Pre-application Document (PAD) (AEA 2011b). A recreation study was initiated in 2012 to gather data to inform the 2013-2014 study plan, including the following elements:

NPS - There was no aesthetics inventory, as would be understood by that term in 2011-12 as opposed to 1984, in the PAD – nor a gap analysis.

- Interviews with key representatives of agencies and organizations, including Alaska Native entities, knowledgeable about regional and state recreation management and issues
- A compilation of existing recreation inventory and capacity information
- An inventory of Project area access
- Incidental Observation Survey Data (completed by field crews)
- Coordination with other study disciplines and incorporation of data
- Geo-referenced mapping
- Field reconnaissance
- Identification of future trends and issues
- A description of the management framework
- Interviews with key representatives of agencies and organizations
- Assessment of management frameworks for pertinent agencies
- Identification of broad Project area viewsheds and preliminary KOPs using those identified in the 1985 license application
- Photography
- Field reconnaissance
- Description of Project area soundscape

Through the prior processes, the FERC scoping process and incorporation of work group and other licensing participant recommendations, study methods for 2013-2014 were developed. Issues, trends, original data collection strategies, and items for detailed analysis are incorporated into the 2013-2014 Study Plan.

NPS - "Through the prior processes, the FERC scoping process . . . study methods for 2013-14 **were developed** [emphasis added]" This is incorrect, they are **still being developed!** We find this very strange language to include in a *proposed* study plan. NPS has in fact had little time and opportunity to see products and engage consultants so far, so it is extremely premature to claim this as *fait accompli*.

10.6.3. Study Area

The overall Project area is shown in Figure 1.2-1. The specific study area for Aesthetic Resources will be developed as part of the analysis and in coordination with information from other disciplines, such as hydrology. It will be based on a viewshed model of proposed Project features, including the dam structure, transmission and road corridors, and the resulting Watana reservoir. The study area will also include portions of the Susitna River located downstream of the Watana Dam site down to Talkeetna.

NPS – As NPS and other agencies have noted, deciding to limit the downstream scope of this and other studies to Talkeetna is **totally unfounded**. Until we get the results of the instream flow, ice, fluvial geomorphology, fish, and other studies, no one can say how far downstream the project's measurable effects on visual and auditory resources will go. For example, as previously noted by numerous commenters numerous times, the project's proposed, artificially high and variable winter load following flows are highly likely to alter the formation of stable ice on the Susitna far downstream of the project. Spring flushing flows and sediment transport may be largely eliminated, and summer flows will be very low, in all probability leading to major changes in the formation and maintenance of islands, sloughs, side channels, beaches, and riparian vegetation. Again, no one yet knows how far downstream of the Talkeetna and Chulitna confluence these major changes will be evident. All of these altered features will be visible. NPS vehemently disagrees about this premature decision, which contradicts statements elsewhere in this and other PSPs acknowledging the need to rely on the results of other studies. We will not have these results prior to 10/15, when NPS comments must be finalized, or 12/14, when FERC's determination on SPs will be made.

10.6.4. Study Methods

The visual resource impact analysis will follow methods developed by the BLM (BLM 1986). Specific methodology will be augmented with relevant portions of the USFS Visual Management System (VMS) / Scenery Management System (SMS) (USFS 1995) methods, as consideration of this approach will be an important aspect of bridging data collected during the 1985 PAD

(Harza-Ebasco 1985) and that collected during the current study effort. It is also expected that the Visual Sensitivity Analysis will be expanded beyond what is used by the BLM at the planning level to incorporate surveys, focus groups, and information collected through the scoping process. Data collection and analysis will be completed across all four seasons. The Aesthetic Resources Study is interdependent with analyses conducted in other disciplines, both biophysical (e.g., hydrology) and social (e.g., transportation), and coordination of data with other study groups will be significant.

NPS – Again, this acknowledges interdependency of this study on results of other studies, but provides no detail on timing of those deliverables and proposed schedule for finalizing details of this. See also our comments under “Overall Comments.”

Define Study Area

The preliminary study area identified as part of the 2012 work will be refined based on updated Project design and siting. The viewshed will be generated for all Project features, including roads and transmission lines, and refined in coordination with federal, state, and local agencies. The study area will be sufficient in size to address all established indicators of change, including potential indirect effects to recreation, cultural resources, subsistence, and socioeconomics. It is expected that this area will include the Susitna River drainage and upland areas where views of the basin are expected to change based on construction and/or operation of the proposed Project. Viewshed models will be developed for pre-and post-Project conditions to depict expected changes in viewshed areas (i.e., creation of new views, loss of others). The study area will also include common air transportation routes used for transportation and recreational air tours. Maps displaying the viewsheds and geographic boundary of the analysis area will be created. Important views and vistas identified through other resource reviews will be identified and placed on the viewshed map.

Establish Key Observation Points

A final list of KOPs will be developed using information from the 1985 license application (Harza-Ebasco 1985), field observations in 2012, ongoing interdisciplinary/interagency coordination, and Project scoping. It is expected that KOPs will differ by landscape analysis factors, such as their distance from the Project, predominant angle of observation, dominant use (i.e., recreation or travel), and average travel speed at which the Project could be viewed. KOPs may represent views experienced across all seasons or may be specific to a particular season.

NPS - KOPs – Do NPS, other resource agencies and stakeholders get a say on these? When? This is supposed to be The Plan, not a plan to plan.

Baseline Data Collection

Field data collection will include a combination of site visits by helicopter and travel of upstream segments of the Susitna River by boat. Additional information describing access, existing lighting, and movement will be recorded. Baseline photography will be collected at a resolution sufficient for use in computer-generated visual simulations.

Data on existing aesthetic resource values will be collected using the BLM's Visual Resource Inventory (VRI) methodology (BLM 1986). Data collection efforts will include an inventory of scenic quality, visual sensitivity, and distance zones within the Study Area. All areas will be evaluated within the context of viewer experiences. For example, views from roadways or from the perspective of a boater traveling downriver will be established as "linear" or "roving" KOPs. Data collection methods are described below.

Scenic Quality

Scenic quality of the Project area will be determined through the VRI process (BLM 1986). This process entails dividing the landscape into Scenic Quality Rating Units (SQRUs) based on conspicuous changes in physiography or land use and ranking scenic quality within each SQRU based on the assessment of seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modification. Each key factor is scored, and the value of each is added to derive an overall score for the unit. Based on these results, each SQRU is assigned a scenic quality rating of A, B, or C, with A representing the highest scenic quality and C representing the lowest scenic quality.

Visual Sensitivity

Viewer sensitivity will be classified using the BLM Visual Sensitivity Level Analysis (SLA) (BLM 1986). The SLA will be completed in two steps: (1) delineation of Sensitivity Level Rating Units (SLRUs), and (2) rating visual sensitivity within each SLRU. By definition, SLRUs represent a geographic area where public sensitivity to change of the visual resources is shared amongst constituents. The unit boundaries may be defined by a single factor driving the sensitivity consideration, or factors driving sensitivity may extend across numerous SLRUs. Units are thus derived, in part, by the consideration of factors analyzed in the SLA. Visual sensitivity within each SLRU is estimated as high, medium, or low, based on the types of users, amount of use, public interest, adjacent land use, and land use designations. Information required for this analysis will be obtained through land use plan review, data collected by other resource disciplines, and surveys and/or focus groups. The data collected through surveys and focus groups will be coordinated with the set conducted for the Recreation Resources Study. Respondents will be asked about their place-based visual preferences.

Visual Distance Zones

Distance zones represent the distance from which the landscape is most commonly viewed. These zones will be established by buffering common travel routes and viewer locations at distances of 3 miles, 5 miles, and 15 miles using GIS (BLM 1986).

NPS - There is no mention of assessing the aesthetics of varying flows. This is a high volume glacial river flowing at up to 25 mph – the sight and sound of its flows, color of its water, mixing at clear water tributaries are major components of river-related recreation. Need to do this at KOPs along the river, in all seasons, using videography (sound). Need to add to Sound analysis, too.

Photo Simulations

To support the visual resource impact analysis and to disclose expected visibility of Project components from various vantage points, photo simulations will be prepared. Simulations will be produced by rendering Project components (turbines, substations, access roads, etc.) with 3-dimensional (3D) computer models and superimposing these images onto photographs taken from KOPs. Model parameters will account for environmental factors, such as seasons, viewing angle, and light conditions, resulting in an accurate virtual representation of the appearance of the proposed Project. Simulations will be produced to illustrate (1) the structure, (2) downriver landscape characteristics, (3) reservoir landscape characteristics, (4) access roads and transmission lines, (5) views of reservoir from upland areas, and (6) views of potential construction-related impacts. Additional simulations and/or videography will be produced as needed in key areas. Simulations will be completed by seasons and under daylight and nighttime conditions.

Visual Resources Analysis

BLM contrast rating procedures will be used (BLM 1986). The visual resource impact analysis focuses on established indicators of change. Indicators will include, but will not be limited to, the following:

- Impacts to visual resources, measured by the degree of visual contrast created by the Project
 - Change in existing VRI values of scenic quality, visual sensitivity, and distance zones
 - Introduction of new sources of light and glare
 - Change in the viewshed area, including both the elimination and creation of views and vistas
 - Change in the mechanism of view (e.g., transition from mobile view traveling downriver to a static view when situated on the reservoir)
 - Change in visibility that may result from Project-related dust
- Methodology used to address each indicator is described below.

Contrast Rating Analysis

The BLM Contrast Rating procedure will be used to determine visual contrast that may result from the construction and operation of the Project based on photo simulations depicting Project features. This method assumes that the extent to which the Project results in adverse effects to visual resources is a function of the visual contrast between the Project and the existing landscape character. Impact determinations will be based on the identified level of contrast and are not a measure of the overall attractiveness of the Project (BLM 1986).

At each KOP, Project features will be evaluated using photo simulations and described using the same basic elements of form, line, color, and texture used during the baseline evaluation. The level of perceived contrast between the proposed Project and the existing landscape will be classified using the following definitions:

- None: The element contrast is not visible or perceived.
- Weak: The element contrast can be seen but does not attract attention.
- Moderate: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- Strong: The element contrast demands attention, would not be overlooked, and is dominant in the landscape.

The level of contrast will be assessed for all Project components used during construction, operations and maintenance, and decommissioning of the proposed Project.

Visual Resource Inventory Analysis

The VRI analysis will be used to identify expected change to VRI classes based on changes to the visual resource values of scenic quality, visual sensitivity, and/or distance zones that may result from operation of the proposed Project. This analysis will be completed within the framework study area, with the goal of understanding how visual resource values and resulting VRI class may shift based on operation of the proposed Project (including the dam, access roads, and transmission lines). Impacts to VRI components will be evaluated by ranking each key factor used to classify scenic quality, visual sensitivity, and distance zones under operational conditions, and comparing those values to that determined through the established pre-Project VRI.

Light and Glare

The impact analysis for light and glare will focus on potential impacts that may result from nighttime artificial lighting and/or daytime glare. The analysis of artificial lighting will identify potential impacts to human activity at nearby off-site locations that may result from the proposed Project. Photo simulations will be produced to demonstrate views of the proposed Project at night from selected KOPs.

Change in Viewshed Area and Mechanism of View

Viewshed analysis performed for both pre- and post-Project conditions will be compared to identify the changes in viewshed and mechanism of view. These data will quantify the extent of changes in views, and the degree to which access to views changes with the development of roads and the elevation of the viewer within the inundated portions of the reservoir.

Change in Visibility

Data generated by the Air Quality Resource discipline will be used to determine the potential for changes in visibility that may result from construction and/or operation of the proposed Project and related recreation resource values. Results from the air quality dust analysis will be incorporated in this study.

Sound Analysis

A systematic sound study will be conducted to characterize the existing ambient sound environment in the vicinity of the proposed Project and estimate the potential impact associated with construction and operational activities.

The steps in the sound analysis are described below.

Review Documentation and Develop Data Needs

Relevant Project data will be reviewed, including the most current Project description, operating and construction equipment rosters, construction schedules. Ambient sound data recorded in the area or in a similar area will be obtained. Based upon this review, itemized data requirements will be developed that would be needed to perform predictive sound emission modeling. Based on this review a set of outdoor ambient sound level surveys in the vicinity of the Project area will be obtained. The data requirements will include anticipated categories of stationary and mobile construction equipment and their frequency of operation, locations of nearest representative noise-sensitive receivers (NSR), recreation sites (RS), and sound data or specifications associated with intended operating dam systems and processes. Laws, ordinances, regulations, and standards that may influence the sound impact assessment for this study will also be inventoried.

Seasonal Surveys of Ambient Sound Levels

Ambient sound level measurements will be collected in the Project vicinity. These will include unattended long-term ([LT]”, a minimum of 24 continuous hours, up to a single week) sound level monitoring at up to a total of four representative NSR or RS locations and up to a total of 16 attended short-term ([ST], e.g., 15-20 minutes duration each) daytime and nighttime sound measurements to help characterize the affected environment. Observations of perceived and identifiable sources of sound contributing to the ambient sound environment and the conditions during which they occur will be documented as part of the field survey. This survey will be conducted up to four times, associated with up to four distinct seasons (e.g., summer, fall, winter, spring) but for a minimum of two seasons consistent with NPS Natural Sounds Program (NSP) published guidelines (NPS 2012). To the extent practicable, the survey locations will be the same for each surveyed season.

NPS - When do we decide where the four LT and 16 ST locations will be? What if we think there should be more? Again, need to agree about this prior to 10/15/12. NPS would like to have enough advance detail to involve our Soundscapes staff in reviewing this methodology.

Modeling of Project Sound Levels.

Up to three scenarios or alternatives of future Project operational sound levels will be estimated with System for the Prediction of Acoustic Detectability (SPreAD). Computer Aided Noise Abatement (CADNA/A), an industry-accepted outdoor sound propagation modeling program, could also be used (Sound Advice Acoustics Ltd, 2012). Predicted sound level isopleths or

“sound contours” will be superimposed on suitable aerial photographs or maps of the Project vicinity and will include specific sound level prediction at selected measurement and/or assessment locations from the ambient sound field surveys of Task 2. Predicted sound emissions associated with both Project construction and operation using different transportation route options will also be assessed.

GIS Maps and Figures

Viewsheds, KOPs, and soundscapes will be mapped as GIS layers according to Project standards. Mapping will also identify relevant management standards within the study area. Significant visual features will be photographed for inclusion in the Aesthetic Resources Report. Visual simulations depicting the appearance of the proposed Project will be produced for a subset of KOPs, and used to inform the impact analysis.

10.6.5. Consistency with Generally Accepted Scientific Practice

The methods and work efforts outlined in this Study Plan are the same or consistent with analyses used by applicants and licensees and relied upon by the Commission in other hydroelectric licensing proceedings. The Aesthetics studies are based on the BLM’s visual resources methodology. The sound analysis is consistent with National Park Service Guidelines.

10.6.6. Schedule

Upon implementation, it is estimated that the term of the studies will be approximately two years.

Table 10.6-1. Aesthetic Resources Study Schedule. Description Start Date Completion Date Duration (months)

Description	Start Date	Completion Date	Duration (months)
Data Collection(including seasonal field visits and sound monitoring)	January 2013	November 2013	11
Inventory	January 2013	October 2013	10
Initial Study Report	October 2013	December 2013	3
Analysis	November 2013	March 2014	5
Updated Study Report	April 2014	December 2014	8

NPS - very short, and no work in any December. Initial study report is scheduled for 12/13 – will this allow integration of results of other biophysical studies?

10.6.7. Level of Effort and Cost

The estimate of \$500,000 includes the following components over two full years of study.

10.6.8. Literature Cited

AEA (Alaska Energy Authority). 2011a. Susitna-Watana Hydroelectric Project, Socioeconomic, Recreation, Air Quality and Transportation Data Gap Analysis. Prepared by HDR, Inc., Anchorage.

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- USDA Forest Service. (USFS) 1974. The Visual Management System. Agriculture Handbook Number 462.
- —. 1995. Landscape Aesthetics: A Handbook for Scenery Management.

10.7. Recreational Boating / River Access Study

NPS– Consider changing the title of this study to “Flow Dependent Recreation,” reflecting the broader affected activities beyond boating and fishing. The Study’s title and some initial statements about scope are contradictory. Study goal is not merely to contribute data concerning recreational boating and access – it is to look at all forms of flow-dependent rec. That would include activities like fishing that are affected by flows (e.g. if salmon disappear because no more spawning habitat, or if you can’t ski, mush, or snow machine the river anymore due to unstable ice) regardless of whether you’re doing it in a boat or from shore.

NPS - Aesthetics can be flow dependent (stillwater in res. v. free-flowing stream, lost sight and sound of whitewater at high flows in DC, morphological and vegetation changes downstream due to changed flow regime). There is no mention of this in this or the Aesthetics PSP.

NPS – There is also no mention of whether impacts on rec access and experiences due to changed ice and snow cover resulting from changed flow regime will be assessed under this PSP. It should be included.

10.7.1. General Description of the Proposed Study

This study incorporates and contributes to data and analysis conducted as part of the Recreation Resources Study (Section 10.5). In the overall recreation study, recreational boating uses and river access points will be identified. Current and future use of the river by both motorized and non-motorized boat users will also be estimated therein. Because the Project will affect river flow regimes, including the inundation of about 39 miles of the river, and because changes in river flow regimes may directly impact boating and other flow-dependent recreation activities, a specific methodology of recreational flow analysis is also proposed.

Study Goals and Objectives

- The goal of the Recreational Boating / River Access Study is to contribute data to the Recreation Resource Study concerning recreational boating and access. The goal and objective of the study is to contribute to the Recreation Resource Study concerning the relationship between river flows and recreation opportunities and uses, by:
 - developing flow preference curves for each major river reach by type of use and equipment; NPS: Doubt you can develop a preference curve for winter activities that require stable river ice. It will either be present or absent. What method will be used to assess this effect?
 - describing the potential effects of altered river flows on existing and potential boating activity and other recreational uses of the Susitna River; and
 - describing any new boating or other flow-dependent recreational opportunities that may be created by Project construction and operation.

10.7.2. Existing Information and Need for Additional Information

Existing information was compiled in the Recreation Data Gap Analysis (AEA 2011a) and recreation resource descriptions and inventory presented in AEA's Pre-application Document (PAD) (AEA 2011b). A recreation study was initiated in 2012 to gather data to inform the 2013-2014 study plan, including the following elements:

- Interviews with key representatives of agencies and organizations, including Alaska Native entities, knowledgeable about regional and state recreation management and issues
- A compilation of existing recreation inventory and capacity information
- An inventory of Project area access
- Incidental Observation Survey Data (completed by field crews)
- Coordination with other study disciplines and incorporation of data
- Geo-referenced mapping
- Field reconnaissance
- Identification of future trends and issues
- A description of the management framework
- compilation of existing baseline boating recreation information and access;
- hydrology data review;
- field reconnaissance and photography;
- identification of future trends and issues; and
- description of the management framework and special river designations.
- compilation of existing baseline boating recreation information and access;
- hydrology data review;
- field reconnaissance and photography;
- identification of future trends and issues; and
- description of the management framework and special river designations.

Available information from the 2012 data gathering efforts will be used to develop the Revised Study Plan.

Through the consultation events including the FERC scoping process and work group meetings, other licensing participant recommendations including input on study methods were used for development of the 2013-2014 study plans.

10.7.3. Study Area

The reaches of the Susitna River, shown in Figure 10.7-1, will be subdivided into smaller units as a result of physical studies in other disciplines and field observations conducted in the Recreational River Flow Study. Areas of concentration will include areas where the proposed reservoir would create the most flow changes.

NPS – We do not understand the statement: “areas where the proposed reservoir would create the most flow changes.” What is the threshold for “most”? Who decides? When? Even assuming consensus on the standard to be used, how can this decision be made before the results of the instream flow, flow routing, ice processes, etc. studies are in hand? What if we and others disagree with AEA’s geographic scope decision? This needs to be nailed down by 10/15/12.

The Recreation River Flow Study will focus on those reaches of the Susitna River directly affected by the Project. These include the section of river that would be inundated by the proposed reservoir, Devils Canyon, and the reach downstream of Devils Canyon to the confluence with the Talkeetna River.

NPS - Again, it is totally unfounded for AEA to arbitrarily stop at Talkeetna River. This contradicts prior commitments to rely on the results of other studies to inform impacts on recreation. Those studies will not be completed for several years.

10.7.4. Study Methods

The Recreation River Flow Study is interdependent with analyses conducted in other disciplines, especially physical (e.g., hydrology) and social (e.g., transportation), and input of data from those study groups will be significant.

This Study is designed to identify the minimum and optimum instream flow needed for motorized, non-motorized, and whitewater boating, as well as other flow-dependent recreational activities, on the Susitna River.

Using accepted practices for recreational flow study design, as described in Whittaker et al. (1993, 2005), a progressive sequence of levels of study will be undertaken. These include: Level 1, desktop analysis; Level 2, limited reconnaissance; and Level 3, intensive field studies. This process maximizes study efficiency by characterizing recreation activities for respective river segments in the desktop phase, confirming assessments in the reconnaissance phase, and then focusing intensive field studies to those activities and river segments warranting detailed study and analysis. This process also contributes to early identification of potential Project effects and user conflicts, and information needed to evaluate potential Project effects on river-based recreation.

Level 1: Desktop analyses integrate existing information about channel characteristics, hydrology, river recreational opportunities, access points, and flows in order to determine what recreational boating resources are present that could be affected by the potential Project.

Level 2: Reconnaissance efforts gather first-hand information on the river resource, types of recreation opportunities, and associated attributes as well as the recreational user groups accessing the river. The reconnaissance also provides valuable information on access sites, logistics, travel to and from the site, local resources and people, and, lastly, potential safety concerns. Motorized and non-motorized watercraft may be used during the reconnaissance to better understand recreation opportunities on the river.

Level 3: Intensive field studies will document the existing flow-dependent recreation opportunities (motorized and non-motorized watercraft) and the associated attributes for the respective opportunities, and will quantify the flow preferences (minimum acceptable and optimum) for each opportunity. This is done through a combination of field observations, interviews with licensing participant groups, focus group sessions, and an instream flow recreation survey targeting recreation opportunities for a given river segment. The survey work will be conducted in coordination with surveys associated with the overall Recreation Study.

NPS – Again, this underscores why we need to see the proposed survey instruments, protocol, etc. to determine if the Rec Survey adequately addresses these issues.

Elements of recreational boating flow research include:

- *Data collection* - Water recreation attributes for discrete sections on the Susitna River will be described, including types of river recreation, reach length, gradient, character, whitewater difficulty classification, and recommended range of flows for respective recreation activities. Activities will be identified by type of motorized and non-motorized water craft, including whitewater kayaks and packrafts; commercial and non-commercial uses; and trip purposes, trip length, frequency of use, and seasonal considerations.
- *Reconnaissance* – River recreation opportunities and associated instream flow attributes will be observed and described. Existing and potential sites for recreational boating access along the river corridor and the area inundated by the proposed reservoir will also be described.
- *Consultations* - Boaters, land and resource managers, guides, user groups and others will

be interviewed to determine the types and locations of boating activity occurring on the Susitna River. Interviews will be conducted with boaters and other experts with experience on the Susitna River to determine a range of conditions generally acceptable to various types of watercraft and skill levels.

Consultation methods include the following:

- Interviews will be conducted with river recreation users with previous experience on the Susitna, including motorized, non-motorized, and whitewater boaters.
- Focus group sessions will contribute additional information about flow preferences, recreation use patterns for respective reaches and groups, whitewater difficulty, safety, campsites, significant rapids, and recreational access. The focus group sessions will be coordinated with national, regional, or local water recreation clubs.

Outcomes of the process include the following:

- Motorized and non-motorized boating opportunities and associated attributes for the range of flows will be examined. This includes, where applicable, the level of whitewater difficulty, portage requirements, length of trip, and characterization of experiences. Includes tourism boating up to Devils Canyon.
- Flow preference curves for each reach will be developed for respective river recreation opportunities.
- The frequency for the range of preferred flows for respective opportunities will be quantified for existing conditions and likely proposed Project operations.
- Put-in and take-out sites and related needs (e.g., scouting and remote camping) that may be associated with respective recreation opportunities in a particular river segment will be identified.

10.7.5. Consistency with Generally Accepted Scientific Practice

The methods and work efforts outlined in this Study Plan are the same or consistent with analyses used by applicants and licensees and relied upon by the Commission in other hydroelectric licensing proceedings. The proposed methodology is often used in analysis for development of hydroelectric license applications to fulfill the FERC's Exhibit E requirements for documentation and development of mitigation measures for flow dependent recreation.

10.7.6. Schedule

Upon implementation, it is estimated that the term of the studies will be approximately two years.

Table 10.7-1. Recreational Boating / River Access Study Schedule. Description Start Date Completion Date Duration (months)

Data Collection (including seasonal field visits and consultations)	January 2013	November 2013	11
Inventory	January 2013	October 2013	10
Initial Study Report		December 2013	
Analysis	November 2013	March 2014	5
Updated Study Report	April 2013	December 2014	8

NPS - No information about when/how the Level 1-3 analyses fit in with this schedule. Much of this study plan appears to have been cut and paste from the NPS/OSU guide, without an explanation of how the methods will be applied to this particular project. We need specifics and an agreement on who makes mid-point decisions to proceed, e.g., from Level 1 to 2, or 2 to 3, based on what criteria.

NPS - There is only one winter and one summer of study, and no Novembers or Decembers. This does not indicate a sincere concern for impacts on winter recreation. Arguably, AK's winter rec season is longer than its summer season. It is certainly important to users, as well as purveyors of equipment (e.g. snow machines) and the local economy. One year of study is also not an adequate sample size to support conclusions about important flow-dependent activities like sportfishing and float hunting. Note the emergency Chinook closure this year – how can you study the most sought-after fish species in SC AK if harvest is prohibited during the only year of study? Likewise, the upland game hunting season is dependent on variable weather etc. – one season is just not enough to document baseline opportunities and experiences when they are dependent on highly variable interannual conditions.

10.7.7. Level of Effort and Cost

The estimated cost of the two-year study is \$100,000.

10.7.8. Literature Cited

AEA (Alaska Energy Authority). 2011a. Susitna-Watana Hydroelectric Project, Socioeconomic, Recreation, Air Quality and Transportation Data Gap Analysis. Prepared by HDR, Inc.,

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Whittaker, D., B. Shelby, and J. Gangemi. 2005. Flows and recreation: a guide to studies for river professionals. Report for Hydropower Reform Coalition and National Park Service – Hydropower Recreation Assistance.

From: Klein, Joseph P (DFG) [mailto:joe.klein@alaska.gov]

Sent: Thursday, August 23, 2012 2:48 PM

To: Betsy McGregor

Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); Michael_Buntjer@fws.gov; Betsy_McCracken@fws.gov; eric Rothwell; Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)

Subject: RE: Follow up Meeting Notes-additional comments

Following are additional comments

Baseline Water Quality

5.5.4.3.2 In-Situ Water Quality Sampling The sampling protocol currently calls for monthly in-situ water quality monitoring for the 4 summer months. It should be revised to include continuous (hourly or so) water quality measurements for basic parameters (pH, DO, conductivity, turbidity), year-round if possible using in-situ semi-permanent sensors (e.g. sondes). The technology is readily available and would provide very useful baseline information to assess any post project impacts.

River Productivity

7.8.4.4 Conduct a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River. We recommend supplementing or substituting this section using a reference reach in a similar Alaska river using a BACI design monitoring program in order to assess post project impacts.

From: Klein, Joseph P (DFG)

Sent: Thursday, August 23, 2012 10:42 AM

To: McGregor, Elizabeth A (AIDEA)

Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); Michael_Buntjer@fws.gov; Betsy_McCracken@fws.gov; Eric Rothwell (Eric.Rothwell@noaa.gov); Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)

Subject: Follow up Meeting Notes

Betsy-

Thank you for the opportunity to discuss the proposed study plans for the Susitna-Watana Hydroelectric project. We look to further discussions to continue to clarify study plan details.

To assist in you and your consultants in this process, below are brief notes by ADF&G staff. We may have additional comments/or clarifications. Please feel free to contact me if you have any questions.

Regards, Joe

Fish Distribution and abundance in Upper, Middle and Lower Susitna River

- Trot lines should considered during the winter to target appropriate fish species.
- Minnow trapping under ice should be used during the winter, in all habitat types.
- Should evaluate the feasibility of under ice videography.

Salmon Escapement

- Identify locations of adult fish weir locations described on tributary streams (7.7.4.1.5, page 7-39). Consider placement of adult fish weir upstream of the proposed dam on prominent Chinook salmon streams.

Instream Flow

- What is the sampling strategy (e.g. representative reach, mesohabitat typing) for the defined habitat types?
- How many and at what range will discharge-calibration sets be collected for each sampling method?
- Will 2D modeling include side channels and sloughs within study area?
 - Based on comments at the meeting it was my understanding it would.
- What criteria will be used to identify cover types and substrate sizes?
- For PHABSIM, will transects be independent, dependent or a combination and accordingly, what WSE models and composite suitability index will be used?
- What criteria will be used to select and weight transect-derived models?
- Per the description of study sites for fish passage/off-channel connectivity (§6.5.4.5.5), what criteria will be used to identify "a representative number" of different habitat types?
- HSI data is needed for identified target species for each defined habitat type, over 2 years.
- How will the data be aggregated to evaluate single flow recommendation?
- Will a DSS-type program be available to review study results and if so, information is needed on it.
- How do you envision the "collaborative process" will work? When will major decisions be made (e.g. site and transect selections) and how often do you envision the work group will get together?
- What equipment will be used and how will they be calibrated?
- For the eulachon and boating studies, similar information is needed on what is the study area, what sampling strategy will be used, how many and what range of calibration-discharge sets if appropriate, and how will HSI curves will be developed?
- Variational zone modeling, may need more defined time steps during analysis phase (possibly down to 15-minute increments) depending on the rate of flow change over time.

Groundwater

- What are the monitoring well placement sampling approach (e.g. equal spacing along linear transects, etc.) and location (e.g. for instream flow, in all habitat types?) for the various resource studies (i.e. instream flow, riparian instream flow, water quality). Also, a description of sampling intensity would be helpful (i.e. for instream flow purposes, will the objective be to characterize entire gw/sw interaction throughout entire intensive study site or only at select microhabitats).
- What is the duration for monitoring (I believe at the meeting it would be from installation until winter 2013-14?)
- How often will monitoring wells be calibrated for various parameters to be sampled pre- post- and during field monitoring?
- For each resource discipline, what parameters will be sampled and what are range of accuracies (e.g. for water level +/- 0.1 ft?, water temp +/- 0.2 C?, etc.).

Water Quality

- Information on availability of the Sampling and Analysis Plan and Quality Assurance Project Plan is needed.
- GW Quality in Selected Habitats (Section 5.5.4.7) - need more information on study. For example, sampling intensity/number of site measurements per slough or criteria for how they will be determined. Will ground water level monitors be installed if so, what is the sampling intensity (numbers per habitat type) and duration of monitoring (e.g. continuous year-round/ point samples during field visits, etc.). If not, it is strongly recommended groundwater monitoring be performed concurrently with water quality monitoring in this study.
- Any monitors should be calibrated pre- and post-monitoring along with multiple field measurements for post monitoring calibration.

From: Betsy_McCracken@fws.gov [mailto:Betsy_McCracken@fws.gov]
Sent: Friday, September 07, 2012 4:02 PM
To: Betsy McGregor
Cc: Bryan Carey; 'Fullerton, Bill'; Betsy McGregor; Bob_Henszey@fws.gov; eric Rothwell; 'Klein, Joseph P (DFG)'; 'Kevin Fetherston'; 'Matthew LaCroix'; 'Laura Arendall'; 'Mike Buntjer'; 'MaryLou Keefe'; 'Michael R. Lilly, GW Scientific'; PHIlgert@r2usa.com; rob.plotnikoff@tetrattech.com; 'Benkert, Ronald C (DFG)'; susan walker; 'William Rice'; matt.cutlip@ferc.gov; Lori_Verbrugge@fws.gov; Catherine_Berg@fws.gov; Jennifer_Spegon@fws.gov; dreiser@r2usa.com
Subject: Follow up comments from August 15-17 ILP meetings

Hi Betsy,

Thank you and AEA for hosting the August ILP meetings. We all gained a lot of insight from the meetings, and we were pleased to be updated. Like others, as a result of the meetings, the Service has a few comments and concerns to share with the group.

In addition to these below, other staff from the Service may provide comments relative to their study area expertise. We hope that our collective comments will be helpful toward gaining concurrence on proposed studies, and as we move forward with the review process of the proposed Watana dam.

Thank you,
Betsy

September 7, 2012

Notes from ILP Formal Study Meetings August 15-17, 2012:

At the request of AEA and its consultants, the USFWS (Service) submits this brief summary of concerns regarding the Susitna-Watana hydropower dam formal ILP Formal Study meetings that were held August 16-17, 2012. The Service's concerns in this informal correspondence, along with other remaining concerns will be further articulated in the Service's formal response letter on AEA's ILP Proposed Study Plan (PSP) review, due to FERC October 15, 2012. Additional informal comments from the Service may be provided under separate cover before the October due date.

FWS concerns highlighted during meetings relative to Instream Flow, Habitat Utilization and the Geomorphology proposed study plans:

Overall, the Service finds that AEA's proposed study plans for instream flow, habitat utilization and geomorphology do not fully address agency's resource management concerns. During the three days of ILP study meetings, sequencing and integration of the proposed biological resource studies and the physical process studies was not described and is still a significant outstanding information need. It is necessary to describe the integration of these inter-related studies and how that integration will result in a comparison of the baseline biological information and the resulting effects to biologic resources caused by the proposed project operations. Study results must be quantifiable in order to assess potential losses to aquatic resources and their habitats, to review the project under our relevant fish and wildlife resource conservation authorities, to inform fishway prescription authority under Section 18 of the Federal Power Act, and to eventually develop recommended protection, mitigation, and enhancement for the project license. We do not believe that the current study plan proposals will yield sufficient information to allow us to adequately assess proposed project impacts to the Nation's fish and wildlife resources and develop adequate PME's.

The Service has repeatedly articulated concerns about the lack of study sequencing, connectivity and integration between the biological studies and the other proposed engineering and physical processes studies. We reiterate and highlight the need for the collection of adequate temporal and spatial baseline biological and fish habitat data to provide direct input to some of the proposed physical modeling efforts. Many of our concerns, below, are related to the temporal mismatch of biological data collection with the forward momentum of the physical modeling efforts.

-Habitat Mapping

Hierarchially-nested aquatic habitats- HDR stated at the meeting that the “habitat mapping” will be started in September; and that the sampling will be stratified by meso-habitat type as identified in the 1980’s study reports.

The 1980’s studies did not hierarchically nest the habitat types. The Service specifically requested hierarchially nested habitat mapping (e.g., Frissel et al, 1986). We are concerned with the proposal to use the 1980’s study sites, which focus on the side sloughs, and do not consider the full breadth of fish habitats, which is currently unknown and the subject of ongoing study that has not been completed or submitted for agency review and comment. We do not endorse the use of the 1980’s sites without first completing and then applying a hierarchal assessment of the river reaches as a study framework. The hierarchally nested aquatic habitats framework is needed to structure fish distribution surveys, the instream flow study and other physical process studies. Without it, the fish surveys will be too narrowly constrained and the instream flow studies will not represent all habitats that may be affected by the proposed project. The Service recommends the following habitat hierarchy for the Susitna River be used for habitat mapping purposes and integration of studies:

Large River Floodplain Habitat Hierarchy

1. **Geomorphic units:** Large-scale geomorphic and hydraulic controls.
 - a. Bedrock controlled, single-channel units with shallow hyporheic exchange and thermal homogeneity.
 - b. Unconfined, multiple channel floodplain units with expansive hyporheic exchange and thermal heterogeneity.
2. **Macrohabitats:** Primary, flood, and spring channel networks.
 - a. Primary channels—Perennial channels.
 - b. Flood channels—Seasonally connected channels.
 - c. Spring channels—Disconnected sloughs that discharge groundwater.
 - d. Floodplain ponds—Ponded spring channel networks.
3. **Mesohabitats:** Bed and bank morphological controls; hydraulic features.
 - a. Riffle-pool sequences—Run, riffle, pool, glide, tailout.
 - b. Backwaters, alcoves, shallow meander margins.
4. **Microhabitats:** Hydraulics, water quality, substrate, cover.
 - a. Water depth, velocity, bulk flow characteristics (e.g. Reynolds and Froude #'s).
 - b. Vertical hydraulic exchange (ground and surface water exchange).
 - c. Bed, or intragravel temperature and dissolved oxygen.
 - d. Substrate size, heterogeneity.

e. Elements of wood, vegetation, and rock structure.

-Fish distribution: A first step is to assess the seasonal distributions of target species and life stages and the physical habitat criteria that influence habitat selection and suitability. As a first step, target species have to be identified, agreed upon, and their life history and habitat use similarities to other, unstudied species (i.e., non-target species) need to be determined and described. In the study requests of the Service and other agencies, we recommended studying the baselines of all affected fish species and life stages, including all five species of anadromous salmon and all resident fish.

Fish distribution data are needed to describe the baseline data to support and compliment other proposed study objectives, including those related to fish habitat selection and utilization. A first step to acquiring adequate fish distribution is to assess the full lateral and longitudinal profile of seasonal fish distribution, life stage periodicity, and suitable used and unused habitats that are influential in fish habitat site selection. The fish distribution data is needed to provide the base data layer that will support and compliment other proposed study objectives, including those related to fish habitat selection and utilization, and instream flow (ISF) needs. This information is also needed for resource agencies' fishway prescription decisions under the Federal Power Act. Baseline biological information is critical input necessary for integration with physical studies. Accordingly, the Service is reiterating the need for multiple and continuous years of biologically relevant data in order to provide robust integration with the physical modeling studies, and decision-support relative to fish and wildlife resources of the Susitna River basin.

-Habitat site selection criteria: Criteria that influence habitat selection and suitability need to be identified using statistically powerful and robust methods and current models of fish distribution including bioenergetics and not exclusively physical habitat models (Lovtang 2005). The Service remains opposed to the proposal to repeat the 1980's approaches to fisheries studies. The 1980's studies do not determine the habitat criteria influencing fish habitat site-selection, they simply report utilization functions for water depth and velocity, or depth and substrate. They also lack a fundamental baseline assessment of all available fish habitat and instead focus on study of habitats that had high fish use density. The habitats that were apparently suitable but unoccupied or underutilized by fish need to be assessed, and the entire range of habitat availability and habitat use data need to be assessed prior to habitat study site selection.

More comprehensive data collected on nearby glacial rivers may be used to demonstrate that habitat selection by salmon in side-sloughs can be independent of water depth and velocity and should be compiled.

Fish habitat study sites should be surveyed and identified using the full range of habitats seasonally utilized by agreed-upon target species and life stages. The objective is to identify the bioenergetics and physical factors that control fish habitat selection. The Service considers the assessment of habitat influential to fish habitat site selection to be an objective of the Instream Flow and Habitat Utilization Study request. In the resource agencies Instream Flow and Habitat Utilization Study Plan requests, this is a specifically stated objective.

Sequentially, appropriate flow-habitat models can be selected *after* assessment and validation of 1) the full seasonal distribution of target species and life stages, 2) the physical factors (e.g., micro-habitat data) that influence habitat selection and suitability, and 3) the bioenergetic factors affecting fish habitat suitability and productivity.

Thus, field visits proposed for the end of September (2012) should be considered as reconnaissance and for discussion purposes, and not for the purpose of actual study site-selection.

-Habitat Suitability Indices: Methods for collecting site-specific habitat criteria for the glacial Susitna River need to be collaboratively identified. (As recommended in the resource agencies study plan request for Instream Flow and Habitat Utilization). These criteria also need to be evaluated in the context of the hierarchical habitat model, such that habitat criteria are determined and evaluated in all habitats of importance to each agreed-upon target species and life stage.

The 1980's studies were inconclusive in demonstrating a relationship between fish habitat criteria and fish distribution, and they were also narrowly focused on associations of spawning and rearing salmon with water

depth and velocity in spring channels (side sloughs). Not only is this not representative of existing habitat and the distribution of fish within those habitats, habitat data collected from nearby glacial rivers demonstrates that spawning habitats selection is independent of flow depth and velocity in side sloughs and may be profoundly influenced by bioenergetics and the input of organic matter .

This indicates that traditional hydraulic modeling (e.g., PHABSIM), as proposed, may be an insufficient fish focus/tool. So, first we need to identify criteria that are influential to habitat selection, within the full seasonal distributions of agreed-upon target species and life stages. Only then, after this has been adequately determined, can we begin to develop utilization functions (curves or HSC) for those criteria.

The Service has previously expressed concern with the approach of repeating the 1980's study effort, and we have repeatedly asked for both a complete compilation of available data, and a review of the 1980's information prior to accepting its use for the proposed project. Lacking that review, we independently note that, in the 1980's sites were selected that were, presumably, heavily utilized by spawning sockeye and chum (qualitative). Study sites need to be based on relevant criteria related to physical habitat site selection as documented by fish distribution and lack thereof.

-Groundwater- The integration of the groundwater study efforts with the biological studies is not clear. Specifically, how will the groundwater study be made relevant to the scale of fish habitat and fish habitat site selection in the Susitna River? The objectives of the groundwater study should include relevance to the hierarchially nested habitats, including macro-, meso-, and micro-habitats that are influential to fish habitat selection. The groundwater study sampling design should be relevant to fish habitat and site selection. A specific objective needs to be measuring the hydraulic gradient/head (upwelling or downwelling) under the existing hydrograph and under the proposed project hydrograph release flow schedule.

-Model selection: We need to first determine what criteria are important to fish habitat site/suitability and selection before we can choose an appropriate flow-habitat model. ADFG Marine Mammals biologist, Dr. Bob Small also reiterated this very same point regarding model selection for the beluga whale studies. Again, the Service notes our concern about the limited focus of the 1980's studies and using PHABSIM. Our concerns stated in earlier correspondence to AEA remain unaddressed and are reiterated here for emphasis.

Model sensitivity and relevant criteria (inputs) are critical to achieving statistically valid outputs. At this point, it is premature to select a model until we have known 1) fish distribution, and 2) identification of variables influential to fish habitat site selection.

-Biometric Review- The Service previously requested a biometric review of the 1980's findings. This request is remains outstanding and should be conducted prior to basing any study plans on 1980's studies or results. In all cases, including the usage of the 1980's Su-hydro data results and for the Susitna-Watana study plans, estimates of precision and accuracy of study results is required to evaluate the power of any study plan. Details of proposed study plan sampling and design methods need to be explicit and statistically valid with a priori determination of levels of precision and accuracy of model outputs.

-Fish genetics- During the August 15-17 meetings, AEA stated that genetic samples from the Chinook above the proposed dam site would not be collected. The stated rationale was due to the desire to minimize the handling of the fish after subsequent tagging of fish. Genetic samples of Chinook at locations above the proposed Susitna-Watana dam site are crucial to informing the Service's management goals specific to recommending licensing conditions under the Federal Power Act, and to conservation recommendations under the Fish and Wildlife Coordination Act, and the Anadromous Fish Act. As such, we consider our request for collection of genetic samples from Chinook salmon, and other fish species to be necessary for our resource evaluation of the Susitna-Watana hydropower project. Because of this information need, if AEA does not plan to collect the information, AEA should document how this study request is being addressed.

Fish species genetic samples used for comparisons should be less than ten years old to reflect current gene frequencies among the sampled fish populations. Genetic samples for salmon exist for some tributaries in the

lower and middle Susitna River. Some of these samples are greater than ten years old.

Fish genetic samples should be current and include samples of the Chinook migrating above the proposed dam location. Because gene frequencies change over time, all genetic samples should be within the most recent ten years to allow for valid comparison. Genetic analysis should analyze the existing extent of genetic differentiation within and between fish using distinctly different habitats. We request genetic analysis of Chinook above the proposed dam site relative to those at other upper, middle and lower river and tributary sample locations.

-Fish Passage/fishway prescription- The Service is concerned with the lack of transparent discussion about the potential for fish passage alternatives at the proposed Susitna-Watana dam. If fish passage is required, how will that be accomplished? If it is not feasible, what is your alternative proposal? Where is your project assessment of the fish passage feasibility? What are the design criteria being considered/evaluated?

-Compensatory Mitigation- Compensatory mitigation is determined as part of a mitigation sequence after avoidance, and minimization efforts. The Service has inquired about potential compensatory mitigation for project impacts during several meetings. To date, this concern has not satisfactorily been addressed by the project sponsors or project consultants. Because compensatory mitigation is a requirement in order to offset unavoidable projects impacts to fish and wildlife resources and their habitats, it is should be considered throughout the review process. Please explain how you plan to quantify existing habitats, and quantify primary, secondary and cumulative (40cfr Part230 of the CWA) losses to those habitats under the proposed operational flows over the temporal scale of the license period. How will habitats change proportionally under project operations?

-Lower river- The Service is concerned with AEA consultants' proposal to establish a lower boundary for the physical studies (e.g., geomorphology, instream flow) at a location "downstream of Sunshine" at approximately river mile 75, and not extend the study efforts further down into lower river to inform the biological studies. There are many biological resource studies that would necessarily be informed by establishing a consistent study boundary between the physical and biological studies. For example, studies related to the federally listed Cook Inlet beluga whale, fish species and habitats, including the resident species, and anadromous salmon and eulachon (beluga whale prey species). The lower river also includes the Susitna Flats State Game Refuge. If the physical studies boundary is terminated at river mile 75, there will be no ability to relate or integrate biological data to those studies (e.g., geomorphology, ISF, ice processes, flow routing). Resource agencies management goals would effectively not be addressed below river mile 75, if project effects are not assessed to the mouth of the river.

According to USACE (1966), 80% of the ability to produce accurate model results depends on using appropriate bathymetry data, mesh design, and boundary conditions. The amount of time needed to collect this information, particularly the bathymetry data, depends on the complexity of the channel's geometry, which is known to be complex in the lower Susitna River. Because data collection in the lower river will likely require rigorous field collection due to the channel complexity, it is critical to initiate these efforts in a time sensitive manner. The proposal to delay work in the lower river pending analysis at an arbitrary, and certainly non-biologically relevant location, does not meet resource agencies objective of evaluating the potential project impacts to fish and wildlife resources in the lower Susitna River. This is particularly true under the FERC ILP process timeline specific to the Susitna-Watana dam project.

-Studies integration: A "map" or chart of how studies are proposed to be integrated is needed. AEA sponsors and consultants, committed to providing this by September. Biological resource components are currently not integrated or connected to the other studies, and appear as being treated independently of the rest of the study requests. Study proposals must demonstrate how they will be integrated to provide needed resource information.

Studies/components not address from the Non salmon anadromous, resident and invasives fish species study request: During the August ILP meetings, the follow Service requests were preliminarily noted as not being addressed or adequately addressed by AEA's PSPs.

1) **Marine derived nutrients** contribution from non salmon anadromous species. The Service requested information in our non-salmon anadromous, resident and invasive study plan request. It is not clear which study proposal it is addressing this request, or IF it is being addressed. During the August 15-17 meetings, it was indicated that it may be addressed in either the riparian instream flow, the terrestrial wildlife, the river productivity or elsewhere. However, AEA's consultants were unable to specifically "point to it" when asked. It does not appear to have been included in the PSPs.

2) **Resource valuation** of non-salmon anadromous and resident fish resources. During the meeting, AEA consultants stated that a resource valuation would not be provided, as requested in the Service's study request for non salmon anadromous, resident and invasive fish study. An explanation of why this assessment will not be addressed was not provided. We request that an explanation be provided that describes the rationale for this determination and urge reconsideration of our study request.

3) **Trophic ecology**- The Service requested information on trophic ecology in the non salmon anadromous, resident and invasive species study request. Michael Link stated that there are "significant predator-prey dynamics" particular once fish move out of the mainstem; using this behavior to explain why fish hold there until they are ready to dash to tributaries. He noted that the creeks are heavily preyed upon by bears, for example. Dr. Bob Small (ADFG) recommended trophic ecology and/or foraging ecology information for the Cook Inlet beluga whale studies. For fish, coordination with Tim Nightengale (AEA's consultant; via teleconference) stated that he would take gut samples from fish to see what macro-invertebrates they are eating, and when, and will work with fish study teams to do some trophic analysis. The trophic ecology component needs to be clearly spelled out in a study plan identifying any aspects that will and will not be addressed explained and with appropriate rationale.

References:

Frissell, C. A., W. J. Liss, C. E. Warren, and M. D. Hurley. 1986. A hierarchical framework for stream habitat classification: viewing streams in a watershed context. *Environmental Management* 10:2. Pp. 199-214.

Lovtang, J. C. 2005. Distribution, habitat use, and growth of juvenile Chinook salmon in the Metolius River Basin, Oregon. M.S. Thesis, Oregon State University. March 2005.

USACE 1966. (Full citation will be provided in follow-up correspondence)

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From: Bob_Henszey@fws.gov [mailto:Bob_Henszey@fws.gov]
Sent: Tuesday, September 11, 2012 12:26 PM
To: 'Kevin Fetherston'; Betsy McGregor
Cc: Catherine_Berg@fws.gov; Ann_Rappoport@fws.gov; Betsy_McCracken@fws.gov; Jennifer_Spegon@fws.gov; Lori_Verbrugge@fws.gov; Michael_Buntjer@fws.gov; chiska.derr@noaa.gov; Klein, Joseph P (DFG); 'Matthew LaCroix'; 'Michael R. Lilly, GW Scientific'; eric Rothwell; susan walker; 'William Rice'; matt.cutlip@ferc.gov; dreiser@r2usa.com
Subject: PSP 6.6 Riparian Instream Flow Study Plan - Interim Comments

Kevin,

The following are some of the key differences the USFWS sees between our study plan request (USFWS 10.1, Instream Flows for Floodplain and Riparian Vegetation Study) and AEA's proposed study plan (PSP 6.6, Riparian Instream Flow Study). The differences and comments listed below are likely not inclusive, since we have not had a chance to fully evaluate the PSP.

Many of the PSPs rely upon or provide data from/for other studies. Recognizing these relationships is an important part of the Integrated Licensing Process (ILP); however, the study providing the data should describe the methodology and oversee the data collection and analyses, while the study requiring the results should restrict its discussion to the types of data/results required from other PSPs. Repeating the methods in a study not responsible for the data collection and analyses is unnecessary and risks confusion if the methods differ or are inadequate in one of the studies. Since the Riparian Instream Flow PSP will rely upon data from the Groundwater PSP, the Riparian Instream Flow PSP should describe only the results required from the Groundwater PSP, and then describe how those results will be used in the Riparian Instream Flow PSP (e.g., 5.7 Groundwater PSP should be the only PSP that describes the groundwater methods). This applies to other PSPs, such as the habitat mapping studies that may be providing data for this PSP.

Study Goals and Objectives: The USFWS requested a specific goal that included quantifying the frequency, timing and duration of surface-water and groundwater levels required to establish, maintain, and promote floodplain and riparian plant communities. Two ancillary goals were also requested to quantify the frequency and rate of sediment deposition required to promote soil development, and to quantify the effect of river ice on the establishment and persistence of riparian plant communities. Section 6.6.1.1 of the PSP has no stated goal, and only a general approach is provided. An "overarching goal" is provided in the Section 6.6.4 Study Methods, but this goal is also very general. While goals can be very general in nature, the specifics in our goal set the stage for a rigorous study plan to evaluate potential project-related effects on floodplain plant communities.

The USFWS requested six objectives to help meet our goal. Three of the PSP objectives are similar to our requests {1) Synthesize 1980s data, 2) Study sites, and 6) Seed dispersal}, but they lack the additional specifics stated in our requested objectives. Two of the PSP objectives appear to be wholly or at least partially the objectives for other PSPs and not appropriate as stated {3) Map riparian vegetation, and 10) Impacts to shallow groundwater well users}. What the PSP objectives lack, however, are our specific requests for river ice, sediment deposition, and water-level regime (USFWS Objectives 4, 5, and 6). These missing objectives may be studied under AEA's PSP objectives, but the USFWS prefers they be considered as standalone objectives, and possibly integrated into a single modeling objective after they have been studied individually. The USFWS is particularly interested in our Objective 6 to characterize the water-level regime required to maintain floodplain and riparian plant communities. Much of the discussion so far has focused on floodplain plant succession, but little or no discussion so far has involved maintenance flows. Succession is important, but without maintenance flows whole floodplain plant communities may collapse or the direction of succession changed to an unnatural target (e.g., non-floodplain plant communities).

Study Area: The USFWS agrees with the PSP study area and four river segments, with the following additional comments. The width of the active valley should also include the distance from the River that the River influences groundwater, as well as define the return interval for both groundwater and flooding (e.g., 100-year event under current or climate-change induced conditions). Much discussion has centered on the downstream

influence of the Project. The PSP study area Lower Reach would extend to RM 0. Will this lower extent remain even if all agree that the Project influence on surface- and ground-water becomes indistinguishable from normal environmental variation?

Study Methods: The methods need to follow the order of the objectives and use section headings that refer to the intent of the objectives. Few methods are referenced, and some references that are cited are not included in the literature cited. The relationship with other PSPs often seems confusing. It would be more helpful to state what results will be required from PSP "x" to evaluate a Riparian ISF objective, and potentially what results from a Riparian ISF objective will be required by PSP "y." It is not necessary to repeat coordination for every objective, only state the inputs required and the outputs provided by an objective. This applies across PSPs and among a PSP's objectives. The following comments on methods follow the order of the Objectives requested by the USFWS:

RIFS-1 Synthesize Historical Data: In addition to other North American hydro-projects, this review should also include a review of relatively undisturbed riverine systems.

RIFS-2 Select and Design Study Sites: The number of study sites should provide sufficient replication to address the needs of the objectives, and should include sites where Project operation is expected to cause early channel bed degradation or aggradation. The casual reference to pseudoreplication in one of the other objectives needs to be addressed at the study-site level. Study sites are typically the experimental unit where replication is used for true statistical analysis. All other sampling (e.g., within the study site) is really subsampling used to obtain a better average value for that one replicate. As envisioned by many of the PSPs, the "representative" study sites are really only one replicate for each process-domain. For more on pseudoreplication see:

Hurlbert, Stuart H. 1984. Pseudoreplication and the Design of Ecological Field Experiments. Ecological Monographs 54:187–211. <http://dx.doi.org/10.2307/1942661>

RISF-3 Characterize Seed Dispersal and Frequency of Establishment: Not sure where this objective is addressed in the PSP. It appears to be scattered across several sections in the methods. If the methods have been described by other similar projects, then cite their methods if appropriate and include enough details to help others understand the methods that will be used. How will the Susitna River bimodal peak flows be addressed? On a float trip down the Susitna 27-29 July 2012, there were newly emerging dicot seedlings on the sandbars. How will the fate of these "second peak" seedlings be addressed? How will the role of precipitation in maintaining favorable soil moisture conditions be evaluated? Will soil texture be considered? If so, how will the soil profile be described?

In Section 6.6.4.3.1.4: Is "abundance" density or some other metric? What is "elevation" referenced to: ASL, an arbitrary datum, or some elevation that can be linked to the local river or groundwater stage (keep in mind the river drops downstream, so that must be accounted for also)? Is there a citation for others using 2-meter square plots? What is the shape of these plots? A square plot may not be appropriate for a narrow band of seedlings along a specific elevation in the gradient above the river. MODFLOW is a groundwater model, and many not be sensitive enough to quantify hydroperiod relationships for seedlings. What other metrics will be used to quantify/separate surface water, groundwater, soil moisture, precipitation, and other potential hydrological process that support seedling establishment and recruitment?

How will the results from this objective be used to predict potential Project-related changes in seedling establishment and recruitment into the population?

RISF-4 Characterize the Role of Ice in the Establishment, Survival and Recruitment of Riparian Species: The discussion on ice processes (Section 6.6.4.4.1) seems unfocused, and essentially provides no discernible methods: "Final details of the geomorphology and ice processes modeling ... will be developed as the 2012 studies are obtained." The goal of this study should be to characterize the role of river ice in the establishment (colonization), survival (first 3 years) and recruitment into the future reproductive population of dominant riparian species (e.g., balsam poplar, willows). Have others investigated the role of ice on riparian plant communities?

If so, can their methods be used here? How will the magnitude, frequency, and longitudinal distribution of ice events affecting dominant riparian species/communities be evaluated?

RISF-5 Characterize the Role of Sediment Deposition in the Formation of Soils: The proposed soil sampling techniques are included in Section 6.6.4.3.1.5, but based on these techniques it is unclear how the USFWS requested objective to characterize the role of sediment deposition in the formation of floodplain and riparian soils, and how sediment deposition affects the rate and trajectory of plant community succession. This objective should investigate the rate of deposition, depth of sediment, and soil profile development required for natural floodplain plant community succession, and then use the predicted sediment deposition characteristic from the Fluvial Geomorphology Study to predict the effects of Project operation on floodplain plant communities.

Sampling to only a depth of 50 cm, and describing cumulative thickness of all organic horizons and loess (windblown material?) without stratigraphy will likely be insufficient to meet this objective. Soil texture by feel should follow standard techniques (e.g., Thien 1979, <http://soils.usda.gov/education/resources/lessons/texture/>).

RISF-6 Characterize Water-Level Regime Required to Maintain Floodplain and Riparian Plant Communities:

This is a critical objective that has not been sufficiently discussed in past workgroup meetings, possibly due to lack of time, and the PSP methods are insufficient to evaluate if the USFWS requested objective will be met.

Suggest this objective be discussed near the beginning of future meetings to allow sufficient time for discussion.

Objective 6 combines hydrologic information from the groundwater study (PSP 5.7) and the plant community information from this study (PSP 6.6) and possibly the habitat mapping studies (PSPs 9.6 and 9.7) to produce plant species/community response curves. The USFWS's Objectives RISF-3 to RISF-5 target critical stages in plant community succession, while RISF-6 targets critical instream flows required for maintaining plant communities as succession progresses (i.e., both succession and maintenance are important).

The methods for groundwater belong in the Groundwater PSP, and not in this PSP for reasons discussed above. This PSP should request the required hydrologic information from PSP 5.7 and begin the discussion from that point. The following comments, however, include the pertinent groundwater methods that should be discussed in PSP 5.7.

Section 6.6.4.5 (Groundwater): The suggested four to six intensive study reaches instrumented with groundwater and surface-water recording instruments may be insufficient to address this objective if plant response will be described by process-domains (see pseudoreplication discussion above). However, hydrology is likely the most dominant physical factor required for maintaining floodplain plant communities across the various process-domains, and barring some other dominant physical factor (e.g., soil parent material, weather, etc.) it may be possible to use data from the individual intensive study-site transects to build response curves (see Henszey et al. 2004 {ne.water.usgs.gov/platte/reports/wetlands_24-3.pdf}, Figure 7 for an indication of the number of data points required to build a response curve).

One-and-a-half growing seasons (July 2013 to September 2014) will likely provide insufficient groundwater hydrology data to fit individual species response curves (especially for annual species), and may not be enough data to reasonably predict groundwater relationships with river stage and to verify the model predictions with independent data. Precipitation may also dramatically affect transient but critical groundwater levels (a few days to a week or more of elevated water levels), which would be difficult to evaluate with limited data. How will these potential problems be addressed?

What are the "project accuracy standards used for water-level measurements" for horizontal, vertical and temporal measurements?

In addition to the Work Products described in Section 6.6.4.5.2, the products should provide water-level summary statistics for each location (e.g., point, plot, or transect) that will be used to test and fit plant response curves, such as growing season cumulative frequency, 7-day moving average, 10-day moving average, 14-day moving average, and arithmetic mean (see Henszey et al. 2004 {ne.water.usgs.gov/platte/reports/wetlands_24-3.pdf}, Table 1).

Section 6.6.4.7 (Succession Models and Flow Response Guilds) appears to potentially address the USFWS's Objective 6 request; however, two critical referenced papers (Merritt et al. 2010 and Pearlstine et al. 1985) were not included in the Literature Cited. These references were not provided until 8/28/2012, and the USFWS has had insufficient time to review these papers in detail. The concept of the PSP response guilds is similar to the USFWS's request to develop plant community response curves, but the PSP methods are insufficient to evaluate if our requested Objective 6 will be met. The USFWS requested evaluating specific water-level summary statistics (see above discussion for groundwater) with a rigorous curve-fitting technique similar to Henszey et al. (2004). The methods should provide sufficient detail to show how quantifiable (not qualitative) hydrologic (surface-water and groundwater) gradients will be constructed to show the optimum and range of favorable water levels required for maintaining floodplain species/communities.

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APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION
SECTION 7 – HYDROLOGY-RELATED RESOURCES

From: Klein, Joseph P (DFG) [mailto:joe.klein@alaska.gov]

Sent: Thursday, August 23, 2012 2:48 PM

To: Betsy McGregor

Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); Michael_Buntjer@fws.gov; Betsy_McCracken@fws.gov; eric Rothwell; Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)

Subject: RE: Follow up Meeting Notes-additional comments

Following are additional comments

Baseline Water Quality

5.5.4.3.2 In-Situ Water Quality Sampling The sampling protocol currently calls for monthly in-situ water quality monitoring for the 4 summer months. It should be revised to include continuous (hourly or so) water quality measurements for basic parameters (pH, DO, conductivity, turbidity), year-round if possible using in-situ semi-permanent sensors (e.g. sondes). The technology is readily available and would provide very useful baseline information to assess any post project impacts.

River Productivity

7.8.4.4 Conduct a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River. We recommend supplementing or substituting this section using a reference reach in a similar Alaska river using a BACI design monitoring program in order to assess post project impacts.

From: Klein, Joseph P (DFG)

Sent: Thursday, August 23, 2012 10:42 AM

To: McGregor, Elizabeth A (AIDEA)

Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); Michael_Buntjer@fws.gov; Betsy_McCracken@fws.gov; Eric Rothwell (Eric.Rothwell@noaa.gov); Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)

Subject: Follow up Meeting Notes

Betsy-

Thank you for the opportunity to discuss the proposed study plans for the Susitna-Watana Hydroelectric project. We look to further discussions to continue to clarify study plan details.

To assist in you and your consultants in this process, below are brief notes by ADF&G staff. We may have additional comments/or clarifications. Please feel free to contact me if you have any questions.

Regards, Joe

Fish Distribution and abundance in Upper, Middle and Lower Susitna River

- Trot lines should considered during the winter to target appropriate fish species.
- Minnow trapping under ice should be used during the winter, in all habitat types.
- Should evaluate the feasibility of under ice videography.

Salmon Escapement

- Identify locations of adult fish weir locations described on tributary streams (7.7.4.1.5, page 7-39). Consider placement of adult fish weir upstream of the proposed dam on prominent Chinook salmon streams.

Instream Flow

- What is the sampling strategy (e.g. representative reach, mesohabitat typing) for the defined habitat types?
- How many and at what range will discharge-calibration sets be collected for each sampling method?
- Will 2D modeling include side channels and sloughs within study area?
 - Based on comments at the meeting it was my understanding it would.
- What criteria will be used to identify cover types and substrate sizes?
- For PHABSIM, will transects be independent, dependent or a combination and accordingly, what WSE models and composite suitability index will be used?
- What criteria will be used to select and weight transect-derived models?
- Per the description of study sites for fish passage/off-channel connectivity (§6.5.4.5.5), what criteria will be used to identify "a representative number" of different habitat types?
- HSI data is needed for identified target species for each defined habitat type, over 2 years.
- How will the data be aggregated to evaluate single flow recommendation?
- Will a DSS-type program be available to review study results and if so, information is needed on it.
- How do you envision the "collaborative process" will work? When will major decisions be made (e.g. site and transect selections) and how often do you envision the work group will get together?
- What equipment will be used and how will they be calibrated?
- For the eulachon and boating studies, similar information is needed on what is the study area, what sampling strategy will be used, how many and what range of calibration-discharge sets if appropriate, and how will HSI curves will be developed?
- Variational zone modeling, may need more defined time steps during analysis phase (possibly down to 15-minute increments) depending on the rate of flow change over time.

Groundwater

- What are the monitoring well placement sampling approach (e.g. equal spacing along linear transects, etc.) and location (e.g. for instream flow, in all habitat types?) for the various resource studies (i.e. instream flow, riparian instream flow, water quality). Also, a description of sampling intensity would be helpful (i.e. for instream flow purposes, will the objective be to characterize entire gw/sw interaction throughout entire intensive study site or only at select microhabitats).
- What is the duration for monitoring (I believe at the meeting it would be from installation until winter 2013-14?)
- How often will monitoring wells be calibrated for various parameters to be sampled pre- post- and during field monitoring?
- For each resource discipline, what parameters will be sampled and what are range of accuracies (e.g. for water level +/- 0.1 ft?, water temp +/- 0.2 C?, etc.).

Water Quality

- Information on availability of the Sampling and Analysis Plan and Quality Assurance Project Plan is needed.
- GW Quality in Selected Habitats (Section 5.5.4.7) - need more information on study. For example, sampling intensity/number of site measurements per slough or criteria for how they will be determined. Will ground water level monitors be installed if so, what is the sampling intensity (numbers per habitat type) and duration of monitoring (e.g. continuous year-round/ point samples during field visits, etc.). If not, it is strongly recommended groundwater monitoring be performed concurrently with water quality monitoring in this study.
- Any monitors should be calibrated pre- and post-monitoring along with multiple field measurements for post monitoring calibration.

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Subject: Follow up comments from August 15-17 ILP meetings

Hi Betsy,

Thank you and AEA for hosting the August ILP meetings. We all gained a lot of insight from the meetings, and we were pleased to be updated. Like others, as a result of the meetings, the Service has a few comments and concerns to share with the group.

In addition to these below, other staff from the Service may provide comments relative to their study area expertise. We hope that our collective comments will be helpful toward gaining concurrence on proposed studies, and as we move forward with the review process of the proposed Watana dam.

Thank you,
Betsy

September 7, 2012

Notes from ILP Formal Study Meetings August 15-17, 2012:

At the request of AEA and its consultants, the USFWS (Service) submits this brief summary of concerns regarding the Susitna-Watana hydropower dam formal ILP Formal Study meetings that were held August 16-17, 2012. The Service's concerns in this informal correspondence, along with other remaining concerns will be further articulated in the Service's formal response letter on AEA's ILP Proposed Study Plan (PSP) review, due to FERC October 15, 2012. Additional informal comments from the Service may be provided under separate cover before the October due date.

FWS concerns highlighted during meetings relative to Instream Flow, Habitat Utilization and the Geomorphology proposed study plans:

Overall, the Service finds that AEA's proposed study plans for instream flow, habitat utilization and geomorphology do not fully address agency's resource management concerns. During the three days of ILP study meetings, sequencing and integration of the proposed biological resource studies and the physical process studies was not described and is still a significant outstanding information need. It is necessary to describe the integration of these inter-related studies and how that integration will result in a comparison of the baseline biological information and the resulting effects to biologic resources caused by the proposed project operations. Study results must be quantifiable in order to assess potential losses to aquatic resources and their habitats, to review the project under our relevant fish and wildlife resource conservation authorities, to inform fishway prescription authority under Section 18 of the Federal Power Act, and to eventually develop recommended protection, mitigation, and enhancement for the project license. We do not believe that the current study plan proposals will yield sufficient information to allow us to adequately assess proposed project impacts to the Nation's fish and wildlife resources and develop adequate PME's.

The Service has repeatedly articulated concerns about the lack of study sequencing, connectivity and integration between the biological studies and the other proposed engineering and physical processes studies. We reiterate and highlight the need for the collection of adequate temporal and spatial baseline biological and fish habitat data to provide direct input to some of the proposed physical modeling efforts. Many of our concerns, below, are related to the temporal mismatch of biological data collection with the forward momentum of the physical modeling efforts.

-Habitat Mapping

Hierarchially-nested aquatic habitats- HDR stated at the meeting that the “habitat mapping” will be started in September; and that the sampling will be stratified by meso-habitat type as identified in the 1980’s study reports.

The 1980’s studies did not hierarchically nest the habitat types. The Service specifically requested hierarchially nested habitat mapping (e.g., Frissel et al, 1986). We are concerned with the proposal to use the 1980’s study sites, which focus on the side sloughs, and do not consider the full breadth of fish habitats, which is currently unknown and the subject of ongoing study that has not been completed or submitted for agency review and comment. We do not endorse the use of the 1980’s sites without first completing and then applying a hierarchal assessment of the river reaches as a study framework. The hierarchally nested aquatic habitats framework is needed to structure fish distribution surveys, the instream flow study and other physical process studies. Without it, the fish surveys will be too narrowly constrained and the instream flow studies will not represent all habitats that may be affected by the proposed project. The Service recommends the following habitat hierarchy for the Susitna River be used for habitat mapping purposes and integration of studies:

Large River Floodplain Habitat Hierarchy

1. **Geomorphic units:** Large-scale geomorphic and hydraulic controls.
 - a. Bedrock controlled, single-channel units with shallow hyporheic exchange and thermal homogeneity.
 - b. Unconfined, multiple channel floodplain units with expansive hyporheic exchange and thermal heterogeneity.
2. **Macrohabitats:** Primary, flood, and spring channel networks.
 - a. Primary channels—Perennial channels.
 - b. Flood channels—Seasonally connected channels.
 - c. Spring channels—Disconnected sloughs that discharge groundwater.
 - d. Floodplain ponds—Ponded spring channel networks.
3. **Mesohabitats:** Bed and bank morphological controls; hydraulic features.
 - a. Riffle-pool sequences—Run, riffle, pool, glide, tailout.
 - b. Backwaters, alcoves, shallow meander margins.
4. **Microhabitats:** Hydraulics, water quality, substrate, cover.
 - a. Water depth, velocity, bulk flow characteristics (e.g. Reynolds and Froude #'s).
 - b. Vertical hydraulic exchange (ground and surface water exchange).
 - c. Bed, or intragravel temperature and dissolved oxygen.
 - d. Substrate size, heterogeneity.

e. Elements of wood, vegetation, and rock structure.

-Fish distribution: A first step is to assess the seasonal distributions of target species and life stages and the physical habitat criteria that influence habitat selection and suitability. As a first step, target species have to be identified, agreed upon, and their life history and habitat use similarities to other, unstudied species (i.e., non-target species) need to be determined and described. In the study requests of the Service and other agencies, we recommended studying the baselines of all affected fish species and life stages, including all five species of anadromous salmon and all resident fish.

Fish distribution data are needed to describe the baseline data to support and compliment other proposed study objectives, including those related to fish habitat selection and utilization. A first step to acquiring adequate fish distribution is to assess the full lateral and longitudinal profile of seasonal fish distribution, life stage periodicity, and suitable used and unused habitats that are influential in fish habitat site selection. The fish distribution data is needed to provide the base data layer that will support and compliment other proposed study objectives, including those related to fish habitat selection and utilization, and instream flow (ISF) needs. This information is also needed for resource agencies' fishway prescription decisions under the Federal Power Act. Baseline biological information is critical input necessary for integration with physical studies. Accordingly, the Service is reiterating the need for multiple and continuous years of biologically relevant data in order to provide robust integration with the physical modeling studies, and decision-support relative to fish and wildlife resources of the Susitna River basin.

-Habitat site selection criteria: Criteria that influence habitat selection and suitability need to be identified using statistically powerful and robust methods and current models of fish distribution including bioenergetics and not exclusively physical habitat models (Lovtang 2005). The Service remains opposed to the proposal to repeat the 1980's approaches to fisheries studies. The 1980's studies do not determine the habitat criteria influencing fish habitat site-selection, they simply report utilization functions for water depth and velocity, or depth and substrate. They also lack a fundamental baseline assessment of all available fish habitat and instead focus on study of habitats that had high fish use density. The habitats that were apparently suitable but unoccupied or underutilized by fish need to be assessed, and the entire range of habitat availability and habitat use data need to be assessed prior to habitat study site selection.

More comprehensive data collected on nearby glacial rivers may be used to demonstrate that habitat selection by salmon in side-sloughs can be independent of water depth and velocity and should be compiled.

Fish habitat study sites should be surveyed and identified using the full range of habitats seasonally utilized by agreed-upon target species and life stages. The objective is to identify the bioenergetics and physical factors that control fish habitat selection. The Service considers the assessment of habitat influential to fish habitat site selection to be an objective of the Instream Flow and Habitat Utilization Study request. In the resource agencies Instream Flow and Habitat Utilization Study Plan requests, this is a specifically stated objective.

Sequentially, appropriate flow-habitat models can be selected *after* assessment and validation of 1) the full seasonal distribution of target species and life stages, 2) the physical factors (e.g., micro-habitat data) that influence habitat selection and suitability, and 3) the bioenergetic factors affecting fish habitat suitability and productivity.

Thus, field visits proposed for the end of September (2012) should be considered as reconnaissance and for discussion purposes, and not for the purpose of actual study site-selection.

-Habitat Suitability Indices: Methods for collecting site-specific habitat criteria for the glacial Susitna River need to be collaboratively identified. (As recommended in the resource agencies study plan request for Instream Flow and Habitat Utilization). These criteria also need to be evaluated in the context of the hierarchical habitat model, such that habitat criteria are determined and evaluated in all habitats of importance to each agreed-upon target species and life stage.

The 1980's studies were inconclusive in demonstrating a relationship between fish habitat criteria and fish distribution, and they were also narrowly focused on associations of spawning and rearing salmon with water

depth and velocity in spring channels (side sloughs). Not only is this not representative of existing habitat and the distribution of fish within those habitats, habitat data collected from nearby glacial rivers demonstrates that spawning habitats selection is independent of flow depth and velocity in side sloughs and may be profoundly influenced by bioenergetics and the input of organic matter .

This indicates that traditional hydraulic modeling (e.g., PHABSIM), as proposed, may be an insufficient fish focus/tool. So, first we need to identify criteria that are influential to habitat selection, within the full seasonal distributions of agreed-upon target species and life stages. Only then, after this has been adequately determined, can we begin to develop utilization functions (curves or HSC) for those criteria.

The Service has previously expressed concern with the approach of repeating the 1980's study effort, and we have repeatedly asked for both a complete compilation of available data, and a review of the 1980's information prior to accepting its use for the proposed project. Lacking that review, we independently note that, in the 1980's sites were selected that were, presumably, heavily utilized by spawning sockeye and chum (qualitative). Study sites need to be based on relevant criteria related to physical habitat site selection as documented by fish distribution and lack thereof.

-Groundwater- The integration of the groundwater study efforts with the biological studies is not clear. Specifically, how will the groundwater study be made relevant to the scale of fish habitat and fish habitat site selection in the Susitna River? The objectives of the groundwater study should include relevance to the hierarchially nested habitats, including macro-, meso-, and micro-habitats that are influential to fish habitat selection. The groundwater study sampling design should be relevant to fish habitat and site selection. A specific objective needs to be measuring the hydraulic gradient/head (upwelling or downwelling) under the existing hydrograph and under the proposed project hydrograph release flow schedule.

-Model selection: We need to first determine what criteria are important to fish habitat site/suitability and selection before we can choose an appropriate flow-habitat model. ADFG Marine Mammals biologist, Dr. Bob Small also reiterated this very same point regarding model selection for the beluga whale studies. Again, the Service notes our concern about the limited focus of the 1980's studies and using PHABSIM. Our concerns stated in earlier correspondence to AEA remain unaddressed and are reiterated here for emphasis.

Model sensitivity and relevant criteria (inputs) are critical to achieving statistically valid outputs. At this point, it is premature to select a model until we have known 1) fish distribution, and 2) identification of variables influential to fish habitat site selection.

-Biometric Review- The Service previously requested a biometric review of the 1980's findings. This request is remains outstanding and should be conducted prior to basing any study plans on 1980's studies or results. In all cases, including the usage of the 1980's Su-hydro data results and for the Susitna-Watana study plans, estimates of precision and accuracy of study results is required to evaluate the power of any study plan. Details of proposed study plan sampling and design methods need to be explicit and statistically valid with a priori determination of levels of precision and accuracy of model outputs.

-Fish genetics- During the August 15-17 meetings, AEA stated that genetic samples from the Chinook above the proposed dam site would not be collected. The stated rationale was due to the desire to minimize the handling of the fish after subsequent tagging of fish. Genetic samples of Chinook at locations above the proposed Susitna-Watana dam site are crucial to informing the Service's management goals specific to recommending licensing conditions under the Federal Power Act, and to conservation recommendations under the Fish and Wildlife Coordination Act, and the Anadromous Fish Act. As such, we consider our request for collection of genetic samples from Chinook salmon, and other fish species to be necessary for our resource evaluation of the Susitna-Watana hydropower project. Because of this information need, if AEA does not plan to collect the information, AEA should document how this study request is being addressed.

Fish species genetic samples used for comparisons should be less than ten years old to reflect current gene frequencies among the sampled fish populations. Genetic samples for salmon exist for some tributaries in the

lower and middle Susitna River. Some of these samples are greater than ten years old.

Fish genetic samples should be current and include samples of the Chinook migrating above the proposed dam location. Because gene frequencies change over time, all genetic samples should be within the most recent ten years to allow for valid comparison. Genetic analysis should analyze the existing extent of genetic differentiation within and between fish using distinctly different habitats. We request genetic analysis of Chinook above the proposed dam site relative to those at other upper, middle and lower river and tributary sample locations.

-Fish Passage/fishway prescription- The Service is concerned with the lack of transparent discussion about the potential for fish passage alternatives at the proposed Susitna-Watana dam. If fish passage is required, how will that be accomplished? If it is not feasible, what is your alternative proposal? Where is your project assessment of the fish passage feasibility? What are the design criteria being considered/evaluated?

-Compensatory Mitigation- Compensatory mitigation is determined as part of a mitigation sequence after avoidance, and minimization efforts. The Service has inquired about potential compensatory mitigation for project impacts during several meetings. To date, this concern has not satisfactorily been addressed by the project sponsors or project consultants. Because compensatory mitigation is a requirement in order to offset unavoidable projects impacts to fish and wildlife resources and their habitats, it is should be considered throughout the review process. Please explain how you plan to quantify existing habitats, and quantify primary, secondary and cumulative (40cfr Part230 of the CWA) losses to those habitats under the proposed operational flows over the temporal scale of the license period. How will habitats change proportionally under project operations?

-Lower river- The Service is concerned with AEA consultants' proposal to establish a lower boundary for the physical studies (e.g., geomorphology, instream flow) at a location "downstream of Sunshine" at approximately river mile 75, and not extend the study efforts further down into lower river to inform the biological studies. There are many biological resource studies that would necessarily be informed by establishing a consistent study boundary between the physical and biological studies. For example, studies related to the federally listed Cook Inlet beluga whale, fish species and habitats, including the resident species, and anadromous salmon and eulachon (beluga whale prey species). The lower river also includes the Susitna Flats State Game Refuge. If the physical studies boundary is terminated at river mile 75, there will be no ability to relate or integrate biological data to those studies (e.g., geomorphology, ISF, ice processes, flow routing). Resource agencies management goals would effectively not be addressed below river mile 75, if project effects are not assessed to the mouth of the river.

According to USACE (1966), 80% of the ability to produce accurate model results depends on using appropriate bathymetry data, mesh design, and boundary conditions. The amount of time needed to collect this information, particularly the bathymetry data, depends on the complexity of the channel's geometry, which is known to be complex in the lower Susitna River. Because data collection in the lower river will likely require rigorous field collection due to the channel complexity, it is critical to initiate these efforts in a time sensitive manner. The proposal to delay work in the lower river pending analysis at an arbitrary, and certainly non-biologically relevant location, does not meet resource agencies objective of evaluating the potential project impacts to fish and wildlife resources in the lower Susitna River. This is particularly true under the FERC ILP process timeline specific to the Susitna-Watana dam project.

-Studies integration: A "map" or chart of how studies are proposed to be integrated is needed. AEA sponsors and consultants, committed to providing this by September. Biological resource components are currently not integrated or connected to the other studies, and appear as being treated independently of the rest of the study requests. Study proposals must demonstrate how they will be integrated to provide needed resource information.

Studies/components not address from the Non salmon anadromous, resident and invasives fish species study request: During the August ILP meetings, the follow Service requests were preliminarily noted as not being addressed or adequately addressed by AEA's PSPs.

1) **Marine derived nutrients** contribution from non salmon anadromous species. The Service requested information in our non-salmon anadromous, resident and invasive study plan request. It is not clear which study proposal it is addressing this request, or IF it is being addressed. During the August 15-17 meetings, it was indicated that it may be addressed in either the riparian instream flow, the terrestrial wildlife, the river productivity or elsewhere. However, AEA' s consultants were unable to specifically "point to it" when asked. It does not appear to have been included in the PSPs.

2) **Resource valuation** of non-salmon anadromous and resident fish resources. During the meeting, AEA consultants stated that a resource valuation would not be provided, as requested in the Service's study request for non salmon anadromous, resident and invasive fish study. An explanation of why this assessment will not be addressed was not provided. We request that an explanation be provided that describes the rationale for this determination and urge reconsideration of our study request.

3) **Trophic ecology**- The Service requested information on trophic ecology in the non salmon anadromous, resident and invasive species study request. Michael Link stated that there are "significant predator-prey dynamics" particular once fish move out of the mainstem; using this behavior to explain why fish hold there until they are ready to dash to tributaries. He noted that the creeks are heavily preyed upon by bears, for example. Dr. Bob Small (ADFG) recommended trophic ecology and/or foraging ecology information for the Cook Inlet beluga whale studies. For fish, coordination with Tim Nightengale (AEA's consultant; via teleconference) stated that he would take gut samples from fish to see what macro-invertebrates they are eating, and when, and will work with fish study teams to do some trophic analysis. The trophic ecology component needs to be clearly spelled out in a study plan identifying any aspects that will and will not be addressed explained and with appropriate rationale.

References:

Frissell, C. A., W. J. Liss, C. E. Warren, and M. D. Hurley. 1986. A hierarchical framework for stream habitat classification: viewing streams in a watershed context. *Environmental Management* 10:2. Pp. 199-214.

Lovtang, J. C. 2005. Distribution, habitat use, and growth of juvenile Chinook salmon in the Metolius River Basin, Oregon. M.S. Thesis, Oregon State University. March 2005.

USACE 1966. (Full citation will be provided in follow-up correspondence)

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Subject: PSP 6.6 Riparian Instream Flow Study Plan - Interim Comments

Kevin,

The following are some of the key differences the USFWS sees between our study plan request (USFWS 10.1, Instream Flows for Floodplain and Riparian Vegetation Study) and AEA's proposed study plan (PSP 6.6, Riparian Instream Flow Study). The differences and comments listed below are likely not inclusive, since we have not had a chance to fully evaluate the PSP.

Many of the PSPs rely upon or provide data from/for other studies. Recognizing these relationships is an important part of the Integrated Licensing Process (ILP); however, the study providing the data should describe the methodology and oversee the data collection and analyses, while the study requiring the results should restrict its discussion to the types of data/results required from other PSPs. Repeating the methods in a study not responsible for the data collection and analyses is unnecessary and risks confusion if the methods differ or are inadequate in one of the studies. Since the Riparian Instream Flow PSP will rely upon data from the Groundwater PSP, the Riparian Instream Flow PSP should describe only the results required from the Groundwater PSP, and then describe how those results will be used in the Riparian Instream Flow PSP (e.g., 5.7 Groundwater PSP should be the only PSP that describes the groundwater methods). This applies to other PSPs, such as the habitat mapping studies that may be providing data for this PSP.

Study Goals and Objectives: The USFWS requested a specific goal that included quantifying the frequency, timing and duration of surface-water and groundwater levels required to establish, maintain, and promote floodplain and riparian plant communities. Two ancillary goals were also requested to quantify the frequency and rate of sediment deposition required to promote soil development, and to quantify the effect of river ice on the establishment and persistence of riparian plant communities. Section 6.6.1.1 of the PSP has no stated goal, and only a general approach is provided. An "overarching goal" is provided in the Section 6.6.4 Study Methods, but this goal is also very general. While goals can be very general in nature, the specifics in our goal set the stage for a rigorous study plan to evaluate potential project-related effects on floodplain plant communities.

The USFWS requested six objectives to help meet our goal. Three of the PSP objectives are similar to our requests {1) Synthesize 1980s data, 2) Study sites, and 6) Seed dispersal}, but they lack the additional specifics stated in our requested objectives. Two of the PSP objectives appear to be wholly or at least partially the objectives for other PSPs and not appropriate as stated {3) Map riparian vegetation, and 10) Impacts to shallow groundwater well users}. What the PSP objectives lack, however, are our specific requests for river ice, sediment deposition, and water-level regime (USFWS Objectives 4, 5, and 6). These missing objectives may be studied under AEA's PSP objectives, but the USFWS prefers they be considered as standalone objectives, and possibly integrated into a single modeling objective after they have been studied individually. The USFWS is particularly interested in our Objective 6 to characterize the water-level regime required to maintain floodplain and riparian plant communities. Much of the discussion so far has focused on floodplain plant succession, but little or no discussion so far has involved maintenance flows. Succession is important, but without maintenance flows whole floodplain plant communities may collapse or the direction of succession changed to an unnatural target (e.g., non-floodplain plant communities).

Study Area: The USFWS agrees with the PSP study area and four river segments, with the following additional comments. The width of the active valley should also include the distance from the River that the River influences groundwater, as well as define the return interval for both groundwater and flooding (e.g., 100-year event under current or climate-change induced conditions). Much discussion has centered on the downstream

influence of the Project. The PSP study area Lower Reach would extend to RM 0. Will this lower extent remain even if all agree that the Project influence on surface- and ground-water becomes indistinguishable from normal environmental variation?

Study Methods: The methods need to follow the order of the objectives and use section headings that refer to the intent of the objectives. Few methods are referenced, and some references that are cited are not included in the literature cited. The relationship with other PSPs often seems confusing. It would be more helpful to state what results will be required from PSP "x" to evaluate a Riparian ISF objective, and potentially what results from a Riparian ISF objective will be required by PSP "y." It is not necessary to repeat coordination for every objective, only state the inputs required and the outputs provided by an objective. This applies across PSPs and among a PSP's objectives. The following comments on methods follow the order of the Objectives requested by the USFWS:

RIFS-1 Synthesize Historical Data: In addition to other North American hydro-projects, this review should also include a review of relatively undisturbed riverine systems.

RIFS-2 Select and Design Study Sites: The number of study sites should provide sufficient replication to address the needs of the objectives, and should include sites where Project operation is expected to cause early channel bed degradation or aggradation. The casual reference to pseudoreplication in one of the other objectives needs to be addressed at the study-site level. Study sites are typically the experimental unit where replication is used for true statistical analysis. All other sampling (e.g., within the study site) is really subsampling used to obtain a better average value for that one replicate. As envisioned by many of the PSPs, the "representative" study sites are really only one replicate for each process-domain. For more on pseudoreplication see:

Hurlbert, Stuart H. 1984. Pseudoreplication and the Design of Ecological Field Experiments. Ecological Monographs 54:187–211. <http://dx.doi.org/10.2307/1942661>

RISF-3 Characterize Seed Dispersal and Frequency of Establishment: Not sure where this objective is addressed in the PSP. It appears to be scattered across several sections in the methods. If the methods have been described by other similar projects, then cite their methods if appropriate and include enough details to help others understand the methods that will be used. How will the Susitna River bimodal peak flows be addressed? On a float trip down the Susitna 27-29 July 2012, there were newly emerging dicot seedlings on the sandbars. How will the fate of these "second peak" seedlings be addressed? How will the role of precipitation in maintaining favorable soil moisture conditions be evaluated? Will soil texture be considered? If so, how will the soil profile be described?

In Section 6.6.4.3.1.4: Is "abundance" density or some other metric? What is "elevation" referenced to: ASL, an arbitrary datum, or some elevation that can be linked to the local river or groundwater stage (keep in mind the river drops downstream, so that must be accounted for also)? Is there a citation for others using 2-meter square plots? What is the shape of these plots? A square plot may not be appropriate for a narrow band of seedlings along a specific elevation in the gradient above the river. MODFLOW is a groundwater model, and many not be sensitive enough to quantify hydroperiod relationships for seedlings. What other metrics will be used to quantify/separate surface water, groundwater, soil moisture, precipitation, and other potential hydrological process that support seedling establishment and recruitment?

How will the results from this objective be used to predict potential Project-related changes in seedling establishment and recruitment into the population?

RISF-4 Characterize the Role of Ice in the Establishment, Survival and Recruitment of Riparian Species: The discussion on ice processes (Section 6.6.4.4.1) seems unfocused, and essentially provides no discernible methods: "Final details of the geomorphology and ice processes modeling ... will be developed as the 2012 studies are obtained." The goal of this study should be to characterize the role of river ice in the establishment (colonization), survival (first 3 years) and recruitment into the future reproductive population of dominant riparian species (e.g., balsam poplar, willows). Have others investigated the role of ice on riparian plant communities?

If so, can their methods be used here? How will the magnitude, frequency, and longitudinal distribution of ice events affecting dominant riparian species/communities be evaluated?

RISF-5 Characterize the Role of Sediment Deposition in the Formation of Soils: The proposed soil sampling techniques are included in Section 6.6.4.3.1.5, but based on these techniques it is unclear how the USFWS requested objective to characterize the role of sediment deposition in the formation of floodplain and riparian soils, and how sediment deposition affects the rate and trajectory of plant community succession. This objective should investigate the rate of deposition, depth of sediment, and soil profile development required for natural floodplain plant community succession, and then use the predicted sediment deposition characteristic from the Fluvial Geomorphology Study to predict the effects of Project operation on floodplain plant communities.

Sampling to only a depth of 50 cm, and describing cumulative thickness of all organic horizons and loess (windblown material?) without stratigraphy will likely be insufficient to meet this objective. Soil texture by feel should follow standard techniques (e.g., Thien 1979, <http://soils.usda.gov/education/resources/lessons/texture/>).

RISF-6 Characterize Water-Level Regime Required to Maintain Floodplain and Riparian Plant Communities:

This is a critical objective that has not been sufficiently discussed in past workgroup meetings, possibly due to lack of time, and the PSP methods are insufficient to evaluate if the USFWS requested objective will be met.

Suggest this objective be discussed near the beginning of future meetings to allow sufficient time for discussion.

Objective 6 combines hydrologic information from the groundwater study (PSP 5.7) and the plant community information from this study (PSP 6.6) and possibly the habitat mapping studies (PSPs 9.6 and 9.7) to produce plant species/community response curves. The USFWS's Objectives RISF-3 to RISF-5 target critical stages in plant community succession, while RISF-6 targets critical instream flows required for maintaining plant communities as succession progresses (i.e., both succession and maintenance are important).

The methods for groundwater belong in the Groundwater PSP, and not in this PSP for reasons discussed above. This PSP should request the required hydrologic information from PSP 5.7 and begin the discussion from that point. The following comments, however, include the pertinent groundwater methods that should be discussed in PSP 5.7.

Section 6.6.4.5 (Groundwater): The suggested four to six intensive study reaches instrumented with groundwater and surface-water recording instruments may be insufficient to address this objective if plant response will be described by process-domains (see pseudoreplication discussion above). However, hydrology is likely the most dominant physical factor required for maintaining floodplain plant communities across the various process-domains, and barring some other dominant physical factor (e.g., soil parent material, weather, etc.) it may be possible to use data from the individual intensive study-site transects to build response curves (see Henszey et al. 2004 {ne.water.usgs.gov/platte/reports/wetlands_24-3.pdf}, Figure 7 for an indication of the number of data points required to build a response curve).

One-and-a-half growing seasons (July 2013 to September 2014) will likely provide insufficient groundwater hydrology data to fit individual species response curves (especially for annual species), and may not be enough data to reasonably predict groundwater relationships with river stage and to verify the model predictions with independent data. Precipitation may also dramatically affect transient but critical groundwater levels (a few days to a week or more of elevated water levels), which would be difficult to evaluate with limited data. How will these potential problems be addressed?

What are the "project accuracy standards used for water-level measurements" for horizontal, vertical and temporal measurements?

In addition to the Work Products described in Section 6.6.4.5.2, the products should provide water-level summary statistics for each location (e.g., point, plot, or transect) that will be used to test and fit plant response curves, such as growing season cumulative frequency, 7-day moving average, 10-day moving average, 14-day moving average, and arithmetic mean (see Henszey et al. 2004 {ne.water.usgs.gov/platte/reports/wetlands_24-3.pdf}, Table 1).

Section 6.6.4.7 (Succession Models and Flow Response Guilds) appears to potentially address the USFWS's Objective 6 request; however, two critical referenced papers (Merritt et al. 2010 and Pearlstine et al. 1985) were not included in the Literature Cited. These references were not provided until 8/28/2012, and the USFWS has had insufficient time to review these papers in detail. The concept of the PSP response guilds is similar to the USFWS's request to develop plant community response curves, but the PSP methods are insufficient to evaluate if our requested Objective 6 will be met. The USFWS requested evaluating specific water-level summary statistics (see above discussion for groundwater) with a rigorous curve-fitting technique similar to Henszey et al. (2004). The methods should provide sufficient detail to show how quantifiable (not qualitative) hydrologic (surface-water and groundwater) gradients will be constructed to show the optimum and range of favorable water levels required for maintaining floodplain species/communities.

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Bob_Henszey@fws.gov

From: Eric Rothwell [mailto:eric.rothwell@noaa.gov]
Sent: Wednesday, September 12, 2012 5:37 PM
To: dreiser@r2usa.com
Cc: PHilgert@r2usa.com; Laura Arendall; Betsy McGregor; susan walker; Berg, Catherine; Betsy McCracken (FWS); Michael_Buntjer@fws.gov
Subject: Re: Meeting on the 12th

Dudley,

Thank you for coming over and meeting today. Also, thank you for providing the meeting presentation before hand, having it to review helped facilitate the discussion. The aerial imagery with the proposed study reaches was also helpful in our conversation, when they are available I would like a copy.

I typed up some of my comments from today, starting with general comments, twg meeting protocol comments, and then specific comments on the site selection process. I cc'd other agency personnel that will likely attend the meeting Friday, hoping that it will provide some useful discussion points and I look forward to continuing the discussion September 26-28th. Betsy, Sue, etc. the attached presentation that Dudley provided is draft and parts will likely change prior to Friday's meeting.

General comments about all of the PSPs:

- What can be determined from each of the study components, a description of deliverables (not results) this will help us understand if our requests have been met.
- How will uncertainty be determined for each of the study components? (ice processes -> hydraulic flow routing -> winter fish and habitat effects)
- How will incomplete study components, data, or results be dealt with - situations where an extension of the study period is necessary.

General comments about TWG meetings, as Friday will start to define what TWG will look like:

- An agenda should be provided with enough time to review and submit changes
- All meeting materials provided with enough time for review prior to the meeting, including presentations
- Relevant background material that will aid the discussion will be provided
- Meeting summary and minutes within two weeks of the meeting, distributed to all attendees as a draft. Then a two week period to submit additions and/or corrections
- And - attendees (agency personnel included) will be prepared by reviewing all the materials prior to meeting.

Comments specific to the study site selection process

The proposed methods for site selection are first to select sites in a hierarchical framework (segment by hydrology, then geomorphology, then habitat units). Sites selected will include all the riverine habitat types that are defined (relevant to that reach, for example MR2 may not have any upland sloughs).

The site selection will be informed by selecting sites that are 'critical', meaning that they are likely to be highly affected/sensitive to flow changes and highly important biologically. Generally I agree with prioritizing sites that will be hydraulically affected and are biologically important, but we have incomplete biologic information. The data from the 1980s provides some useful information about utilization of off-channel habitats that should inform our studies but the information is limited in that it does not fully capture mainstem utilization or overwintering.

So, with new fish utilization and distribution information site selection should include some flexibility to include sites where life histories are not assessed under the currently proposed sites. This seems to be suggested in

the site selection process schedule if it includes fish distribution/habitat utilization information, November 2013 evaluate summer 2013 data and modify/add sites as needed in collaboration with TWG

The schedule provided includes refinement of selected sites by the use of mapping results to evaluate habitat variability, conduct statistical power analysis, refine intensive sites and identify supplementary sites. If possible an addendum to the PSP or definitely in the RSP a description of the initial site selection (by the hierarchical framework) and refinement (by habitat mapping results and fish studies) methods should be presented, not just the selected sites. This depends on the fish studies being sufficient to describe the full distribution of fish and their habitat use.

Incorporation of multiple study elements, such as ice processes, groundwater, geomorphology, and water quality. This is especially important in habitats where one of the other study elements is driving habitat use by fish, for example if upwelling and water temperature is a determining factor for site selecting for Chinook to overwinter then the study site should include this habitat and integrate the WQ and GW studies to understand distribution of thermal refugia for overwintering and how the project would affect those processes/characteristics.

The slides presenting the 1980s electrofishing and sampling was informative, but again shows an incomplete understanding of habitat utilization. The 1980s sampling focused on the off-channel habitats (side sloughs/channel, upland sloughs, and confluences with tributaries). This information should be used to inform selections but must also be put into context that we really don't know very much about mainstem utilization and overwintering, and so need to be flexible (potential with extended study years) when a better understanding is gained through the 2013 and 2014 fish studies.

The slides on each of the species, I had a general comment that they should be put into perspective. That the 1980s data does not represent a complete understanding so comments like no mainstem spawning should be qualified. There likely is a riverine component to sockeye (and other species) that do spawn in the river but that just wasn't captured in the 1980s due to the methodologies available. We do not currently know the full spawning distribution.

Representative reaches, extrapolation of results, and replication. We touched on this and I look forward to talking about this more. I did not review Aaserude et al. 1985 prior to our meeting but plan on reading it prior to the Sept. 26-28 meetings.

Although not discussed, I have a concern with winter flow routing and ice processes, and how they will inform site selection. Site selection for analyzing winter instream flow effects to fish and their habitat will depend on an understanding of operational effects downstream (to flow timing and quantity, hydraulics, and water quality).

Also the extension of the studies downstream will depend on these results. The winter hydraulic flow routing model will rely on ice process modeling to determine the downstream extent and magnitude of operational flow effects. The ice process modeling will need several years of data, in addition to the ice thickness measurements and discharge measurements at each of the cross-sections for the winter routing model. I see a lack of time to collect data for the models (winter flow routing and ice process) calibrate the models and then selection sites and methods to conduct ISF studies to assess project effects on fish during winter operations under the currently proposed study period.

This was a very targeted meeting to discuss site selection, I look forward to discussing this and other parts of the ISF and other study plans in the near future. After Friday's meeting I hope to see the selection methods written up with consideration of the agency comments (including the proposed methods for extrapolation), this should help us continue the discussion.

Best Regards,
Eric

APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION

**SECTION 8 – INSTREAM FLOW STUDY: FISH, AQUATICS, AND
RIPARIAN**

From: Klein, Joseph P (DFG) [joe.klein@alaska.gov]
Sent: Thursday, August 02, 2012 10:32 AM
To: dreiser@r2usa.com
Cc: Betsy McGregor; Erickson, Jack W (DFG); Betsy_McCracken@fws.gov; Michael Buntjer; Steele, Marie C (DNR); eric Rothwell
Subject: Instream Flow Study Plan

Dudley-

Thank you for the channel summaries – there are very helpful and informative.

Following up with the suggestion below, additional information that would be helpful with development of the study design would be a summary of the relative proportions of channel types. It would be great if the information was combined with relative densities of documented fish use. I see that some of this information is included in the proposed study plan and so I'm not clear on when this information will be available.

As you know, this information is one of the initial steps for identifying sampling strategies (representative reach vs macro habitat), habitat selections as well as modeling selections (transects, weighting protocols, hydraulic and habitat simulation programs, aggregation protocols, etc.). Two key issues that I am not clear on are 1) how will the decision be made on which habitat specific model(s) will be used, and 2) how and when will other related riverine studies be integrated (e.g. water temperature, ground water, fish passage, sediment transport, channel maintenance, and ice processes)?

I am looking forward to discussing these topics at the upcoming and future meetings.

Per a future site visit, right now my calendar is open for September.

Hope this helps, Joe

Joe Klein, P.E.
Supervisor Aquatic Resources Unit
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333 Raspberry Rd
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(907) 267-2148
joe.klein@alaska.gov

From: Betsy McGregor
Sent: Wednesday, August 01, 2012 11:50 AM
To: Betsy_McCracken@fws.gov; dreiser@r2usa.com
Cc: eric Rothwell; 'Phil Hilgert (R2)'; Lori_Verbrugge@fws.gov; Catherine_Berg@fws.gov; jklein@alaska.gov; jerickson@alaska.gov; James.brady@hdrinc.com; mink@lgl.com; susan walker; shawn.florio@hdrinc.com; mkeefe@r2usa.com; bburgess@abrinc.com; lawhead@abrinc.com; tschick@abrinc.com; pdworian@urs.com; bridget.easley@urs.com; mtuttell@dowlhkm.com; paul.anderson2@alaska.gov; mobley@alaska.net; donna.logan@mcdowellgroup.net; jmh@northernlanduse.com; keri.lestyk@hdrinc.com; milly@gwscientific.com; jshook@abrinc.com; amy.rosenthal@urs.com; louise.kling@urs.com; john.gangemi@erm.com;

marie.steele@alaska.gov; bill.fullerton@tetrattech.com; Butera, Bob; robert.plotnikoff@tetrattech.com; tracie.krauthoefer@hdrinc.com; Burden, Pat; khansen@dowlhkm.com; bob_henszey@fws.gov; michael_buntjer@fws.gov

Subject: RE: July 26th Su-Watana Field Visit- ISF

Hi Betsy.

Thanks for providing Dudley with your availability for the ISF field trip. Hopefully others will do so as well so the trip can be as beneficial for the licensing participants as possible. R2 prepared the slough and side channel summaries that we used during the site visit last week. It would be great to provide any feedback as to how that summary could be modified or any additional information that may be useful for the September ISF site visit.

Data gathered thus far will be disseminated to the agencies, as well as all other interested licensing participants through AEA. AEA is committed to an open process with all of the licensing participants. However, any requests for summaries of information gathered, project status or data should be directed to AEA instead of AEA's individual contractors.

At this time, contractors are very busy preparing for the August TWG meetings and some are also concurrently in the midst of conducting the 2012 studies. The 2012 study plans have been presented at TWG meetings and can be found on AEA's website. The status of the current data gathering efforts will be mentioned during the August TWG meetings and some information will be presented where it is relevant to development of the Revised Study Plan, which is the primary objective of the upcoming TWG meetings. Additional interim data may also be made available to the licensing participants as it relates to further refinement of the study plans. The 2012 studies will be summarized and data will be presented to the licensing participants after the field season is completed.

Thanks for your participation in this Project.

Betsy

Betsy McGregor
AEA Environmental Manager

From: Betsy_McCracken@fws.gov [Betsy_McCracken@fws.gov]

Sent: Wednesday, August 01, 2012 9:33 AM

To: dreiser@r2usa.com

Cc: Betsy McGregor; eric Rothwell; 'Phil Hilgert (R2)'; Lori_Verbrugge@fws.gov; Catherine_Berg@fws.gov

Subject: RE: July 26th Su-Watana Field Visit- ISF

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Also, as you are likely aware, resource agencies are in the midst of reviewing study plans provided by AEA's consultants. Relative to R2's proposed Instream Flow (ISF), Groundwater and Habitat Utilization study plans,

would you please provide a summary of recent field work conducted or currently in the works from this summer (2012) season? For example, has there been any groundwater (reconnaissance or otherwise) work done this season that would inform the ISF and habitat utilization efforts? I am asking this in an effort to gain an understanding of where we are at, or where we will be at with efforts when we head out to the river in September.

Thank you very much,
Betsy
Betsy W. McCracken

Fishery Biologist
Conservation Planning Assistance
Ecological Services
US Fish and Wildlife Service/Region 7/Anchorage Field Office
Betsy_McCracken@fws.gov
(907) 271 - 2783

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marie.steele@alaska.gov; bill.fullerton@tetrattech.com; Butera, Bob; robert.plotnikoff@tetrattech.com; tracie.krauthoefer@hdrinc.com; Burden, Pat; khansen@dowlhkm.com; bob_henszey@fws.gov; michael_buntjer@fws.gov

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Betsy

Betsy McGregor
AEA Environmental Manager

From: Betsy_McCracken@fws.gov [Betsy_McCracken@fws.gov]

Sent: Wednesday, August 01, 2012 9:33 AM

To: dreiser@r2usa.com

Cc: Betsy McGregor; eric Rothwell; 'Phil Hilgert (R2)'; Lori_Verbrugge@fws.gov; Catherine_Berg@fws.gov

Subject: RE: July 26th Su-Watana Field Visit- ISF

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Thank you very much,
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Betsy W. McCracken

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Betsy_McCracken@fws.gov
(907) 271 - 2783

From: Klein, Joseph P (DFG) [mailto:joe.klein@alaska.gov]

Sent: Thursday, August 23, 2012 2:48 PM

To: Betsy McGregor

Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); Michael_Buntjer@fws.gov; Betsy_McCracken@fws.gov; eric Rothwell; Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)

Subject: RE: Follow up Meeting Notes-additional comments

Following are additional comments

Baseline Water Quality

5.5.4.3.2 In-Situ Water Quality Sampling The sampling protocol currently calls for monthly in-situ water quality monitoring for the 4 summer months. It should be revised to include continuous (hourly or so) water quality measurements for basic parameters (pH, DO, conductivity, turbidity), year-round if possible using in-situ semi-permanent sensors (e.g. sondes). The technology is readily available and would provide very useful baseline information to assess any post project impacts.

River Productivity

7.8.4.4 Conduct a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River. We recommend supplementing or substituting this section using a reference reach in a similar Alaska river using a BACI design monitoring program in order to assess post project impacts.

From: Klein, Joseph P (DFG)

Sent: Thursday, August 23, 2012 10:42 AM

To: McGregor, Elizabeth A (AIDEA)

Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); Michael_Buntjer@fws.gov; Betsy_McCracken@fws.gov; Eric Rothwell (Eric.Rothwell@noaa.gov); Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)

Subject: Follow up Meeting Notes

Betsy-

Thank you for the opportunity to discuss the proposed study plans for the Susitna-Watana Hydroelectric project. We look to further discussions to continue to clarify study plan details.

To assist in you and your consultants in this process, below are brief notes by ADF&G staff. We may have additional comments/or clarifications. Please feel free to contact me if you have any questions.

Regards, Joe

Fish Distribution and abundance in Upper, Middle and Lower Susitna River

- Trot lines should considered during the winter to target appropriate fish species.
- Minnow trapping under ice should be used during the winter, in all habitat types.
- Should evaluate the feasibility of under ice videography.

Salmon Escapement

- Identify locations of adult fish weir locations described on tributary streams (7.7.4.1.5, page 7-39). Consider placement of adult fish weir upstream of the proposed dam on prominent Chinook salmon streams.

Instream Flow

- What is the sampling strategy (e.g. representative reach, mesohabitat typing) for the defined habitat types?
- How many and at what range will discharge-calibration sets be collected for each sampling method?
- Will 2D modeling include side channels and sloughs within study area?
 - Based on comments at the meeting it was my understanding it would.
- What criteria will be used to identify cover types and substrate sizes?
- For PHABSIM, will transects be independent, dependent or a combination and accordingly, what WSE models and composite suitability index will be used?
- What criteria will be used to select and weight transect-derived models?
- Per the description of study sites for fish passage/off-channel connectivity (§6.5.4.5.5), what criteria will be used to identify "a representative number" of different habitat types?
- HSI data is needed for identified target species for each defined habitat type, over 2 years.
- How will the data be aggregated to evaluate single flow recommendation?
- Will a DSS-type program be available to review study results and if so, information is needed on it.
- How do you envision the "collaborative process" will work? When will major decisions be made (e.g. site and transect selections) and how often do you envision the work group will get together?
- What equipment will be used and how will they be calibrated?
- For the eulachon and boating studies, similar information is needed on what is the study area, what sampling strategy will be used, how many and what range of calibration-discharge sets if appropriate, and how will HSI curves will be developed?
- Variational zone modeling, may need more defined time steps during analysis phase (possibly down to 15-minute increments) depending on the rate of flow change over time.

Groundwater

- What are the monitoring well placement sampling approach (e.g. equal spacing along linear transects, etc.) and location (e.g. for instream flow, in all habitat types?) for the various resource studies (i.e. instream flow, riparian instream flow, water quality). Also, a description of sampling intensity would be helpful (i.e. for instream flow purposes, will the objective be to characterize entire gw/sw interaction throughout entire intensive study site or only at select microhabitats).
- What is the duration for monitoring (I believe at the meeting it would be from installation until winter 2013-14?)
- How often will monitoring wells be calibrated for various parameters to be sampled pre- post- and during field monitoring?
- For each resource discipline, what parameters will be sampled and what are range of accuracies (e.g. for water level +/- 0.1 ft?, water temp +/- 0.2 C?, etc.).

Water Quality

- Information on availability of the Sampling and Analysis Plan and Quality Assurance Project Plan is needed.
- GW Quality in Selected Habitats (Section 5.5.4.7) - need more information on study. For example, sampling intensity/number of site measurements per slough or criteria for how they will be determined. Will ground water level monitors be installed if so, what is the sampling intensity (numbers per habitat type) and duration of monitoring (e.g. continuous year-round/ point samples during field visits, etc.). If not, it is strongly recommended groundwater monitoring be performed concurrently with water quality monitoring in this study.
- Any monitors should be calibrated pre- and post-monitoring along with multiple field measurements for post monitoring calibration.

From: Betsy_McCracken@fws.gov [mailto:Betsy_McCracken@fws.gov]
Sent: Friday, September 07, 2012 4:02 PM
To: Betsy McGregor
Cc: Bryan Carey; 'Fullerton, Bill'; Betsy McGregor; Bob_Henszey@fws.gov; eric Rothwell; 'Klein, Joseph P (DFG)'; 'Kevin Fetherston'; 'Matthew LaCroix'; 'Laura Arendall'; 'Mike Buntjer'; 'MaryLou Keefe'; 'Michael R. Lilly, GW Scientific'; PHIlgert@r2usa.com; rob.plotnikoff@tetrattech.com; 'Benkert, Ronald C (DFG)'; susan walker; 'William Rice'; matt.cutlip@ferc.gov; Lori_Verbrugge@fws.gov; Catherine_Berg@fws.gov; Jennifer_Spegon@fws.gov; dreiser@r2usa.com
Subject: Follow up comments from August 15-17 ILP meetings

Hi Betsy,

Thank you and AEA for hosting the August ILP meetings. We all gained a lot of insight from the meetings, and we were pleased to be updated. Like others, as a result of the meetings, the Service has a few comments and concerns to share with the group.

In addition to these below, other staff from the Service may provide comments relative to their study area expertise. We hope that our collective comments will be helpful toward gaining concurrence on proposed studies, and as we move forward with the review process of the proposed Watana dam.

Thank you,
Betsy

September 7, 2012

Notes from ILP Formal Study Meetings August 15-17, 2012:

At the request of AEA and its consultants, the USFWS (Service) submits this brief summary of concerns regarding the Susitna-Watana hydropower dam formal ILP Formal Study meetings that were held August 16-17, 2012. The Service's concerns in this informal correspondence, along with other remaining concerns will be further articulated in the Service's formal response letter on AEA's ILP Proposed Study Plan (PSP) review, due to FERC October 15, 2012. Additional informal comments from the Service may be provided under separate cover before the October due date.

FWS concerns highlighted during meetings relative to Instream Flow, Habitat Utilization and the Geomorphology proposed study plans:

Overall, the Service finds that AEA's proposed study plans for instream flow, habitat utilization and geomorphology do not fully address agency's resource management concerns. During the three days of ILP study meetings, sequencing and integration of the proposed biological resource studies and the physical process studies was not described and is still a significant outstanding information need. It is necessary to describe the integration of these inter-related studies and how that integration will result in a comparison of the baseline biological information and the resulting effects to biologic resources caused by the proposed project operations. Study results must be quantifiable in order to assess potential losses to aquatic resources and their habitats, to review the project under our relevant fish and wildlife resource conservation authorities, to inform fishway prescription authority under Section 18 of the Federal Power Act, and to eventually develop recommended protection, mitigation, and enhancement for the project license. We do not believe that the current study plan proposals will yield sufficient information to allow us to adequately assess proposed project impacts to the Nation's fish and wildlife resources and develop adequate PME's.

The Service has repeatedly articulated concerns about the lack of study sequencing, connectivity and integration between the biological studies and the other proposed engineering and physical processes studies. We reiterate and highlight the need for the collection of adequate temporal and spatial baseline biological and fish habitat data to provide direct input to some of the proposed physical modeling efforts. Many of our concerns, below, are related to the temporal mismatch of biological data collection with the forward momentum of the physical modeling efforts.

-Habitat Mapping

Hierarchially-nested aquatic habitats- HDR stated at the meeting that the “habitat mapping” will be started in September; and that the sampling will be stratified by meso-habitat type as identified in the 1980’s study reports.

The 1980’s studies did not hierarchically nest the habitat types. The Service specifically requested hierarchially nested habitat mapping (e.g., Frissel et al, 1986). We are concerned with the proposal to use the 1980’s study sites, which focus on the side sloughs, and do not consider the full breadth of fish habitats, which is currently unknown and the subject of ongoing study that has not been completed or submitted for agency review and comment. We do not endorse the use of the 1980’s sites without first completing and then applying a hierarchal assessment of the river reaches as a study framework. The hierarchally nested aquatic habitats framework is needed to structure fish distribution surveys, the instream flow study and other physical process studies. Without it, the fish surveys will be too narrowly constrained and the instream flow studies will not represent all habitats that may be affected by the proposed project. The Service recommends the following habitat hierarchy for the Susitna River be used for habitat mapping purposes and integration of studies:

Large River Floodplain Habitat Hierarchy

1. **Geomorphic units:** Large-scale geomorphic and hydraulic controls.
 - a. Bedrock controlled, single-channel units with shallow hyporheic exchange and thermal homogeneity.
 - b. Unconfined, multiple channel floodplain units with expansive hyporheic exchange and thermal heterogeneity.
2. **Macrohabitats:** Primary, flood, and spring channel networks.
 - a. Primary channels—Perennial channels.
 - b. Flood channels—Seasonally connected channels.
 - c. Spring channels—Disconnected sloughs that discharge groundwater.
 - d. Floodplain ponds—Ponded spring channel networks.
3. **Mesohabitats:** Bed and bank morphological controls; hydraulic features.
 - a. Riffle-pool sequences—Run, riffle, pool, glide, tailout.
 - b. Backwaters, alcoves, shallow meander margins.
4. **Microhabitats:** Hydraulics, water quality, substrate, cover.
 - a. Water depth, velocity, bulk flow characteristics (e.g. Reynolds and Froude #'s).
 - b. Vertical hydraulic exchange (ground and surface water exchange).
 - c. Bed, or intragravel temperature and dissolved oxygen.
 - d. Substrate size, heterogeneity.

e. Elements of wood, vegetation, and rock structure.

-Fish distribution: A first step is to assess the seasonal distributions of target species and life stages and the physical habitat criteria that influence habitat selection and suitability. As a first step, target species have to be identified, agreed upon, and their life history and habitat use similarities to other, unstudied species (i.e., non-target species) need to be determined and described. In the study requests of the Service and other agencies, we recommended studying the baselines of all affected fish species and life stages, including all five species of anadromous salmon and all resident fish.

Fish distribution data are needed to describe the baseline data to support and compliment other proposed study objectives, including those related to fish habitat selection and utilization. A first step to acquiring adequate fish distribution is to assess the full lateral and longitudinal profile of seasonal fish distribution, life stage periodicity, and suitable used and unused habitats that are influential in fish habitat site selection. The fish distribution data is needed to provide the base data layer that will support and compliment other proposed study objectives, including those related to fish habitat selection and utilization, and instream flow (ISF) needs. This information is also needed for resource agencies' fishway prescription decisions under the Federal Power Act. Baseline biological information is critical input necessary for integration with physical studies. Accordingly, the Service is reiterating the need for multiple and continuous years of biologically relevant data in order to provide robust integration with the physical modeling studies, and decision-support relative to fish and wildlife resources of the Susitna River basin.

-Habitat site selection criteria: Criteria that influence habitat selection and suitability need to be identified using statistically powerful and robust methods and current models of fish distribution including bioenergetics and not exclusively physical habitat models (Lovtang 2005). The Service remains opposed to the proposal to repeat the 1980's approaches to fisheries studies. The 1980's studies do not determine the habitat criteria influencing fish habitat site-selection, they simply report utilization functions for water depth and velocity, or depth and substrate. They also lack a fundamental baseline assessment of all available fish habitat and instead focus on study of habitats that had high fish use density. The habitats that were apparently suitable but unoccupied or underutilized by fish need to be assessed, and the entire range of habitat availability and habitat use data need to be assessed prior to habitat study site selection.

More comprehensive data collected on nearby glacial rivers may be used to demonstrate that habitat selection by salmon in side-sloughs can be independent of water depth and velocity and should be compiled.

Fish habitat study sites should be surveyed and identified using the full range of habitats seasonally utilized by agreed-upon target species and life stages. The objective is to identify the bioenergetics and physical factors that control fish habitat selection. The Service considers the assessment of habitat influential to fish habitat site selection to be an objective of the Instream Flow and Habitat Utilization Study request. In the resource agencies Instream Flow and Habitat Utilization Study Plan requests, this is a specifically stated objective.

Sequentially, appropriate flow-habitat models can be selected *after* assessment and validation of 1) the full seasonal distribution of target species and life stages, 2) the physical factors (e.g., micro-habitat data) that influence habitat selection and suitability, and 3) the bioenergetic factors affecting fish habitat suitability and productivity.

Thus, field visits proposed for the end of September (2012) should be considered as reconnaissance and for discussion purposes, and not for the purpose of actual study site-selection.

-Habitat Suitability Indices: Methods for collecting site-specific habitat criteria for the glacial Susitna River need to be collaboratively identified. (As recommended in the resource agencies study plan request for Instream Flow and Habitat Utilization). These criteria also need to be evaluated in the context of the hierarchical habitat model, such that habitat criteria are determined and evaluated in all habitats of importance to each agreed-upon target species and life stage.

The 1980's studies were inconclusive in demonstrating a relationship between fish habitat criteria and fish distribution, and they were also narrowly focused on associations of spawning and rearing salmon with water

depth and velocity in spring channels (side sloughs). Not only is this not representative of existing habitat and the distribution of fish within those habitats, habitat data collected from nearby glacial rivers demonstrates that spawning habitats selection is independent of flow depth and velocity in side sloughs and may be profoundly influenced by bioenergetics and the input of organic matter .

This indicates that traditional hydraulic modeling (e.g., PHABSIM), as proposed, may be an insufficient fish focus/tool. So, first we need to identify criteria that are influential to habitat selection, within the full seasonal distributions of agreed-upon target species and life stages. Only then, after this has been adequately determined, can we begin to develop utilization functions (curves or HSC) for those criteria.

The Service has previously expressed concern with the approach of repeating the 1980's study effort, and we have repeatedly asked for both a complete compilation of available data, and a review of the 1980's information prior to accepting its use for the proposed project. Lacking that review, we independently note that, in the 1980's sites were selected that were, presumably, heavily utilized by spawning sockeye and chum (qualitative). Study sites need to be based on relevant criteria related to physical habitat site selection as documented by fish distribution and lack thereof.

-Groundwater- The integration of the groundwater study efforts with the biological studies is not clear. Specifically, how will the groundwater study be made relevant to the scale of fish habitat and fish habitat site selection in the Susitna River? The objectives of the groundwater study should include relevance to the hierarchially nested habitats, including macro-, meso-, and micro-habitats that are influential to fish habitat selection. The groundwater study sampling design should be relevant to fish habitat and site selection. A specific objective needs to be measuring the hydraulic gradient/head (upwelling or downwelling) under the existing hydrograph and under the proposed project hydrograph release flow schedule.

-Model selection: We need to first determine what criteria are important to fish habitat site/suitability and selection before we can choose an appropriate flow-habitat model. ADFG Marine Mammals biologist, Dr. Bob Small also reiterated this very same point regarding model selection for the beluga whale studies. Again, the Service notes our concern about the limited focus of the 1980's studies and using PHABSIM. Our concerns stated in earlier correspondence to AEA remain unaddressed and are reiterated here for emphasis.

Model sensitivity and relevant criteria (inputs) are critical to achieving statistically valid outputs. At this point, it is premature to select a model until we have known 1) fish distribution, and 2) identification of variables influential to fish habitat site selection.

-Biometric Review- The Service previously requested a biometric review of the 1980's findings. This request is remains outstanding and should be conducted prior to basing any study plans on 1980's studies or results. In all cases, including the usage of the 1980's Su-hydro data results and for the Susitna-Watana study plans, estimates of precision and accuracy of study results is required to evaluate the power of any study plan. Details of proposed study plan sampling and design methods need to be explicit and statistically valid with a priori determination of levels of precision and accuracy of model outputs.

-Fish genetics- During the August 15-17 meetings, AEA stated that genetic samples from the Chinook above the proposed dam site would not be collected. The stated rationale was due to the desire to minimize the handling of the fish after subsequent tagging of fish. Genetic samples of Chinook at locations above the proposed Susitna-Watana dam site are crucial to informing the Service's management goals specific to recommending licensing conditions under the Federal Power Act, and to conservation recommendations under the Fish and Wildlife Coordination Act, and the Anadromous Fish Act. As such, we consider our request for collection of genetic samples from Chinook salmon, and other fish species to be necessary for our resource evaluation of the Susitna-Watana hydropower project. Because of this information need, if AEA does not plan to collect the information, AEA should document how this study request is being addressed.

Fish species genetic samples used for comparisons should be less than ten years old to reflect current gene frequencies among the sampled fish populations. Genetic samples for salmon exist for some tributaries in the

lower and middle Susitna River. Some of these samples are greater than ten years old.

Fish genetic samples should be current and include samples of the Chinook migrating above the proposed dam location. Because gene frequencies change over time, all genetic samples should be within the most recent ten years to allow for valid comparison. Genetic analysis should analyze the existing extent of genetic differentiation within and between fish using distinctly different habitats. We request genetic analysis of Chinook above the proposed dam site relative to those at other upper, middle and lower river and tributary sample locations.

-Fish Passage/fishway prescription- The Service is concerned with the lack of transparent discussion about the potential for fish passage alternatives at the proposed Susitna-Watana dam. If fish passage is required, how will that be accomplished? If it is not feasible, what is your alternative proposal? Where is your project assessment of the fish passage feasibility? What are the design criteria being considered/evaluated?

-Compensatory Mitigation- Compensatory mitigation is determined as part of a mitigation sequence after avoidance, and minimization efforts. The Service has inquired about potential compensatory mitigation for project impacts during several meetings. To date, this concern has not satisfactorily been addressed by the project sponsors or project consultants. Because compensatory mitigation is a requirement in order to offset unavoidable projects impacts to fish and wildlife resources and their habitats, it is should be considered throughout the review process. Please explain how you plan to quantify existing habitats, and quantify primary, secondary and cumulative (40cfr Part230 of the CWA) losses to those habitats under the proposed operational flows over the temporal scale of the license period. How will habitats change proportionally under project operations?

-Lower river- The Service is concerned with AEA consultants' proposal to establish a lower boundary for the physical studies (e.g., geomorphology, instream flow) at a location "downstream of Sunshine" at approximately river mile 75, and not extend the study efforts further down into lower river to inform the biological studies. There are many biological resource studies that would necessarily be informed by establishing a consistent study boundary between the physical and biological studies. For example, studies related to the federally listed Cook Inlet beluga whale, fish species and habitats, including the resident species, and anadromous salmon and eulachon (beluga whale prey species). The lower river also includes the Susitna Flats State Game Refuge. If the physical studies boundary is terminated at river mile 75, there will be no ability to relate or integrate biological data to those studies (e.g., geomorphology, ISF, ice processes, flow routing). Resource agencies management goals would effectively not be addressed below river mile 75, if project effects are not assessed to the mouth of the river.

According to USACE (1966), 80% of the ability to produce accurate model results depends on using appropriate bathymetry data, mesh design, and boundary conditions. The amount of time needed to collect this information, particularly the bathymetry data, depends on the complexity of the channel's geometry, which is known to be complex in the lower Susitna River. Because data collection in the lower river will likely require rigorous field collection due to the channel complexity, it is critical to initiate these efforts in a time sensitive manner. The proposal to delay work in the lower river pending analysis at an arbitrary, and certainly non-biologically relevant location, does not meet resource agencies objective of evaluating the potential project impacts to fish and wildlife resources in the lower Susitna River. This is particularly true under the FERC ILP process timeline specific to the Susitna-Watana dam project.

-Studies integration: A "map" or chart of how studies are proposed to be integrated is needed. AEA sponsors and consultants, committed to providing this by September. Biological resource components are currently not integrated or connected to the other studies, and appear as being treated independently of the rest of the study requests. Study proposals must demonstrate how they will be integrated to provide needed resource information.

Studies/components not address from the Non salmon anadromous, resident and invasives fish species study request: During the August ILP meetings, the follow Service requests were preliminarily noted as not being addressed or adequately addressed by AEA's PSPs.

1) **Marine derived nutrients** contribution from non salmon anadromous species. The Service requested information in our non-salmon anadromous, resident and invasive study plan request. It is not clear which study proposal it is addressing this request, or IF it is being addressed. During the August 15-17 meetings, it was indicated that it may be addressed in either the riparian instream flow, the terrestrial wildlife, the river productivity or elsewhere. However, AEA' s consultants were unable to specifically "point to it" when asked. It does not appear to have been included in the PSPs.

2) **Resource valuation** of non-salmon anadromous and resident fish resources. During the meeting, AEA consultants stated that a resource valuation would not be provided, as requested in the Service's study request for non salmon anadromous, resident and invasive fish study. An explanation of why this assessment will not be addressed was not provided. We request that an explanation be provided that describes the rationale for this determination and urge reconsideration of our study request.

3) **Trophic ecology**- The Service requested information on trophic ecology in the non salmon anadromous, resident and invasive species study request. Michael Link stated that there are "significant predator-prey dynamics" particular once fish move out of the mainstem; using this behavior to explain why fish hold there until they are ready to dash to tributaries. He noted that the creeks are heavily preyed upon by bears, for example. Dr. Bob Small (ADFG) recommended trophic ecology and/or foraging ecology information for the Cook Inlet beluga whale studies. For fish, coordination with Tim Nightengale (AEA's consultant; via teleconference) stated that he would take gut samples from fish to see what macro-invertebrates they are eating, and when, and will work with fish study teams to do some trophic analysis. The trophic ecology component needs to be clearly spelled out in a study plan identifying any aspects that will and will not be addressed explained and with appropriate rationale.

References:

Frissell, C. A., W. J. Liss, C. E. Warren, and M. D. Hurley. 1986. A hierarchical framework for stream habitat classification: viewing streams in a watershed context. *Environmental Management* 10:2. Pp. 199-214.

Lovtang, J. C. 2005. Distribution, habitat use, and growth of juvenile Chinook salmon in the Metolius River Basin, Oregon. M.S. Thesis, Oregon State University. March 2005.

USACE 1966. (Full citation will be provided in follow-up correspondence)

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Cc: Betsy_McCracken@fws.gov; Catherine_Berg@fws.gov; Lori_verbrugge@fws.gov; eric Rothwell; Brian Lance; susan walker; joe.klein@alaska.gov; MaryLou Keefe; Cassie_Thomas@nps.gov; tsundlov@blm.gov
Subject: Follow up Notes from the August 2012 Work Group meeting

Hello Betsy:

Thank you for the opportunity to discuss the proposed study plans for the Susitna-Watana Hydroelectric Project. We look forward to further discussions to clarify the details of the proposed study plans. I have attached some initial notes, comments, and questions regarding the objectives in our three fish study requests, our River Productivity Study Request, and those found in the proposed study plan.

These comments are in addition to those provided during the August 2012 work group meetings, and are intended to assist in further discussions about development of the study plans. In addition to the attached comments, I have some overall questions, comments, and concerns about the proposed fish studies. Based on the proposed methodologies, there does not appear to be any studies to collect baseline biological or physical spawning habitat information between the time eggs are deposited in redds and the time of fry emergence, and no information on the timing and movement of fish from spawning to rearing areas, and only limited information on the distribution and abundance of juvenile fish up to 60 mm, particularly in winter. These are the life stages most vulnerable to load-following operations.

Although I have more questions and comments regarding linkages between proposed studies and project details, these should serve as a starting point for the upcoming fish sub-workgroup meetings. If you have any questions, please feel free to contact me. Thanks.

Mike

(See attached file: ELH Juvenile Adult Fish D and A Riv Pro mb initial draft comments on PSP.docx)

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ATTACHMENT: ELH Juvenile Adult Fish D and A Riv Pro mb initial draft comments on PSP.doc

For each USFWS Study Request below (including our three fish studies and River Productivity) I listed the objectives in each study request and then followed them with the objectives I found in the PSP. I noted where the objectives were the same, where they differed, and where our study requests were not addressed in the PSP. I also include other notes, comments, and questions to assist in further discussions about the proposed studies.

Early Life History and Juvenile Fish Distribution and Abundance in the Susitna River (USFWS Study Request; Enclosure 13)

Specific study request objectives versus objectives included in PSP Study 7.5 (upper reach) and Study 7.6 (middle and lower reach):

1. Determine the seasonal distribution, relative abundance (as determined by CPUE, fish density, and counts), and fish-habitat associations of juvenile anadromous and resident juvenile fish species in the mainstem Susitna River (side channel, slough, backwater, and tributary confluence habitats).

1. Describe the seasonal distribution, relative abundance (as determined by CPUE, fish density, and counts), and fish-habitat associations of resident fishes, juvenile anadromous salmonids, and the freshwater life stages of non-salmon anadromous species; (7.5 upper reach)

- Only winter sampling I see proposed in the upper reach includes using DIDSON and video cameras in 10 "selected" sloughs and side channels; how were/will sites be selected?; What other habitat types are available and why are they not being sampled? Is this sufficient to get at winter distribution and abundance for all life stages?; will not likely be able to identify juvenile species using these techniques (therefore, no distribution and abundance information and habitat use by species, particularly for early life stages (<60 mm); other winter sampling (using gill nets, minnow traps, and trot lines) is listed in the schedule section (and not in methods), but it is not described.

1) Describe the seasonal distribution, relative abundance (as determined by CPUE, fish density, and counts), and fish-habitat associations of juvenile anadromous salmonids, non-salmonid anadromous fishes and resident fishes; (7.6 middle and lower reach).

- The list of habitat types to be sampled in this study (middle and lower reaches) appears longer than habitats proposed for the upper reach, but otherwise same comments as listed above for Study 7.5 (upper reach).

2. Describe the seasonal movements and migratory patterns of juvenile anadromous and resident juvenile fish species among mainstem habitats and between tributaries and mainstem habitats with emphasis on identifying foraging and overwintering habitats.

5. Use biotelemetry (PIT and radio tags) to describe seasonal movements of selected fish species (including rainbow trout, Dolly Varden, whitefish, northern pike, burbot, and Pacific lamprey if present) with emphasis on identifying spawning and overwintering habitats within the hydrologic zone of influence upstream of the project; (7.5 upper reach)

- Unclear if this includes or excludes PIT tagging juvenile anadromous salmon, particularly Chinook salmon; i.e., none are listed
- Also, mentions installing up to six antenna arrays in selected sloughs and side channels in winter; is that sufficient to determine movement of juveniles in and out of habitats? What about other habitats? Unclear how sites were selected and what habitats were or were not sampled in the 1980s. Therefore, what is rationale and assumptions for selecting habitat types and sites?
- See nothing on movement (and timing) of newly emergent fish from spawning to rearing areas or movement of juvenile fish <60 mm in winter (i.e., the post-emergent life stages most vulnerable to load-following operations)

2) Describe seasonal movements of selected fish species such as rainbow trout, eulachon, Dolly Varden, whitefish, northern pike, Pacific lamprey, and burbot) using biotelemetry (PIT and radio-tags) with emphasis on identifying foraging, spawning and overwintering habitats within the mainstem of the Susitna River and its associated off-channel habitat; (7.6 middle and lower reach)

- Unclear if this includes or excludes PIT tagging juvenile anadromous salmon; i.e., none are listed
- Also, mentions installing up to 10 antenna arrays; is that sufficient to determine movement of juveniles in and out of habitats by reach? When, where, and how will sites be selected? What is rationale and assumptions for selecting habitat types and sites?
- See nothing on movement (and timing) of newly emergent fish from spawning to rearing areas or movement of juvenile fish <60 mm in winter, particularly for anadromous salmonids.

- 3.** Document the timing of downstream movement of all juvenile fish species and outmigration for anadromous salmon.

6. Document the timing of downstream movement and catch for fish species via outmigrant traps; (7.5 upper reach)

- Unclear if this includes or excludes addressing outmigration and winter sampling

3) Document the timing of downstream movement and catch for all fish species using outmigrant traps; (7.6 middle and lower reach)

Unclear if this includes or excludes addressing outmigration

- 4.** Document the age structure, growth, and condition of juvenile anadromous and juvenile resident fish by season.

4) Characterize the age structure, growth, and condition of juvenile anadromous and resident fish by season; (7.6 middle and lower reach)

- Is there a difference between Document (as requested) and Characterize (as proposed)? Explain
- Is this study objective limited to juveniles or should it say “all” resident fish.
- This objective is not included in upper reach; should at least characterize age structure for all resident and anadromous fish by season

5. Collect and analyze tissue samples from juvenile salmon and opportunistically from all resident and non-salmon anadromous fish to support the Genetic Analysis study.

3. Collect tissue samples to support the Genetic Baseline Study for Selected Fish Species (Section 7.14); (7.5 upper reach)

- No mention of analyzing samples; analysis mentioned in Genetic Baseline Study, but link/integration to analyzing samples collected in this study is not discussed. Will samples be analyzed? Explain.

6) Collect tissue samples from juvenile salmon and opportunistically from all resident and non-salmon anadromous fish to support the Genetic Baseline Study (Section 7.14). (7.6 middle and lower reach)

- Again, no mention of analyzing samples; analysis mentioned in Genetic Baseline Study, but link/integration to analyzing samples collected in this study is not discussed. Will samples be analyzed? Explain.
- Because PSP is not structured similarly to our study requests, why is this study objective limited to juvenile salmon? This may be okay, because genetic sampling included in Salmon Escapement Study, though no mention in study of analyzing samples or overall links between studies. Without providing linkages between studies, there is a lot of searching required to find if, where, and how information is being collected.

6. Collect and provide the Instream Flow study with habitat suitability criteria (HSC) data to support analysis of potential project impacts.

Mention of HSC is in Study 6.5, but the study request objective is not addressed in the upper, middle, or lower reaches for juvenile anadromous, resident fish, and non-salmonid anadromous fish studies. It is unclear how HSC information will be collected, particularly in winter for post-emergent fish up to 60 mm when fish will be most vulnerable to load-following operations. I see no empirical baseline information being collected to evaluate potential project effects or for inclusion in habitat modeling efforts. There is generic reference to developing HSC model in Study 6.5 for these species and life stages, but unclear about the source of that information.

7. Evaluate salmon incubation (embryo development, hatching success, and emergence times) and associated water quality conditions (e.g., temperature, DO, pH) at existing spawning habitats (slough,

side channel, tributary, and mainstem) in areas with and without groundwater upwelling in the middle and lower reaches of the Susitna River.

Study Request objectives 7-9 are not addressed in 7.5 or 7.6; there is no mention of egg incubation (rates or success), hatching (rates or success), stranding (ramping rates) or emergence (dates and times) sampling anywhere; no mention of baseline intragravel temperature or water quality monitoring of spawning and pre-emergent juvenile fish habitats; no mention of characterizing baseline water quality conditions at spawning or rearing habitats.

Only mention is in Study Goals (6.5.1.2, page 6-10); Objective 8. Conduct a variety of post-processing comparative analyses derived from the output metrics under aquatic habitat models. Approach appears to evaluate using only physical habitat models and without empirical sampling post-spawning through emergence and for juveniles up to PIT tagging size (i.e., 60 mm).

8. Evaluate the potential for stranding of juvenile fish and stranding mortality by season under proposed operational conditions.

This Study Request objective is not addressed. Stranding is mentioned in Chapter 6, but the study approach is not discussed

9. Measure intragravel water temperature in spawning habitats and winter juvenile fish habitats at different surface elevations and different depths to determine the potential for freezing of redds, freezing of juvenile fish, and their habitats.

This Study Request objective is not addressed anywhere.

Adult Salmon Distribution, Abundance, Habitat Utilization and Escapement in the Susitna River (USFWS Study Request: Enclosure 15)

Specific objectives included in study request versus objectives listed in PSP Study 7.6:

1. Capture, radio tag and track adults of the five species of Pacific salmon in proportion to their abundance.
1. Capture, radiotag, and track adults of five species of Pacific salmon in the middle and upper Susitna River in proportion to their abundance. Capture and tag Chinook and coho salmon in the lower Susitna River.
2. Determine the migration behavior and spawning locations of radio-tagged fish in the lower, middle, and upper Susitna River.
2. Characterize the migration behavior and spawning locations of radiotagged fish in the lower, middle, and upper Susitna River.
3. Characterize adult salmon migration behavior and run timing within and above Devils Canyon.
3. Characterize adult salmon migration behavior and timing within and above Devils Canyon.
4. If shown to be an effective sampling method during the 2012 study, and where feasible, use sonar to document salmon spawning locations in turbid water.
4. If shown to be an effective sampling method during the 2012 study, and where feasible, use sonar to document salmon spawning locations in turbid water in 2013 and 2014.
5. Compare historical and current data on run timing, distribution, relative abundance, and specific locations of spawning and holding salmon.
5. Compare historical and current data on run timing, distribution, relative abundance, and specific locations of spawning and holding salmon.
6. Estimate escapement of adult salmon spawning by mainstem reaches and tributaries.
6. Generate counts of adult Chinook salmon spawning in the Susitna River and its tributaries.

Need to define "generate count" and how generated. If it is an index of abundance, then need to identify the standardized unit of effort. Also, not sure why escapement estimate is not being determined? This study references escapement estimates from the 1980s, but not here. Explain.
7. Collect tissue samples to support the Genetic Analysis Study.
7. Collect tissue samples to support the Fish Genetic Baseline Study (Section 7.14).
8. Determine system-wide Susitna River escapement and run apportionment.
8. Estimate system-wide Chinook and coho salmon escapement to the Susitna River and the distribution of those fish among tributaries of the Susitna River.
9. Determine the availability and accessibility of spawning habitats by adult salmon to mainstem and tributary locations based upon flow regime.

Unclear if, how, or where this Study Request objective is being addressed.

Not listed as an objective in this study; section 6.5.4.3.1 (page 6-19) describes assessing access to rearing and spawning habitats via output from flow routing models. Also, objective 13 (shown below) in fish passage study (section 7.12); page 7-98):

13. Evaluate the potential creation of fish passage barriers within existing habitats (tributaries, sloughs, side channels, off-channel habitats) related to future flow conditions, water surface elevations, and sediment transport.

10. Measure critical habitat characteristics (e.g., channel type, flow, substrate, and groundwater) at reaches used for spawning and compare these characteristics with those in adjacent reaches that do not contain spawning adults.

Do not see this study request objective addressed or any objective that looks at characterizing use, availability, or quality of potential spawning habitats. There appears to be no empirical baseline information being collected; only see determining distribution and potential abundance of redds. Also, see mention of evaluating potential dewatering or scouring of redds in Chapter 6, but no empirical baseline information to assess daily load-following operations.

River Productivity Study (USFWS Study Request: Enclosure 11)

Specific Study Request objectives versus objectives listed in proposed study 7.8:

1. Develop a white paper on the impacts of hydropower development and operations (including temperature and turbidity) on benthic macroinvertebrate and algal communities in cold climates.

1. Synthesize existing literature on the impacts of hydropower development and operations (including temperature and turbidity) on benthic macroinvertebrate and algal communities;

- Any difference in developing a white paper versus synthesizing existing literature?

2. Characterize the pre-project benthic macroinvertebrate and algal communities with regard to species composition and abundance in the lower, middle and upper Susitna River.

2. Characterize the pre-Project benthic macroinvertebrate and algal communities with regard to species composition and abundance in the middle and upper Susitna River;

- Omission of lower reach is an apparent typo.

3. Estimate drift of benthic macroinvertebrates in habitats within the lower, middle and upper Susitna River to assess food availability to juvenile and resident fishes.

3. Estimate drift of benthic macroinvertebrates in selected habitats within the middle and upper Susitna River to assess food availability to juvenile and resident fishes;

- Omission of lower reach is an apparent typo.

4. Conduct a trophic analysis to describe potential changes in the primary and secondary productivity of the riverine community following post-project construction and operation.

5. Conduct a review on the feasibility of a trophic analysis to describe potential changes in the primary and secondary productivity of the riverine community following Project construction and operation;

- Shouldn't this read: Conduct a trophic analysis, if feasible, to describe...? Also, why would it not be feasible? Explain.

5. Generate habitat suitability criteria (HSC) for Susitna River benthic macroinvertebrate and algal habitats to predict potential change in these habitats downstream of proposed dam site.

6. *Generate habitat suitability criteria for Susitna benthic macroinvertebrate and algal habitats to predict potential change in these habitats downstream of proposed dam site;*

6. Characterize the **benthic** macroinvertebrate compositions in the diets of representative fish species in relationship to their source (benthic or drift component).

7. *Characterize the macroinvertebrate compositions in the diets of representative fish species in relationship to their source (benthic or drift component);*

- I assume this should include term “benthic”. If not, explain difference.

7. Evaluate the feasibility of reference sites on the Talkeetna and Chulitna Rivers to monitor baseline productivity, pre- and post-construction. (**deleted in PSP; and not addressed**)

AEA replaced this objective (with #4 below), but based on discussion at August 15, 2012, TWG meeting it was suggested to do both or keep the original Study Request objective. We recommend and support that suggestion.

4. *Conduct a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River. (added in PSP)*

8. Characterize organic matter resources (e.g., available for macroinvertebrate consumers) including coarse particulate organic matter, fine particulate organic matter, and suspended organic matter in the lower, middle, and upper Susitna River.

8. *Characterize organic matter resources (e.g., available for macroinvertebrate consumers) including coarse particulate organic matter, fine particulate organic matter, and suspended organic matter in the lower, middle, and upper Susitna River.*

9. Estimate benthic macroinvertebrate colonization rates in the middle and lower reaches to monitor baseline conditions and evaluate future changes to productivity in the Susitna River.

9. Estimate benthic macroinvertebrate colonization rates in the middle and lower reaches to monitor baseline conditions and evaluate future changes to productivity in the Susitna River.

Note: Page 7-12 of PSP states that marine derived nutrients are included in River Productivity Study, but there is no mention of it in Chapter 7; i.e., is not addressed.

Adult and juvenile non-salmon anadromous, resident and invasive fish studies in the Susitna River basin (RM 0 - RM 233)(USFWS Study Request; Enclosure 14)

General objectives for this study request are to:

COMMUNITIES AND ASSEMBLAGES

- Characterize the seasonal (spring, summer, fall, winter) distribution, relative abundance, and habitat utilization in the Susitna River mainstem (RM 0-RM 233) for all life stages of non-salmon anadromous, resident, and invasive fish species. [Documenting both hierarchical nested habitat type and use-type as described in the resource agency Instream Flow Study and Habitat Utilization Study Request].

Recommendation for hierarchical nested habitat type and use-type not addressed in PSP.

- Characterize the seasonal (spring, summer, fall and winter) movement patterns of all subject fish species and life stages as they relate to foraging, spawning, rearing and overwintering habitats. The characterization of seasonal movements includes run timing (immigration and emigration) and extent (periodicity) of non-salmon anadromous species in the Susitna River (RM 0-RM 233) and movement into and out of tributary streams. [Interface with resource agency Instream Flow and Habitat Utilization Study Request hierarchical nested habitat types and habitat mapping].

Interface with resource agency Instream Flow and Habitat Utilization Study Request hierarchical nested habitat types and habitat mapping does not appear to be addressed.

- Characterize the flow-related or synchronized life history strategies (migration, movement, spawning, rearing, hatching, emergence) of non-salmon anadromous, resident and invasive species, and their biological behavioral response (e.g., potential for false attraction, delayed migration or increased holding time, synchrony of spawning, relative hatching and emergence timing) to Project-affected flow alterations (flow, temperature, habitat, water quality).

Similar to juvenile anadromous salmonid comments above, much of this Study Request objective does not appear to be addressed in the PSP, particularly for movement, rearing, hatching, emergence and juvenile fish (<60 mm) in winter.

RESOURCE DATA SYNTHESIS

- Synthesize existing resource data, results and information from 1980's Susitna Hydroelectric studies, and other relevant literature to determine applicability and utility of results and information to the currently proposed project.

What is timeframe for completing? Not addressed in PSP

GENETICS

- Collect tissue samples from all resident and non-salmon anadromous fish species for genetic population structure database and future stock identification analysis. This is particularly important for salmon species, anadromous lamprey, and Bering cisco of the Susitna River drainage.

TROPHIC ECOLOGY

- Characterize trophic interactions using seasonal diets (stomach content analysis) of all age classes of non-salmon anadromous, resident and invasive fish species. [Interface with the productivity study, riparian, and instream flow study requests]
- Quantify the relative contribution (biomass) of marine-derived nutrients to the ecology of the Susitna River from adult returns of non-salmon anadromous fish species (e. g., Pacific and Arctic lamprey, eulachon, Bering cisco).

Page 7-12 of PSP states that marine derived nutrients are included in River Productivity Study, but there is no mention of it in Chapter 7; i.e., is not addressed.

From: Bob_Henszey@fws.gov [mailto:Bob_Henszey@fws.gov]
Sent: Tuesday, September 11, 2012 12:26 PM
To: 'Kevin Fetherston'; Betsy McGregor
Cc: Catherine_Berg@fws.gov; Ann_Rappoport@fws.gov; Betsy_McCracken@fws.gov; Jennifer_Spegon@fws.gov; Lori_Verbrugge@fws.gov; Michael_Buntjer@fws.gov; chiska.derr@noaa.gov; Klein, Joseph P (DFG); 'Matthew LaCroix'; 'Michael R. Lilly, GW Scientific'; eric Rothwell; susan walker; 'William Rice'; matt.cutlip@ferc.gov; dreiser@r2usa.com
Subject: PSP 6.6 Riparian Instream Flow Study Plan - Interim Comments

Kevin,

The following are some of the key differences the USFWS sees between our study plan request (USFWS 10.1, Instream Flows for Floodplain and Riparian Vegetation Study) and AEA's proposed study plan (PSP 6.6, Riparian Instream Flow Study). The differences and comments listed below are likely not inclusive, since we have not had a chance to fully evaluate the PSP.

Many of the PSPs rely upon or provide data from/for other studies. Recognizing these relationships is an important part of the Integrated Licensing Process (ILP); however, the study providing the data should describe the methodology and oversee the data collection and analyses, while the study requiring the results should restrict its discussion to the types of data/results required from other PSPs. Repeating the methods in a study not responsible for the data collection and analyses is unnecessary and risks confusion if the methods differ or are inadequate in one of the studies. Since the Riparian Instream Flow PSP will rely upon data from the Groundwater PSP, the Riparian Instream Flow PSP should describe only the results required from the Groundwater PSP, and then describe how those results will be used in the Riparian Instream Flow PSP (e.g., 5.7 Groundwater PSP should be the only PSP that describes the groundwater methods). This applies to other PSPs, such as the habitat mapping studies that may be providing data for this PSP.

Study Goals and Objectives: The USFWS requested a specific goal that included quantifying the frequency, timing and duration of surface-water and groundwater levels required to establish, maintain, and promote floodplain and riparian plant communities. Two ancillary goals were also requested to quantify the frequency and rate of sediment deposition required to promote soil development, and to quantify the effect of river ice on the establishment and persistence of riparian plant communities. Section 6.6.1.1 of the PSP has no stated goal, and only a general approach is provided. An "overarching goal" is provided in the Section 6.6.4 Study Methods, but this goal is also very general. While goals can be very general in nature, the specifics in our goal set the stage for a rigorous study plan to evaluate potential project-related effects on floodplain plant communities.

The USFWS requested six objectives to help meet our goal. Three of the PSP objectives are similar to our requests {1) Synthesize 1980s data, 2) Study sites, and 6) Seed dispersal}, but they lack the additional specifics stated in our requested objectives. Two of the PSP objectives appear to be wholly or at least partially the objectives for other PSPs and not appropriate as stated {3) Map riparian vegetation, and 10) Impacts to shallow groundwater well users}. What the PSP objectives lack, however, are our specific requests for river ice, sediment deposition, and water-level regime (USFWS Objectives 4, 5, and 6). These missing objectives may be studied under AEA's PSP objectives, but the USFWS prefers they be considered as standalone objectives, and possibly integrated into a single modeling objective after they have been studied individually. The USFWS is particularly interested in our Objective 6 to characterize the water-level regime required to maintain floodplain and riparian plant communities. Much of the discussion so far has focused on floodplain plant succession, but little or no discussion so far has involved maintenance flows. Succession is important, but without maintenance flows whole floodplain plant communities may collapse or the direction of succession changed to an unnatural target (e.g., non-floodplain plant communities).

Study Area: The USFWS agrees with the PSP study area and four river segments, with the following additional comments. The width of the active valley should also include the distance from the River that the River influences groundwater, as well as define the return interval for both groundwater and flooding (e.g., 100-year event under current or climate-change induced conditions). Much discussion has centered on the downstream

influence of the Project. The PSP study area Lower Reach would extend to RM 0. Will this lower extent remain even if all agree that the Project influence on surface- and ground-water becomes indistinguishable from normal environmental variation?

Study Methods: The methods need to follow the order of the objectives and use section headings that refer to the intent of the objectives. Few methods are referenced, and some references that are cited are not included in the literature cited. The relationship with other PSPs often seems confusing. It would be more helpful to state what results will be required from PSP "x" to evaluate a Riparian ISF objective, and potentially what results from a Riparian ISF objective will be required by PSP "y." It is not necessary to repeat coordination for every objective, only state the inputs required and the outputs provided by an objective. This applies across PSPs and among a PSP's objectives. The following comments on methods follow the order of the Objectives requested by the USFWS:

RIFS-1 Synthesize Historical Data: In addition to other North American hydro-projects, this review should also include a review of relatively undisturbed riverine systems.

RIFS-2 Select and Design Study Sites: The number of study sites should provide sufficient replication to address the needs of the objectives, and should include sites where Project operation is expected to cause early channel bed degradation or aggradation. The casual reference to pseudoreplication in one of the other objectives needs to be addressed at the study-site level. Study sites are typically the experimental unit where replication is used for true statistical analysis. All other sampling (e.g., within the study site) is really subsampling used to obtain a better average value for that one replicate. As envisioned by many of the PSPs, the "representative" study sites are really only one replicate for each process-domain. For more on pseudoreplication see:

Hurlbert, Stuart H. 1984. Pseudoreplication and the Design of Ecological Field Experiments. Ecological Monographs 54:187–211. <http://dx.doi.org/10.2307/1942661>

RISF-3 Characterize Seed Dispersal and Frequency of Establishment: Not sure where this objective is addressed in the PSP. It appears to be scattered across several sections in the methods. If the methods have been described by other similar projects, then cite their methods if appropriate and include enough details to help others understand the methods that will be used. How will the Susitna River bimodal peak flows be addressed? On a float trip down the Susitna 27-29 July 2012, there were newly emerging dicot seedlings on the sandbars. How will the fate of these "second peak" seedlings be addressed? How will the role of precipitation in maintaining favorable soil moisture conditions be evaluated? Will soil texture be considered? If so, how will the soil profile be described?

In Section 6.6.4.3.1.4: Is "abundance" density or some other metric? What is "elevation" referenced to: ASL, an arbitrary datum, or some elevation that can be linked to the local river or groundwater stage (keep in mind the river drops downstream, so that must be accounted for also)? Is there a citation for others using 2-meter square plots? What is the shape of these plots? A square plot may not be appropriate for a narrow band of seedlings along a specific elevation in the gradient above the river. MODFLOW is a groundwater model, and many not be sensitive enough to quantify hydroperiod relationships for seedlings. What other metrics will be used to quantify/separate surface water, groundwater, soil moisture, precipitation, and other potential hydrological process that support seedling establishment and recruitment?

How will the results from this objective be used to predict potential Project-related changes in seedling establishment and recruitment into the population?

RISF-4 Characterize the Role of Ice in the Establishment, Survival and Recruitment of Riparian Species: The discussion on ice processes (Section 6.6.4.4.1) seems unfocused, and essentially provides no discernible methods: "Final details of the geomorphology and ice processes modeling ... will be developed as the 2012 studies are obtained." The goal of this study should be to characterize the role of river ice in the establishment (colonization), survival (first 3 years) and recruitment into the future reproductive population of dominant riparian species (e.g., balsam poplar, willows). Have others investigated the role of ice on riparian plant communities?

If so, can their methods be used here? How will the magnitude, frequency, and longitudinal distribution of ice events affecting dominant riparian species/communities be evaluated?

RISF-5 Characterize the Role of Sediment Deposition in the Formation of Soils: The proposed soil sampling techniques are included in Section 6.6.4.3.1.5, but based on these techniques it is unclear how the USFWS requested objective to characterize the role of sediment deposition in the formation of floodplain and riparian soils, and how sediment deposition affects the rate and trajectory of plant community succession. This objective should investigate the rate of deposition, depth of sediment, and soil profile development required for natural floodplain plant community succession, and then use the predicted sediment deposition characteristic from the Fluvial Geomorphology Study to predict the effects of Project operation on floodplain plant communities.

Sampling to only a depth of 50 cm, and describing cumulative thickness of all organic horizons and loess (windblown material?) without stratigraphy will likely be insufficient to meet this objective. Soil texture by feel should follow standard techniques (e.g., Thien 1979, <http://soils.usda.gov/education/resources/lessons/texture/>).

RISF-6 Characterize Water-Level Regime Required to Maintain Floodplain and Riparian Plant Communities:

This is a critical objective that has not been sufficiently discussed in past workgroup meetings, possibly due to lack of time, and the PSP methods are insufficient to evaluate if the USFWS requested objective will be met.

Suggest this objective be discussed near the beginning of future meetings to allow sufficient time for discussion.

Objective 6 combines hydrologic information from the groundwater study (PSP 5.7) and the plant community information from this study (PSP 6.6) and possibly the habitat mapping studies (PSPs 9.6 and 9.7) to produce plant species/community response curves. The USFWS's Objectives RISF-3 to RISF-5 target critical stages in plant community succession, while RISF-6 targets critical instream flows required for maintaining plant communities as succession progresses (i.e., both succession and maintenance are important).

The methods for groundwater belong in the Groundwater PSP, and not in this PSP for reasons discussed above. This PSP should request the required hydrologic information from PSP 5.7 and begin the discussion from that point. The following comments, however, include the pertinent groundwater methods that should be discussed in PSP 5.7.

Section 6.6.4.5 (Groundwater): The suggested four to six intensive study reaches instrumented with groundwater and surface-water recording instruments may be insufficient to address this objective if plant response will be described by process-domains (see pseudoreplication discussion above). However, hydrology is likely the most dominant physical factor required for maintaining floodplain plant communities across the various process-domains, and barring some other dominant physical factor (e.g., soil parent material, weather, etc.) it may be possible to use data from the individual intensive study-site transects to build response curves (see Henszey et al. 2004 {ne.water.usgs.gov/platte/reports/wetlands_24-3.pdf}, Figure 7 for an indication of the number of data points required to build a response curve).

One-and-a-half growing seasons (July 2013 to September 2014) will likely provide insufficient groundwater hydrology data to fit individual species response curves (especially for annual species), and may not be enough data to reasonably predict groundwater relationships with river stage and to verify the model predictions with independent data. Precipitation may also dramatically affect transient but critical groundwater levels (a few days to a week or more of elevated water levels), which would be difficult to evaluate with limited data. How will these potential problems be addressed?

What are the "project accuracy standards used for water-level measurements" for horizontal, vertical and temporal measurements?

In addition to the Work Products described in Section 6.6.4.5.2, the products should provide water-level summary statistics for each location (e.g., point, plot, or transect) that will be used to test and fit plant response curves, such as growing season cumulative frequency, 7-day moving average, 10-day moving average, 14-day moving average, and arithmetic mean (see Henszey et al. 2004 {ne.water.usgs.gov/platte/reports/wetlands_24-3.pdf}, Table 1).

Section 6.6.4.7 (Succession Models and Flow Response Guilds) appears to potentially address the USFWS's Objective 6 request; however, two critical referenced papers (Merritt et al. 2010 and Pearlstine et al. 1985) were not included in the Literature Cited. These references were not provided until 8/28/2012, and the USFWS has had insufficient time to review these papers in detail. The concept of the PSP response guilds is similar to the USFWS's request to develop plant community response curves, but the PSP methods are insufficient to evaluate if our requested Objective 6 will be met. The USFWS requested evaluating specific water-level summary statistics (see above discussion for groundwater) with a rigorous curve-fitting technique similar to Henszey et al. (2004). The methods should provide sufficient detail to show how quantifiable (not qualitative) hydrologic (surface-water and groundwater) gradients will be constructed to show the optimum and range of favorable water levels required for maintaining floodplain species/communities.

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From: Eric Rothwell [mailto:eric.rothwell@noaa.gov]
Sent: Wednesday, September 12, 2012 5:37 PM
To: dreiser@r2usa.com
Cc: PHilgert@r2usa.com; Laura Arendall; Betsy McGregor; susan walker; Berg, Catherine; Betsy McCracken (FWS); Michael_Buntjer@fws.gov
Subject: Re: Meeting on the 12th

Dudley,

Thank you for coming over and meeting today. Also, thank you for providing the meeting presentation before hand, having it to review helped facilitate the discussion. The aerial imagery with the proposed study reaches was also helpful in our conversation, when they are available I would like a copy.

I typed up some of my comments from today, starting with general comments, twg meeting protocol comments, and then specific comments on the site selection process. I cc'd other agency personnel that will likely attend the meeting Friday, hoping that it will provide some useful discussion points and I look forward to continuing the discussion September 26-28th. Betsy, Sue, etc. the attached presentation that Dudley provided is draft and parts will likely change prior to Friday's meeting.

General comments about all of the PSPs:

- What can be determined from each of the study components, a description of deliverables (not results) this will help us understand if our requests have been met.
- How will uncertainty be determined for each of the study components? (ice processes -> hydraulic flow routing -> winter fish and habitat effects)
- How will incomplete study components, data, or results be dealt with - situations where an extension of the study period is necessary.

General comments about TWG meetings, as Friday will start to define what TWG will look like:

- An agenda should be provided with enough time to review and submit changes
- All meeting materials provided with enough time for review prior to the meeting, including presentations
- Relevant background material that will aid the discussion will be provided
- Meeting summary and minutes within two weeks of the meeting, distributed to all attendees as a draft. Then a two week period to submit additions and/or corrections
- And - attendees (agency personnel included) will be prepared by reviewing all the materials prior to meeting.

Comments specific to the study site selection process

The proposed methods for site selection are first to select sites in a hierarchical framework (segment by hydrology, then geomorphology, then habitat units). Sites selected will include all the riverine habitat types that are defined (relevant to that reach, for example MR2 may not have any upland sloughs).

The site selection will be informed by selecting sites that are 'critical', meaning that they are likely to be highly affected/sensitive to flow changes and highly important biologically. Generally I agree with prioritizing sites that will be hydraulically affected and are biologically important, but we have incomplete biologic information. The data from the 1980s provides some useful information about utilization of off-channel habitats that should inform our studies but the information is limited in that it does not fully capture mainstem utilization or overwintering.

So, with new fish utilization and distribution information site selection should include some flexibility to include sites where life histories are not assessed under the currently proposed sites. This seems to be suggested in

the site selection process schedule if it includes fish distribution/habitat utilization information, November 2013 evaluate summer 2013 data and modify/add sites as needed in collaboration with TWG

The schedule provided includes refinement of selected sites by the use of mapping results to evaluate habitat variability, conduct statistical power analysis, refine intensive sites and identify supplementary sites. If possible an addendum to the PSP or definitely in the RSP a description of the initial site selection (by the hierarchical framework) and refinement (by habitat mapping results and fish studies) methods should be presented, not just the selected sites. This depends on the fish studies being sufficient to describe the full distribution of fish and their habitat use.

Incorporation of multiple study elements, such as ice processes, groundwater, geomorphology, and water quality. This is especially important in habitats where one of the other study elements is driving habitat use by fish, for example if upwelling and water temperature is a determining factor for site selecting for Chinook to overwinter then the study site should include this habitat and integrate the WQ and GW studies to understand distribution of thermal refugia for overwintering and how the project would affect those processes/characteristics.

The slides presenting the 1980s electrofishing and sampling was informative, but again shows an incomplete understanding of habitat utilization. The 1980s sampling focused on the off-channel habitats (side sloughs/channel, upland sloughs, and confluences with tributaries). This information should be used to inform selections but must also be put into context that we really don't know very much about mainstem utilization and overwintering, and so need to be flexible (potential with extended study years) when a better understanding is gained through the 2013 and 2014 fish studies.

The slides on each of the species, I had a general comment that they should be put into perspective. That the 1980s data does not represent a complete understanding so comments like no mainstem spawning should be qualified. There likely is a riverine component to sockeye (and other species) that do spawn in the river but that just wasn't captured in the 1980s due to the methodologies available. We do not currently know the full spawning distribution.

Representative reaches, extrapolation of results, and replication. We touched on this and I look forward to talking about this more. I did not review Aaserude et al. 1985 prior to our meeting but plan on reading it prior to the Sept. 26-28 meetings.

Although not discussed, I have a concern with winter flow routing and ice processes, and how they will inform site selection. Site selection for analyzing winter instream flow effects to fish and their habitat will depend on an understanding of operational effects downstream (to flow timing and quantity, hydraulics, and water quality). Also the extension of the studies downstream will depend on these results. The winter hydraulic flow routing model will rely on ice process modeling to determine the downstream extent and magnitude of operational flow effects. The ice process modeling will need several years of data, in addition to the ice thickness measurements and discharge measurements at each of the cross-sections for the winter routing model. I see a lack of time to collect data for the models (winter flow routing and ice process) calibrate the models and then selection sites and methods to conduct ISF studies to assess project effects on fish during winter operations under the currently proposed study period.

This was a very targeted meeting to discuss site selection, I look forward to discussing this and other parts of the ISF and other study plans in the near future. After Friday's meeting I hope to see the selection methods written up with consideration of the agency comments (including the proposed methods for extrapolation), this should help us continue the discussion.

Best Regards,
Eric

From: Klein, Joseph P (DFG) [mailto:joe.klein@alaska.gov]

Sent: Tuesday, September 18, 2012 10:18 AM

To: dreiser@r2usa.com

Cc: Benkert, Ronald C (DFG); 'Mike Buntjer'; Betsy_McCracken@fws.gov; eric Rothwell; 'Michael R. Lilly, GW Scientific'; 'Kevin Fetherston'; PHilgert@r2usa.com; 'MaryLou Keefe'; matt.cutlip@ferc.gov; Catherine_Berg@fws.gov; Haught, Stormy B (DFG); Bob Henszey Ph. D. (Bob_Henszey@fws.gov); Betsy McGregor

Subject: Follow up notes on Sept 14 Meeting

Dudley & Company-

I found the Instream Flow Technical Working Group meeting last Friday very helpful. I am concerned, however, that at the pace we are going we are going to run out of time before we have the opportunity to thoroughly discuss key elements (e.g. target species, HSC development, methods per habitat types, transect selection criteria and number, desired outputs). I am grateful for the time extension granted by FERC and encourage you and your staff to take advantage of this opportunity to put forth a concerted effort to hold more meetings (either in person or via teleconference) and address the study topics mentioned.

Site selection is a key component and a good starting point. The upcoming field visit at the end of the month will greatly enhance these discussions and understandings and perhaps during this time some of the topics mentioned can also be discussed.

Following are comments on the meeting last Friday:

- Please include a definition list for each study plan of key terms. We are not overly concerned about consistency between groups since different specialties often have their own terminology, however a list would help understand these differences/similarities.
- After reading my notes, details about the sampling approaches discussed are not clear to me. For example, how many intensive sites are planned? I believe the fish studies mentioned the previous day that they were looking at 8-10 sites – would these be the same? For both instream flow and riparian studies? What is the sampling approach for other habitats in addition to identified critical sites?
- We support and agree with the approach proposed for using 2-D modeling for sampling the intensive sites.
- Likewise, we support and agree with the approach proposed for assessing surface water/ground water interactions.

Regards,

Joe Klein, P.E.
Supervisor Aquatic Resources Unit
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From: Dudley Reiser [mailto:dreiser@r2usa.com]
Sent: Tuesday, September 18, 2012 4:32 PM
To: 'Klein, Joseph P (DFG)'
Cc: 'Benkert, Ronald C (DFG)'; 'Mike Buntjer'; Betsy_McCracken@fws.gov; 'eric Rothwell'; 'Michael R. Lilly, GW Scientific'; 'Kevin Fetherston'; PHilgert@r2usa.com; 'MaryLou Keefe'; matt.cutlip@ferc.gov; Catherine_Berg@fws.gov; 'Haught, Stormy B (DFG)'; 'Bob Henszey Ph. D.'; 'McGregor, Elizabeth A (AIDEA)'; 'Laura Arendall'; 'Fullerton, Bill'
Subject: RE: Follow up notes on Sept 14 Meeting

Hi Joe – thanks for the positive feedback on the September 14th meeting and for your comments and suggestions related to certain key study elements. They are most helpful. I want you to know that although we share your concern about scheduling, we are confident that within the next few months we will be able to address, or at least discuss and agree on the process, criteria, and schedule for addressing the majority of the key instream flow related issues including those you mentioned below. As you have suggested, we are planning on introducing and discussing several of the elements (target species and HSC development) during the upcoming TWG meeting on September 26th, but I am sure there will be a need for additional meetings before those and other elements are fully discussed. In fact, one of the topics we want to discuss during the September 26th meeting is the future scheduling of other TWG meetings (some to occur via teleconference) so that everyone is aware of when these will occur.

As for your specific comments, I have provided my preliminary responses to those at the end of each comment.

Thanks again for your comments and we will plan on seeing you next week.

Best regards,

Dudley

Dudley W. Reiser, Ph.D.
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R2 Resource Consultants
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From: Klein, Joseph P (DFG) [mailto:joe.klein@alaska.gov]
Sent: Tuesday, September 18, 2012 11:18 AM
To: dreiser@r2usa.com
Cc: Benkert, Ronald C (DFG); 'Mike Buntjer'; Betsy_McCracken@fws.gov; eric Rothwell; 'Michael R. Lilly, GW Scientific'; 'Kevin Fetherston'; PHilgert@r2usa.com; 'MaryLou Keefe'; matt.cutlip@ferc.gov; Catherine_Berg@fws.gov; Haught, Stormy B (DFG); Bob Henszey Ph. D. (Bob_Henszey@fws.gov); McGregor, Elizabeth A (AIDEA)
Subject: Follow up notes on Sept 14 Meeting

Dudley & Company-

I found the Instream Flow Technical Working Group meeting last Friday very helpful. I am concerned, however, that at the pace we are going we are going to run out of time before we have the opportunity to thoroughly discuss key elements (e.g. target species, HSC development, methods per habitat types, transect selection criteria and number, desired outputs). I am grateful for the time extension granted by FERC and encourage you and your staff to take advantage of this opportunity to put forth a concerted effort to hold more meetings (either in person or via teleconference) and address the study topics mentioned.

Site selection is a key component and a good starting point. The upcoming field visit at the end of the month will greatly enhance these discussions and understandings and perhaps during this time some of the topics mentioned can also be discussed.

Following are comments on the meeting last Friday: [My responses immediately follow.](#)

- Please include a definition list for each study plan of key terms. We are not overly concerned about consistency between groups since different specialties often have their own terminology, however a list would help understand these differences/similarities. [Good suggestion and this will be provided in each RSP.](#)
- After reading my notes, details about the sampling approaches discussed are not clear to me. For example, how many intensive sites are planned? I believe the fish studies mentioned the previous day that they were looking at 8-10 sites – would these be the same? For both instream flow and riparian studies? What is the sampling approach for other habitats in addition to identified critical sites? [We will review the site selection process at the beginning of the September 26th meeting.](#)
- We support and agree with the approach proposed for using 2-D modeling for sampling the intensive sites. [2-D modeling will be more thoroughly discussed during the September 26th meeting along with other methods and models. We subsequently envision having a more focused discussion on model selection during the TWG meetings scheduled for the week of October 22. While we consider 2-D modeling to be one of several models that may be used, it will not be the only method/model we apply to the Focused Areas.](#)
- Likewise, we support and agree with the approach proposed for assessing surface water/ground water interactions. [I am sure there will be some refinements to that approach based on the questions needing to be addressed at the different sites and as well, logistical considerations.](#)

Regards,

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APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION
SECTION 9 – FISH AND AQUATIC RESOURCES

From: Klein, Joseph P (DFG) [mailto:joe.klein@alaska.gov]

Sent: Thursday, August 23, 2012 2:48 PM

To: Betsy McGregor

Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); Michael_Buntjer@fws.gov; Betsy_McCracken@fws.gov; eric Rothwell; Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)

Subject: RE: Follow up Meeting Notes-additional comments

Following are additional comments

Baseline Water Quality

5.5.4.3.2 In-Situ Water Quality Sampling The sampling protocol currently calls for monthly in-situ water quality monitoring for the 4 summer months. It should be revised to include continuous (hourly or so) water quality measurements for basic parameters (pH, DO, conductivity, turbidity), year-round if possible using in-situ semi-permanent sensors (e.g. sondes). The technology is readily available and would provide very useful baseline information to assess any post project impacts.

River Productivity

7.8.4.4 Conduct a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River. We recommend supplementing or substituting this section using a reference reach in a similar Alaska river using a BACI design monitoring program in order to assess post project impacts.

From: Klein, Joseph P (DFG)

Sent: Thursday, August 23, 2012 10:42 AM

To: McGregor, Elizabeth A (AIDEA)

Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); Michael_Buntjer@fws.gov; Betsy_McCracken@fws.gov; Eric Rothwell (Eric.Rothwell@noaa.gov); Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)

Subject: Follow up Meeting Notes

Betsy-

Thank you for the opportunity to discuss the proposed study plans for the Susitna-Watana Hydroelectric project. We look to further discussions to continue to clarify study plan details.

To assist in you and your consultants in this process, below are brief notes by ADF&G staff. We may have additional comments/or clarifications. Please feel free to contact me if you have any questions.

Regards, Joe

Fish Distribution and abundance in Upper, Middle and Lower Susitna River

- Trot lines should considered during the winter to target appropriate fish species.
- Minnow trapping under ice should be used during the winter, in all habitat types.
- Should evaluate the feasibility of under ice videography.

Salmon Escapement

- Identify locations of adult fish weir locations described on tributary streams (7.7.4.1.5, page 7-39). Consider placement of adult fish weir upstream of the proposed dam on prominent Chinook salmon streams.

Instream Flow

- What is the sampling strategy (e.g. representative reach, mesohabitat typing) for the defined habitat types?
- How many and at what range will discharge-calibration sets be collected for each sampling method?
- Will 2D modeling include side channels and sloughs within study area?
 - Based on comments at the meeting it was my understanding it would.
- What criteria will be used to identify cover types and substrate sizes?
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- What criteria will be used to select and weight transect-derived models?
- Per the description of study sites for fish passage/off-channel connectivity (§6.5.4.5.5), what criteria will be used to identify "a representative number" of different habitat types?
- HSI data is needed for identified target species for each defined habitat type, over 2 years.
- How will the data be aggregated to evaluate single flow recommendation?
- Will a DSS-type program be available to review study results and if so, information is needed on it.
- How do you envision the "collaborative process" will work? When will major decisions be made (e.g. site and transect selections) and how often do you envision the work group will get together?
- What equipment will be used and how will they be calibrated?
- For the eulachon and boating studies, similar information is needed on what is the study area, what sampling strategy will be used, how many and what range of calibration-discharge sets if appropriate, and how will HSI curves will be developed?
- Variational zone modeling, may need more defined time steps during analysis phase (possibly down to 15-minute increments) depending on the rate of flow change over time.

Groundwater

- What are the monitoring well placement sampling approach (e.g. equal spacing along linear transects, etc.) and location (e.g. for instream flow, in all habitat types?) for the various resource studies (i.e. instream flow, riparian instream flow, water quality). Also, a description of sampling intensity would be helpful (i.e. for instream flow purposes, will the objective be to characterize entire gw/sw interaction throughout entire intensive study site or only at select microhabitats).
- What is the duration for monitoring (I believe at the meeting it would be from installation until winter 2013-14?)
- How often will monitoring wells be calibrated for various parameters to be sampled pre- post- and during field monitoring?
- For each resource discipline, what parameters will be sampled and what are range of accuracies (e.g. for water level +/- 0.1 ft?, water temp +/- 0.2 C?, etc.).

Water Quality

- Information on availability of the Sampling and Analysis Plan and Quality Assurance Project Plan is needed.
- GW Quality in Selected Habitats (Section 5.5.4.7) - need more information on study. For example, sampling intensity/number of site measurements per slough or criteria for how they will be determined. Will ground water level monitors be installed if so, what is the sampling intensity (numbers per habitat type) and duration of monitoring (e.g. continuous year-round/ point samples during field visits, etc.). If not, it is strongly recommended groundwater monitoring be performed concurrently with water quality monitoring in this study.
- Any monitors should be calibrated pre- and post-monitoring along with multiple field measurements for post monitoring calibration.



THE STATE
of **ALASKA**
GOVERNOR SEAN PARNELL

**Department of
Fish and Game**

DIVISION OF SPORT FISH
Research and Technical Services

333 Raspberry Road
Anchorage, Alaska 99518-1599
Main: 907.267.2148
Fax: 907.267.2422

August 31, 2012

Wayne Dyok, Project Manager
Alaska Energy Authority
Susitna-Watana Hydroelectric Project
813 W. Northern Lights Blvd
Anchorage, AK 99503

Subject: Comments on the Watana Transportation Access Analysis Draft Report
for the Susitna-Watana Hydroelectric Project, FERC No. 14241

Dear Mr. Dyok:

Alaska Department of Fish and Game (ADF&G) has reviewed the "Watana Transportation Access Analysis" draft report prepared by the Alaska Department of Transportation and Public Facilities for the Susitna-Watana Hydroelectric Project (FERC No. 14241). We offer the following comments from the Divisions of Habitat, Wildlife Conservation, and Subsistence per the Alaska Energy Authority's request for comments.

I. DIVISION OF HABITAT

Access Alternatives

The North Route (Seattle Creek) is ADF&G Division of Habitat's preferred alternative. The North Route would minimize impacts to anadromous systems resulting from construction of transportation infrastructure. West and South Routes would each necessitate several anadromous stream crossings.

Stream Crossings

Fish presence and distribution information is scarce for at least some portion of each proposed access corridor, particularly in regards to resident species. Fish surveys at proposed crossing locations should be conducted. Surveys should consist of electrofishing a distance equal to 40 wetted stream widths in the vicinity of the crossing, with a minimum survey length of 50 meters. If initial surveys do not detect fish presence at specific crossings, at least one additional fish survey should be conducted during a different season to verify that the stream is non-fish bearing. Fish

Habitat Permits will be required from ADF&G Division of Habitat for all stream crossings and Fish Resource Permits will be required from ADF&G Division of Sport Fish for all fish surveys. ADF&G Division of Habitat will make the final determination regarding fish presence if surveys fail to detect fish.

Bridges and culverts utilizing the Streambed Simulation Design Method (NMFS 2011) are recommended for stream crossings. Culverts width should be at least 1.2 times the bankfull channel width of the stream, should have a slope that approximates the average slope of the adjacent stream from approximately ten channel widths upstream and downstream, and should not exceed 6% slope where closed bottom culverts are used. Culverts should be embedded not less than 30% and not more than 50% of culvert height, and fill material should be of similar size composition as adjacent natural streambed material.

NMFS (National Marine Fisheries Service). 2011. Anadromous Salmonid Passage Facility Design. Chapter 7: Culverts and other road crossings. NMFS, Northwest Region, Portland, Oregon.

Improvements to Existing Infrastructure

If a northern route is chosen, replacement or improvement of existing stream crossings along the Denali Highway will be a necessary component of upgrading the highway to accommodate project traffic. A comprehensive survey of Denali Highway stream crossings will be required. Culverts found to be undersized, perched, damaged or otherwise inadequate for fish passage should be repaired or replaced with bridges or culverts designed for fish passage. The Access Study indicates six replacement culverts along the Denali Highway (Table 5-1, page 96). ADF&G Fish Passage Inventory records indicate at least 12 Denali Highway stream crossings between Cantwell and Seattle creek which are currently in conditions unsuitable for fish passage (Table 1).

Table 1.–Denali Highway stream crossings between Cantwell and Seattle Creek unsuitable for fish passage.

Stream	Lat	Long
Unnamed stream	63.38771	-148.88483
Jack River	63.38032	-148.86179
Fish Creek tributary	63.37249	-148.82681
Unnamed pond connection	63.37203	-148.82124
Unnamed Nenana River tributary	63.39041	-148.60771
Unnamed Nenana River tributary	63.38967	-148.56854
Edmonds Creek	63.39304	-148.52495
Unnamed Nenana River tributary	63.38359	-148.43508
Unnamed Nenana River tributary	63.38046	-148.40971
Unnamed Nenana River tributary	63.3744	-148.37766
West Fork Lily Creek	63.33508	-148.2782
East Fork Lily Creek	63.33375	-148.27148

II. DIVISION OF WILDLIFE AND CONSERVATION

The Seattle Creek (North) alternative may have a greater effect on moose, caribou, and ptarmigan (willow, rock and potentially white-tailed) due to increases in hunter access. Increasing access will likely result in increased harvest pressure in Game Management Unit (GMU) 13E. While new access routes may help disperse hunters, conflict among hunters accessing new areas may occur initially. Portions of the area are currently accessible by all-terrain vehicles (ATV) coming off the Denali Highway, but the new road would mean additional highway vehicle access and would also provide new starting points for ATV's. Increases in harvest can be managed through the Board of Game regulatory process by changing seasons, bag limits, methods and means. Social issues due to competition for hunting areas and/or access routes can also be managed to some extent, but solutions can be more elusive and often demand more creative approaches.

Current and planned telemetry studies are expected to inform the assessment of the effects on moose, caribou and ptarmigan. Based on existing information, the Seattle Creek (North) alternative may result in increased vehicular collisions when caribou move through the area seasonally. The full extent to which caribou and moose utilize each of the proposed access routes will remain speculative until ongoing research has been completed. The willow ptarmigan study is inquiring into the extent to which the area between the impoundment and Denali Highway serves as refugia for the greater GMU 13 ptarmigan population. To the extent that ptarmigan have been moving from the affected area to resupply adjacent currently accessible hunting areas, loss of that area as refugia could stress the ptarmigan population throughout the unit.

With any new access road into GMU 13E, additional trapping pressure could result which could lead to increased harvests of certain furbearers. Again, should conservation concerns arise, harvest can be managed through the Board of Game regulatory process.

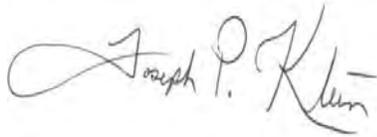
III. DIVISION OF SUBSISTENCE

The three alternatives allow for differing levels of access. The two southern routes, the Gold Creek and Chulitna Route, would provide road access to open up areas for a diversity of harvesting opportunities for residents of Southcentral Alaska where a majority of the State's population resides. These areas are already used extensively by ATV and airplane traffic from the Talkeetna-Willow area. No comprehensive harvest mapping efforts are available for this area currently; however, this will be addressed through the subsistence harvest surveys planned for the communities of Talkeetna and Trapper Creek.

The northern route, the Denali Corridor (Seattle Creek), would increase accessibility for all harvesting activities, but especially for hunting caribou, to rural residents of Cantwell and the Copper River Basin. Based on past mapping and ethnographic research, residents of these communities have traditionally utilized this area for the harvest of caribou (Nelchina Herd) and

freshwater fish. Although a road may be beneficial to local residents, it could also increase competition as better road access, and the upgrade of the Denali Highway, would enable easier access for residents of the road system, both north and south of the area. As noted in the comments above opening up the northern area would demand more creative approaches to managing social issues.

Sincerely,

A handwritten signature in black ink that reads "Joseph P. Klein". The signature is written in a cursive style with a large, looping initial "J".

Joe Klein, Susitna-Watana FERC Coordinator
Alaska Department of Fish and Game

Cc: Doug Vincent-Lang, ADF&G
Bob Clark, ADF&G
Stormy Haught, ADF&G
Mark Burch, ADF&G
Davin Holen, ADF&G
Maria Steele, ADNR
Betsy McGregor, AEA

From: Klein, Joseph P (DFG) [mailto:joe.klein@alaska.gov]
Sent: Thursday, September 06, 2012 1:58 PM
To: Betsy McGregor
Subject: RE: Follow up Meeting Notes-additional comments

Betsy- Per a follow up to our River Productivity comment below, we wish to revise our statement to read:

We support the effort to provide a means to evaluate future changes in the Susitna River under different operation scenarios and also recommend identifying a reference reach in a similar Alaska river for using a BACI design monitoring program to assess post project impacts.

Regards, Joe

From: Klein, Joseph P (DFG)
Sent: Thursday, August 23, 2012 2:48 PM
To: McGregor, Elizabeth A (AIDEA)
Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); [Michael Buntjer@fws.gov](mailto:Michael.Buntjer@fws.gov); [Betsy McCracken@fws.gov](mailto:Betsy.McCracken@fws.gov); Eric Rothwell (Eric.Rothwell@noaa.gov); Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)
Subject: RE: Follow up Meeting Notes-additional comments

Following are additional comments

Baseline Water Quality

5.5.4.3.2 In-Situ Water Quality Sampling The sampling protocol currently calls for monthly in-situ water quality monitoring for the 4 summer months. It should be revised to include continuous (hourly or so) water quality measurements for basic parameters (pH, DO, conductivity, turbidity), year-round if possible using in-situ semi-permanent sensors (e.g. sondes). The technology is readily available and would provide very useful baseline information to assess any post project impacts.

River Productivity

7.8.4.4 Conduct a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River. We recommend supplementing or substituting this section using a reference reach in a similar Alaska river using a BACI design monitoring program in order to assess post project impacts.

From: Klein, Joseph P (DFG)
Sent: Thursday, August 23, 2012 10:42 AM
To: McGregor, Elizabeth A (AIDEA)
Cc: Benkert, Ronald C (DFG); Burch, Mark E (DFG); Erickson, Jack W (DFG); Fair, Lowell F (DFG); Fink, Mark J (DFG); Giefer, Joe (DFG); Haught, Stormy B (DFG); Holen, Davin L (DFG); King, Kimberly N (DFG); Miller, Monte D (DFG); [Michael Buntjer@fws.gov](mailto:Michael.Buntjer@fws.gov); [Betsy McCracken@fws.gov](mailto:Betsy.McCracken@fws.gov); Eric Rothwell (Eric.Rothwell@noaa.gov); Hill, Melissa E (DNR); Schwarz, Terence C (DNR); Sager, Kimberly R (DNR); Ashton, William S (DEC)
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From: Michael_Buntjer@fws.gov [mailto:Michael_Buntjer@fws.gov]
Sent: Friday, September 07, 2012 5:37 PM
To: Betsy McGregor
Cc: Betsy_McCracken@fws.gov; Catherine_Berg@fws.gov; Lori_verbrugge@fws.gov; eric Rothwell; Brian Lance; susan walker; joe.klein@alaska.gov; MaryLou Keefe; Cassie_Thomas@nps.gov; tsundlov@blm.gov
Subject: Follow up Notes from the August 2012 Work Group meeting

Hello Betsy:

Thank you for the opportunity to discuss the proposed study plans for the Susitna-Watana Hydroelectric Project. We look forward to further discussions to clarify the details of the proposed study plans. I have attached some initial notes, comments, and questions regarding the objectives in our three fish study requests, our River Productivity Study Request, and those found in the proposed study plan.

These comments are in addition to those provided during the August 2012 work group meetings, and are intended to assist in further discussions about development of the study plans. In addition to the attached comments, I have some overall questions, comments, and concerns about the proposed fish studies. Based on the proposed methodologies, there does not appear to be any studies to collect baseline biological or physical spawning habitat information between the time eggs are deposited in redds and the time of fry emergence, and no information on the timing and movement of fish from spawning to rearing areas, and only limited information on the distribution and abundance of juvenile fish up to 60 mm, particularly in winter. These are the life stages most vulnerable to load-following operations.

Although I have more questions and comments regarding linkages between proposed studies and project details, these should serve as a starting point for the upcoming fish sub-workgroup meetings. If you have any questions, please feel free to contact me. Thanks.

Mike

(See attached file: ELH Juvenile Adult Fish D and A Riv Pro mb initial draft comments on PSP.docx)

Mike Buntjer
US Fish and Wildlife Service, Anchorage Field Office
Conservation Planning Assistance
605 W. 4th Ave, Room G-72
Anchorage, AK 99501
(907)271-3053
(907)271-2786 FAX

ATTACHMENT: ELH Juvenile Adult Fish D and A Riv Pro mb initial draft comments on PSP.doc

For each USFWS Study Request below (including our three fish studies and River Productivity) I listed the objectives in each study request and then followed them with the objectives I found in the PSP. I noted where the objectives were the same, where they differed, and where our study requests were not addressed in the PSP. I also include other notes, comments, and questions to assist in further discussions about the proposed studies.

Early Life History and Juvenile Fish Distribution and Abundance in the Susitna River (USFWS Study Request; Enclosure 13)

Specific study request objectives versus objectives included in PSP Study 7.5 (upper reach) and Study 7.6 (middle and lower reach):

1. Determine the seasonal distribution, relative abundance (as determined by CPUE, fish density, and counts), and fish-habitat associations of juvenile anadromous and resident juvenile fish species in the mainstem Susitna River (side channel, slough, backwater, and tributary confluence habitats).

1. Describe the seasonal distribution, relative abundance (as determined by CPUE, fish density, and counts), and fish-habitat associations of resident fishes, juvenile anadromous salmonids, and the freshwater life stages of non-salmon anadromous species; (7.5 upper reach)

- Only winter sampling I see proposed in the upper reach includes using DIDSON and video cameras in 10 "selected" sloughs and side channels; how were/will sites be selected?; What other habitat types are available and why are they not being sampled? Is this sufficient to get at winter distribution and abundance for all life stages?; will not likely be able to identify juvenile species using these techniques (therefore, no distribution and abundance information and habitat use by species, particularly for early life stages (<60 mm); other winter sampling (using gill nets, minnow traps, and trot lines) is listed in the schedule section (and not in methods), but it is not described.

1) Describe the seasonal distribution, relative abundance (as determined by CPUE, fish density, and counts), and fish-habitat associations of juvenile anadromous salmonids, non-salmonid anadromous fishes and resident fishes; (7.6 middle and lower reach).

- The list of habitat types to be sampled in this study (middle and lower reaches) appears longer than habitats proposed for the upper reach, but otherwise same comments as listed above for Study 7.5 (upper reach).

2. Describe the seasonal movements and migratory patterns of juvenile anadromous and resident juvenile fish species among mainstem habitats and between tributaries and mainstem habitats with emphasis on identifying foraging and overwintering habitats.

5. Use biotelemetry (PIT and radio tags) to describe seasonal movements of selected fish species (including rainbow trout, Dolly Varden, whitefish, northern pike, burbot, and Pacific lamprey if present) with emphasis on identifying spawning and overwintering habitats within the hydrologic zone of influence upstream of the project; (7.5 upper reach)

- Unclear if this includes or excludes PIT tagging juvenile anadromous salmon, particularly Chinook salmon; i.e., none are listed
- Also, mentions installing up to six antenna arrays in selected sloughs and side channels in winter; is that sufficient to determine movement of juveniles in and out of habitats? What about other habitats? Unclear how sites were selected and what habitats were or were not sampled in the 1980s. Therefore, what is rationale and assumptions for selecting habitat types and sites?
- See nothing on movement (and timing) of newly emergent fish from spawning to rearing areas or movement of juvenile fish <60 mm in winter (i.e., the post-emergent life stages most vulnerable to load-following operations)

2) Describe seasonal movements of selected fish species such as rainbow trout, eulachon, Dolly Varden, whitefish, northern pike, Pacific lamprey, and burbot) using biotelemetry (PIT and radio-tags) with emphasis on identifying foraging, spawning and overwintering habitats within the mainstem of the Susitna River and its associated off-channel habitat; (7.6 middle and lower reach)

- Unclear if this includes or excludes PIT tagging juvenile anadromous salmon; i.e., none are listed
- Also, mentions installing up to 10 antenna arrays; is that sufficient to determine movement of juveniles in and out of habitats by reach? When, where, and how will sites be selected? What is rationale and assumptions for selecting habitat types and sites?
- See nothing on movement (and timing) of newly emergent fish from spawning to rearing areas or movement of juvenile fish <60 mm in winter, particularly for anadromous salmonids.

- 3.** Document the timing of downstream movement of all juvenile fish species and outmigration for anadromous salmon.

6. Document the timing of downstream movement and catch for fish species via outmigrant traps; (7.5 upper reach)

- Unclear if this includes or excludes addressing outmigration and winter sampling

3) Document the timing of downstream movement and catch for all fish species using outmigrant traps; (7.6 middle and lower reach)

Unclear if this includes or excludes addressing outmigration

- 4.** Document the age structure, growth, and condition of juvenile anadromous and juvenile resident fish by season.

4) Characterize the age structure, growth, and condition of juvenile anadromous and resident fish by season; (7.6 middle and lower reach)

- Is there a difference between Document (as requested) and Characterize (as proposed)? Explain
- Is this study objective limited to juveniles or should it say “all” resident fish.
- This objective is not included in upper reach; should at least characterize age structure for all resident and anadromous fish by season

5. Collect and analyze tissue samples from juvenile salmon and opportunistically from all resident and non-salmon anadromous fish to support the Genetic Analysis study.

3. Collect tissue samples to support the Genetic Baseline Study for Selected Fish Species (Section 7.14); (7.5 upper reach)

- No mention of analyzing samples; analysis mentioned in Genetic Baseline Study, but link/integration to analyzing samples collected in this study is not discussed. Will samples be analyzed? Explain.

6) Collect tissue samples from juvenile salmon and opportunistically from all resident and non-salmon anadromous fish to support the Genetic Baseline Study (Section 7.14). (7.6 middle and lower reach)

- Again, no mention of analyzing samples; analysis mentioned in Genetic Baseline Study, but link/integration to analyzing samples collected in this study is not discussed. Will samples be analyzed? Explain.
- Because PSP is not structured similarly to our study requests, why is this study objective limited to juvenile salmon? This may be okay, because genetic sampling included in Salmon Escapement Study, though no mention in study of analyzing samples or overall links between studies. Without providing linkages between studies, there is a lot of searching required to find if, where, and how information is being collected.

6. Collect and provide the Instream Flow study with habitat suitability criteria (HSC) data to support analysis of potential project impacts.

Mention of HSC is in Study 6.5, but the study request objective is not addressed in the upper, middle, or lower reaches for juvenile anadromous, resident fish, and non-salmonid anadromous fish studies. It is unclear how HSC information will be collected, particularly in winter for post-emergent fish up to 60 mm when fish will be most vulnerable to load-following operations. I see no empirical baseline information being collected to evaluate potential project effects or for inclusion in habitat modeling efforts. There is generic reference to developing HSC model in Study 6.5 for these species and life stages, but unclear about the source of that information.

7. Evaluate salmon incubation (embryo development, hatching success, and emergence times) and associated water quality conditions (e.g., temperature, DO, pH) at existing spawning habitats (slough,

side channel, tributary, and mainstem) in areas with and without groundwater upwelling in the middle and lower reaches of the Susitna River.

Study Request objectives 7-9 are not addressed in 7.5 or 7.6; there is no mention of egg incubation (rates or success), hatching (rates or success), stranding (ramping rates) or emergence (dates and times) sampling anywhere; no mention of baseline intragravel temperature or water quality monitoring of spawning and pre-emergent juvenile fish habitats; no mention of characterizing baseline water quality conditions at spawning or rearing habitats.

Only mention is in Study Goals (6.5.1.2, page 6-10); Objective 8. Conduct a variety of post-processing comparative analyses derived from the output metrics under aquatic habitat models. Approach appears to evaluate using only physical habitat models and without empirical sampling post-spawning through emergence and for juveniles up to PIT tagging size (i.e., 60 mm).

8. Evaluate the potential for stranding of juvenile fish and stranding mortality by season under proposed operational conditions.

This Study Request objective is not addressed. Stranding is mentioned in Chapter 6, but the study approach is not discussed

9. Measure intragravel water temperature in spawning habitats and winter juvenile fish habitats at different surface elevations and different depths to determine the potential for freezing of redds, freezing of juvenile fish, and their habitats.

This Study Request objective is not addressed anywhere.

Adult Salmon Distribution, Abundance, Habitat Utilization and Escapement in the Susitna River (USFWS Study Request: Enclosure 15)

Specific objectives included in study request versus objectives listed in PSP Study 7.6:

1. Capture, radio tag and track adults of the five species of Pacific salmon in proportion to their abundance.
1. Capture, radiotag, and track adults of five species of Pacific salmon in the middle and upper Susitna River in proportion to their abundance. Capture and tag Chinook and coho salmon in the lower Susitna River.
2. Determine the migration behavior and spawning locations of radio-tagged fish in the lower, middle, and upper Susitna River.
2. Characterize the migration behavior and spawning locations of radiotagged fish in the lower, middle, and upper Susitna River.
3. Characterize adult salmon migration behavior and run timing within and above Devils Canyon.
3. Characterize adult salmon migration behavior and timing within and above Devils Canyon.
4. If shown to be an effective sampling method during the 2012 study, and where feasible, use sonar to document salmon spawning locations in turbid water.
4. If shown to be an effective sampling method during the 2012 study, and where feasible, use sonar to document salmon spawning locations in turbid water in 2013 and 2014.
5. Compare historical and current data on run timing, distribution, relative abundance, and specific locations of spawning and holding salmon.
5. Compare historical and current data on run timing, distribution, relative abundance, and specific locations of spawning and holding salmon.
6. Estimate escapement of adult salmon spawning by mainstem reaches and tributaries.
6. Generate counts of adult Chinook salmon spawning in the Susitna River and its tributaries.

Need to define "generate count" and how generated. If it is an index of abundance, then need to identify the standardized unit of effort. Also, not sure why escapement estimate is not being determined? This study references escapement estimates from the 1980s, but not here. Explain.
7. Collect tissue samples to support the Genetic Analysis Study.
7. Collect tissue samples to support the Fish Genetic Baseline Study (Section 7.14).
8. Determine system-wide Susitna River escapement and run apportionment.
8. Estimate system-wide Chinook and coho salmon escapement to the Susitna River and the distribution of those fish among tributaries of the Susitna River.
9. Determine the availability and accessibility of spawning habitats by adult salmon to mainstem and tributary locations based upon flow regime.

Unclear if, how, or where this Study Request objective is being addressed.

Not listed as an objective in this study; section 6.5.4.3.1 (page 6-19) describes assessing access to rearing and spawning habitats via output from flow routing models. Also, objective 13 (shown below) in fish passage study (section 7.12); page 7-98):

13. Evaluate the potential creation of fish passage barriers within existing habitats (tributaries, sloughs, side channels, off-channel habitats) related to future flow conditions, water surface elevations, and sediment transport.

10. Measure critical habitat characteristics (e.g., channel type, flow, substrate, and groundwater) at reaches used for spawning and compare these characteristics with those in adjacent reaches that do not contain spawning adults.

Do not see this study request objective addressed or any objective that looks at characterizing use, availability, or quality of potential spawning habitats. There appears to be no empirical baseline information being collected; only see determining distribution and potential abundance of redds. Also, see mention of evaluating potential dewatering or scouring of redds in Chapter 6, but no empirical baseline information to assess daily load-following operations.

River Productivity Study (USFWS Study Request: Enclosure 11)

Specific Study Request objectives versus objectives listed in proposed study 7.8:

1. Develop a white paper on the impacts of hydropower development and operations (including temperature and turbidity) on benthic macroinvertebrate and algal communities in cold climates.

1. Synthesize existing literature on the impacts of hydropower development and operations (including temperature and turbidity) on benthic macroinvertebrate and algal communities;

- Any difference in developing a white paper versus synthesizing existing literature?

2. Characterize the pre-project benthic macroinvertebrate and algal communities with regard to species composition and abundance in the lower, middle and upper Susitna River.

2. Characterize the pre-Project benthic macroinvertebrate and algal communities with regard to species composition and abundance in the middle and upper Susitna River;

- Omission of lower reach is an apparent typo.

3. Estimate drift of benthic macroinvertebrates in habitats within the lower, middle and upper Susitna River to assess food availability to juvenile and resident fishes.

3. Estimate drift of benthic macroinvertebrates in selected habitats within the middle and upper Susitna River to assess food availability to juvenile and resident fishes;

- Omission of lower reach is an apparent typo.

4. Conduct a trophic analysis to describe potential changes in the primary and secondary productivity of the riverine community following post-project construction and operation.

5. Conduct a review on the feasibility of a trophic analysis to describe potential changes in the primary and secondary productivity of the riverine community following Project construction and operation;

- Shouldn't this read: Conduct a trophic analysis, if feasible, to describe...? Also, why would it not be feasible? Explain.

5. Generate habitat suitability criteria (HSC) for Susitna River benthic macroinvertebrate and algal habitats to predict potential change in these habitats downstream of proposed dam site.

6. *Generate habitat suitability criteria for Susitna benthic macroinvertebrate and algal habitats to predict potential change in these habitats downstream of proposed dam site;*

6. Characterize the **benthic** macroinvertebrate compositions in the diets of representative fish species in relationship to their source (benthic or drift component).

7. *Characterize the macroinvertebrate compositions in the diets of representative fish species in relationship to their source (benthic or drift component);*

- I assume this should include term “benthic”. If not, explain difference.

7. Evaluate the feasibility of reference sites on the Talkeetna and Chulitna Rivers to monitor baseline productivity, pre- and post-construction. (**deleted in PSP; and not addressed**)

AEA replaced this objective (with #4 below), but based on discussion at August 15, 2012, TWG meeting it was suggested to do both or keep the original Study Request objective. We recommend and support that suggestion.

4. *Conduct a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River. (added in PSP)*

8. Characterize organic matter resources (e.g., available for macroinvertebrate consumers) including coarse particulate organic matter, fine particulate organic matter, and suspended organic matter in the lower, middle, and upper Susitna River.

8. *Characterize organic matter resources (e.g., available for macroinvertebrate consumers) including coarse particulate organic matter, fine particulate organic matter, and suspended organic matter in the lower, middle, and upper Susitna River.*

9. Estimate benthic macroinvertebrate colonization rates in the middle and lower reaches to monitor baseline conditions and evaluate future changes to productivity in the Susitna River.

9. Estimate benthic macroinvertebrate colonization rates in the middle and lower reaches to monitor baseline conditions and evaluate future changes to productivity in the Susitna River.

Note: Page 7-12 of PSP states that marine derived nutrients are included in River Productivity Study, but there is no mention of it in Chapter 7; i.e., is not addressed.

Adult and juvenile non-salmon anadromous, resident and invasive fish studies in the Susitna River basin (RM 0 - RM 233)(USFWS Study Request; Enclosure 14)

General objectives for this study request are to:

COMMUNITIES AND ASSEMBLAGES

- Characterize the seasonal (spring, summer, fall, winter) distribution, relative abundance, and habitat utilization in the Susitna River mainstem (RM 0-RM 233) for all life stages of non-salmon anadromous, resident, and invasive fish species. [Documenting both hierarchical nested habitat type and use-type as described in the resource agency Instream Flow Study and Habitat Utilization Study Request].

Recommendation for hierarchical nested habitat type and use-type not addressed in PSP.

- Characterize the seasonal (spring, summer, fall and winter) movement patterns of all subject fish species and life stages as they relate to foraging, spawning, rearing and overwintering habitats. The characterization of seasonal movements includes run timing (immigration and emigration) and extent (periodicity) of non-salmon anadromous species in the Susitna River (RM 0-RM 233) and movement into and out of tributary streams. [Interface with resource agency Instream Flow and Habitat Utilization Study Request hierarchical nested habitat types and habitat mapping].

Interface with resource agency Instream Flow and Habitat Utilization Study Request hierarchical nested habitat types and habitat mapping does not appear to be addressed.

- Characterize the flow-related or synchronized life history strategies (migration, movement, spawning, rearing, hatching, emergence) of non-salmon anadromous, resident and invasive species, and their biological behavioral response (e.g., potential for false attraction, delayed migration or increased holding time, synchrony of spawning, relative hatching and emergence timing) to Project-affected flow alterations (flow, temperature, habitat, water quality).

Similar to juvenile anadromous salmonid comments above, much of this Study Request objective does not appear to be addressed in the PSP, particularly for movement, rearing, hatching, emergence and juvenile fish (<60 mm) in winter.

RESOURCE DATA SYNTHESIS

- Synthesize existing resource data, results and information from 1980's Susitna Hydroelectric studies, and other relevant literature to determine applicability and utility of results and information to the currently proposed project.

What is timeframe for completing? Not addressed in PSP

GENETICS

- Collect tissue samples from all resident and non-salmon anadromous fish species for genetic population structure database and future stock identification analysis. This is particularly important for salmon species, anadromous lamprey, and Bering cisco of the Susitna River drainage.

TROPHIC ECOLOGY

- Characterize trophic interactions using seasonal diets (stomach content analysis) of all age classes of non-salmon anadromous, resident and invasive fish species. [Interface with the productivity study, riparian, and instream flow study requests]
- Quantify the relative contribution (biomass) of marine-derived nutrients to the ecology of the Susitna River from adult returns of non-salmon anadromous fish species (e. g., Pacific and Arctic lamprey, eulachon, Bering cisco).

Page 7-12 of PSP states that marine derived nutrients are included in River Productivity Study, but there is no mention of it in Chapter 7; i.e., is not addressed.

From: Betsy_McCracken@fws.gov [mailto:Betsy_McCracken@fws.gov]
Sent: Friday, September 07, 2012 4:02 PM
To: Betsy McGregor
Cc: Bryan Carey; 'Fullerton, Bill'; Betsy McGregor; Bob_Henszey@fws.gov; eric Rothwell; 'Klein, Joseph P (DFG)'; 'Kevin Fetherston'; 'Matthew LaCroix'; 'Laura Arendall'; 'Mike Buntjer'; 'MaryLou Keefe'; 'Michael R. Lilly, GW Scientific'; PHIlgert@r2usa.com; rob.plotnikoff@tetrattech.com; 'Benkert, Ronald C (DFG)'; susan walker; 'William Rice'; matt.cutlip@ferc.gov; Lori_Verbrugge@fws.gov; Catherine_Berg@fws.gov; Jennifer_Spegon@fws.gov; dreiser@r2usa.com
Subject: Follow up comments from August 15-17 ILP meetings

Hi Betsy,

Thank you and AEA for hosting the August ILP meetings. We all gained a lot of insight from the meetings, and we were pleased to be updated. Like others, as a result of the meetings, the Service has a few comments and concerns to share with the group.

In addition to these below, other staff from the Service may provide comments relative to their study area expertise. We hope that our collective comments will be helpful toward gaining concurrence on proposed studies, and as we move forward with the review process of the proposed Watana dam.

Thank you,
Betsy

September 7, 2012

Notes from ILP Formal Study Meetings August 15-17, 2012:

At the request of AEA and its consultants, the USFWS (Service) submits this brief summary of concerns regarding the Susitna-Watana hydropower dam formal ILP Formal Study meetings that were held August 16-17, 2012. The Service's concerns in this informal correspondence, along with other remaining concerns will be further articulated in the Service's formal response letter on AEA's ILP Proposed Study Plan (PSP) review, due to FERC October 15, 2012. Additional informal comments from the Service may be provided under separate cover before the October due date.

FWS concerns highlighted during meetings relative to Instream Flow, Habitat Utilization and the Geomorphology proposed study plans:

Overall, the Service finds that AEA's proposed study plans for instream flow, habitat utilization and geomorphology do not fully address agency's resource management concerns. During the three days of ILP study meetings, sequencing and integration of the proposed biological resource studies and the physical process studies was not described and is still a significant outstanding information need. It is necessary to describe the integration of these inter-related studies and how that integration will result in a comparison of the baseline biological information and the resulting effects to biologic resources caused by the proposed project operations. Study results must be quantifiable in order to assess potential losses to aquatic resources and their habitats, to review the project under our relevant fish and wildlife resource conservation authorities, to inform fishway prescription authority under Section 18 of the Federal Power Act, and to eventually develop recommended protection, mitigation, and enhancement for the project license. We do not believe that the current study plan proposals will yield sufficient information to allow us to adequately assess proposed project impacts to the Nation's fish and wildlife resources and develop adequate PME's.

The Service has repeatedly articulated concerns about the lack of study sequencing, connectivity and integration between the biological studies and the other proposed engineering and physical processes studies. We reiterate and highlight the need for the collection of adequate temporal and spatial baseline biological and fish habitat data to provide direct input to some of the proposed physical modeling efforts. Many of our concerns, below, are related to the temporal mismatch of biological data collection with the forward momentum of the physical modeling efforts.

-Habitat Mapping

Hierarchially-nested aquatic habitats- HDR stated at the meeting that the “habitat mapping” will be started in September; and that the sampling will be stratified by meso-habitat type as identified in the 1980’s study reports.

The 1980’s studies did not hierarchically nest the habitat types. The Service specifically requested hierarchially nested habitat mapping (e.g., Frissel et al, 1986). We are concerned with the proposal to use the 1980’s study sites, which focus on the side sloughs, and do not consider the full breadth of fish habitats, which is currently unknown and the subject of ongoing study that has not been completed or submitted for agency review and comment. We do not endorse the use of the 1980’s sites without first completing and then applying a hierarchal assessment of the river reaches as a study framework. The hierarchally nested aquatic habitats framework is needed to structure fish distribution surveys, the instream flow study and other physical process studies. Without it, the fish surveys will be too narrowly constrained and the instream flow studies will not represent all habitats that may be affected by the proposed project. The Service recommends the following habitat hierarchy for the Susitna River be used for habitat mapping purposes and integration of studies:

Large River Floodplain Habitat Hierarchy

1. **Geomorphic units:** Large-scale geomorphic and hydraulic controls.
 - a. Bedrock controlled, single-channel units with shallow hyporheic exchange and thermal homogeneity.
 - b. Unconfined, multiple channel floodplain units with expansive hyporheic exchange and thermal heterogeneity.
2. **Macrohabitats:** Primary, flood, and spring channel networks.
 - a. Primary channels—Perennial channels.
 - b. Flood channels—Seasonally connected channels.
 - c. Spring channels—Disconnected sloughs that discharge groundwater.
 - d. Floodplain ponds—Ponded spring channel networks.
3. **Mesohabitats:** Bed and bank morphological controls; hydraulic features.
 - a. Riffle-pool sequences—Run, riffle, pool, glide, tailout.
 - b. Backwaters, alcoves, shallow meander margins.
4. **Microhabitats:** Hydraulics, water quality, substrate, cover.
 - a. Water depth, velocity, bulk flow characteristics (e.g. Reynolds and Froude #'s).
 - b. Vertical hydraulic exchange (ground and surface water exchange).
 - c. Bed, or intragravel temperature and dissolved oxygen.
 - d. Substrate size, heterogeneity.

e. Elements of wood, vegetation, and rock structure.

-Fish distribution: A first step is to assess the seasonal distributions of target species and life stages and the physical habitat criteria that influence habitat selection and suitability. As a first step, target species have to be identified, agreed upon, and their life history and habitat use similarities to other, unstudied species (i.e., non-target species) need to be determined and described. In the study requests of the Service and other agencies, we recommended studying the baselines of all affected fish species and life stages, including all five species of anadromous salmon and all resident fish.

Fish distribution data are needed to describe the baseline data to support and compliment other proposed study objectives, including those related to fish habitat selection and utilization. A first step to acquiring adequate fish distribution is to assess the full lateral and longitudinal profile of seasonal fish distribution, life stage periodicity, and suitable used and unused habitats that are influential in fish habitat site selection. The fish distribution data is needed to provide the base data layer that will support and compliment other proposed study objectives, including those related to fish habitat selection and utilization, and instream flow (ISF) needs. This information is also needed for resource agencies' fishway prescription decisions under the Federal Power Act. Baseline biological information is critical input necessary for integration with physical studies. Accordingly, the Service is reiterating the need for multiple and continuous years of biologically relevant data in order to provide robust integration with the physical modeling studies, and decision-support relative to fish and wildlife resources of the Susitna River basin.

-Habitat site selection criteria: Criteria that influence habitat selection and suitability need to be identified using statistically powerful and robust methods and current models of fish distribution including bioenergetics and not exclusively physical habitat models (Lovtang 2005). The Service remains opposed to the proposal to repeat the 1980's approaches to fisheries studies. The 1980's studies do not determine the habitat criteria influencing fish habitat site-selection, they simply report utilization functions for water depth and velocity, or depth and substrate. They also lack a fundamental baseline assessment of all available fish habitat and instead focus on study of habitats that had high fish use density. The habitats that were apparently suitable but unoccupied or underutilized by fish need to be assessed, and the entire range of habitat availability and habitat use data need to be assessed prior to habitat study site selection.

More comprehensive data collected on nearby glacial rivers may be used to demonstrate that habitat selection by salmon in side-sloughs can be independent of water depth and velocity and should be compiled.

Fish habitat study sites should be surveyed and identified using the full range of habitats seasonally utilized by agreed-upon target species and life stages. The objective is to identify the bioenergetics and physical factors that control fish habitat selection. The Service considers the assessment of habitat influential to fish habitat site selection to be an objective of the Instream Flow and Habitat Utilization Study request. In the resource agencies Instream Flow and Habitat Utilization Study Plan requests, this is a specifically stated objective.

Sequentially, appropriate flow-habitat models can be selected *after* assessment and validation of 1) the full seasonal distribution of target species and life stages, 2) the physical factors (e.g., micro-habitat data) that influence habitat selection and suitability, and 3) the bioenergetic factors affecting fish habitat suitability and productivity.

Thus, field visits proposed for the end of September (2012) should be considered as reconnaissance and for discussion purposes, and not for the purpose of actual study site-selection.

-Habitat Suitability Indices: Methods for collecting site-specific habitat criteria for the glacial Susitna River need to be collaboratively identified. (As recommended in the resource agencies study plan request for Instream Flow and Habitat Utilization). These criteria also need to be evaluated in the context of the hierarchical habitat model, such that habitat criteria are determined and evaluated in all habitats of importance to each agreed-upon target species and life stage.

The 1980's studies were inconclusive in demonstrating a relationship between fish habitat criteria and fish distribution, and they were also narrowly focused on associations of spawning and rearing salmon with water

depth and velocity in spring channels (side sloughs). Not only is this not representative of existing habitat and the distribution of fish within those habitats, habitat data collected from nearby glacial rivers demonstrates that spawning habitats selection is independent of flow depth and velocity in side sloughs and may be profoundly influenced by bioenergetics and the input of organic matter .

This indicates that traditional hydraulic modeling (e.g., PHABSIM), as proposed, may be an insufficient fish focus/tool. So, first we need to identify criteria that are influential to habitat selection, within the full seasonal distributions of agreed-upon target species and life stages. Only then, after this has been adequately determined, can we begin to develop utilization functions (curves or HSC) for those criteria.

The Service has previously expressed concern with the approach of repeating the 1980's study effort, and we have repeatedly asked for both a complete compilation of available data, and a review of the 1980's information prior to accepting its use for the proposed project. Lacking that review, we independently note that, in the 1980's sites were selected that were, presumably, heavily utilized by spawning sockeye and chum (qualitative). Study sites need to be based on relevant criteria related to physical habitat site selection as documented by fish distribution and lack thereof.

-Groundwater- The integration of the groundwater study efforts with the biological studies is not clear. Specifically, how will the groundwater study be made relevant to the scale of fish habitat and fish habitat site selection in the Susitna River? The objectives of the groundwater study should include relevance to the hierarchially nested habitats, including macro-, meso-, and micro-habitats that are influential to fish habitat selection. The groundwater study sampling design should be relevant to fish habitat and site selection. A specific objective needs to be measuring the hydraulic gradient/head (upwelling or downwelling) under the existing hydrograph and under the proposed project hydrograph release flow schedule.

-Model selection: We need to first determine what criteria are important to fish habitat site/suitability and selection before we can choose an appropriate flow-habitat model. ADFG Marine Mammals biologist, Dr. Bob Small also reiterated this very same point regarding model selection for the beluga whale studies. Again, the Service notes our concern about the limited focus of the 1980's studies and using PHABSIM. Our concerns stated in earlier correspondence to AEA remain unaddressed and are reiterated here for emphasis.

Model sensitivity and relevant criteria (inputs) are critical to achieving statistically valid outputs. At this point, it is premature to select a model until we have known 1) fish distribution, and 2) identification of variables influential to fish habitat site selection.

-Biometric Review- The Service previously requested a biometric review of the 1980's findings. This request is remains outstanding and should be conducted prior to basing any study plans on 1980's studies or results. In all cases, including the usage of the 1980's Su-hydro data results and for the Susitna-Watana study plans, estimates of precision and accuracy of study results is required to evaluate the power of any study plan. Details of proposed study plan sampling and design methods need to be explicit and statistically valid with a priori determination of levels of precision and accuracy of model outputs.

-Fish genetics- During the August 15-17 meetings, AEA stated that genetic samples from the Chinook above the proposed dam site would not be collected. The stated rationale was due to the desire to minimize the handling of the fish after subsequent tagging of fish. Genetic samples of Chinook at locations above the proposed Susitna-Watana dam site are crucial to informing the Service's management goals specific to recommending licensing conditions under the Federal Power Act, and to conservation recommendations under the Fish and Wildlife Coordination Act, and the Anadromous Fish Act. As such, we consider our request for collection of genetic samples from Chinook salmon, and other fish species to be necessary for our resource evaluation of the Susitna-Watana hydropower project. Because of this information need, if AEA does not plan to collect the information, AEA should document how this study request is being addressed.

Fish species genetic samples used for comparisons should be less than ten years old to reflect current gene frequencies among the sampled fish populations. Genetic samples for salmon exist for some tributaries in the

lower and middle Susitna River. Some of these samples are greater than ten years old.

Fish genetic samples should be current and include samples of the Chinook migrating above the proposed dam location. Because gene frequencies change over time, all genetic samples should be within the most recent ten years to allow for valid comparison. Genetic analysis should analyze the existing extent of genetic differentiation within and between fish using distinctly different habitats. We request genetic analysis of Chinook above the proposed dam site relative to those at other upper, middle and lower river and tributary sample locations.

-Fish Passage/fishway prescription- The Service is concerned with the lack of transparent discussion about the potential for fish passage alternatives at the proposed Susitna-Watana dam. If fish passage is required, how will that be accomplished? If it is not feasible, what is your alternative proposal? Where is your project assessment of the fish passage feasibility? What are the design criteria being considered/evaluated?

-Compensatory Mitigation- Compensatory mitigation is determined as part of a mitigation sequence after avoidance, and minimization efforts. The Service has inquired about potential compensatory mitigation for project impacts during several meetings. To date, this concern has not satisfactorily been addressed by the project sponsors or project consultants. Because compensatory mitigation is a requirement in order to offset unavoidable projects impacts to fish and wildlife resources and their habitats, it is should be considered throughout the review process. Please explain how you plan to quantify existing habitats, and quantify primary, secondary and cumulative (40cfr Part230 of the CWA) losses to those habitats under the proposed operational flows over the temporal scale of the license period. How will habitats change proportionally under project operations?

-Lower river- The Service is concerned with AEA consultants' proposal to establish a lower boundary for the physical studies (e.g., geomorphology, instream flow) at a location "downstream of Sunshine" at approximately river mile 75, and not extend the study efforts further down into lower river to inform the biological studies. There are many biological resource studies that would necessarily be informed by establishing a consistent study boundary between the physical and biological studies. For example, studies related to the federally listed Cook Inlet beluga whale, fish species and habitats, including the resident species, and anadromous salmon and eulachon (beluga whale prey species). The lower river also includes the Susitna Flats State Game Refuge. If the physical studies boundary is terminated at river mile 75, there will be no ability to relate or integrate biological data to those studies (e.g., geomorphology, ISF, ice processes, flow routing). Resource agencies management goals would effectively not be addressed below river mile 75, if project effects are not assessed to the mouth of the river.

According to USACE (1966), 80% of the ability to produce accurate model results depends on using appropriate bathymetry data, mesh design, and boundary conditions. The amount of time needed to collect this information, particularly the bathymetry data, depends on the complexity of the channel's geometry, which is known to be complex in the lower Susitna River. Because data collection in the lower river will likely require rigorous field collection due to the channel complexity, it is critical to initiate these efforts in a time sensitive manner. The proposal to delay work in the lower river pending analysis at an arbitrary, and certainly non-biologically relevant location, does not meet resource agencies objective of evaluating the potential project impacts to fish and wildlife resources in the lower Susitna River. This is particularly true under the FERC ILP process timeline specific to the Susitna-Watana dam project.

-Studies integration: A "map" or chart of how studies are proposed to be integrated is needed. AEA sponsors and consultants, committed to providing this by September. Biological resource components are currently not integrated or connected to the other studies, and appear as being treated independently of the rest of the study requests. Study proposals must demonstrate how they will be integrated to provide needed resource information.

Studies/components not address from the Non salmon anadromous, resident and invasives fish species study request: During the August ILP meetings, the follow Service requests were preliminarily noted as not being addressed or adequately addressed by AEA's PSPs.

1) **Marine derived nutrients** contribution from non salmon anadromous species. The Service requested information in our non-salmon anadromous, resident and invasive study plan request. It is not clear which study proposal it is addressing this request, or IF it is being addressed. During the August 15-17 meetings, it was indicated that it may be addressed in either the riparian instream flow, the terrestrial wildlife, the river productivity or elsewhere. However, AEA' s consultants were unable to specifically "point to it" when asked. It does not appear to have been included in the PSPs.

2) **Resource valuation** of non-salmon anadromous and resident fish resources. During the meeting, AEA consultants stated that a resource valuation would not be provided, as requested in the Service's study request for non salmon anadromous, resident and invasive fish study. An explanation of why this assessment will not be addressed was not provided. We request that an explanation be provided that describes the rationale for this determination and urge reconsideration of our study request.

3) **Trophic ecology**- The Service requested information on trophic ecology in the non salmon anadromous, resident and invasive species study request. Michael Link stated that there are "significant predator-prey dynamics" particular once fish move out of the mainstem; using this behavior to explain why fish hold there until they are ready to dash to tributaries. He noted that the creeks are heavily preyed upon by bears, for example. Dr. Bob Small (ADFG) recommended trophic ecology and/or foraging ecology information for the Cook Inlet beluga whale studies. For fish, coordination with Tim Nightengale (AEA's consultant; via teleconference) stated that he would take gut samples from fish to see what macro-invertebrates they are eating, and when, and will work with fish study teams to do some trophic analysis. The trophic ecology component needs to be clearly spelled out in a study plan identifying any aspects that will and will not be addressed explained and with appropriate rationale.

References:

Frissell, C. A., W. J. Liss, C. E. Warren, and M. D. Hurley. 1986. A hierarchical framework for stream habitat classification: viewing streams in a watershed context. *Environmental Management* 10:2. Pp. 199-214.

Lovtang, J. C. 2005. Distribution, habitat use, and growth of juvenile Chinook salmon in the Metolius River Basin, Oregon. M.S. Thesis, Oregon State University. March 2005.

USACE 1966. (Full citation will be provided in follow-up correspondence)

Betsy W. McCracken

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AEA Team Member		Other Party	
Name:	<i>Dani Evenson</i>	Name:	<i>Randy Brown</i>
Organization:	<i>R2 Resource Consultants</i>	Organization:	<i>USFWS</i>
Study Area:	<i>Fish & Aquatics - Fish Distribution and Abundance Study Plan</i>	Phone Number:	<i>(907) 456-0295</i>
Date:	<i>9/18/12</i>	Time:	<i>3:30 PM – 4:45 PM</i>
Call Placed by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others on Call:

N/A

Subject: Fish Distribution and Abundance Study Plan

Discussion:

Discussed Randy Brown's recent research on whitefish and Dolly Varden on Susitna River.

1. Humpback whitefish. Has n=20 otoliths from Yentna (ADF&G) and n=20 from Upper Su (from J. Buckwalter @ ADF&G. Will analyze otoliths to determine anadromy.
2. Round whitefish. Only has n=60 otoliths. Less migratory; little to no time in salt/brackish water.
3. Bering cisco. 4 years of recent data (2008-2011)
 - a. Spawn in mainstem downstream of 3 rivers confluence; most of the population is within the 5 river miles below Montana Creek.
 - b. Enter the Susitna in August from the sea.
 - c. Spawn 2nd week in October
 - d. Otolith microchemistry analysis suggests they all go to sea.
 - e. Sampled on spawning grounds for genetic tissues; no results yet.
 - f. Length distributions are the same as in the 1980's. Aging methods may be suspect, but lengths are not. Consistent lengths between now and the 1980's suggest stability and validate 80's data.
 - g. Did not think additional data on cisco are warranted.
4. Dolly Varden. Lots of variability; some venturing into brackish water- semi-anadromous.

Randy shared his unpublished data with D. Evenson

AEA Team Member		Other Party	
Name:	<i>Dani Evenson</i>	Name:	<i>Matt Evenson</i>
Organization:	<i>R2 Resource Consultants</i>	Organization:	<i>ADF&G-Division of Sport Fish</i>
Study Area:	<i>Fish & Aquatics - Fish Distribution and Abundance Study Plan</i>	Phone Number:	<i>(907) 459-7273</i>
Date:	<i>9/19/12</i>	Time:	<i>10:00 AM – 11:00 AM</i>
Call Placed by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others on Call:

N/A

Subject: Fish Distribution and Abundance Study Plan

Discussion:

Matt reviewed his burbot research on the Tanana River.

1. Suggested reviewing Bernard et al 1991 for description of hoop traps.
2. Indicated that trot lines are lethal sampling for burbot; suggested using hoop traps to capture fish for tagging. Offered to loan AEA consultants their traps.
3. Methods:
 - a. Sampling is best right before freeze up. Suggested sampling in late August-early Oct.
 - b. Burbot prefer slack water in the mainstem. Deploy hoop traps near cut banks or snags where they can easily be anchored.
 - c. Soak overnight, but not too long as accumulation of sediment can be lethal.
 - d. Catch rates highest in spring and fall.
 - e. Bait traps with herring.
 - f. Tag and release in open water.
 - g. Spread out sampling above and below proposed dam site.
 - h. Only tag fish >550mm.
4. Would like to participate in burbot sampling if possible.
5. Would like info on when burbot spawn.

River Productivity Study Subgroup Meeting

September 27, 2012

Draft Agenda Items

Determine if AEA proposed study plans are sufficient to meet agency objectives in the following study plan requests.

Characterize the pre-project benthic macroinvertebrate and algal communities with regard to species composition and abundance in the lower, middle and upper Susitna River.

AEA Proposal. Samples will be collected at 9 mainstem and 18 off channel habitats above and below the proposed dam site, stratified by macrohabitat classification, side channel, side slough, upland slough, tributary, and tributary mouth (study plan only identifies mainstem, side channels, and sloughs). Six replicates will be collected at each sampling location, and samples will be collected on three sampling dates from April through September. "Woody snags" would be removed from the stream and invertebrates collected from the snags and identified.

Additional Questions. Are all mainchannel locations equal. That is, will a sample along an outside bend be the same as a sample collected on a point bar? Will sample locations be selected randomly or only those sites that are easily accessed? If equally divided among four macrohabitat types (excluding tributaries), this will result in approximately 4 replicates of each habitat type. Is this enough to characterize macroinvertebrates in the upper, lower, and middle river? Should sample locations be stratified based on degree of project effect (i.e. closer to the dam site to further downstream)? Will the replicates sample the same microhabitat (i.e. water depth, substrate, cover, velocity, temperature, turbidity)? How will sampling be stratified based on these microhabitats? Should macrophyte beds be added as an additional microhabitat? What constitutes a snag (i.e. LWD 10 cm diameter and 1 m length)? How will sections of logs be removed, chain saw? Will this disturb the insects? How will submerged or buried logs be located in turbid water? Other Questions?

Estimate drift of benthic macroinvertebrates in habitats within the lower, middle and upper Susitna River to assess food availability to juvenile and resident fishes.

AEA Proposal. Collect macroinvertebrates in the drift at 9 of the benthic collection sites. Duplicate samples will be collected. Water velocity measured when nets deployed and just before removal.

Additional Questions. Not clear whether samples will be collected during spring, summer and fall. Are 9 [middle river only] locations sufficient to characterize invertebrate drift?

study plan requests.

Characterize the pre-project benthic macroinvertebrate and algal communities with regard to species composition and abundance in the lower, middle and upper Susitna River.

AEA Proposal. Samples will be collected at 9 mainstem and 18 off channel habitats above and below the proposed dam site, stratified by macrohabitat classification, side channel, side slough, upland slough, tributary, and tributary mouth (study plan only identifies mainstem, side channels, and sloughs). Six replicates will be collected at each sampling location, and samples will be collected on three sampling dates from April through September. "Woody snags" would be removed from the stream and invertebrates collected from the snags and identified.

Additional Questions. Are all mainchannel locations equal. That is, will a sample along an outside bend be the same as a sample collected on a point bar? Will sample locations be selected randomly or only those sites that are easily accessed? If equally divided among four macrohabitat types (excluding tributaries), this will result in approximately 4 replicates of each habitat type. Is this enough to characterize macroinvertebrates in the upper, lower, and middle river? Should sample locations be stratified based on degree of project effect (i.e. closer to the dam site to further downstream)? Will the replicates sample the same microhabitat (i.e. water depth, substrate, cover, velocity, temperature, turbidity)? How will sampling be stratified based on these microhabitats? Should macrophyte beds be added as an additional microhabitat? What constitutes a snag (i.e. LWD 10 cm diameter and 1 m length)? How will sections of logs be removed, chain saw? Will this disturb the insects? How will submerged or buried logs be located in turbid water? Other Questions?

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AEA Proposal. Collect macroinvertebrates in the drift at 9 of the benthic collection sites. Duplicate samples will be collected. Water velocity measured when nets deployed and just before removal.

Additional Questions. Not clear whether samples will be collected during spring, summer and fall. Are 9 [middle river only] locations sufficient to characterize invertebrate drift? Will sample collection be related to the hydrograph (i.e. rising or falling limb)? How will drift be sampled in backwater sloughs with no velocity? How will rapid changes in flow alter invertebrate drift? Is fish abundance at tributaries related to invertebrate drift?

Other Questions?

Conduct a trophic analysis to describe potential changes in the primary and secondary productivity of the riverine community following post-project construction and operation.

AEA Proposal. The proposed study plan states that a literature review will be conducted to determine the feasibility of a trophic study. The results of that review will be used to determine if a trophic analysis should be conducted.

Additional Questions. Is a literature review sufficient? Project operations will store water during the spring and summer. This will reduce the surface area for primary and secondary production and may affect the portion of the bed within the photic zone. The changes may be offset by reduced turbidity. This seems to be a major project related study request that is not being addressed by AEA. Measures of primary and secondary production require more than just algal chl-a and invertebrate density. They are measures of the change in biomass (usually carbon) over time. Productivity often is a function of temperature, nutrient availability, solar radiation, and velocity, all of which can be effected by project operations.

generate habitat suitability criteria (HSC) for Susitna River benthic macroinvertebrate and algal habitats to predict potential changes in these habitats downstream of the proposed dam site.

AEA Proposal. Habitat suitability criteria would be determined concurrent with macroinvertebrate and algal sampling at the 27 sampling locations above and below the dam stratified by macrohabitat type and collected three times from April to September.

Additional Questions. Is the proposed sampling sufficient to develop habitat suitability criteria for macroinvertebrates and periphyton? What about macrophytes? These criteria will be used to evaluate how modeled changes in water depth, velocity, and substrate will affect the macroinvertebrate and algal communities. They do not currently evaluate how changes in turbidity, temperature, and macronutrients will affect invertebrate and algal communities or primary and secondary production. A good argument could be made that this level of sampling is insufficient.

characterize the benthic macroinvertebrate compositions in the diets of representative species in relationship to their source (benthic or drift component).

AEA Proposal. Stomach contents will be flushed from fish target species at the 9 locations where benthic and drift samples are collected. Samples will be processed compatible with other Alaska studies, and taking federal protocols into consideration.

Additional Questions. What is the objective of this study? Is this sampling effort (locations and frequency) sufficient? Does AEA provide enough detail for the agencies

secondary production and may affect the portion of primary production that is available to higher trophic levels. Changes may be offset by reduced turbidity. This seems to be a major project related study request that is not being addressed by AEA. Measures of primary and secondary production require more than just algal chl-a and invertebrate density. They are measures of the change in biomass (usually carbon) over time. Productivity often is a function of temperature, nutrient availability, solar radiation, and velocity, all of which can be effected by project operations.

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Characterize the benthic macroinvertebrate compositions in the diets of representative fish species in relationship to their source (benthic or drift component).

AEA Proposal. Stomach contents will be flushed from fish target species at the 9 locations where benthic and drift samples are collected. Samples will be processed compatible with other Alaska studies, and taking federal protocols into consideration.

Additional Questions. What is the objective of this study? Is this sampling effort (locations and frequency) sufficient? Does AEA provide enough detail for the agencies to evaluate the study? If this is to determine the relative importance of different food sources, shouldn't weights of invertebrate species and cohorts be collected? Should there be some information on terrestrial invertebrates and the relationship between riparian vegetation cover?

Evaluate the feasibility of reference sites on the Talkeetna and Chulitna Rivers to monitor baseline productivity, pre- and post-construction.

AEA Proposal. Conduct a literature review to identify existing river systems that could act as surrogates in evaluating future changes in productivity. If identified, evaluate the feasibility of collecting data from these river(s).

Additional Questions. There seems to be only slight differences between the agency and AEA proposed studies. Are these differences significant? How and who will determine if additional reference data collection at other sites be "feasible"? Is the intent to compare changes in macroinvertebrate community composition and algal abundance or primary and secondary production?

3. Characterize organic matter resources (e.g., available for macroinvertebrate consumers) including coarse particulate organic matter, fine particulate organic matter, and suspended organic matter in the lower, middle, and upper Susitna River.

AEA Proposal. In order to quantify the amounts of organic matter available in the Susitna River for river productivity, CPOM and FPOM (specifically FBOM) will be collected concurrently with all benthic macroinvertebrate sampling (Objective 2, Section 7.8.4.2.1). Suspended FPOM (Seston) [27 locations 3 times from April through September] will be collected at same time and alongside invertebrate drift sampling (Objective 3, Section 7.8.4.3). Organic matter collection will be conducted using methods compatible with other Alaska studies, to allow for comparable results. State and federal protocols will be considered as study plans are developed, in consultation with resource agencies.

Additional Questions. This also appears to be a major project component as organic matter will be trapped in the reservoir (serial discontinuity Stanford and Ward 2002). Is this level of evaluation sufficient (benthic samples at 27 locations and transport samples at 9 locations)? Should FPOM be divided into ultra fine and fine fractions? Will there still be 6 replicates of BOM and 2 replicates of transported OM at each sampling location and each sampling date? What about organic matter processing (i.e. decomposition rates) that can be influenced by temperature and nutrients? How about the effects of flow fluctuation on organic matter transport, that is flushing organic matter out of the system How about the relationship between flood flows and organic matter transport from the riparian to the stream (river flood plain interactions)? What are the state and federal protocols and how will they be considered?

Estimate benthic macroinvertebrate colonization rates in the middle and lower reaches to monitor baseline conditions and evaluate future changes to productivity in the Susitna River.

AEA Proposal. Using a stratified sampling approach, a field study will be conducted to estimate potential benthic macroinvertebrate colonization rates for different seasons in the Susitna River. Sets of three to five preconditioned artificial substrates will be deployed incrementally for set periods of colonization time (e.g., 12, 8, 6, 4, 2, and 1 weeks) and

organic matter in the lower, middle, and upper Susitna River.

AEA Proposal. In order to quantify the amounts of organic matter available in the Susitna River for river productivity, CPOM and FPOM (specifically FBOM) will be collected concurrently with all benthic macroinvertebrate sampling (Objective 2, Section 7.8.4.2.1). Suspended FPOM (Seston) [27 locations 3 times from April through September] will be collected at same time and alongside invertebrate drift sampling (Objective 3, Section 7.8.4.3). Organic matter collection will be conducted using methods compatible with other Alaska studies, to allow for comparable results. State and federal protocols will be considered as study plans are developed, in consultation with resource agencies.

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AEA Proposal. Using a stratified sampling approach, a field study will be conducted to estimate potential benthic macroinvertebrate colonization rates for different seasons in the Susitna River. Sets of three to five preconditioned artificial substrates will be deployed incrementally for set periods of colonization time (e.g., 12, 8, 6, 4, 2, and 1 weeks) and then pulled simultaneously at the conclusion of the colonization period. Artificial substrates will be deployed at three depths at fixed sites along the channel bed. Benthic macroinvertebrate colonization rates may be conducted in a variety of habitats (e.g., turbid vs. non-turbid areas, groundwater upwelling areas vs. areas without groundwater upwelling). Benthic macroinvertebrate processing protocols would be identical to those used in sampling.

Additional Questions. How are samples stratified? Is colonization of tiles the same as colonization of newly inundated stream beds? Will colonization be related to drift? Does

substrate effect colonization (i.e. use natural substrate, cobble, woody debris)? Will colonization of a substrate suspended in the water column be the same as on the stream bed?

AEA Proposed Agenda

Address the feasibility of a trophic analysis to describe potential changes in the primary and secondary productivity of the riverine community following Project construction and operation.

-What is productivity?

-Options to consider, bioenergetics model, ecosystem productivity study, isotope analysis, other?

Reference sites on the Talkeetna and Chulitna Rivers to monitor baseline productivity, pre- and post-construction.

-Potential reference sites

-Need for/utility of BACI design

-Evaluation of reference sites

Need for/value of a literature/data search to identify existing river systems that could act as surrogates in evaluating future changes to productivity in the Susitna River

-Quick overview of literature on regulated glacial rivers,

-Discussion of potential AK surrogates and existing data

APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION

SECTION 10 – WILDLIFE RESOURCES

Documentation of Consultation on Wildlife Resources Study Plans
(from release of PSP on July 16, 2012 through Interim Draft RSP on October 31, 2012)

08/16/2012 Telephone conversation between Mark Burch, ADF&G, and Brian Lawhead, ABR

09/06/2012 Notes from Small Group Meeting on Shorebirds and Landbirds

09/13/2012 Notes from Small Group Meeting on Selected Mammals

09/22/2012 Email from Steve Matsuoka, USFWS, to Brian Lawhead, ABR

09/24/2012 Email from Mark Burch, ADF&G, to Brian Lawhead, ABR

09/24/2012 Telephone conversation between Mark Burch, ADF&G, and Brian Lawhead, ABR

10/04/2012 Notes from Small Group Meeting on Waterbirds

10/12/2012 Email (re: wolverine study) from Mark Burch, ADF&G, to Brian Lawhead, ABR

10/12/2012 Email (re: Dall's sheep study) from Mark Burch, ADF&G, to Brian Lawhead, ABR

10/31/2012 Email from Mark Burch, ADF&G, to Brian Lawhead, ABR

11/21/2012 Telephone conversation between Mark Burch, ADF&G, and Brian Lawhead, ABR

11/29/2012 Telephone conversation between Sarah Bullock, BLM, and Brian Lawhead, ABR

12/04/2012 Telephone conversation between Howard Golden, ADF&G, and Brian Lawhead, ABR

12/04/2012 Telephone conversation between Merav Ben-David, University of Wyoming and Brian Lawhead, ABR

12/7/2012 Email from Mark Burch, ADF&G, to Brian Lawhead, ABR

Robin Reich

From: Brian Lawhead <lawhead@abrinc.com>
Sent: Friday, December 07, 2012 4:03 PM
To: Robin Reich
Subject: FW: BLM comments on AEA study requests

From: Burch, Mark E (DFG) [mailto:mark.burch@alaska.gov]
Sent: Thursday, August 16, 2012 4:34 PM
To: 'Brian Lawhead'
Cc: McGregor, Elizabeth A (AIDEA); Dale, Bruce W (DFG); Merizon, Richard A (DFG); 'msslindberg@alaska.edu'; King, Kimberly N (DFG)
Subject: RE: BLM comments on AEA study requests

Hi Brian,

Here is our response to BLM's comment (Methods are very vague in relation to "multistate models" and "occupancy models". The BLM recommends more specificity about which models are used to ensure that the analysis represents the best science available to produce valid results.):

Multistate and occupancy models are the most advanced analytical techniques for estimating movement, survival, and distributional patterns of marked and unmarked wildlife populations. These analytical approaches are a specific form of modeling that account for detection in the estimation algorithms and each approach is described in detail in the references provided. A more detailed description of the modeling would be extensive and redundant to that provided in the references and the references provide evidence that we are using best tools for valid results. We could provide additional reference to support our choice of methods if necessary.

Hopefully the meeting notes from the terrestrial working group will reflect resolution of the other issues raised by BLM. If not, we can provide written responses to any unresolved concerns.

As you have probably noticed, I've been in a long period of transitioning my office to Palmer. My email address will remain the same, but my mailing address and office telephone number are changing as indicated below.

Mark

*Mark Burch
Special Projects Coordinator
1800 Glenn Highway, Suite 4,
Palmer, Alaska 99645
Office (907) 861-2109
Cell (907) 863-8518*

Robin Reich

From: Terry Schick <tschick@abrinc.com>
Sent: Thursday, November 01, 2012 4:17 PM
To: Robin Reich
Subject: Fwd: species list
Attachments: pic24767.gif

----- Forwarded message -----

From: <Steve_Matsuoka@fws.gov>
Date: Wed, Sep 12, 2012 at 1:25 PM
Subject: Re: species list
To: Brian Lawhead <lawhead@abrinc.com>
Cc: [Jim A Johnson@fws.gov](mailto:Jim_A_Johnson@fws.gov), [Maureen deZeeuw@fws.gov](mailto:Maureen_deZeeuw@fws.gov), [Richard Lanctot@fws.gov](mailto:Richard_Lanctot@fws.gov), Terry Schick <tschick@abrinc.com>

Hi Brian,

Thanks for the explanation about the wildlife-gap analysis and the Kessel surveys. Thanks also for including the two shorebirds as species possibly occurring in the project area.

The BCC list that I referenced is the 2008 version (http://library.fws.gov/bird_publications/bcc2008.pdf). It includes species at 3 different levels: BCR, Region, and National. It would be useful if the BCC column in your document reflected whether the species was on at least one of these 3 levels.

Thanks again Brian for fielding our comments.

Steve Matsuoka
U.S. Fish and Wildlife Service
Migratory Bird Management
1011 E. Tudor Road, ms 201
Anchorage, Alaska 99503
[907-786-3853](tel:907-786-3853)

▾ Brian Lawhead <lawhead@abrinc.com>

Brian Lawhead
<lawhead@abrinc.com>

09/12/2012 11:18 AM

To Steve_Matsuoka@fws.gov

cc Terry Schick <tschick@abrinc.com>, [Maureen deZeeuw@fws.gov](mailto:Maureen_deZeeuw@fws.gov), [Jim A Johnson@fws.gov](mailto:Jim_A_Johnson@fws.gov), [Richard Lanctot@fws.gov](mailto:Richard_Lanctot@fws.gov)

Subject Re: species list

Hi Steve,

Thanks very much for this review. The table that Terry sent you was from the wildlife data-gap analysis that we provided to AEA in August 2011. It reflects the BCC lists for BCR 4 and the Alaska region (Tables 4 and 46 in the 2008 version, which was cited at that time in the FERC/USFWS MOU). It sounds as though a newer version of the BCC document is now available, so we would appreciate a copy if you have it handy (otherwise we will check the national USFWS site), and we will update the list and citations accordingly.

We did not include Short-billed Dowitcher or Hudsonian Godwit because they were not recorded in the study area during the 2 years of field surveys done by Kessel's UA Museum crews, but we will add them to the list as possible species.

It was good to see you last week -- thanks again for your contributions in the meeting and since then!

Brian

On Wed, Sep 12, 2012 at 9:29 AM, <Steve.Matsuoka@fws.gov> wrote:

Hi Terry,

Jim Johnson, Rick Lanctot, and I looked over the list and and a couple of quite minor comments.

1. A few species on your list are on the BCC list for Alaska or nationally, but are not checked off under the BCC column. Some examples include Short-eared Owl and Surfbird. I recommend that you review the Alaska and national lists in the BCC report to make sure that all the relevant species are properly included.

2. Two shorebirds that are on the BCC list that could be added are Hudsonian Godwit and Short-billed Dowitcher. These are probably occur in quite low densities, but should be included to the list.

Thanks for the opportunity for us to weigh in on this.

Steve Matsuoka
U.S. Fish and Wildlife Service
Migratory Bird Management
1011 E. Tudor Road, ms 201
Anchorage, Alaska 99503

[907-786-3853](tel:907-786-3853)

☞ Terry Schick <tschick@abrinc.com>

Terry Schick
<tschick@abrinc.com>

To Steve_Matsuoka@fws.gov

09/10/2012 06:45 PM

cc Maureen_deZeeuw@abrinc.com
Brian Lawhead
<lawhead@abrinc.com>

Subject: Re: species list

Steve,

It was nice to see you again, and thanks again for your input into the process. Attached is the table of bird species of conservation concern that we were discussing in the meeting. This set of species was selected based on the FERC-USFWS MOU on migratory birds (also attached).

-Terry

On Mon, Sep 10, 2012 at 10:39 AM, <Steve_Matsuoka@fws.gov> wrote:

Hi Terry,

Nice talking with you last week. Just wanted to follow up on a few things that I promised you during our meeting.

1. Priority species list. Can you send me the priority species list that Brian showed us so that I can quickly review it for important omissions? Thanks.

2. Kessel versus Viereck. I could not find a copy of Colleen Handel's summary of the differences between Kessel and Viereck classifications. I emailed Colleen to get a copy but have not heard back from her. I'll get back in touch with you about this after I have heard back from Colleen.

Robin Reich

From: Brian Lawhead <lawhead@abrinc.com>
Sent: Monday, September 24, 2012 3:47 PM
To: Robin Reich
Cc: Betsy McGregor; Alex Prichard
Subject: Fwd: Caribou and Moose Proposed Study Plans
Attachments: SuWa_Telephone-Record_ADFG_20120924.docx

Robin,

Here is a record of further consultation with ADF&G today on wildlife study plans. Also see the attached telephone record for other items I discussed with Mark by telephone this afternoon.

Brian

----- Forwarded message -----

From: **Burch, Mark E (DFG)** <mark.burch@alaska.gov>
Date: Mon, Sep 24, 2012 at 2:48 PM
Subject: Caribou and Moose Proposed Study Plans
To: "Brian Lawhead (lawhead@abrinc.com)" <lawhead@abrinc.com>
Cc: "King, Kimberly N (DFG)" <kimberly.king@alaska.gov>, "Dale, Bruce W (DFG)" <bruce.dale@alaska.gov>, "Butler, Lem G (DFG)" <lem.butler@alaska.gov>, "Schwanke, Becky A (DFG)" <becky.schwanke@alaska.gov>

Hi Brian,

We would like to make a change to the caribou study as indicated below:

“Document productivity and calf survival of caribou using the greater Project area;”

The change is to simply strike calf from the third objective.

The moose study plan contemplates conducting one or more GSPE's above and below the proposed dam. As we discussed, if conditions allow and it is otherwise feasible one large (200 sample units) GSPE for both upstream and downstream of the proposed dam will be conducted in November of 2012. Otherwise the proposed study plan will need to be amended to include one or more GSPE's at a later date.

Mark Burch

AEA Team Member		Other Party	
Name:	<i>Brian Lawhead</i>	Name:	<i>Mark Burch</i>
Organization:	<i>ABR, Inc.</i>	Organization:	<i>Alaska Dept. of Fish & Game</i>
Study Area:	<i>Various</i>	Phone Number:	<i>907-861-2109</i>
Date:	<i>24 Sep 2012</i>	Time:	<i>~14:00</i>
Call Placed by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others on Call: None

Subject: Expansion of ADF&G role in 2013–2014 wildlife study plans

Discussion:

Brian called Mark to initiate further discussion on ADF&G’s potential interest in expanding the agency’s role in the 2013–2014 study plans, first discussed at the September 13 meeting at ADF&G. Mark is currently trying to organize internal ADF&G meetings to follow up on specifics with the appropriate departmental staff.

Specific items of discussion included the following:

Wolverine study: ADF&G is potentially interested in participating in the proposed survey effort, using the Sample-Unit Probability Estimator (SUPE) method. ABR could potentially provide some observers if ADF&G needs additional help.

Dall’s sheep study: ADF&G is potentially interested in conducting the proposed aerial survey in the study area. Other items being considered by ADF&G are the possibility of genetic sampling to elucidate the degree of isolation of the sheep inhabiting the Watana Creek Hills (north of the proposed reservoir inundation zone), as well as the extent of the aerial survey area needed on the southern side of the Susitna River.

Large carnivores study: ADF&G is pursuing the feasibility of conducting the density modeling (discussed at the Sep. 13 meeting) with David Miller of the University of Rhode island. They also will discuss their potential involvement in the DNA and stable isotope sampling proposed for bears using anadromous fish spawning streams downstream from the dam in the middle reach of the Susitna River drainage.

Aquatic furbearer study: ADF&G is willing to assist in obtaining hair samples for preconstruction characterization of mercury levels in aquatic furbearers, although the small number of trappers, and the small number of piscivorous furbearers likely harvested, in the reservoir inundation zone and stream drainages immediately downstream from the proposed dam site would be problematic for obtaining samples. Hair snags might be a better way to obtain samples.

Also discussed minor revisions to the Proposed Study Plans for caribou (drop calf survival estimation from objectives) and moose (GeoSpatial Population Estimator [GSPE] survey is being planned for November 2012, so, if successful, then the GSPE effort could be dropped from the 2013–2014 study plan. If not successful in 2012 due to unsuitable survey conditions, then the GSPE survey effort would be retained in the study plan. See follow-up email about the caribou and moose plan revisions from Mark Burch to Brian Lawhead on same date.

AEA Team Member		Other Party	
Name:	<i>Brian Lawhead</i>	Name:	<i>Mark Burch</i>
Organization:	<i>ABR, Inc.</i>	Organization:	<i>Alaska Dept. of Fish & Game</i>
Study Area:	<i>Dall's Sheep & Wolverine</i>	Phone Number:	<i>907-861-2109</i>
Date:	<i>5 Oct 2012</i>	Time:	<i>(not recorded)</i>
Call Placed by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others on Call: None

Subject: Expansion of ADF&G role in 2013–2014 wildlife study plans

Discussion:

Mark called Brian to discuss ADF&G's interest in expanding the agency's role in the 2013–2014 study plans, as discussed at the small-group follow-up meeting at ADF&G September 13 and in a phone conversation on September 24.

Specific items of discussion included the following:

Dall's sheep study: ADF&G is interested in conducting the proposed aerial survey in the study area, focusing on Game Management Unit 13E east of the Parks Highway, using their standard summer survey timing in late July or early August, shortly before the hunting season begins. Another potential study component being considered by ADF&G is the possibility of radio-collaring sheep at the Jay Creek mineral lick to examine movements in sheep range north of the Susitna River. He requested an electronic version of the most current version of the study plan for revision.

Wolverine study: ADF&G is interested in conducting the proposed survey effort, using the Sample-Unit Probability Estimator (SUPE) method and possibly extending the sampling over 2 years to allow for occupancy modeling. He requested an electronic version of the most current version of the study plan for revision.

From: Burch, Mark E (DFG) [mailto:mark.burch@alaska.gov]

Sent: Friday, October 12, 2012 11:22 AM

To: Brian Lawhead (lawhead@abrinc.com)

Cc: Dale, Bruce W (DFG); Schwanke, Becky A (DFG); King, Kimberly N (DFG); Butler, Lem G (DFG); Bender, Louis C (DFG); Rinaldi, Todd A (DFG)

Subject: Draft RSP-10_Wildlife Resources_10 9 Wolverine DWCa

Brian,

Our revised wolverine study plan is attached in track changes as you requested. For the purposes of planning, we needed an idea of how many sample units we were dealing with so we developed the attached map. I realize you will need to develop an entirely new figure once you get the revised shape files for the inundation area. The grid depicted in the attachments is rough. Note the shape file for the grid is also attached. Generally we make the grid 3 degrees by 2 degrees so the lat and long stay constant for the sample unit. This also figures pretty close to 25 km². The result is that the number of sample units should remain at about 320, but the grid lines may move on the map. The attachments should be fine for study review at this time, even though they may change by February. We may also consider another change if we can work it out. For the occupancy modeling it would be more efficient to have hexagonal shaped sample units. We're not sure if we could make that work logistically for the SUPE at this point. Whatever we do, the sample units for the occupancy model must be constant and would have to match the SUPE if we want to use the SUPE data to run the occupancy modeling.

Mark

From: Burch, Mark E (DFG) [mailto:mark.burch@alaska.gov]
Sent: Friday, October 12, 2012 3:15 PM
To: Brian Lawhead (lawhead@abrinc.com)
Cc: Dale, Bruce W (DFG); Schwanke, Becky A (DFG); Butler, Lem G (DFG); King, Kimberly N (DFG)
Subject: FW: Revised Sheep Study draft

Brian,

The revised sheep study plan without the collaring included is attached. As we discussed on the phone the Division of Wildlife Conservation believes this approach will be adequate. We commented previously that, "The Dall's Sheep project calls for delineating seasonal home ranges, but summer range should be adequate. The Jay Creek mineral lick is above the area of inundation, so there is no reason to believe the current data is not adequate."

*Mark Burch
Special Projects Coordinator
1800 Glenn Highway, Suite 4,
Palmer, Alaska 99645
Office (907) 861-2109
Cell (907) 863-8518*

-----Original Message-----

From: Burch, Mark E (DFG) [<mailto:mark.burch@alaska.gov>]
Sent: Wednesday, October 31, 2012 9:39 AM
To: 'Brian Lawhead'
Subject: RE: Susitna-Watana study area boundary

Brian,

We have to draw the line somewhere and we are saying we will draw it at the subunit boundary. Note the 13A mountains are some distance from the impoundment area. I recognize that makes the south boundary adjacent to 13A a bit arbitrary too.

Mark

-----Original Message-----

From: Brian Lawhead [<mailto:lawhead@abrinc.com>]
Sent: Tuesday, October 30, 2012 6:36 PM
To: Becker, Earl F (DFG)
Cc: Burch, Mark E (DFG)
Subject: Susitna-Watana study area boundary

Hi Earl,

We're currently revising all of the study area maps for the Revised Study Plan; the attached are from the Proposed Study Plan (July version) for your reference.

I'm changing the "downstream area" boundary to correspond to cataloged anadromous spawning streams, but I need you to indicate the outlines of your area for the spatial modeling of bear densities. I included the revised moose map in case the study area boundary is close to what you envision for the bear density modeling.

You can either print one of these and draw something on by hand to scan and send back, or use descriptive geographic features, or ask Becky Strauch to draw something for you and send it as a shapefile. It need not be elaborate and can be approximate, but it I need your best take on it for our next draft, which is due to AEA early next week.

Thanks!
Brian

PS -- Mark, is the attached moose study area similar to what you envision for sheep? The only difference from the text description you provided for the sheep survey area is that part of 13A is included for moose. I'm wondering if you want

to include the mountains in that portion of 13A for the sheep surveys too, rather than dividing it at the 13E boundary (Kosina Creek).

AEA Team Member		Other Party	
Name:	<i>Brian Lawhead</i>	Name:	<i>Mark Burch</i>
Organization:	<i>ABR, Inc.</i>	Organization:	<i>Alaska Dept. of Fish & Game</i>
Study Area:	<i>Various</i>	Phone Number:	<i>907-861-2109</i>
Date:	<i>21 Nov 2012</i>	Time:	<i>~12:00</i>
Call Placed by: <input checked="" type="checkbox"/> AEA Team <input checked="" type="checkbox"/> Other Party			

Others on Call: None

Subject: Follow-up on ADF&G comments on selected wildlife study plans for 2013–2014 Revised Study Plan

Discussion:

Brian returned Mark’s call, which was a follow-up to an email from Brian requesting a conversation to discuss ADF&G comments in an email from Mark to Brian on November 19, 2012.

Specific items of discussion included the following:

Wood frog study (Section 10.18): Brian described ABR’s proposed response to Mark’s email comment (dated Monday, November 19, 2012) regarding the need to conduct two visits to each sampling site for frog surveys. As proposed, the frog study plan will incorporate removal sampling, which should be slightly more efficient than the standard design for estimating occupancy rate and will allow sampling of more ponds in the fairly short time period available for sampling, which will help meet the objective to sample a broad area throughout the entire Project area.

Aquatic furbearer study (Section 10.11): Brian asked for clarification on the PSP comment regarding the use of transects for river otter surveys, and Mark suggested that Brian contact Howard Golden of ADF&G DWC for further discussion.

Moose study (Section 10.5): The GeoSpatial Population Estimator (GSPE) survey planned for November 2012 has not yet been conducted because of insufficient snow cover in the study area during preliminary stratification survey flights. They will keep trying, but the cut-off date is December 5. If the GSPE cannot be flown in 2012 due to unsuitable survey conditions, then it will be retained in the study plan for November 2013 or March 2014.

AEA Team Member		Other Party	
Name:	<i>Brian Lawhead</i>	Name:	<i>Sarah Bullock</i>
Organization:	<i>ABR, Inc.</i>	Organization:	<i>Bureau of Land Management</i>
Study Area:	<i>Project area</i>	Phone Number:	<i>(907) 822-3217</i>
Date:	<i>29 November 2012</i>	Time:	<i>3:00 PM</i>
Call Placed by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others on Call: None

Subject: 2013–2014 Revised Study Plans for Willow Ptarmigan and Small Mammals

Discussion:

Willow Ptarmigan (Section 10.17): Brian described the comment response received by email on 16 August 2012 from the Alaska Department of Fish and Game and the University of Alaska Fairbanks, sent in response to Sarah’s comment on the study request in BLM’s May submittal and discussed at the Terrestrial Resources Technical Work Group meeting on 9 August 2012. Although Brian had received the original email from Mark Burch, she was not cc’d and Brian did not forward it to Sarah for her records. Brian discussed the response with Sarah and she was satisfied with the response. After the call, Brian forwarded the email response to Sarah for her records.

Small Mammals (Section 10.12): Brian described the proposed conversion of the small mammal study from one with both desktop and field components to a desktop-only analysis, as proposed at the Terrestrial Resources Technical Work Group meeting on 16 October 2012. He explained the rationale for doing so, which is that, based on the intensive work conducted using appropriate sampling methods by the University of Alaska Museum in the early 1980s for the original APA Susitna Hydroelectric Project, additional field trapping using the same sampling methods is unlikely to provide significant new information on the occurrence and habitat use of small mammal species in the Project area. The combination of the existing data with the habitat map to be produced for the Project area is expected to provide sufficiently detailed information to fulfill the goal of the study. Sarah appreciated the call and was satisfied with the proposed change. After the call, Brian forwarded some information and publications to Sara on the Alaska tiny shrew, which is listed by BLM as a sensitive species.

AEA Team Member		Other Party	
Name:	<i>Brian Lawhead</i>	Name:	<i>Howard Golden</i>
Organization:	<i>ABR, Inc.</i>	Organization:	<i>Alaska Dept. of Fish and Game</i>
Study Area:	<i>Project area</i>	Phone Number:	<i>(907) 267-2177</i>
Date:	<i>4 December 2012</i>	Time:	<i>11:10 AM</i>
Call Placed by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others on Call: Alex Prichard, ABR, Inc.

Subject: 2013–2014 Revised Study Plan for Aquatic Furbearers

Discussion:

Aquatic Furbearers (Section 10.11): Brian and Alex called Howard to discuss ADF&G's comment on the draft interim Revised Study Plan, dated 14 November 2012, in which it was suggested that transect surveys or occupancy modeling might be considered as part of the study design. Howard suggested that transect surveys to count tracks intercepting the flight lines (marked as GPS waypoints and quantified as tracks per kilometer) would be more useful for river otters than would an occupancy model design.

The discussion focused on layout of transects perpendicular to the main Susitna River drainage and tributary drainages, rather than following the watercourses, as proposed in the plan. The purpose of the perpendicular transects would be to attempt to detect river otters using lakes away from streams and crossing from one drainage into adjacent ones.

Howard also described the design of the modified snare he suggested using to sample otter hair for mercury sampling. Following the call, Howard sent an article describing the otter hair snare design he suggested.

AEA Team Member		Other Party	
Name:	<i>Brian Lawhead</i>	Name:	<i>Merav Ben-David</i>
Organization:	<i>ABR, Inc.</i>	Organization:	<i>University of Wyoming</i>
Study Area:	<i>Project area</i>	Phone Number:	<i>(307) 766-5307</i>
Date:	<i>4 December 2012</i>	Time:	<i>11:40 AM</i>
Call Placed by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others on Call: Alex Prichard and Rick Johnson, ABR, Inc.

Subject: 2013–2014 Revised Study Plan for Aquatic Furbearers

Discussion:

Aquatic Furbearers (Section 10.11): Brian, Alex, and Rick called Dr. Ben-David to discuss her suggestions for potential sampling methods and study design considerations for aquatic furbearers. Rather than using measures of relative abundance or snow-tracking transects, she favors using noninvasive sampling of sampling of hair obtained with snags or scats collected from latrine sites for DNA genotyping, combined with capture–recapture methods, to derive population estimates, which would require an intensive ground-based sampling effort in an area as large as the Project area. Following the call, she emailed several articles describing various hair and fecal sampling techniques.

Robin Reich

From: Brian Lawhead <lawhead@abrinc.com>
Sent: Friday, December 07, 2012 3:39 PM
To: Robin Reich
Subject: FW: Interim Draft Revised Study Plan for Wood Frog Occupancy

From: Burch, Mark E (DFG) [<mailto:mark.burch@alaska.gov>]
Sent: Monday, November 19, 2012 2:36 PM
To: Brian Lawhead (lawhead@abrinc.com)
Cc: McGregor, Elizabeth A (AIDEA); Klein, Joseph P (DFG); Dale, Bruce W (DFG)
Subject: Interim Draft Revised Study Plan for Wood Frog Occupancy

Brian,

After the deadline for comments on the Study Plans had passed, I was catching up on reviewing some of the Interim draft revised study plans that I had not been able to carefully review previously. That led to a concern about the occupancy study for wood frogs. Rather than wait for the next opportunity to comment, I'm bringing the concern to you now.

The document says, "The second survey at each site will be conducted by a different observer with no knowledge of the survey results from the first survey." This makes sense, but it goes on to say, "However, if detected on the first survey, a second survey will not be needed." The two statements don't really jive. The second statement apparently assumes a detectability of "1". All sites should be surveyed twice to assess detectability. The draft goes on to explain that a small number of acoustic monitoring devices will be deployed to increase accuracy. That is a good approach in addition to making at least two site visits.

The document lists a number of covariates such as habitat and environmental characteristics that will be noted. Recording these parameters will be very useful.

Thank you for considering these comments outside of the formal process. I hope you find them helpful.

*Mark Burch
Special Projects Coordinator
1800 Glenn Highway, Suite 4,
Palmer, Alaska 99645
Office (907) 861-2109
Cell (907) 863-8518*

APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION
SECTION 12 – RECREATION AND AESTHETIC RESOURCES

AEA Team Member		Other Party	
Name:	<i>Bridget Easley</i>	Name:	<i>Cassie Thomas</i>
Organization:	<i>URS</i>	Organization:	<i>National Park Service</i>
Study Area:	<i>Recreation/Aesthetics/Boating</i>	Phone Number:	<i>907-257-2622</i>
Date:	<i>July 25, 2012</i>	Time:	<i>2:30 PM</i>
Meeting held by: <input checked="" type="checkbox"/> AEA Team <input type="checkbox"/> Other Party			

Others at meeting:

Amy Rosenthal, Louise Kling, and Tim Kramer, URS; John Gangemi, Oasis; Donna Logan and Robert Koenitzer, McDowell Group.

Subject:

Study coordination, and in-person introductions, as out-of-town team members had assembled in Anchorage.

Discussion:

The study team asked questions about how the NPS views the project; Ms. Thomas' experiences on similar projects; and the NPS' role in hydro projects. Methods for collecting qualitative and quantitative recreation use data were discussed. Methods for collecting data from widely dispersed recreationists were also discussed.

Ms. Thomas described a forthcoming (personal) trip to float the Susitna River to become more familiar with the study area. She agreed to utilize the Incidental Observation form submitted by URS if she spotted any other recreationists during her trip. The study team was also planning a site visit, so that was also described.

Ms. Thomas said that she perceives that the quality of recreation opportunities should be emphasized. This includes attributes such as flow rates preferable for different types of boating, and sound associated with activities. For example, the sound of rushing water could be a desirable attribute for whitewater rafters; and silence, a desirable attribute for birdwatching.

Action Item:

Continuing coordination with the National Park Service.

Easley, Bridget

From: Cassie_Thomas@nps.gov
Sent: Wednesday, August 01, 2012 10:45 AM
To: Easley, Bridget
Cc: Rosenthal, Amy; Donna Logan; Kling, Louise; hbwillia44@gmail.com
Subject: Re: Thank you and I/O from

Hi everyone,

Our Lower Susitna float trip went very well. Fourteen people participated, from a variety of state and federal agencies, consultant companies, NGOs, and a local rafting outfitter. We floated about 42 miles. Flows at Gold Creek ranged from 18,00 to 22,000 cfs during our trip.

We put in at Indian River (M 138.5) the evening of 7/27, having chartered two Mahay's jet boats for our participants and gear. We spent the night there, then floated down to an island near Lane Creek (M 113.5), where we camped on 7/28. The following day we floated the rest of the way down to the beach at Talkeetna, just below the confluence of the Susitna and Talkeetna (M 97). The rafting guide helped us get our boat and gear off the beach using a four-wheeler and trailer -- Talkeetna lacks good access to the Susitna by vehicle, having blocked the beach in order to discourage rowdy parties.

The segment of river we floated is Class I, with some mid-channel rocks, rootwads, sweepers, and 2-3' high standing waves at the flows we experienced. We used an 18' cataraft, three 14' rafts, one 12' raft, and an inflatable kayak and had no problems avoiding (or enjoying!) these obstacles despite the relatively fast flows and challenges of reading opaque glacial water. Gravel bars and beaches large enough for our large party to camp on were available at Indian River and numerous islands from just above Curry all the way down to Talkeetna. Camping at Gold Creek (AK RR put-in) would have been more challenging due to the narrow beaches there. Also, the AK RR prohibits passengers from transporting any kind of fuel (white gas, propane, or small butane canisters), making overnight camping a challenge. Note that this post 9/11 NTSB policy was successfully modified for the AK RR's Spencer Lake whistle stop on the Kenai Peninsula after USFS intervened; recreationists would benefit from a similar change in policy for Susitna whistlestops.

One alternative to the put-in we used would have been to go farther upstream to the confluence of Portage Creek and the Susitna, just downstream from the mouth of Devil's Canyon. This area is not large enough for a group of 14 to use as a camp, however.

On the put-in day and during most of the next day, we had clear skies, affording us spectacular views of the Alaska Range as we set off from Talkeetna by jet boat, and also highly attractive views of K'esugi Ridge on RR for the first several miles of our float. Farther downstream, Curry Ridge on RR and tundra above steeply forested hillsides on RL also provided visual interest. Unvegetated riprap and shiny-rusted galvanized culverts (some in poor repair and most perched well above river levels) where the AK RR parallels the shoreline on RL in many locations detracted somewhat from our aesthetic enjoyment. As we floated the last 12 or so miles to Talkeetna, aircraft flying relatively low (coming and going from TKA airport) became more and more common, as would be expected on a Sunday in July.

We saw one young (second year?) cow moose swimming across the river, from west to east, around M 117. Moose tracks were common on the beaches we stopped at to camp, eat lunch, and rest. We saw no bears and very little bear sign. There were both wolf and lynx tracks on the island we camped at on 7/28. Bald eagles --

PM

cc

"Rosenthal, Amy"
<amy.rosenthal@urs.com>, "Kling,
Louise" <louise.kling@urs.com>,
Donna Logan
<Donna.Logan@mcdowellgroup.net>
Subject
Thank you and I/O from

Thank you, Cassie. for coming over to URS G Street today. We met with the BLM and the USFS on this day also, and we are so impressed with all of the the thoughtfulness, creativity, data, and work, that is going into this project. URS, McDowell, and Oasis all intend to give this our finest concentration and effort.

The Incidental Observation Form is attached. We are looking forward to the (private citizen) dream-float-team trip reports!
Bridget

This e-mail and any attachments contain URS Corporation confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

[attachment "Recreation Observation Form.pdf" deleted by Cassie Thomas/WASO/NPS]

NPS Preliminary Comments on Proposed Study Plans for Susitna-Watana Project

These informal comments focus on the three recreation-related study plans released by AEA on July 15th 2012, i.e., the Recreation Resources, Aesthetics Resources, and Recreational Boating/River Access study plans.

Overall Comments

Common to all three PSP's:

- **Gap Analyses/PAD:** Contrary to the opening language of the three PSP's, the Gap Analyses for Recreation and Aesthetics Resources were not included in the PAD and were made available only after numerous complaints from NPS, other agencies, and stakeholders shortly before our original comments on the PAD and study requests were due.
- **Disciplinary/Study Interdependencies:** NPS and others have repeatedly requested AEA to develop a schedule that ensures coordination between the numerous interdependent resource studies associated with the Watana project. Of particular interest to NPS are the recreation and aesthetics studies, which are dependent on the results of other biophysical resource studies such as the hydrology, instream flow, fluvial geomorphology, ice processes, fisheries and game studies. Despite these requests, the July 2012 PSPs make only vague references to the issue. There remains no visible sign that this coordination is being conducted at a project-wide, discipline-wide level. For example, none of the tables depicting the various study schedules includes any reference to when the results of the "input" studies will be available, or how the dependent studies might be modified if these input studies reveal and need to change the dependent studies' substantive, temporal or geographic scopes.

Critical Path Method or some comparable project management mechanism should be a key element of this project, especially with some 58 studies in play, many occurring concurrently. There should be a transparent process for tracking the critical milestones and progress of the PSP's with the interdependencies identified in each study plan. A summary of the overall critical path schedule should be included as a separate plan, and made available on the project website for the stakeholders to access.

- **Availability of 2012 Study results and schedule:** According to the current published schedule, comments on the July 2012 PSP's are due on 10/15/12; AEA files revised PSP's on 11/14/12; comments on the revised PSP's are due on 11/29/12; and FERC will make final determination on study plans on 12/14/12. This schedule means that agencies and stakeholders will not have the results of critical 2012 reconnaissance and baselining studies that are key to determining the scope and adequacy of the 2013-14 ILP studies before our final opportunity to comment on the ILP studies. We are being asked to take the Applicant's word that if the results of 2012 studies indicate a need to modify the ILP studies, such modifications will be made voluntarily.

- **Socioeconomics** – NPS maintains that the metrics and analyses regarding the socioeconomic costs and benefits of the project should extend beyond the estimated value of increased recreation and tourism. We recognize that it is less straightforward to determine some non-market values, e.g. ecosystem services and existence values, than it is to estimate the future value of commercial tourism in the project area. That does not mean that these non-market values are zero, however. NPS continues to assert that a full accounting of all project-related impacts on the social environment must include an estimate of these values. While it will of course be up to FERC to decide how reliable the various economic value estimates are (just as the uncertainty associated with the future value of energy production v. project construction and operation costs must be accounted for), and thus to determine much weight to give the various types of estimated socioeconomic values in its “equal consideration” analysis, nowhere does the FPA as amended by ECPA instruct FERC or license applicants to ignore such values outright, especially in light of emerging valuation methodology.

With respect to Benefits Transfer methodology, this method is most reliable when the reference and study sites and projects are very similar, and when the economic impact valuation study at the reference site was performed at the highest standard. Given the dearth of large original hydropower projects licensed on free-flowing rivers in remote locations in recent decades, NPS believes it will be challenging to identify an appropriate reference project for Watana. Just as with ecosystem services valuation methods, there will be numerous assumptions and approximations associated with application of the benefits transfer method to this project. In contrast to the lack of appropriate reference sites for a benefits transfer analysis, however, the value of ecosystem services – including services associated with the Susitna River -- is currently being studied with some rigor in Mat-Su Borough.

From the “Socioeconomic and Transportation Study, Regional Economic Evaluation Study,” p. 263 of the PSP document:

“The economic impact of the Project on local tourism establishments (e.g., river sport fishing, whitewater boating) and the regional economy will be estimated using the results of the Recreation and Aesthetics study. Calculations will be based on information obtained from the recreation survey, including the estimated recreation-related expenditures per recreational day or trip and changes in the number of days or trips per year. The regional economic impact of changes in subsistence-related expenditures due to the proposed Project will be estimated using the results of the Subsistence study. Approximate cash expenses to generate each pound of subsistence harvest will be based on published information (Goldsmith 1998).

In addition, the benefits transfer approach will be used to supplement or compare unit values (e.g., value per-day of sport fishing) for recreational goods and services obtained from primary valuation methods. Benefits transfer involves the application of unit value estimates, functions, data, and/or models from one or more previously conducted valuation studies to estimate benefits associated with the resource under consideration (Black et al. 1998). The basis of the method is the assumption that the recreational experience is enhanced by high quality sites (e.g., clean water, abundant recreational

fisheries), hence the net willingness to pay for, and hence the value of, recreational trips depends on site quality.

Different model specifications can be used to value specific qualities of the resource and attributes of the recreational experience. To value these types of amenities, economists typically rely on a variant of the basic travel cost model referred to as a discrete choice or random utility model. Whereas basic travel cost models are most appropriate in analyzing the number of trips people make to a site, random utility models can be used to assess how people choose between multiple sites based on the qualities of the sites. Travel cost approaches require data on site visitation, place of residence, substitute sites, and user characteristics (such as income) (Black et al. 1998). These data will be obtained from the recreation survey conducted for the Recreation and Aesthetics Study.”

The PSP for Socioeconomics appears to rely largely on results generated through the Recreation and Aesthetics Resources studies. Having not seen the survey instruments and protocol, we don't know how socioeconomic data will be gleaned from those surveys. We would like to participate in reviewing the proposed survey methodology, ideally before our ability to comment on the ILP study plans expires.

Section by Section Comments

10. RECREATION AND AESTHETIC RESOURCES

10.1. Introduction

The Alaska Energy Authority (AEA) proposes a Recreation Resources Study, a Recreational River Flow Study, and an Aesthetic Resources Study in order to document baseline conditions and help assess potential impacts on recreation and aesthetic resources from construction and operation of the proposed Susitna-Watana Project (Project). The proposed Recreation Resources Study has been prepared in consultation with agencies and licensing participants.

The Recreation Resources Study (Section 10.5) will research, describe, and quantify recreation demand and capacity of facilities, and assess reasonably foreseeable recreation needs associated with development of the proposed Susitna–Watana Hydroelectric Project.”

NPS – The study is focusing on recreational uses and demand rather than recreational opportunities and experiences. Need to be qualitative, not just quantitative, because experiences are likely to change post project. We are relying on the recreation surveys to tease out qualitative information (quality of experience, preferences, etc.). Without seeing the survey instruments and protocol, we don't have assurance that they will be able to characterize these.

10.5. Recreation Resources Study

10.5.1. General Description of the Proposed Study

The Recreation Resources Study is designed to identify recreation resources and activities that may be affected by the construction and operation of the proposed Susitna-Watana Project (Project), and to help assess the potential impacts of Project construction and operation on those resources and activities. The specific goals of the study are to:

- Identify and document recreation resources and facilities that support both commercial and non-commercial recreation in the Project area;
 - Identify the types and levels of current recreational uses and future reasonably foreseeable future uses based on surveys and interviews, consultation with licensing participants, regional and statewide plans, and other data;
 - Evaluate the potential impacts of Project construction and operation on recreation resources, needs, and uses in the Project area; and
 - Use the results of analyses to develop an RMP for the Project.
- **NPS: Incorporate the results of the 2012 studies**

10.5.2. Existing Information and Need for Additional Information

Existing information was compiled in the Recreation Data Gap Analysis (AEA 2011a) and recreation resource descriptions and inventory presented in AEA's Pre-application Document (PAD) (AEA 2011b).

NPS - This claim that existing info was compiled in Rec Data Gap analysis and included in PAD is incorrect. Note that the claim was repeated (cut and paste) in the two other rec/aesthetic studies. The PAD was filed in December 2011 but we did not receive AEA's "2011" gap analysis until March 2012, after much pleading. To our knowledge, the 2011 publication date for this document is inaccurate since it was not made public until 2012. There was no project-specific info in the PAD on rec and aesthetics, just a regurgitation of the scanty, methodologically primitive information developed for a different hydro project thirty years ago, at a time when FERC did not have to give equal consideration to these resource values in deciding whether to license a project.

A recreation study was initiated in 2012 to gather data to inform the 2013-2014 study plan, including the following elements:

- Interviews with key representatives of agencies and organizations, including Alaska Native entities knowledgeable about regional and state recreation management and issues
- A compilation of existing recreation inventory and capacity information
- An inventory of Project area access
- Incidental Observation Survey Data (completed by field crews)
- Coordination with other study disciplines and incorporation of data
- Geo-referenced mapping
- Field reconnaissance

- Identification of future trends and issues
- A description of the management framework

Available information from the 2012 data gathering efforts will be used to develop the Revised Study Plan.

NPS- Agencies and stakeholders will not have the results from the “2012 data gathering efforts” until they are reported out in 11/5/12. We will not be able to incorporate any comments on them by the 10/15 due date for our PSP comments. It is also unclear how much of this information AEA and its consultants will have far enough in advance of their 11/14 RSP deadline to help inform the revised plans.

10.5.3. Study Area

The Project area is shown in Figure 1.2-1. The study area includes the Susitna River watershed, focusing on recreation opportunities and use patterns in and around the immediate Project area.

10.5.4. Study Methods

Both water-based and land-based recreation uses and access will be analyzed. Seasonal uses that relate to ice and snow conditions will also be analyzed. Specialized study of river flow-dependent activities will also be conducted, as described in Section 10.7. The Recreation Resources Study is interdependent with analyses conducted in other disciplines, both biophysical (e.g., aquatics and hydrology) and social (e.g., transportation and socioeconomics), and systematic coordination of data with those study groups will be required.

NPS – with respect to interdependent analyses, and the reliance of the rec and aesthetics studies on results from other disciplines, there is no detail in this PSP explaining how the timing will work. The schedule table at end of each PSP with study seasons and deliverables does not mention this, either. We need details of how the sequence will work. AEA can't just say it will happen when it does not appear that the results of other studies will be available before the delivery date for this one.

Methods for the components of the proposed Recreation Resources Study Plan for 2013-14 are described below.

Regional Recreation Analysis

NPS – This study plan should note, early-on, the distinction with subsistence hunting and fishing v. sport activities. May be confusing to some stakeholders and readers as the process goes on.

The regional recreation resources context will be defined in coordination with agencies, technical workgroups, and other participants, including Alaska Native entities. Regional and local data related to recreation use will be collected and analyzed, including examination of various land management regimes within the area. Existing resource management plans relevant to the recreational resources of the study area will be reviewed and compiled. The analysis will be

conducted in accordance with existing and proposed community and regional plans, and private sector plans. Plans that will be incorporated include:

NPS - "Existing resource management plans . . . will be reviewed and compiled." Isn't this being done in 2012?

- Alaska's Outdoor Legacy Statewide Comprehensive Outdoor Recreation Plan (SCORP) 2009–2014 (Alaska Department of Natural Resources [ADNR] 2009)
- Alaska Recreational Trails Plan (ADNR 2000)
- Chase Comprehensive Plan (MSB 1993)
- Cultural Resource Management Plan for the Denali Highway Lands (VanderHoek 2005)
- Denali State Park Management Plan (Alaska Division of Parks and Outdoor Recreation [DPOR] 2006)
- DPOR Ten Year Strategic Plan 2007–2017 (DPOR 2007)
- East Alaska Resource Management Plan (Bureau of Land Management [BLM] 2006)
- MSB Comprehensive Development Plan (MSB 2005)
- MSB Trails Plan (MSB 2008)
- MSB Comprehensive Economic Development Strategy (TIP Strategies Inc. 2010)
- MSB Parks and Recreation Open Space Plan (MSB 2000)
- South Denali Implementation Plan and Environmental Impact Statement (National Park Service [NPS] 2006)
- Susitna Area Plan (ADNR 1985)
- Susitna Basin Recreation Rivers Management Plan (ADNR 1991)
- Susitna Matanuska Area Plan (ADNR 2011)
- Talkeetna Comprehensive Plan (MSB 1999)

NPS - 2012 info will be used to develop RSP. Will we see this prior to the 10/15 due date for our PSP comments? If not, how will agencies and the public ensure that the 2012 data is applied correctly? Timing problem points to larger problem of trying to finalize study plans for a project before reconnaissance level work is complete. This applies to two other PSPs (Aesthetics and Instream Recreation), too.

Trails leading into and within the Project area will be identified using aerial imagery. These include multiple formal and informal trails and routes, several formally identified Revised Statute (RS) 2477 trails, and Alaska Native Claims Settlement Act (ANCSA) 17(b) trails. The trails will then be mapped, and "ground-truthed." This will identify trails that have historical use, and are legal under State "generally allowed uses," but have not been named or identified by ADNR. Management responsibilities for 17(b) easement trails will also be clarified wherever possible.

Recreation Activity Areas (per SCORP planning) and the Recreation Opportunity Spectrum (USFS 1979) “primitive” class will also be described as they relate to the study area. Scenic Byways, Wild and Scenic Rivers (WSR), and other special resource use designations will be identified and described. There are two river segments within the Project area that have been identified by BLM as eligible for inclusion into the WSR System: Brushkana Creek and the portion of the Susitna River from the headwaters to the confluence of Kosina Creek. BLM has stated that they will conduct a suitability determination for these eligible river segments (Social Sciences Technical Workgroup Meeting, April 3, 2012). The George Parks Highway between MP 132 and 248 is designated as an Alaska State Scenic Byway (ADOT&PF 2008; 2012).
Recreation Use and Demand

Currently, the recreation uses of the Project area are widely dispersed. Visitors to the area participate in a wide variety of activities; including sport hunting, sport fishing, recreational boating, skiing, snowshoeing, and snow-machining. The amount, extent, and potential impact of Project-related dispersed recreation use on the proposed Project area’s land and water resources is currently unquantified.

A baseline of developed and dispersed recreation uses, including types, levels, and access will be determined and described. High use locations will be identified by activity, along with daytime and overnight visits, and seasonal patterns. User preferences and opinions about the quality of recreation resources will also be described. Data will be collected through a literature review and a comprehensive survey and interview program. Salient existing data will also be incorporated.

Future recreation demand will be estimated, based on socioeconomic indicators, foreseeable non-Project recreation developments, and identified issues and trends. Effects of the Project features (e.g., reservoir and access roads) on hunting and trapping opportunities and on non-consumptive uses (bird-watching, hiking, camping, boating, etc.) in the vicinity and downstream of the proposed Project reservoir will be assessed. Additionally, the recreation effects of any Project-induced changes in ice formation the Susitna River will be evaluated. There are also potential effects of induced recreation along the Denali Highway and downstream from the Susitna River bridge on the Denali Highway to the proposed Watana Reservoir. The effects of Project construction and operational activities (e.g. noise, dust, limitations on access, and recreation activities of construction workers) on recreation will also be analyzed. Recreation demand within the study will be estimated within the study area in the reasonably foreseeable future.

NPS – AEA needs to analyze effects of project operations, not just “features.” Nowhere in the PSP is it explicitly acknowledged that the project may have effects on things like fish abundance (affecting sportfishing opportunities), moose, caribou, waterfowl and upland game bird populations due to migration barriers and alteration of habitat due to altered fluvial morphology and riparian vegetation.

Survey results and an inventory of current and projected recreation opportunities, commercial services, and facilities will inform the Socioeconomic Resource Study in regard to the economic contribution of recreation in the study area.

NPS - Socioeconomic study needs to determine value of rec., not just contribution to local economy. This value includes “consumers” outside the local market. AEA needs to expand their inquiry into alternative socioeconomic methods and models beyond “Benefits Transfer”. Also see our comment under “Overall Comments.”

Recreation Carrying Capacity

There are no existing developed recreation facilities on the Susitna River at the Watana Dam site. In the broader Project area, both public and private recreation facilities exist. These are primarily located along the road system.

The existing physical carrying capacity of recreation resources in the Project area will be estimated. Public facilities will be inventoried and described as to condition, capacity, adequacy and operational cost. Private facilities will also be inventoried to the extent practicable. Public access to recreation sites will also be described, including Americans with Disabilities Act (ADA) compliance, if appropriate.

NPS –Physical carrying capacity is just one of the four elements of “carrying capacity” (physical, ecological, social, and spatial). The area’s physical capacity may or may not be the most limiting, especially if the project results in greater access, which could cause use to exceed the area’s social carrying capacity. This is one reason why it’s so important to study the experiential aspect of pre- and post-project recreational use. On rivers in particular, social capacity is almost always more sensitive than other aspects of capacity, with concerns about group size and encounter rates; competition for space at put-ins, take-outs and campsites; and crowding at fishing holes, play boating features, etc.

The need for and capacity of additional reasonably foreseeable recreational facilities will be forecast. Carrying capacity guidelines and standards will be applied in order to develop recommendations for future recreation facilities and sites.

Data Collection

The collection of recreation user data will be accomplished through multiple survey processes. The study design will describe target respondents, geographic locations, target days and months, and questionnaire content; survey methods, in the context of consultation with agencies, workgroups, Alaska Natives, and others. Survey instruments will be designed to collect information typical of and compatible with other FERC efforts. This includes the survey conducted for the 1985 studies (Harza-Ebasco 1985b) and other surveys such as the SCORP (DNR 2009) and the Alaska Visitor Statistic Program (AVSP) (McDowell 2012).

Identification and Analysis of Salient Data from Existing Survey Research

Recreation supply and demand data from other recreation planning sources applicable to the region will be synthesized. Existing data can inform estimates of levels (e.g., “recreation days”) and types of participation in recreation uses. The estimates will include a discussion and comparison of participation rates in activities regionally, statewide, and nationally. Recreation trends, as forecast in other studies, will also be described.

NPS – The existing survey research appears to be biased towards “industrial tourism.” This is not the only population that uses the project area. This analysis needs to capture use by independent tourists, e.g. people driving up the AK Highway and on to Denali Hwy., and local (unguided AK resident) users, many of whom are able to access the area without relying on air taxis or heli boat charters.

The AVSP Survey (McDowell 2012) is a statewide research program commissioned by the Alaska Department of Commerce, Community and Economic Development that included 6,747 visitors to Alaska in the summer of 2011 and 1,361 visitors in the Fall/Winter 2011/2012. The SCORP (ADNR 2009) survey database will also be used quantify recreation uses and demand. In addition, Alaska Travel Industry Association research (GMA 2011) about nonresident travel to Alaska will be reviewed and summarized as it pertains to recreation and aesthetic appeal of Alaska’s visitor market. NPS– Excludes the Spring season

These data will be utilized to describe year-round nonresident (non-Alaskan) experiences by visitors in three major communities in the MSB (Palmer, Wasilla, and Talkeetna), passengers on the Alaska Railroad, and cruise passengers (visiting McKinley Princess Lodge).

The existing data include

- Lodging types
- Activities
- Length of stay
- Purpose of trip
- Previous travel to Alaska
- Modes of transportation used within the State
- Trip spending
- Communities visited (overall and overnight)
- Demographics (origin, age, income, party size)

This nonresident data will be evaluated along with existing data relating to recreation use by Alaska Resident, in the context of the overall study plan.

Incidental Observation Survey

The purpose of the incidental observation survey is to capture information from field researchers about dispersed recreational use. The survey will gather information on the date and time of day the activity was observed, the type of activity observed, number of people recreating, and the location of observed activity. This survey will not have statistical value, but will help identify types of recreational use in the study area. A protocol will accompany the survey to inform field crews how to complete and submit the survey. The survey will be used throughout the study.

Telephone Surveys of Railbelt Residents

The purpose of this survey is to interview a sample of residents about their recreation use in the area and to collect perspectives about recreational opportunities. The survey will be administered to a statistical sample of 600-900 randomly-selected Railbelt residents within a four-hour drive of the study area (Fairbanks, Denali Borough, Mat-Su Borough, and Anchorage). This survey will be central to the estimation of resident recreation demand. The SCORP survey instrument will be reviewed for any benchmark questions to be considered in the survey design. The overall sample size will be refined after considering desired subgroup samples.

NPS – We believe that the Phone survey has very little value. Given the sample size, very few subjects are likely to be familiar with the project area, and the SCORP questions are too general to yield useful information about the specific kinds of recreational opportunities in the area (SCORPs for states as large and geographically diverse as AK are a problem in and of themselves). Instead we suggest the resources be focused on “executive interviews” -- use snowball sampling method to find actual users of this area and others like it. Expecting great cooperation from vendors and outfitters, who are being asked to take the time and effort to hand over private info on “actual users,” may also be difficult. This underscores our need to review the survey instruments and protocols ASAP. Even though the project is unique, such survey templates are fairly standard and should already have been developed and disseminated to agencies and stakeholders.

The survey instrument design will capture

- Past and current recreation use within the study area
- Year-round seasonal, and day/night recreation use in the study area
- Nature of use or recreational interest, including, but not limited to, fishing, boating, camping, picnicking, hiking, off-roading, snowmachining, snowshoeing, skiing, horseback riding, biking, rock/ice climbing, dogsledding, photography, mushroom/berry picking, scenic touring, wildlife viewing, and hunting
- Guided or unguided uses
- Recreation preferences (such as pristine, primitive, semi-primitive, or developed)
- Expected future recreation use within the study area, including how use may change with Project development and operational alternatives
- Means of access to the study area
- Quality of the recreational opportunity
- Importance of and satisfaction with current recreation facilities (such as boat launches and trails)
- Attractiveness of the study area for recreational activities
- Accessibility and conditions/availability
- Visual quality of the scenery in the study area
- Distance that users are willing to travel for weekend recreational opportunities

- Demographics of household and respondents.

Questions that elicit information central to related disciplines, such as the Regional Economic Evaluation Study, may also be included.

Intercept Surveys and Structured Observation Visitor Counts

The purpose of these surveys would be to capture specific recreation use data from users accessing the area by boat, rail, air, snowmachine, or other modes. The survey would be conducted in person based on a sampling plan that captures peak seasonal uses.

Access points may include, but are not limited to, boat launches (e.g., Susitna Landing, Willow Creek, Talkeetna, Deshka Landing), railroad whistle stops, trail heads (e.g., East-West snowmachine trail head on the Parks Highway, along the Denali Highway), air strips, and campgrounds (e.g., Brushkana Creek).

NPS - Where is the detail on this and other methods? Again, we need to be developing instruments now, or at least deciding when they will be developed (prior to our last chance to comment in mid-Oct.).

The survey instrument design would capture, but would not be limited to

- Number in party and demographics
- Community of residence
- Participation in type and location of recreation activity
- Rating of quality of recreation experience
- Level of satisfaction with facilities/recreation activities, including aesthetics
- Guided or unguided use
- Past use and intention for future use
- Trip expenses
- Means of access to the recreation area
- Accessibility, conditions, and availability
- Other opportunities within same distance that offers similar experiences
- Preferences
- Interest in potential new recreation facilities and opportunities.

On sample days, the survey crews will observe key characteristics of recreation use (e.g., the number of people present, the number of vehicles entering/exiting the access site, types of recreation activities evident) and record this information on pre-printed forms. Users to be surveyed in person will be selected by availability and willingness to participate.

Executive Interviews

The purpose of the executive interviews is to gather specific information about commercial (e.g., guides, tours, etc.) and private recreation use the study area. It is anticipated that between 50 and 70 private sector recreation businesses, associations, and other entities will be interviewed. These interviews will be conducted by telephone. The executive interview process will be necessary to develop trust with businesses and organizations with recreation-related interests in the study area, in order to collect proprietary economic data for use in the Regional Economic Evaluation Study. The process of developing a list of potential respondents includes the identification of organizations, associations, government agencies, and businesses with recreation-related interests in study area. This list will be developed through existing and referred contacts, internet searches, and interviews. Contacts may include, but will not be limited to

- Mat-Su Borough Convention and Visitors Bureau
- Federal Agencies, such as BLM, NPS, etc.
- State Agencies, such as DNR, Alaska Department of Fish and Game (ADF&G), etc.
- Alaska Railroad
- Regional governments
- ANCSA corporations and tribal organizations
- Community councils
- Alaska Outdoor Council and other recreation organizations
- Alaska Outdoors Bulletin Board
- Citizen groups
- Environmental organizations

Business representatives to be interviewed may include those associated with

- Remote lodges/cabin rentals/accommodations/campgrounds
- Restaurants
- Airstrips and flying services/flightseeing
- Guide services
- Whitewater rafting/boat trips
- Tour operators (all modes)
- Recreational mining operations
- Transportation services, including buses and Alaska Railroad

The interview protocol (guide) may include, but is not limited to the following topics:

- Nature of business/service (e.g., guide, tour operator, accommodations, etc.)
- Employment

- Season of operation (e.g., year-round, summer, winter, hunting, etc.)
- Means of access to destination (e.g., fly-in, boat, road, etc.)
- Specific areas of operation within the study area
- Years of operation
- Estimated number of clients per year
- Client/membership information, including origin, party size, general perceptions of age, or other demographic features
- Fees charged
- Ways that use might change under the various operational alternatives identified and potential impacts on area image, fishing, hunting, and other recreation activities
- Past and current plans, programs, business operations, membership, activity, etc.
- Geographic areas of highest recreational interest (and reasons why)
- Recreation infrastructure used or needed
- Identification of any trends (anecdotal and data sources) in recreational use levels or patterns
- Information about other projects proposed in the study area that could directly or indirectly affect recreation, tourism, or access to the previously inaccessible areas
- Suggestions for prioritizing the highest potential recreation demand in the area
- Other data needed for socioeconomic baseline or other social science research

GIS Maps and Figures

Recreational sites, facilities, and access routes (RS 2477 rights-of-way, 17(b) easements, and other recreation use trails) will be identified and digitized in a GIS using existing agency and licensing participant datasets and aerial photography. These recreation features will be “groundtruthed” (via ground- and air-based observations) and geo-referenced where possible.

Focus group interviews, discussions with licensing participants, coordination with other resource study disciplines, and user intercept surveys will augment recreation facilities and trails mapping. Significant recreation facilities and access points will be photographed for inclusion in the Recreation Resources Report.

10.5.5. Consistency with Generally Accepted Scientific Practice

The methods and work efforts outlined in this Study Plan are the same or consistent with analyses used by applicants and licensees and relied upon by the Commission in other hydroelectric licensing proceedings. The proposed methodology for analysis for demand and capacity estimates and survey sampling are commonly employed in the development of hydroelectric project license applications.

10.5.6. Schedule

Upon approval for implementation, it is estimated that the term of the study would be approximately two years.

Table 10.5-1. Recreation Resources Study Schedule. Description Start Date Completion Date

Data Collection (including seasonal field visits and surveys)	January 2013	November 2014
Inventory	January 2013	October 2014
Analysis	November 2013	November 2014
Initial Study Report		December 2013
Updated Study Report		December 2014

NPS - Only one December (2013) will be sampled. There is no "wobble room" should weather or other conditions render the limited sample seasons inadequate to represent actual project area conditions. There is no mention of when results of other studies – ice, morphology, fish and game populations, etc. – will be in hand, and how these results will be incorporated in the rec study report. See our comment under Overall Comments regarding interdependent studies.

10.5.7. Level of Effort and Cost

The estimate of the two-year recreation study is \$570,000.

10.5.8. Literature Cited

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10.6. Aesthetics Resources Study

10.6.1. General Description of the Proposed Study

The goals and objectives for the Aesthetic Resources Study are to inventory and document baseline aesthetic (e.g., visual, auditory) conditions in the Project area and evaluate the potential effects on aesthetic resources, beneficial or adverse, that may result from construction and operation of the proposed Project.

10.6.2. Existing Information and Need for Additional Information

Existing information was compiled in the Recreation Data Gap Analysis (AEA 2011a) and recreation resource descriptions and inventory presented in AEA's Pre-application Document (PAD) (AEA 2011b). A recreation study was initiated in 2012 to gather data to inform the 2013-2014 study plan, including the following elements:

NPS - There was no aesthetics inventory, as would be understood by that term in 2011-12 as opposed to 1984, in the PAD – nor a gap analysis.

- Interviews with key representatives of agencies and organizations, including Alaska Native entities, knowledgeable about regional and state recreation management and issues
- A compilation of existing recreation inventory and capacity information
- An inventory of Project area access
- Incidental Observation Survey Data (completed by field crews)
- Coordination with other study disciplines and incorporation of data
- Geo-referenced mapping
- Field reconnaissance
- Identification of future trends and issues
- A description of the management framework
- Interviews with key representatives of agencies and organizations
- Assessment of management frameworks for pertinent agencies
- Identification of broad Project area viewsheds and preliminary KOPs using those identified in the 1985 license application
- Photography
- Field reconnaissance
- Description of Project area soundscape

Through the prior processes, the FERC scoping process and incorporation of work group and other licensing participant recommendations, study methods for 2013-2014 were developed. Issues, trends, original data collection strategies, and items for detailed analysis are incorporated into the 2013-2014 Study Plan.

NPS - "Through the prior processes, the FERC scoping process . . . study methods for 2013-14 **were developed** [emphasis added]" This is incorrect, they are **still being developed!** We find this very strange language to include in a *proposed* study plan. NPS has in fact had little time and opportunity to see products and engage consultants so far, so it is extremely premature to claim this as *fait accompli*.

10.6.3. Study Area

The overall Project area is shown in Figure 1.2-1. The specific study area for Aesthetic Resources will be developed as part of the analysis and in coordination with information from other disciplines, such as hydrology. It will be based on a viewshed model of proposed Project features, including the dam structure, transmission and road corridors, and the resulting Watana reservoir. The study area will also include portions of the Susitna River located downstream of the Watana Dam site down to Talkeetna.

NPS – As NPS and other agencies have noted, deciding to limit the downstream scope of this and other studies to Talkeetna is **totally unfounded**. Until we get the results of the instream flow, ice, fluvial geomorphology, fish, and other studies, no one can say how far downstream the project's measurable effects on visual and auditory resources will go. For example, as previously noted by numerous commenters numerous times, the project's proposed, artificially high and variable winter load following flows are highly likely to alter the formation of stable ice on the Susitna far downstream of the project. Spring flushing flows and sediment transport may be largely eliminated, and summer flows will be very low, in all probability leading to major changes in the formation and maintenance of islands, sloughs, side channels, beaches, and riparian vegetation. Again, no one yet knows how far downstream of the Talkeetna and Chulitna confluence these major changes will be evident. All of these altered features will be visible. NPS vehemently disagrees about this premature decision, which contradicts statements elsewhere in this and other PSPs acknowledging the need to rely on the results of other studies. We will not have these results prior to 10/15, when NPS comments must be finalized, or 12/14, when FERC's determination on SPs will be made.

10.6.4. Study Methods

The visual resource impact analysis will follow methods developed by the BLM (BLM 1986). Specific methodology will be augmented with relevant portions of the USFS Visual Management System (VMS) / Scenery Management System (SMS) (USFS 1995) methods, as consideration of this approach will be an important aspect of bridging data collected during the 1985 PAD

(Harza-Ebasco 1985) and that collected during the current study effort. It is also expected that the Visual Sensitivity Analysis will be expanded beyond what is used by the BLM at the planning level to incorporate surveys, focus groups, and information collected through the scoping process. Data collection and analysis will be completed across all four seasons. The Aesthetic Resources Study is interdependent with analyses conducted in other disciplines, both biophysical (e.g., hydrology) and social (e.g., transportation), and coordination of data with other study groups will be significant.

NPS – Again, this acknowledges interdependency of this study on results of other studies, but provides no detail on timing of those deliverables and proposed schedule for finalizing details of this. See also our comments under “Overall Comments.”

Define Study Area

The preliminary study area identified as part of the 2012 work will be refined based on updated Project design and siting. The viewshed will be generated for all Project features, including roads and transmission lines, and refined in coordination with federal, state, and local agencies. The study area will be sufficient in size to address all established indicators of change, including potential indirect effects to recreation, cultural resources, subsistence, and socioeconomics. It is expected that this area will include the Susitna River drainage and upland areas where views of the basin are expected to change based on construction and/or operation of the proposed Project. Viewshed models will be developed for pre-and post-Project conditions to depict expected changes in viewshed areas (i.e., creation of new views, loss of others). The study area will also include common air transportation routes used for transportation and recreational air tours. Maps displaying the viewsheds and geographic boundary of the analysis area will be created. Important views and vistas identified through other resource reviews will be identified and placed on the viewshed map.

Establish Key Observation Points

A final list of KOPs will be developed using information from the 1985 license application (Harza-Ebasco 1985), field observations in 2012, ongoing interdisciplinary/interagency coordination, and Project scoping. It is expected that KOPs will differ by landscape analysis factors, such as their distance from the Project, predominant angle of observation, dominant use (i.e., recreation or travel), and average travel speed at which the Project could be viewed. KOPs may represent views experienced across all seasons or may be specific to a particular season.

NPS - KOPs – Do NPS, other resource agencies and stakeholders get a say on these? When? This is supposed to be The Plan, not a plan to plan.

Baseline Data Collection

Field data collection will include a combination of site visits by helicopter and travel of upstream segments of the Susitna River by boat. Additional information describing access, existing lighting, and movement will be recorded. Baseline photography will be collected at a resolution sufficient for use in computer-generated visual simulations.

Data on existing aesthetic resource values will be collected using the BLM's Visual Resource Inventory (VRI) methodology (BLM 1986). Data collection efforts will include an inventory of scenic quality, visual sensitivity, and distance zones within the Study Area. All areas will be evaluated within the context of viewer experiences. For example, views from roadways or from the perspective of a boater traveling downriver will be established as "linear" or "roving" KOPs. Data collection methods are described below.

Scenic Quality

Scenic quality of the Project area will be determined through the VRI process (BLM 1986). This process entails dividing the landscape into Scenic Quality Rating Units (SQRUs) based on conspicuous changes in physiography or land use and ranking scenic quality within each SQRU based on the assessment of seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modification. Each key factor is scored, and the value of each is added to derive an overall score for the unit. Based on these results, each SQRU is assigned a scenic quality rating of A, B, or C, with A representing the highest scenic quality and C representing the lowest scenic quality.

Visual Sensitivity

Viewer sensitivity will be classified using the BLM Visual Sensitivity Level Analysis (SLA) (BLM 1986). The SLA will be completed in two steps: (1) delineation of Sensitivity Level Rating Units (SLRUs), and (2) rating visual sensitivity within each SLRU. By definition, SLRUs represent a geographic area where public sensitivity to change of the visual resources is shared amongst constituents. The unit boundaries may be defined by a single factor driving the sensitivity consideration, or factors driving sensitivity may extend across numerous SLRUs. Units are thus derived, in part, by the consideration of factors analyzed in the SLA. Visual sensitivity within each SLRU is estimated as high, medium, or low, based on the types of users, amount of use, public interest, adjacent land use, and land use designations. Information required for this analysis will be obtained through land use plan review, data collected by other resource disciplines, and surveys and/or focus groups. The data collected through surveys and focus groups will be coordinated with the set conducted for the Recreation Resources Study. Respondents will be asked about their place-based visual preferences.

Visual Distance Zones

Distance zones represent the distance from which the landscape is most commonly viewed. These zones will be established by buffering common travel routes and viewer locations at distances of 3 miles, 5 miles, and 15 miles using GIS (BLM 1986).

NPS - There is no mention of assessing the aesthetics of varying flows. This is a high volume glacial river flowing at up to 25 mph – the sight and sound of its flows, color of its water, mixing at clear water tributaries are major components of river-related recreation. Need to do this at KOPs along the river, in all seasons, using videography (sound). Need to add to Sound analysis, too.

Photo Simulations

To support the visual resource impact analysis and to disclose expected visibility of Project components from various vantage points, photo simulations will be prepared. Simulations will be produced by rendering Project components (turbines, substations, access roads, etc.) with 3-dimensional (3D) computer models and superimposing these images onto photographs taken from KOPs. Model parameters will account for environmental factors, such as seasons, viewing angle, and light conditions, resulting in an accurate virtual representation of the appearance of the proposed Project. Simulations will be produced to illustrate (1) the structure, (2) downriver landscape characteristics, (3) reservoir landscape characteristics, (4) access roads and transmission lines, (5) views of reservoir from upland areas, and (6) views of potential construction-related impacts. Additional simulations and/or videography will be produced as needed in key areas. Simulations will be completed by seasons and under daylight and nighttime conditions.

Visual Resources Analysis

BLM contrast rating procedures will be used (BLM 1986). The visual resource impact analysis focuses on established indicators of change. Indicators will include, but will not be limited to, the following:

- Impacts to visual resources, measured by the degree of visual contrast created by the Project
 - Change in existing VRI values of scenic quality, visual sensitivity, and distance zones
 - Introduction of new sources of light and glare
 - Change in the viewshed area, including both the elimination and creation of views and vistas
 - Change in the mechanism of view (e.g., transition from mobile view traveling downriver to a static view when situated on the reservoir)
 - Change in visibility that may result from Project-related dust
- Methodology used to address each indicator is described below.

Contrast Rating Analysis

The BLM Contrast Rating procedure will be used to determine visual contrast that may result from the construction and operation of the Project based on photo simulations depicting Project features. This method assumes that the extent to which the Project results in adverse effects to visual resources is a function of the visual contrast between the Project and the existing landscape character. Impact determinations will be based on the identified level of contrast and are not a measure of the overall attractiveness of the Project (BLM 1986).

At each KOP, Project features will be evaluated using photo simulations and described using the same basic elements of form, line, color, and texture used during the baseline evaluation. The level of perceived contrast between the proposed Project and the existing landscape will be classified using the following definitions:

- None: The element contrast is not visible or perceived.
- Weak: The element contrast can be seen but does not attract attention.
- Moderate: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- Strong: The element contrast demands attention, would not be overlooked, and is dominant in the landscape.

The level of contrast will be assessed for all Project components used during construction, operations and maintenance, and decommissioning of the proposed Project.

Visual Resource Inventory Analysis

The VRI analysis will be used to identify expected change to VRI classes based on changes to the visual resource values of scenic quality, visual sensitivity, and/or distance zones that may result from operation of the proposed Project. This analysis will be completed within the framework study area, with the goal of understanding how visual resource values and resulting VRI class may shift based on operation of the proposed Project (including the dam, access roads, and transmission lines). Impacts to VRI components will be evaluated by ranking each key factor used to classify scenic quality, visual sensitivity, and distance zones under operational conditions, and comparing those values to that determined through the established pre-Project VRI.

Light and Glare

The impact analysis for light and glare will focus on potential impacts that may result from nighttime artificial lighting and/or daytime glare. The analysis of artificial lighting will identify potential impacts to human activity at nearby off-site locations that may result from the proposed Project. Photo simulations will be produced to demonstrate views of the proposed Project at night from selected KOPs.

Change in Viewshed Area and Mechanism of View

Viewshed analysis performed for both pre- and post-Project conditions will be compared to identify the changes in viewshed and mechanism of view. These data will quantify the extent of changes in views, and the degree to which access to views changes with the development of roads and the elevation of the viewer within the inundated portions of the reservoir.

Change in Visibility

Data generated by the Air Quality Resource discipline will be used to determine the potential for changes in visibility that may result from construction and/or operation of the proposed Project and related recreation resource values. Results from the air quality dust analysis will be incorporated in this study.

Sound Analysis

A systematic sound study will be conducted to characterize the existing ambient sound environment in the vicinity of the proposed Project and estimate the potential impact associated with construction and operational activities.

The steps in the sound analysis are described below.

Review Documentation and Develop Data Needs

Relevant Project data will be reviewed, including the most current Project description, operating and construction equipment rosters, construction schedules. Ambient sound data recorded in the area or in a similar area will be obtained. Based upon this review, itemized data requirements will be developed that would be needed to perform predictive sound emission modeling. Based on this review a set of outdoor ambient sound level surveys in the vicinity of the Project area will be obtained. The data requirements will include anticipated categories of stationary and mobile construction equipment and their frequency of operation, locations of nearest representative noise-sensitive receivers (NSR), recreation sites (RS), and sound data or specifications associated with intended operating dam systems and processes. Laws, ordinances, regulations, and standards that may influence the sound impact assessment for this study will also be inventoried.

Seasonal Surveys of Ambient Sound Levels

Ambient sound level measurements will be collected in the Project vicinity. These will include unattended long-term ([LT]”, a minimum of 24 continuous hours, up to a single week) sound level monitoring at up to a total of four representative NSR or RS locations and up to a total of 16 attended short-term ([ST], e.g., 15-20 minutes duration each) daytime and nighttime sound measurements to help characterize the affected environment. Observations of perceived and identifiable sources of sound contributing to the ambient sound environment and the conditions during which they occur will be documented as part of the field survey. This survey will be conducted up to four times, associated with up to four distinct seasons (e.g., summer, fall, winter, spring) but for a minimum of two seasons consistent with NPS Natural Sounds Program (NSP) published guidelines (NPS 2012). To the extent practicable, the survey locations will be the same for each surveyed season.

NPS - When do we decide where the four LT and 16 ST locations will be? What if we think there should be more? Again, need to agree about this prior to 10/15/12. NPS would like to have enough advance detail to involve our Soundscapes staff in reviewing this methodology.

Modeling of Project Sound Levels.

Up to three scenarios or alternatives of future Project operational sound levels will be estimated with System for the Prediction of Acoustic Detectability (SPreAD). Computer Aided Noise Abatement (CADNA/A), an industry-accepted outdoor sound propagation modeling program, could also be used (Sound Advice Acoustics Ltd, 2012). Predicted sound level isopleths or

“sound contours” will be superimposed on suitable aerial photographs or maps of the Project vicinity and will include specific sound level prediction at selected measurement and/or assessment locations from the ambient sound field surveys of Task 2. Predicted sound emissions associated with both Project construction and operation using different transportation route options will also be assessed.

GIS Maps and Figures

Viewsheds, KOPs, and soundscapes will be mapped as GIS layers according to Project standards. Mapping will also identify relevant management standards within the study area. Significant visual features will be photographed for inclusion in the Aesthetic Resources Report. Visual simulations depicting the appearance of the proposed Project will be produced for a subset of KOPs, and used to inform the impact analysis.

10.6.5. Consistency with Generally Accepted Scientific Practice

The methods and work efforts outlined in this Study Plan are the same or consistent with analyses used by applicants and licensees and relied upon by the Commission in other hydroelectric licensing proceedings. The Aesthetics studies are based on the BLM’s visual resources methodology. The sound analysis is consistent with National Park Service Guidelines.

10.6.6. Schedule

Upon implementation, it is estimated that the term of the studies will be approximately two years.

Table 10.6-1. Aesthetic Resources Study Schedule. Description Start Date Completion Date Duration (months)

Description	Start Date	Completion Date	Duration (months)
Data Collection(including seasonal field visits and sound monitoring)	January 2013	November 2013	11
Inventory	January 2013	October 2013	10
Initial Study Report	October 2013	December 2013	3
Analysis	November 2013	March 2014	5
Updated Study Report	April 2014	December 2014	8

NPS - very short, and no work in any December. Initial study report is scheduled for 12/13 – will this allow integration of results of other biophysical studies?

10.6.7. Level of Effort and Cost

The estimate of \$500,000 includes the following components over two full years of study.

10.6.8. Literature Cited

AEA (Alaska Energy Authority). 2011a. Susitna-Watana Hydroelectric Project, Socioeconomic, Recreation, Air Quality and Transportation Data Gap Analysis. Prepared by HDR, Inc., Anchorage.

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- USDA Forest Service. (USFS) 1974. The Visual Management System. Agriculture Handbook Number 462.
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10.7. Recreational Boating / River Access Study

NPS– Consider changing the title of this study to “Flow Dependent Recreation,” reflecting the broader affected activities beyond boating and fishing. The Study’s title and some initial statements about scope are contradictory. Study goal is not merely to contribute data concerning recreational boating and access – it is to look at all forms of flow-dependent rec. That would include activities like fishing that are affected by flows (e.g. if salmon disappear because no more spawning habitat, or if you can’t ski, mush, or snow machine the river anymore due to unstable ice) regardless of whether you’re doing it in a boat or from shore.

NPS - Aesthetics can be flow dependent (stillwater in res. v. free-flowing stream, lost sight and sound of whitewater at high flows in DC, morphological and vegetation changes downstream due to changed flow regime). There is no mention of this in this or the Aesthetics PSP.

NPS – There is also no mention of whether impacts on rec access and experiences due to changed ice and snow cover resulting from changed flow regime will be assessed under this PSP. It should be included.

10.7.1. General Description of the Proposed Study

This study incorporates and contributes to data and analysis conducted as part of the Recreation Resources Study (Section 10.5). In the overall recreation study, recreational boating uses and river access points will be identified. Current and future use of the river by both motorized and non-motorized boat users will also be estimated therein. Because the Project will affect river flow regimes, including the inundation of about 39 miles of the river, and because changes in river flow regimes may directly impact boating and other flow-dependent recreation activities, a specific methodology of recreational flow analysis is also proposed.

Study Goals and Objectives

- The goal of the Recreational Boating / River Access Study is to contribute data to the Recreation Resource Study concerning recreational boating and access. The goal and objective of the study is to contribute to the Recreation Resource Study concerning the relationship between river flows and recreation opportunities and uses, by:
 - developing flow preference curves for each major river reach by type of use and equipment; NPS: Doubt you can develop a preference curve for winter activities that require stable river ice. It will either be present or absent. What method will be used to assess this effect?
 - describing the potential effects of altered river flows on existing and potential boating activity and other recreational uses of the Susitna River; and
 - describing any new boating or other flow-dependent recreational opportunities that may be created by Project construction and operation.

10.7.2. Existing Information and Need for Additional Information

Existing information was compiled in the Recreation Data Gap Analysis (AEA 2011a) and recreation resource descriptions and inventory presented in AEA's Pre-application Document (PAD) (AEA 2011b). A recreation study was initiated in 2012 to gather data to inform the 2013-2014 study plan, including the following elements:

- Interviews with key representatives of agencies and organizations, including Alaska Native entities, knowledgeable about regional and state recreation management and issues
- A compilation of existing recreation inventory and capacity information
- An inventory of Project area access
- Incidental Observation Survey Data (completed by field crews)
- Coordination with other study disciplines and incorporation of data
- Geo-referenced mapping
- Field reconnaissance
- Identification of future trends and issues
- A description of the management framework
- compilation of existing baseline boating recreation information and access;
- hydrology data review;
- field reconnaissance and photography;
- identification of future trends and issues; and
- description of the management framework and special river designations.
- compilation of existing baseline boating recreation information and access;
- hydrology data review;
- field reconnaissance and photography;
- identification of future trends and issues; and
- description of the management framework and special river designations.

Available information from the 2012 data gathering efforts will be used to develop the Revised Study Plan.

Through the consultation events including the FERC scoping process and work group meetings, other licensing participant recommendations including input on study methods were used for development of the 2013-2014 study plans.

10.7.3. Study Area

The reaches of the Susitna River, shown in Figure 10.7-1, will be subdivided into smaller units as a result of physical studies in other disciplines and field observations conducted in the Recreational River Flow Study. Areas of concentration will include areas where the proposed reservoir would create the most flow changes.

NPS – We do not understand the statement: “areas where the proposed reservoir would create the most flow changes.” What is the threshold for “most”? Who decides? When? Even assuming consensus on the standard to be used, how can this decision be made before the results of the instream flow, flow routing, ice processes, etc. studies are in hand? What if we and others disagree with AEA’s geographic scope decision? This needs to be nailed down by 10/15/12.

The Recreation River Flow Study will focus on those reaches of the Susitna River directly affected by the Project. These include the section of river that would be inundated by the proposed reservoir, Devils Canyon, and the reach downstream of Devils Canyon to the confluence with the Talkeetna River.

NPS - Again, it is totally unfounded for AEA to arbitrarily stop at Talkeetna River. This contradicts prior commitments to rely on the results of other studies to inform impacts on recreation. Those studies will not be completed for several years.

10.7.4. Study Methods

The Recreation River Flow Study is interdependent with analyses conducted in other disciplines, especially physical (e.g., hydrology) and social (e.g., transportation), and input of data from those study groups will be significant.

This Study is designed to identify the minimum and optimum instream flow needed for motorized, non-motorized, and whitewater boating, as well as other flow-dependent recreational activities, on the Susitna River.

Using accepted practices for recreational flow study design, as described in Whittaker et al. (1993, 2005), a progressive sequence of levels of study will be undertaken. These include: Level 1, desktop analysis; Level 2, limited reconnaissance; and Level 3, intensive field studies. This process maximizes study efficiency by characterizing recreation activities for respective river segments in the desktop phase, confirming assessments in the reconnaissance phase, and then focusing intensive field studies to those activities and river segments warranting detailed study and analysis. This process also contributes to early identification of potential Project effects and user conflicts, and information needed to evaluate potential Project effects on river-based recreation.

Level 1: Desktop analyses integrate existing information about channel characteristics, hydrology, river recreational opportunities, access points, and flows in order to determine what recreational boating resources are present that could be affected by the potential Project.

Level 2: Reconnaissance efforts gather first-hand information on the river resource, types of recreation opportunities, and associated attributes as well as the recreational user groups accessing the river. The reconnaissance also provides valuable information on access sites, logistics, travel to and from the site, local resources and people, and, lastly, potential safety concerns. Motorized and non-motorized watercraft may be used during the reconnaissance to better understand recreation opportunities on the river.

Level 3: Intensive field studies will document the existing flow-dependent recreation opportunities (motorized and non-motorized watercraft) and the associated attributes for the respective opportunities, and will quantify the flow preferences (minimum acceptable and optimum) for each opportunity. This is done through a combination of field observations, interviews with licensing participant groups, focus group sessions, and an instream flow recreation survey targeting recreation opportunities for a given river segment. The survey work will be conducted in coordination with surveys associated with the overall Recreation Study.

NPS – Again, this underscores why we need to see the proposed survey instruments, protocol, etc. to determine if the Rec Survey adequately addresses these issues.

Elements of recreational boating flow research include:

- *Data collection* - Water recreation attributes for discrete sections on the Susitna River will be described, including types of river recreation, reach length, gradient, character, whitewater difficulty classification, and recommended range of flows for respective recreation activities. Activities will be identified by type of motorized and non-motorized water craft, including whitewater kayaks and packrafts; commercial and non-commercial uses; and trip purposes, trip length, frequency of use, and seasonal considerations.
- *Reconnaissance* – River recreation opportunities and associated instream flow attributes will be observed and described. Existing and potential sites for recreational boating access along the river corridor and the area inundated by the proposed reservoir will also be described.
- *Consultations* - Boaters, land and resource managers, guides, user groups and others will

be interviewed to determine the types and locations of boating activity occurring on the Susitna River. Interviews will be conducted with boaters and other experts with experience on the Susitna River to determine a range of conditions generally acceptable to various types of watercraft and skill levels.

Consultation methods include the following:

- Interviews will be conducted with river recreation users with previous experience on the Susitna, including motorized, non-motorized, and whitewater boaters.
- Focus group sessions will contribute additional information about flow preferences, recreation use patterns for respective reaches and groups, whitewater difficulty, safety, campsites, significant rapids, and recreational access. The focus group sessions will be coordinated with national, regional, or local water recreation clubs.

Outcomes of the process include the following:

- Motorized and non-motorized boating opportunities and associated attributes for the range of flows will be examined. This includes, where applicable, the level of whitewater difficulty, portage requirements, length of trip, and characterization of experiences. Includes tourism boating up to Devils Canyon.
- Flow preference curves for each reach will be developed for respective river recreation opportunities.
- The frequency for the range of preferred flows for respective opportunities will be quantified for existing conditions and likely proposed Project operations.
- Put-in and take-out sites and related needs (e.g., scouting and remote camping) that may be associated with respective recreation opportunities in a particular river segment will be identified.

10.7.5. Consistency with Generally Accepted Scientific Practice

The methods and work efforts outlined in this Study Plan are the same or consistent with analyses used by applicants and licensees and relied upon by the Commission in other hydroelectric licensing proceedings. The proposed methodology is often used in analysis for development of hydroelectric license applications to fulfill the FERC's Exhibit E requirements for documentation and development of mitigation measures for flow dependent recreation.

10.7.6. Schedule

Upon implementation, it is estimated that the term of the studies will be approximately two years.

Table 10.7-1. Recreational Boating / River Access Study Schedule. Description Start Date Completion Date Duration (months)

Data Collection (including seasonal field visits and consultations)	January 2013	November 2013	11
Inventory	January 2013	October 2013	10
Initial Study Report		December 2013	
Analysis	November 2013	March 2014	5
Updated Study Report	April 2013	December 2014	8

NPS - No information about when/how the Level 1-3 analyses fit in with this schedule. Much of this study plan appears to have been cut and paste from the NPS/OSU guide, without an explanation of how the methods will be applied to this particular project. We need specifics and an agreement on who makes mid-point decisions to proceed, e.g., from Level 1 to 2, or 2 to 3, based on what criteria.

NPS - There is only one winter and one summer of study, and no Novembers or Decembers. This does not indicate a sincere concern for impacts on winter recreation. Arguably, AK's winter rec season is longer than its summer season. It is certainly important to users, as well as purveyors of equipment (e.g. snow machines) and the local economy. One year of study is also not an adequate sample size to support conclusions about important flow-dependent activities like sportfishing and float hunting. Note the emergency Chinook closure this year – how can you study the most sought-after fish species in SC AK if harvest is prohibited during the only year of study? Likewise, the upland game hunting season is dependent on variable weather etc. – one season is just not enough to document baseline opportunities and experiences when they are dependent on highly variable interannual conditions.

10.7.7. Level of Effort and Cost

The estimated cost of the two-year study is \$100,000.

10.7.8. Literature Cited

AEA (Alaska Energy Authority). 2011a. Susitna-Watana Hydroelectric Project, Socioeconomic, Recreation, Air Quality and Transportation Data Gap Analysis. Prepared by HDR, Inc.,

Anchorage.

• —. 2011b. Pre-application Document: Susitna-Watana Hydroelectric Project FERC Project No. 14241. December 2011. Prepared for the Federal Energy Regulatory Commission, Washington, DC.

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Whittaker, D., B. Shelby, and J. Gangemi. 2005. Flows and recreation: a guide to studies for river professionals. Report for Hydropower Reform Coalition and National Park Service – Hydropower Recreation Assistance.

Easley, Bridget

From: Harry Williamson <hbwillia44@gmail.com>
Sent: Tuesday, August 14, 2012 1:46 PM
To: Bob Koenitzer
Cc: Cassie Thomas; Easley, Bridget
Subject: Review of Boundary Project Recreation Study Report

Bob, Again, thanks for directing me to the final recreation study report for Boundary. I have discussed this project and their consultants' approaches with Susan Rosebrough of our Seattle office. She represented NPS during those proceedings. Susan and I had worked with EDAW and Tetra Tech on various projects in our region and consider their work to be good. I'm pleased that McDowell Gr. is using the Boundary project approach for the user survey effort for several reasons.

- They recognized the utility of employing various survey methods to support a number of other elements of the recreation studies such as the regional recreation analysis, dispersed recreation use, access, and future recreation use analysis. Similarly, the surveys will also inform other areas currently included in the "Social Sciences Studies" such as transportation and socio-economics in Watana.

- Importantly, at the City of Seattle's (licensee) urging, the recreation studies were developed and implemented in a highly collaborative fashion. Numerous meetings were held with agencies and stakeholders once the initial proposed study plans were issued and leading up to acceptable revised study plans. This included involvement in developing the field surveying program, sampling methods, and even decisions on locations, frequency, level of effort, etc. It was clearly a deliberate, iterative process. Since Boundary was also conducted under FERC's ILP this demonstrates the value of a proactive, collaborative approach.

- Boundary is somewhat similar to Watana in that recreation around the project is highly dispersed and the population centers were limited. They used active user surveying as well as more passive means such as: visitor registries at key facilities, interviews with providers, questionnaires to local residents (via mail), and focus groups. I think that these are all techniques that are applicable to Watana.

The only other FERC proceeding that we've been involved in recently for an original license is Bear River Narrows in Idaho (FERC # 12486). Although much smaller scale than Watana, I'll take a look at the user survey approach used there. In reviewing various other recreation studies from other projects, I'm seeing a great deal of homogeneity and generally things that are reflected in Boundary's. That is to be expected since they were relatively routine relicensings and many of the studies were conducted by a handful of qualified consultants at the time. I guess that these could be considered "off-the-shelf" and but they do represent established, accepted methods. So I agree that there is no need to reinvent the wheel, but there will certainly be a great deal of site-specific adaptation given the uniqueness of Watana.

Cassie Thomas returns to Anchorage in another week. I should be available until, and after, she returns. So, again, we would appreciate the opportunity to confer and review any preliminary materials as they become available.

Thanks, Harry

AEA Team Member		Other Party	
Name:	<i>Bob Koenitzer</i>	Name:	<i>Rebecca Schwanke</i>
Organization:	<i>McDowell Group</i>	Organization:	<i>ADF&G Wildlife Biologist, Glennallen</i>
Study Area:	<i>Recreation Resources 10.5</i>	Phone Number:	<i>474-6926</i>
Date:	<i>8/21/2012</i>	Time:	<i>2:00 PM</i>
Meeting held by: <input type="checkbox"/> AEA Team <input checked="" type="checkbox"/> Other Party <small>McDowell</small>			

Others at meeting: None

Subject:

Recreation surveys

Discussion:

Extensive discussion of the availability and level of detail for hunter effort and harvest in GMU 13.

Action Item:

NPS Comments on 9/20/12 Draft Survey Instruments and Methodology

Summary of Recreation Resources Survey Methodology

A. Study Area Definition

NPS contends that changes in flows, sediment transport, and ice formation could likely result in significant changes in post-construction recreational opportunities downstream of Talkeetna. Thus baseline boating, fishing, and winter use of the Susitna River corridor from Talkeetna to its mouth needs to be assessed in order to determine the project's impacts on recreation and aesthetics. We believe the FERC will need this information in order to balance the power and non-power uses of the Susitna River in its licensing decision, and NPS will also need it in order to develop appropriate Section 10(a) recommended terms and conditions for the license. Only if studies of the river's post-project flows, morphology, ice processes, fish habitat, etc. determine that there will be a negligible effect on relevant biophysical conditions in the river corridor downstream of Talkeetna should the recreational and aesthetics study areas be restricted to the river corridor upstream of the confluence with the Talkeetna and Chulitna rivers.

C.1 Access Points

In NPS's opinion, study efficiency could benefit if resources were reprogrammed away from certain areas along the Richardson and Glenn highways, e.g. Chickaloon, Sourdough, and Paxson Lake. This would presumably help keep study costs in line while including summer and winter access points downstream of Talkeetna. If the goal of intercepting Chickaloon area residents is to sample subsistence activities, this effort is more appropriate under the Subsistence survey.

The description of access points along the Parks Highway leaves the impression that Talkeetna is on the Parks. It might be better to say that it runs past the Talkeetna Spur Road.

Fixed Wing Aircraft

Will any effort be made to intercept private aircraft at Talkeetna airport? If not, why not, in light of planned intercepts at Willow airport and float plane dock?

3. Survey Content

While the Boundary project surveys provide a useful template for the Watana, the crucial difference between these two projects must be kept in mind. Boundary project area visitors were, for example, asked about the quality of their recreational experiences, whether there was over-crowding, and whether project facilities and services were adequate. Better questions to capture baseline recreational resource conditions in the Watana study area would focus more on the recreational experiences currently being sought by visitors to the area, in terms of attributes like remoteness, solitude, self-reliance, low encounter rates, absence of "combat fishing" atmosphere, etc. Instead of asking about the adequacy of existing facilities and services – none of which are provided by AEA – better questions for capturing pre- and post-project differences would endeavor to assess demand for potential new facilities such as reservoir-based fishing, serviced campgrounds, maintained trails, a hut system, etc. It is also important to determine whether some current visitors to the area might go elsewhere if the project significantly changed the recreational character of the area.

AEA proposes to collect party size information to inform the “shared expenses” portion of the economics study. Party size is an important recreational use parameter in its own right (e.g. it helps characterize visitor experience), so this information should be collected early in the intercept survey.

While the basic structure of the intercept survey will likely work as an online survey, some elements will need revision, e.g. we suggest that the “don’t know” and “refused” options be deleted from each question.

D. Mail and Online Survey

By surveying only registered voters, the sample will be somewhat skewed in terms of demographics. Younger visitors are less likely to be registered in Alaska, as are military members and their dependents. Snowbirds may also be registered in another state, even if they own property in or near the study area. Is it possible to use power utility customer lists to generate a random sample? DMV records may also yield a less biased sample population.

Contingency plan: Does AEA have a plan for gathering recreation and aesthetics resource information if the study area is affected by floods, other unusual or extreme weather, wildfires, earthquakes, road or railroad closures, etc. during critical survey periods? Or if the Susitna is subject to additional emergency Chinook sportfishing closures? These factors can have a drastic effect on the number of recreational users who want to or are able to access the study area. The study plans should include a detailed strategy for altering survey methods and/or extending the study period in the event the study area is affected by these forces beyond AEA’s control.

AEA proposes to reduce intercept survey frequency (fortnightly instead of weekly) to save money, if a sufficient sample size can otherwise be ensured. NPS believes that AEA should also consider reprogramming its survey efforts as the season progresses in order to respond to unforeseen weather, access, and regulatory conditions.

Executive Interviews

Project description: NPS thinks it would be helpful to provide more information for interview subjects about the project’s possible effects on recreation and aesthetics. Many non-specialists have no context for the study area, and the project’s footprint will be more than just a high dam and a large reservoir. Before the project’s final operations are determined (e.g. habitat maintenance, sediment flushing, and ramping flows, which subtract from the volume of water available to make power), and before total project costs are known, NPS feels it is inappropriate to tell survey subjects that the project will “meet nearly 50% of the Railbelt’s electrical demand.” The goal of the executive interviews is to gather more information about baseline conditions and potential project effects, not to “sell” the project to recreationists.

NPS suggest adding to the executive survey intro a brief description of the new road, new powerline, changes in natural flows downstream of the dam, potential changes in snow and ice cover, etc.

As with the intercept survey, it would be useful to learn more about the kinds of recreational experiences executive survey subjects seek in the project area.

“Day use areas” could be added to examples of new facilities in Q. 7.

Survey subjects: based on the 9/20 meeting, it appears that members of paddling clubs as well as highly skilled kayakers who have run Devil's Canyon will be surveyed – good.

Northern Economics Survey Request

NPS was encouraged to hear about the RUM approach to monetizing the value recreation in the project area. However, we disagree with the assumption that the project will lead to “increases in visitation.” Some kinds of baseline project area uses will likely decrease post-project, e.g. hunting in the area inundated by the reservoir, floating the upper Susitna downstream from the Denali Highway, and potentially activities dependent on the existing amount of fish habitat and existing extent and duration of stable winter ice cover.

Recreational activities that will likely be affected by the project also include kayaking and ATV use.

Intercept Survey

We recognize the need to keep the length of this survey short enough that subjects will agree to complete it. Some of the questions seem more appropriate to a relicensing situation, where the adequacy of existing licensee-provided facilities and management is under review. In Watana's case, the primary need at this point is more information about baseline recreational use in the area that could be affected by the project. Such use can be further characterized by attributes such as experiences sought and opportunities provided to the public.

Here are our specific suggestions about the survey instrument:

Q. 3 – Why are subjects not being asked if they drove the Parks Highway?

Q. 13 & 14 Quality of Experience and Crowdedness and Q. 19 Experiences Sought

We suggest re-ordering these questions. Put what is now Q. 19 before Q. 13. Then reword Q. 13 and 14 to find out if the project area lacks facilities or management that would enhance recreational experiences if provided. Given the low density and high dispersion of recreational use in the project area, linear quality and crowdedness assessments are unlikely to yield information useful to project design and management decisions.

Q. 15, 16, 17 – Again, these questions seem more appropriate for assessing how well an existing recreation management plan is working at an existing hydro project than for assessing the probability of displacement from areas that will be utilized or affected by this project. While there may be existing conflicts between visitors to the project area, they are not necessarily AEA's responsibility to fix. Presumably AEA will want to exert – or be required to exert – more active management of project lands and waters post-construction, reducing conflicts due to littering, vandalism, gunfire too close to roads, trails and campsites, etc.

Until we know more about the kinds of new recreational facilities Watana may provide; how project operations will affect boating, fishing, etc. downstream; and the management and access policies for the dam, road, transmission corridor right of way, and reservoir, it will not be possible to design survey questions that will yield meaningful feedback on public preferences for such facilities and policies. NPS

respectfully suggests that an additional survey regarding such preferences will be needed after more is known about the location of the new road and transmission corridor, reservoir operations, the boatability of the river downstream of the dam, etc.

Q. 20(f) & (g) – We suggest that subjects be asked about the adequacy both of trails and trailheads.

This table should also ask about the need for Information and Education resources: kiosks, signage, trail information, points of interest, geologic, historic and/or cultural information. Subjects could also be asked about management: level of maintenance, staff presence, etc.

Q. 21 & 22 – We suggest reversing the order of these questions to ascertain which areas are most important to visitors before assessing whether anything interfered with their aesthetic enjoyment. Note that our Aesthetic Resources study plan request included natural sounds, not just scenic values.

Q. 23 – This questions should be closer to the start of the survey. It provides context for many of the more specific questions that follow. It could be combined with Q. 10 to help keep the survey from being too long.

Q. 24 – We suggest that party size be determined earlier in the survey. It is an important recreational attribute so it's important to capture this information before subjects potentially abandon the interview.

Incidental Observation Survey

Is it possible to get an update on the effectiveness of this survey prior to release of the 2012 study report?

AEA Team Member		Other Party	
Name:	<i>Bob Koenitzer</i>	Name:	<i>Harry Williamson</i>
Organization:	<i>McDowell Group</i>	Organization:	<i>NPS</i>
Study Area:	<i>Recreation Resources</i>	Phone Number:	<i>425-322-4151</i>
Date:	<i>9/20/2012</i>	Time:	<i>3:00 pm</i>
Meeting held by: <input type="checkbox"/> AEA Team <input checked="" type="checkbox"/> Other Party			

Others at meeting: None

Subject:

Recreation survey design

Discussion:

The purpose of the teleconference was to get some initial feedback from NPS on the first survey and sample plan drafts and facilitate the design process. Harry expressed that he had had limited time to review the survey and sample plan and that both he and Cassie would have further comments but he felt that the draft survey and sample plan were a good start. Bob stated that nothing discussed would be final until AEA had approved the survey. The following are questions, issues, and concerns that were discussed:

- He requested the exclusion of “don’t know” and “refused” from the mail and online surveys. McDowell group concurred.
- Q1a- Harry inquired as to the Alaska resident check box. That is provided so that if we have a respondent refuse to give us their zip code we can still ask if they are an Alaska resident.
- Q20e/f- Harry requested rewording of the questions to capture both the number of trails (measured by trailheads) and total amount of trails (measured by length). McDowell Group concurred.
- A question will be added to capture group size in addition to party size.
- Q20a- Harry requested cultural and educational resources (signage, kiosks, points of interest) be added to this table. McDowell group concurs.
- Both parties agreed to further review the qualitative questions.

Action Item:

Bob will try and incorporate these changes before the 10/3 meeting. NPS will send further comments as soon as possible. Both agreed that these informal meetings will speed the complex process of survey design. Again, the survey content is not final until AEA approves.

APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION
SECTION 14 – SUBSISTENCE RESOURCES



Chickaloon Village

Traditional Council
(Nay'dini'aa Na')

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September 14, 2012

Paul Anderson M.D., M.P.H.
Health Impact Assessment (HIA) Program Manager
State of Alaska

Department of Health and Social Services

Division of Public Health

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3601 C St., Suite 540

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Re: Susitna-Watana Hydroelectric Project Health Impact Assessment Study
Comments on section 13.8.1 General Description of the Proposed Study

Dear Paul,

Please find attached my preliminary comments on the proposed Susitna-Watana Hydroelectric Project Health Impact Assessment Study Plan.

On a first glance, one of the things that I can't stress enough is the importance of engaging community as early in the process as possible and in keeping the CHIA process as transparent as possible all the way through the process. This includes engaging the community to help contribute to and guide the potential impact analysis, what to do with data gaps, and in developing and proposing sound mitigation strategies.

Another area that definitely needs to be strengthened is the Tribal engagement process to allow for the provision and recognition of traditional knowledge as complementary to existing baseline health and other scientific information. Tribal people hold the history and knowledge of this area and there must be some mechanism made available in the study plan for acknowledging how this information will contribute to the legitimacy of the HIA study plan and data collection. Ultimately, this will strengthen this CHIA.

Specific comments pertaining to individual sections of the Study Plan are as follows:

13.8.1.1. Study Goals and Objectives

I recommend revising “The goals and objectives of the HIA include the following” section to add an engagement piece. We would add a bullet point to read:

- **Engage the community in a transparent process of identifying community health concerns for evaluation.**

In recognition of the federally recognized Tribal governments in the potentially affected areas, We would revise the second bullet point to read:

- Collect baseline health data at the state, borough or census area, **tribal**, and potentially affected community, as possible.

I question bullet point number three. Once data gaps are identified, how will this trigger additional studies to take place? Or, will there be some weighting of data gaps to determine which are priorities for further review? Can this be addressed somehow in this section?

We would revise bullet point number four to read:

Evaluate the baseline data against the Project description to determine **the magnitude of potential impacts both positive and negative.**

Additionally, we strongly believe a projective component for potential impacts and applied mitigation strategies should be attempted in this CHIA.

13.8.2. Existing Information and Need for Additional Information

This is the section where we feel very strongly that traditional knowledge should be gathered through qualitative discussions within Tribal communities to contribute to the completion of the HIA. This information should be given the same weighting as other scientific information gathered.

Data gaps should not just be noted, but should attempt to be adequately addressed in further studies to be determined by the community.

13.8.3. Study Area

Tribal communities should have the opportunity to weigh in on impact areas and in defining the study area. Additionally, tribal communities should have the opportunity to define key subsistence resources rather than simply relying upon the State of Alaska Department of Fish and Game or U.S. Fish and Wildlife Service as the only viable

source of information for the CHIA.

13.8.4.1. The community should have the opportunity to help identify the “Issues Summary.” Additionally, a comprehensive discussion pertaining to Social Determinants of Health (SDH) should take place to identify disparities affecting various community groups and the potential to project future impacts both positive and negative. This will ensure that the CHIA is transparent and comprehensive in addressing as many social impacts as possible and in providing adequate mitigation strategies for possible impacts once evaluated.

In many local indigenous cultures information is passed down orally. Traditional knowledge regarding past and present concerns related to similar development projects should be acknowledged as valid in addressing “Causal links between the proposed project and the anticipated health impacts.” In essence, there must be a consideration in the CHIA for undocumented and yet authentic experiences conveyed orally.

13.8.4.2. Phase 2: Baseline Data Collection

I would like a clearer definition for the study of subsistence issues and “reasonably close proximity.” This project will likely impact salmon and displace moose habitat significantly; therefore, this definition will need to be discussed with scientific experts and local Tribal experts.

13.8.4.3. Phase 3: Impact Assessment

Again, I would suggest that you add revise the following bullet point to include “An in-depth review of available state, regional, **tribal**, and local health data.”

I would suggest that a special analysis be performed for impacts to tribal peoples; especially in relation to social determinants of health and subsistence impacts.

A holistic approach to looking at health will definitely help with the development of a more effective Health Management Plan; however, if this CHIA finds no place for Traditional Knowledge, a HMP could be yet one more document which compartmentalizes health in a way that is not helpful or applicable to local Tribal peoples.

13.8.5. Consistency with Generally Accepted Scientific Practices

Again, I can’t stress enough the importance of traditional knowledge and how this CHIA should make a place for this type of evidence-based knowledge.

13.8.6. Schedule

I do not think you are allocating enough time on the front end to help with the development of the Project Overview and Issues Summary. This section is integral to getting community buy-in on the CHIA. If you don’t do work on the front end, it will not

have credibility on the back end. It is not enough to do this during the Baseline Data Collection process. CHIA's call for more of a community-based participatory research approach. The community, whenever possible, should be included to have ownership over contributing to the document.

This only constitutes my commentary on sections 13.8. As you can see, we have made several recommendations which we believe will strengthen your CHIA process. We also have similar concerns pertaining to other parts of Section 13. We would like additional time to review through these sections, as again, they all have direct impact on our Tribal citizens.

Please let me know if you have any questions regarding our comments or if I can provide additional clarification for you.

Sincerely,



Lisa Wade

Director, Health and Social Services

APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION

**SECTION 15 – SOCIOECONOMIC AND TRANSPORTATION
RESOURCES**

This comment is in regards to the proposed Susitna Watana Dam.

I want to point out that there are a significant number of private land owners (200 or so) congregated along the Alaska Railroad corridor between Gold Creek and Hurricane, Alaska. FERC appears to recognize the community of people who own land along the railroad south of Gold creek (Chase community for example) but do not appreciate the large number of landowners to the north of Gold Creek. This is likely due to the fact that we are not formally organized like the Chase community is.

Landowners along the railroad corridor (I am one of them), particularly between Gold Creek and Hurricane, stand to be disproportionately affected by two access roads under consideration (South Road and Hurricane alternatives-DOT transportation access study (<http://www.susitna-watanahydro.org/type/studies/>)).

Though these landowners are not formally organized - but they do represent a "community" that may be affected disproportionately compared to the population at-large, particularly by the possible access roads from Hurricane and/or Gold Creek.

Under the Environmental Justice language in the National Environmental Policy Act I feel that we should be recognized as a community under NEPA and as lead permitting agency FERC should open direct dialogue with this community to insure: 1) accurate information is delivered directly to members of this community, 2) that public meetings are held at locations that facilitate members of this community to participate in the NEPA process, and 3) that the community's points of view (for or against project components) be given their weight during the development of the project alternatives portion of the EIS process.

I appreciate that some effort is required to identify and communicate with an unorganized "community" such as this but nonetheless you must. I am offering to help with the 90 or so landowners nearest Chulitna.

Document Content(s)

14780.TXT.....1-1

NPS Preliminary Comments on Proposed Study Plans for Susitna-Watana Project

These informal comments focus on the three recreation-related study plans released by AEA on July 15th 2012, i.e., the Recreation Resources, Aesthetics Resources, and Recreational Boating/River Access study plans.

Overall Comments

Common to all three PSP's:

- **Gap Analyses/PAD:** Contrary to the opening language of the three PSP's, the Gap Analyses for Recreation and Aesthetics Resources were not included in the PAD and were made available only after numerous complaints from NPS, other agencies, and stakeholders shortly before our original comments on the PAD and study requests were due.
- **Disciplinary/Study Interdependencies:** NPS and others have repeatedly requested AEA to develop a schedule that ensures coordination between the numerous interdependent resource studies associated with the Watana project. Of particular interest to NPS are the recreation and aesthetics studies, which are dependent on the results of other biophysical resource studies such as the hydrology, instream flow, fluvial geomorphology, ice processes, fisheries and game studies. Despite these requests, the July 2012 PSPs make only vague references to the issue. There remains no visible sign that this coordination is being conducted at a project-wide, discipline-wide level. For example, none of the tables depicting the various study schedules includes any reference to when the results of the "input" studies will be available, or how the dependent studies might be modified if these input studies reveal and need to change the dependent studies' substantive, temporal or geographic scopes.

Critical Path Method or some comparable project management mechanism should be a key element of this project, especially with some 58 studies in play, many occurring concurrently. There should be a transparent process for tracking the critical milestones and progress of the PSP's with the interdependencies identified in each study plan. A summary of the overall critical path schedule should be included as a separate plan, and made available on the project website for the stakeholders to access.

- **Availability of 2012 Study results and schedule:** According to the current published schedule, comments on the July 2012 PSP's are due on 10/15/12; AEA files revised PSP's on 11/14/12; comments on the revised PSP's are due on 11/29/12; and FERC will make final determination on study plans on 12/14/12. This schedule means that agencies and stakeholders will not have the results of critical 2012 reconnaissance and baselining studies that are key to determining the scope and adequacy of the 2013-14 ILP studies before our final opportunity to comment on the ILP studies. We are being asked to take the Applicant's word that if the results of 2012 studies indicate a need to modify the ILP studies, such modifications will be made voluntarily.

- **Socioeconomics** – NPS maintains that the metrics and analyses regarding the socioeconomic costs and benefits of the project should extend beyond the estimated value of increased recreation and tourism. We recognize that it is less straightforward to determine some non-market values, e.g. ecosystem services and existence values, than it is to estimate the future value of commercial tourism in the project area. That does not mean that these non-market values are zero, however. NPS continues to assert that a full accounting of all project-related impacts on the social environment must include an estimate of these values. While it will of course be up to FERC to decide how reliable the various economic value estimates are (just as the uncertainty associated with the future value of energy production v. project construction and operation costs must be accounted for), and thus to determine much weight to give the various types of estimated socioeconomic values in its “equal consideration” analysis, nowhere does the FPA as amended by ECPA instruct FERC or license applicants to ignore such values outright, especially in light of emerging valuation methodology.

With respect to Benefits Transfer methodology, this method is most reliable when the reference and study sites and projects are very similar, and when the economic impact valuation study at the reference site was performed at the highest standard. Given the dearth of large original hydropower projects licensed on free-flowing rivers in remote locations in recent decades, NPS believes it will be challenging to identify an appropriate reference project for Watana. Just as with ecosystem services valuation methods, there will be numerous assumptions and approximations associated with application of the benefits transfer method to this project. In contrast to the lack of appropriate reference sites for a benefits transfer analysis, however, the value of ecosystem services – including services associated with the Susitna River -- is currently being studied with some rigor in Mat-Su Borough.

From the “Socioeconomic and Transportation Study, Regional Economic Evaluation Study,” p. 263 of the PSP document:

“The economic impact of the Project on local tourism establishments (e.g., river sport fishing, whitewater boating) and the regional economy will be estimated using the results of the Recreation and Aesthetics study. Calculations will be based on information obtained from the recreation survey, including the estimated recreation-related expenditures per recreational day or trip and changes in the number of days or trips per year. The regional economic impact of changes in subsistence-related expenditures due to the proposed Project will be estimated using the results of the Subsistence study. Approximate cash expenses to generate each pound of subsistence harvest will be based on published information (Goldsmith 1998).

In addition, the benefits transfer approach will be used to supplement or compare unit values (e.g., value per-day of sport fishing) for recreational goods and services obtained from primary valuation methods. Benefits transfer involves the application of unit value estimates, functions, data, and/or models from one or more previously conducted valuation studies to estimate benefits associated with the resource under consideration (Black et al. 1998). The basis of the method is the assumption that the recreational experience is enhanced by high quality sites (e.g., clean water, abundant recreational

fisheries), hence the net willingness to pay for, and hence the value of, recreational trips depends on site quality.

Different model specifications can be used to value specific qualities of the resource and attributes of the recreational experience. To value these types of amenities, economists typically rely on a variant of the basic travel cost model referred to as a discrete choice or random utility model. Whereas basic travel cost models are most appropriate in analyzing the number of trips people make to a site, random utility models can be used to assess how people choose between multiple sites based on the qualities of the sites. Travel cost approaches require data on site visitation, place of residence, substitute sites, and user characteristics (such as income) (Black et al. 1998). These data will be obtained from the recreation survey conducted for the Recreation and Aesthetics Study.”

The PSP for Socioeconomics appears to rely largely on results generated through the Recreation and Aesthetics Resources studies. Having not seen the survey instruments and protocol, we don't know how socioeconomic data will be gleaned from those surveys. We would like to participate in reviewing the proposed survey methodology, ideally before our ability to comment on the ILP study plans expires.

Section by Section Comments

10. RECREATION AND AESTHETIC RESOURCES

10.1. Introduction

The Alaska Energy Authority (AEA) proposes a Recreation Resources Study, a Recreational River Flow Study, and an Aesthetic Resources Study in order to document baseline conditions and help assess potential impacts on recreation and aesthetic resources from construction and operation of the proposed Susitna-Watana Project (Project). The proposed Recreation Resources Study has been prepared in consultation with agencies and licensing participants.

The Recreation Resources Study (Section 10.5) will research, describe, and quantify recreation demand and capacity of facilities, and assess reasonably foreseeable recreation needs associated with development of the proposed Susitna–Watana Hydroelectric Project.”

NPS – The study is focusing on recreational uses and demand rather than recreational opportunities and experiences. Need to be qualitative, not just quantitative, because experiences are likely to change post project. We are relying on the recreation surveys to tease out qualitative information (quality of experience, preferences, etc.). Without seeing the survey instruments and protocol, we don't have assurance that they will be able to characterize these.

10.5. Recreation Resources Study

10.5.1. General Description of the Proposed Study

The Recreation Resources Study is designed to identify recreation resources and activities that may be affected by the construction and operation of the proposed Susitna-Watana Project (Project), and to help assess the potential impacts of Project construction and operation on those resources and activities. The specific goals of the study are to:

- Identify and document recreation resources and facilities that support both commercial and non-commercial recreation in the Project area;
- Identify the types and levels of current recreational uses and future reasonably foreseeable future uses based on surveys and interviews, consultation with licensing participants, regional and statewide plans, and other data;
- Evaluate the potential impacts of Project construction and operation on recreation resources, needs, and uses in the Project area; and
- Use the results of analyses to develop an RMP for the Project.
- NPS: Incorporate the results of the 2012 studies

10.5.2. Existing Information and Need for Additional Information

Existing information was compiled in the Recreation Data Gap Analysis (AEA 2011a) and recreation resource descriptions and inventory presented in AEA's Pre-application Document (PAD) (AEA 2011b).

NPS - This claim that existing info was compiled in Rec Data Gap analysis and included in PAD is incorrect. Note that the claim was repeated (cut and paste) in the two other rec/aesthetic studies. The PAD was filed in December 2011 but we did not receive AEA's "2011" gap analysis until March 2012, after much pleading. To our knowledge, the 2011 publication date for this document is inaccurate since it was not made public until 2012. There was no project-specific info in the PAD on rec and aesthetics, just a regurgitation of the scanty, methodologically primitive information developed for a different hydro project thirty years ago, at a time when FERC did not have to give equal consideration to these resource values in deciding whether to license a project.

A recreation study was initiated in 2012 to gather data to inform the 2013-2014 study plan, including the following elements:

- Interviews with key representatives of agencies and organizations, including Alaska Native entities knowledgeable about regional and state recreation management and issues
- A compilation of existing recreation inventory and capacity information
- An inventory of Project area access
- Incidental Observation Survey Data (completed by field crews)
- Coordination with other study disciplines and incorporation of data
- Geo-referenced mapping
- Field reconnaissance

- Identification of future trends and issues
- A description of the management framework

Available information from the 2012 data gathering efforts will be used to develop the Revised Study Plan.

NPS- Agencies and stakeholders will not have the results from the “2012 data gathering efforts” until they are reported out in 11/5/12. We will not be able to incorporate any comments on them by the 10/15 due date for our PSP comments. It is also unclear how much of this information AEA and its consultants will have far enough in advance of their 11/14 RSP deadline to help inform the revised plans.

10.5.3. Study Area

The Project area is shown in Figure 1.2-1. The study area includes the Susitna River watershed, focusing on recreation opportunities and use patterns in and around the immediate Project area.

10.5.4. Study Methods

Both water-based and land-based recreation uses and access will be analyzed. Seasonal uses that relate to ice and snow conditions will also be analyzed. Specialized study of river flow-dependent activities will also be conducted, as described in Section 10.7. The Recreation Resources Study is interdependent with analyses conducted in other disciplines, both biophysical (e.g., aquatics and hydrology) and social (e.g., transportation and socioeconomics), and systematic coordination of data with those study groups will be required.

NPS – with respect to interdependent analyses, and the reliance of the rec and aesthetics studies on results from other disciplines, there is no detail in this PSP explaining how the timing will work. The schedule table at end of each PSP with study seasons and deliverables does not mention this, either. We need details of how the sequence will work. AEA can't just say it will happen when it does not appear that the results of other studies will be available before the delivery date for this one.

Methods for the components of the proposed Recreation Resources Study Plan for 2013-14 are described below.

Regional Recreation Analysis

NPS – This study plan should note, early-on, the distinction with subsistence hunting and fishing v. sport activities. May be confusing to some stakeholders and readers as the process goes on.

The regional recreation resources context will be defined in coordination with agencies, technical workgroups, and other participants, including Alaska Native entities. Regional and local data related to recreation use will be collected and analyzed, including examination of various land management regimes within the area. Existing resource management plans relevant to the recreational resources of the study area will be reviewed and compiled. The analysis will be

conducted in accordance with existing and proposed community and regional plans, and private sector plans. Plans that will be incorporated include:

NPS - "Existing resource management plans . . . will be reviewed and compiled." Isn't this being done in 2012?

- Alaska's Outdoor Legacy Statewide Comprehensive Outdoor Recreation Plan (SCORP) 2009–2014 (Alaska Department of Natural Resources [ADNR] 2009)
- Alaska Recreational Trails Plan (ADNR 2000)
- Chase Comprehensive Plan (MSB 1993)
- Cultural Resource Management Plan for the Denali Highway Lands (VanderHoek 2005)
- Denali State Park Management Plan (Alaska Division of Parks and Outdoor Recreation [DPOR] 2006)
- DPOR Ten Year Strategic Plan 2007–2017 (DPOR 2007)
- East Alaska Resource Management Plan (Bureau of Land Management [BLM] 2006)
- MSB Comprehensive Development Plan (MSB 2005)
- MSB Trails Plan (MSB 2008)
- MSB Comprehensive Economic Development Strategy (TIP Strategies Inc. 2010)
- MSB Parks and Recreation Open Space Plan (MSB 2000)
- South Denali Implementation Plan and Environmental Impact Statement (National Park Service [NPS] 2006)
- Susitna Area Plan (ADNR 1985)
- Susitna Basin Recreation Rivers Management Plan (ADNR 1991)
- Susitna Matanuska Area Plan (ADNR 2011)
- Talkeetna Comprehensive Plan (MSB 1999)

NPS - 2012 info will be used to develop RSP. Will we see this prior to the 10/15 due date for our PSP comments? If not, how will agencies and the public ensure that the 2012 data is applied correctly? Timing problem points to larger problem of trying to finalize study plans for a project before reconnaissance level work is complete. This applies to two other PSPs (Aesthetics and Instream Recreation), too.

Trails leading into and within the Project area will be identified using aerial imagery. These include multiple formal and informal trails and routes, several formally identified Revised Statute (RS) 2477 trails, and Alaska Native Claims Settlement Act (ANCSA) 17(b) trails. The trails will then be mapped, and "ground-truthed." This will identify trails that have historical use, and are legal under State "generally allowed uses," but have not been named or identified by ADNR. Management responsibilities for 17(b) easement trails will also be clarified wherever possible.

Recreation Activity Areas (per SCORP planning) and the Recreation Opportunity Spectrum (USFS 1979) “primitive” class will also be described as they relate to the study area. Scenic Byways, Wild and Scenic Rivers (WSR), and other special resource use designations will be identified and described. There are two river segments within the Project area that have been identified by BLM as eligible for inclusion into the WSR System: Brushkana Creek and the portion of the Susitna River from the headwaters to the confluence of Kosina Creek. BLM has stated that they will conduct a suitability determination for these eligible river segments (Social Sciences Technical Workgroup Meeting, April 3, 2012). The George Parks Highway between MP 132 and 248 is designated as an Alaska State Scenic Byway (ADOT&PF 2008; 2012).
Recreation Use and Demand

Currently, the recreation uses of the Project area are widely dispersed. Visitors to the area participate in a wide variety of activities; including sport hunting, sport fishing, recreational boating, skiing, snowshoeing, and snow-machining. The amount, extent, and potential impact of Project-related dispersed recreation use on the proposed Project area’s land and water resources is currently unquantified.

A baseline of developed and dispersed recreation uses, including types, levels, and access will be determined and described. High use locations will be identified by activity, along with daytime and overnight visits, and seasonal patterns. User preferences and opinions about the quality of recreation resources will also be described. Data will be collected through a literature review and a comprehensive survey and interview program. Salient existing data will also be incorporated.

Future recreation demand will be estimated, based on socioeconomic indicators, foreseeable non-Project recreation developments, and identified issues and trends. Effects of the Project features (e.g., reservoir and access roads) on hunting and trapping opportunities and on non-consumptive uses (bird-watching, hiking, camping, boating, etc.) in the vicinity and downstream of the proposed Project reservoir will be assessed. Additionally, the recreation effects of any Project-induced changes in ice formation the Susitna River will be evaluated. There are also potential effects of induced recreation along the Denali Highway and downstream from the Susitna River bridge on the Denali Highway to the proposed Watana Reservoir. The effects of Project construction and operational activities (e.g. noise, dust, limitations on access, and recreation activities of construction workers) on recreation will also be analyzed. Recreation demand within the study will be estimated within the study area in the reasonably foreseeable future.

NPS – AEA needs to analyze effects of project operations, not just “features.” Nowhere in the PSP is it explicitly acknowledged that the project may have effects on things like fish abundance (affecting sportfishing opportunities), moose, caribou, waterfowl and upland game bird populations due to migration barriers and alteration of habitat due to altered fluvial morphology and riparian vegetation.

Survey results and an inventory of current and projected recreation opportunities, commercial services, and facilities will inform the Socioeconomic Resource Study in regard to the economic contribution of recreation in the study area.

NPS - Socioeconomic study needs to determine value of rec., not just contribution to local economy. This value includes “consumers” outside the local market. AEA needs to expand their inquiry into alternative socioeconomic methods and models beyond “Benefits Transfer”. Also see our comment under “Overall Comments.”

Recreation Carrying Capacity

There are no existing developed recreation facilities on the Susitna River at the Watana Dam site. In the broader Project area, both public and private recreation facilities exist. These are primarily located along the road system.

The existing physical carrying capacity of recreation resources in the Project area will be estimated. Public facilities will be inventoried and described as to condition, capacity, adequacy and operational cost. Private facilities will also be inventoried to the extent practicable. Public access to recreation sites will also be described, including Americans with Disabilities Act (ADA) compliance, if appropriate.

NPS –Physical carrying capacity is just one of the four elements of “carrying capacity” (physical, ecological, social, and spatial). The area’s physical capacity may or may not be the most limiting, especially if the project results in greater access, which could cause use to exceed the area’s social carrying capacity. This is one reason why it’s so important to study the experiential aspect of pre- and post-project recreational use. On rivers in particular, social capacity is almost always more sensitive than other aspects of capacity, with concerns about group size and encounter rates; competition for space at put-ins, take-outs and campsites; and crowding at fishing holes, play boating features, etc.

The need for and capacity of additional reasonably foreseeable recreational facilities will be forecast. Carrying capacity guidelines and standards will be applied in order to develop recommendations for future recreation facilities and sites.

Data Collection

The collection of recreation user data will be accomplished through multiple survey processes. The study design will describe target respondents, geographic locations, target days and months, and questionnaire content; survey methods, in the context of consultation with agencies, workgroups, Alaska Natives, and others. Survey instruments will be designed to collect information typical of and compatible with other FERC efforts. This includes the survey conducted for the 1985 studies (Harza-Ebasco 1985b) and other surveys such as the SCORP (DNR 2009) and the Alaska Visitor Statistic Program (AVSP) (McDowell 2012).

Identification and Analysis of Salient Data from Existing Survey Research

Recreation supply and demand data from other recreation planning sources applicable to the region will be synthesized. Existing data can inform estimates of levels (e.g., “recreation days”) and types of participation in recreation uses. The estimates will include a discussion and comparison of participation rates in activities regionally, statewide, and nationally. Recreation trends, as forecast in other studies, will also be described.

NPS – The existing survey research appears to be biased towards “industrial tourism.” This is not the only population that uses the project area. This analysis needs to capture use by independent tourists, e.g. people driving up the AK Highway and on to Denali Hwy., and local (unguided AK resident) users, many of whom are able to access the area without relying on air taxis or heli boat charters.

The AVSP Survey (McDowell 2012) is a statewide research program commissioned by the Alaska Department of Commerce, Community and Economic Development that included 6,747 visitors to Alaska in the summer of 2011 and 1,361 visitors in the Fall/Winter 2011/2012. The SCORP (ADNR 2009) survey database will also be used quantify recreation uses and demand. In addition, Alaska Travel Industry Association research (GMA 2011) about nonresident travel to Alaska will be reviewed and summarized as it pertains to recreation and aesthetic appeal of Alaska’s visitor market. NPS– Excludes the Spring season

These data will be utilized to describe year-round nonresident (non-Alaskan) experiences by visitors in three major communities in the MSB (Palmer, Wasilla, and Talkeetna), passengers on the Alaska Railroad, and cruise passengers (visiting McKinley Princess Lodge).

The existing data include

- Lodging types
- Activities
- Length of stay
- Purpose of trip
- Previous travel to Alaska
- Modes of transportation used within the State
- Trip spending
- Communities visited (overall and overnight)
- Demographics (origin, age, income, party size)

This nonresident data will be evaluated along with existing data relating to recreation use by Alaska Resident, in the context of the overall study plan.

Incidental Observation Survey

The purpose of the incidental observation survey is to capture information from field researchers about dispersed recreational use. The survey will gather information on the date and time of day the activity was observed, the type of activity observed, number of people recreating, and the location of observed activity. This survey will not have statistical value, but will help identify types of recreational use in the study area. A protocol will accompany the survey to inform field crews how to complete and submit the survey. The survey will be used throughout the study.

Telephone Surveys of Railbelt Residents

The purpose of this survey is to interview a sample of residents about their recreation use in the area and to collect perspectives about recreational opportunities. The survey will be administered to a statistical sample of 600-900 randomly-selected Railbelt residents within a four-hour drive of the study area (Fairbanks, Denali Borough, Mat-Su Borough, and Anchorage). This survey will be central to the estimation of resident recreation demand. The SCORP survey instrument will be reviewed for any benchmark questions to be considered in the survey design. The overall sample size will be refined after considering desired subgroup samples.

NPS – We believe that the Phone survey has very little value. Given the sample size, very few subjects are likely to be familiar with the project area, and the SCORP questions are too general to yield useful information about the specific kinds of recreational opportunities in the area (SCORPs for states as large and geographically diverse as AK are a problem in and of themselves). Instead we suggest the resources be focused on “executive interviews” -- use snowball sampling method to find actual users of this area and others like it. Expecting great cooperation from vendors and outfitters, who are being asked to take the time and effort to hand over private info on “actual users,” may also be difficult. This underscores our need to review the survey instruments and protocols ASAP. Even though the project is unique, such survey templates are fairly standard and should already have been developed and disseminated to agencies and stakeholders.

The survey instrument design will capture

- Past and current recreation use within the study area
- Year-round seasonal, and day/night recreation use in the study area
- Nature of use or recreational interest, including, but not limited to, fishing, boating, camping, picnicking, hiking, off-roading, snowmachining, snowshoeing, skiing, horseback riding, biking, rock/ice climbing, dogsledding, photography, mushroom/berry picking, scenic touring, wildlife viewing, and hunting
- Guided or unguided uses
- Recreation preferences (such as pristine, primitive, semi-primitive, or developed)
- Expected future recreation use within the study area, including how use may change with Project development and operational alternatives
- Means of access to the study area
- Quality of the recreational opportunity
- Importance of and satisfaction with current recreation facilities (such as boat launches and trails)
- Attractiveness of the study area for recreational activities
- Accessibility and conditions/availability
- Visual quality of the scenery in the study area
- Distance that users are willing to travel for weekend recreational opportunities

- Demographics of household and respondents.

Questions that elicit information central to related disciplines, such as the Regional Economic Evaluation Study, may also be included.

Intercept Surveys and Structured Observation Visitor Counts

The purpose of these surveys would be to capture specific recreation use data from users accessing the area by boat, rail, air, snowmachine, or other modes. The survey would be conducted in person based on a sampling plan that captures peak seasonal uses.

Access points may include, but are not limited to, boat launches (e.g., Susitna Landing, Willow Creek, Talkeetna, Deshka Landing), railroad whistle stops, trail heads (e.g., East-West snowmachine trail head on the Parks Highway, along the Denali Highway), air strips, and campgrounds (e.g., Brushkana Creek).

NPS - Where is the detail on this and other methods? Again, we need to be developing instruments now, or at least deciding when they will be developed (prior to our last chance to comment in mid-Oct.).

The survey instrument design would capture, but would not be limited to

- Number in party and demographics
- Community of residence
- Participation in type and location of recreation activity
- Rating of quality of recreation experience
- Level of satisfaction with facilities/recreation activities, including aesthetics
- Guided or unguided use
- Past use and intention for future use
- Trip expenses
- Means of access to the recreation area
- Accessibility, conditions, and availability
- Other opportunities within same distance that offers similar experiences
- Preferences
- Interest in potential new recreation facilities and opportunities.

On sample days, the survey crews will observe key characteristics of recreation use (e.g., the number of people present, the number of vehicles entering/exiting the access site, types of recreation activities evident) and record this information on pre-printed forms. Users to be surveyed in person will be selected by availability and willingness to participate.

Executive Interviews

The purpose of the executive interviews is to gather specific information about commercial (e.g., guides, tours, etc.) and private recreation use the study area. It is anticipated that between 50 and 70 private sector recreation businesses, associations, and other entities will be interviewed. These interviews will be conducted by telephone. The executive interview process will be necessary to develop trust with businesses and organizations with recreation-related interests in the study area, in order to collect proprietary economic data for use in the Regional Economic Evaluation Study. The process of developing a list of potential respondents includes the identification of organizations, associations, government agencies, and businesses with recreation-related interests in study area. This list will be developed through existing and referred contacts, internet searches, and interviews. Contacts may include, but will not be limited to

- Mat-Su Borough Convention and Visitors Bureau
- Federal Agencies, such as BLM, NPS, etc.
- State Agencies, such as DNR, Alaska Department of Fish and Game (ADF&G), etc.
- Alaska Railroad
- Regional governments
- ANCSA corporations and tribal organizations
- Community councils
- Alaska Outdoor Council and other recreation organizations
- Alaska Outdoors Bulletin Board
- Citizen groups
- Environmental organizations

Business representatives to be interviewed may include those associated with

- Remote lodges/cabin rentals/accommodations/campgrounds
- Restaurants
- Airstrips and flying services/flightseeing
- Guide services
- Whitewater rafting/boat trips
- Tour operators (all modes)
- Recreational mining operations
- Transportation services, including buses and Alaska Railroad

The interview protocol (guide) may include, but is not limited to the following topics:

- Nature of business/service (e.g., guide, tour operator, accommodations, etc.)
- Employment

- Season of operation (e.g., year-round, summer, winter, hunting, etc.)
- Means of access to destination (e.g., fly-in, boat, road, etc.)
- Specific areas of operation within the study area
- Years of operation
- Estimated number of clients per year
- Client/membership information, including origin, party size, general perceptions of age, or other demographic features
- Fees charged
- Ways that use might change under the various operational alternatives identified and potential impacts on area image, fishing, hunting, and other recreation activities
- Past and current plans, programs, business operations, membership, activity, etc.
- Geographic areas of highest recreational interest (and reasons why)
- Recreation infrastructure used or needed
- Identification of any trends (anecdotal and data sources) in recreational use levels or patterns
- Information about other projects proposed in the study area that could directly or indirectly affect recreation, tourism, or access to the previously inaccessible areas
- Suggestions for prioritizing the highest potential recreation demand in the area
- Other data needed for socioeconomic baseline or other social science research

GIS Maps and Figures

Recreational sites, facilities, and access routes (RS 2477 rights-of-way, 17(b) easements, and other recreation use trails) will be identified and digitized in a GIS using existing agency and licensing participant datasets and aerial photography. These recreation features will be “groundtruthed” (via ground- and air-based observations) and geo-referenced where possible.

Focus group interviews, discussions with licensing participants, coordination with other resource study disciplines, and user intercept surveys will augment recreation facilities and trails mapping. Significant recreation facilities and access points will be photographed for inclusion in the Recreation Resources Report.

10.5.5. Consistency with Generally Accepted Scientific Practice

The methods and work efforts outlined in this Study Plan are the same or consistent with analyses used by applicants and licensees and relied upon by the Commission in other hydroelectric licensing proceedings. The proposed methodology for analysis for demand and capacity estimates and survey sampling are commonly employed in the development of hydroelectric project license applications.

10.5.6. Schedule

Upon approval for implementation, it is estimated that the term of the study would be approximately two years.

Table 10.5-1. Recreation Resources Study Schedule. Description Start Date Completion Date

Data Collection (including seasonal field visits and surveys)	January 2013	November 2014
Inventory	January 2013	October 2014
Analysis	November 2013	November 2014
Initial Study Report		December 2013
Updated Study Report		December 2014

NPS - Only one December (2013) will be sampled. There is no "wobble room" should weather or other conditions render the limited sample seasons inadequate to represent actual project area conditions. There is no mention of when results of other studies – ice, morphology, fish and game populations, etc. – will be in hand, and how these results will be incorporated in the rec study report. See our comment under Overall Comments regarding interdependent studies.

10.5.7. Level of Effort and Cost

The estimate of the two-year recreation study is \$570,000.

10.5.8. Literature Cited

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USDA Forest Service (USFS). 1979. The Recreation Opportunity Spectrum: A Framework for Planning, Management, and Research. US Department of Agriculture, Forest Service.

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10.6. Aesthetics Resources Study

10.6.1. General Description of the Proposed Study

The goals and objectives for the Aesthetic Resources Study are to inventory and document baseline aesthetic (e.g., visual, auditory) conditions in the Project area and evaluate the potential effects on aesthetic resources, beneficial or adverse, that may result from construction and operation of the proposed Project.

10.6.2. Existing Information and Need for Additional Information

Existing information was compiled in the Recreation Data Gap Analysis (AEA 2011a) and recreation resource descriptions and inventory presented in AEA's Pre-application Document (PAD) (AEA 2011b). A recreation study was initiated in 2012 to gather data to inform the 2013-2014 study plan, including the following elements:

NPS - There was no aesthetics inventory, as would be understood by that term in 2011-12 as opposed to 1984, in the PAD – nor a gap analysis.

- Interviews with key representatives of agencies and organizations, including Alaska Native entities, knowledgeable about regional and state recreation management and issues
- A compilation of existing recreation inventory and capacity information
- An inventory of Project area access
- Incidental Observation Survey Data (completed by field crews)
- Coordination with other study disciplines and incorporation of data
- Geo-referenced mapping
- Field reconnaissance
- Identification of future trends and issues
- A description of the management framework
- Interviews with key representatives of agencies and organizations
- Assessment of management frameworks for pertinent agencies
- Identification of broad Project area viewsheds and preliminary KOPs using those identified in the 1985 license application
- Photography
- Field reconnaissance
- Description of Project area soundscape

Through the prior processes, the FERC scoping process and incorporation of work group and other licensing participant recommendations, study methods for 2013-2014 were developed. Issues, trends, original data collection strategies, and items for detailed analysis are incorporated into the 2013-2014 Study Plan.

NPS - "Through the prior processes, the FERC scoping process . . . study methods for 2013-14 **were developed** [emphasis added]" This is incorrect, they are **still being developed!** We find this very strange language to include in a *proposed* study plan. NPS has in fact had little time and opportunity to see products and engage consultants so far, so it is extremely premature to claim this as *fait accompli*.

10.6.3. Study Area

The overall Project area is shown in Figure 1.2-1. The specific study area for Aesthetic Resources will be developed as part of the analysis and in coordination with information from other disciplines, such as hydrology. It will be based on a viewshed model of proposed Project features, including the dam structure, transmission and road corridors, and the resulting Watana reservoir. The study area will also include portions of the Susitna River located downstream of the Watana Dam site down to Talkeetna.

NPS – As NPS and other agencies have noted, deciding to limit the downstream scope of this and other studies to Talkeetna is **totally unfounded**. Until we get the results of the instream flow, ice, fluvial geomorphology, fish, and other studies, no one can say how far downstream the project's measurable effects on visual and auditory resources will go. For example, as previously noted by numerous commenters numerous times, the project's proposed, artificially high and variable winter load following flows are highly likely to alter the formation of stable ice on the Susitna far downstream of the project. Spring flushing flows and sediment transport may be largely eliminated, and summer flows will be very low, in all probability leading to major changes in the formation and maintenance of islands, sloughs, side channels, beaches, and riparian vegetation. Again, no one yet knows how far downstream of the Talkeetna and Chulitna confluence these major changes will be evident. All of these altered features will be visible. NPS vehemently disagrees about this premature decision, which contradicts statements elsewhere in this and other PSPs acknowledging the need to rely on the results of other studies. We will not have these results prior to 10/15, when NPS comments must be finalized, or 12/14, when FERC's determination on SPs will be made.

10.6.4. Study Methods

The visual resource impact analysis will follow methods developed by the BLM (BLM 1986). Specific methodology will be augmented with relevant portions of the USFS Visual Management System (VMS) / Scenery Management System (SMS) (USFS 1995) methods, as consideration of this approach will be an important aspect of bridging data collected during the 1985 PAD

(Harza-Ebasco 1985) and that collected during the current study effort. It is also expected that the Visual Sensitivity Analysis will be expanded beyond what is used by the BLM at the planning level to incorporate surveys, focus groups, and information collected through the scoping process. Data collection and analysis will be completed across all four seasons. The Aesthetic Resources Study is interdependent with analyses conducted in other disciplines, both biophysical (e.g., hydrology) and social (e.g., transportation), and coordination of data with other study groups will be significant.

NPS – Again, this acknowledges interdependency of this study on results of other studies, but provides no detail on timing of those deliverables and proposed schedule for finalizing details of this. See also our comments under “Overall Comments.”

Define Study Area

The preliminary study area identified as part of the 2012 work will be refined based on updated Project design and siting. The viewshed will be generated for all Project features, including roads and transmission lines, and refined in coordination with federal, state, and local agencies. The study area will be sufficient in size to address all established indicators of change, including potential indirect effects to recreation, cultural resources, subsistence, and socioeconomics. It is expected that this area will include the Susitna River drainage and upland areas where views of the basin are expected to change based on construction and/or operation of the proposed Project. Viewshed models will be developed for pre-and post-Project conditions to depict expected changes in viewshed areas (i.e., creation of new views, loss of others). The study area will also include common air transportation routes used for transportation and recreational air tours. Maps displaying the viewsheds and geographic boundary of the analysis area will be created. Important views and vistas identified through other resource reviews will be identified and placed on the viewshed map.

Establish Key Observation Points

A final list of KOPs will be developed using information from the 1985 license application (Harza-Ebasco 1985), field observations in 2012, ongoing interdisciplinary/interagency coordination, and Project scoping. It is expected that KOPs will differ by landscape analysis factors, such as their distance from the Project, predominant angle of observation, dominant use (i.e., recreation or travel), and average travel speed at which the Project could be viewed. KOPs may represent views experienced across all seasons or may be specific to a particular season.

NPS - KOPs – Do NPS, other resource agencies and stakeholders get a say on these? When? This is supposed to be The Plan, not a plan to plan.

Baseline Data Collection

Field data collection will include a combination of site visits by helicopter and travel of upstream segments of the Susitna River by boat. Additional information describing access, existing lighting, and movement will be recorded. Baseline photography will be collected at a resolution sufficient for use in computer-generated visual simulations.

Data on existing aesthetic resource values will be collected using the BLM's Visual Resource Inventory (VRI) methodology (BLM 1986). Data collection efforts will include an inventory of scenic quality, visual sensitivity, and distance zones within the Study Area. All areas will be evaluated within the context of viewer experiences. For example, views from roadways or from the perspective of a boater traveling downriver will be established as "linear" or "roving" KOPs. Data collection methods are described below.

Scenic Quality

Scenic quality of the Project area will be determined through the VRI process (BLM 1986). This process entails dividing the landscape into Scenic Quality Rating Units (SQRUs) based on conspicuous changes in physiography or land use and ranking scenic quality within each SQRU based on the assessment of seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modification. Each key factor is scored, and the value of each is added to derive an overall score for the unit. Based on these results, each SQRU is assigned a scenic quality rating of A, B, or C, with A representing the highest scenic quality and C representing the lowest scenic quality.

Visual Sensitivity

Viewer sensitivity will be classified using the BLM Visual Sensitivity Level Analysis (SLA) (BLM 1986). The SLA will be completed in two steps: (1) delineation of Sensitivity Level Rating Units (SLRUs), and (2) rating visual sensitivity within each SLRU. By definition, SLRUs represent a geographic area where public sensitivity to change of the visual resources is shared amongst constituents. The unit boundaries may be defined by a single factor driving the sensitivity consideration, or factors driving sensitivity may extend across numerous SLRUs. Units are thus derived, in part, by the consideration of factors analyzed in the SLA. Visual sensitivity within each SLRU is estimated as high, medium, or low, based on the types of users, amount of use, public interest, adjacent land use, and land use designations. Information required for this analysis will be obtained through land use plan review, data collected by other resource disciplines, and surveys and/or focus groups. The data collected through surveys and focus groups will be coordinated with the set conducted for the Recreation Resources Study. Respondents will be asked about their place-based visual preferences.

Visual Distance Zones

Distance zones represent the distance from which the landscape is most commonly viewed. These zones will be established by buffering common travel routes and viewer locations at distances of 3 miles, 5 miles, and 15 miles using GIS (BLM 1986).

NPS - There is no mention of assessing the aesthetics of varying flows. This is a high volume glacial river flowing at up to 25 mph – the sight and sound of its flows, color of its water, mixing at clear water tributaries are major components of river-related recreation. Need to do this at KOPs along the river, in all seasons, using videography (sound). Need to add to Sound analysis, too.

Photo Simulations

To support the visual resource impact analysis and to disclose expected visibility of Project components from various vantage points, photo simulations will be prepared. Simulations will be produced by rendering Project components (turbines, substations, access roads, etc.) with 3-dimensional (3D) computer models and superimposing these images onto photographs taken from KOPs. Model parameters will account for environmental factors, such as seasons, viewing angle, and light conditions, resulting in an accurate virtual representation of the appearance of the proposed Project. Simulations will be produced to illustrate (1) the structure, (2) downriver landscape characteristics, (3) reservoir landscape characteristics, (4) access roads and transmission lines, (5) views of reservoir from upland areas, and (6) views of potential construction-related impacts. Additional simulations and/or videography will be produced as needed in key areas. Simulations will be completed by seasons and under daylight and nighttime conditions.

Visual Resources Analysis

BLM contrast rating procedures will be used (BLM 1986). The visual resource impact analysis focuses on established indicators of change. Indicators will include, but will not be limited to, the following:

- Impacts to visual resources, measured by the degree of visual contrast created by the Project
 - Change in existing VRI values of scenic quality, visual sensitivity, and distance zones
 - Introduction of new sources of light and glare
 - Change in the viewshed area, including both the elimination and creation of views and vistas
 - Change in the mechanism of view (e.g., transition from mobile view traveling downriver to a static view when situated on the reservoir)
 - Change in visibility that may result from Project-related dust
- Methodology used to address each indicator is described below.

Contrast Rating Analysis

The BLM Contrast Rating procedure will be used to determine visual contrast that may result from the construction and operation of the Project based on photo simulations depicting Project features. This method assumes that the extent to which the Project results in adverse effects to visual resources is a function of the visual contrast between the Project and the existing landscape character. Impact determinations will be based on the identified level of contrast and are not a measure of the overall attractiveness of the Project (BLM 1986).

At each KOP, Project features will be evaluated using photo simulations and described using the same basic elements of form, line, color, and texture used during the baseline evaluation. The level of perceived contrast between the proposed Project and the existing landscape will be classified using the following definitions:

- None: The element contrast is not visible or perceived.
- Weak: The element contrast can be seen but does not attract attention.
- Moderate: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- Strong: The element contrast demands attention, would not be overlooked, and is dominant in the landscape.

The level of contrast will be assessed for all Project components used during construction, operations and maintenance, and decommissioning of the proposed Project.

Visual Resource Inventory Analysis

The VRI analysis will be used to identify expected change to VRI classes based on changes to the visual resource values of scenic quality, visual sensitivity, and/or distance zones that may result from operation of the proposed Project. This analysis will be completed within the framework study area, with the goal of understanding how visual resource values and resulting VRI class may shift based on operation of the proposed Project (including the dam, access roads, and transmission lines). Impacts to VRI components will be evaluated by ranking each key factor used to classify scenic quality, visual sensitivity, and distance zones under operational conditions, and comparing those values to that determined through the established pre-Project VRI.

Light and Glare

The impact analysis for light and glare will focus on potential impacts that may result from nighttime artificial lighting and/or daytime glare. The analysis of artificial lighting will identify potential impacts to human activity at nearby off-site locations that may result from the proposed Project. Photo simulations will be produced to demonstrate views of the proposed Project at night from selected KOPs.

Change in Viewshed Area and Mechanism of View

Viewshed analysis performed for both pre- and post-Project conditions will be compared to identify the changes in viewshed and mechanism of view. These data will quantify the extent of changes in views, and the degree to which access to views changes with the development of roads and the elevation of the viewer within the inundated portions of the reservoir.

Change in Visibility

Data generated by the Air Quality Resource discipline will be used to determine the potential for changes in visibility that may result from construction and/or operation of the proposed Project and related recreation resource values. Results from the air quality dust analysis will be incorporated in this study.

Sound Analysis

A systematic sound study will be conducted to characterize the existing ambient sound environment in the vicinity of the proposed Project and estimate the potential impact associated with construction and operational activities.

The steps in the sound analysis are described below.

Review Documentation and Develop Data Needs

Relevant Project data will be reviewed, including the most current Project description, operating and construction equipment rosters, construction schedules. Ambient sound data recorded in the area or in a similar area will be obtained. Based upon this review, itemized data requirements will be developed that would be needed to perform predictive sound emission modeling. Based on this review a set of outdoor ambient sound level surveys in the vicinity of the Project area will be obtained. The data requirements will include anticipated categories of stationary and mobile construction equipment and their frequency of operation, locations of nearest representative noise-sensitive receivers (NSR), recreation sites (RS), and sound data or specifications associated with intended operating dam systems and processes. Laws, ordinances, regulations, and standards that may influence the sound impact assessment for this study will also be inventoried.

Seasonal Surveys of Ambient Sound Levels

Ambient sound level measurements will be collected in the Project vicinity. These will include unattended long-term ([LT]”, a minimum of 24 continuous hours, up to a single week) sound level monitoring at up to a total of four representative NSR or RS locations and up to a total of 16 attended short-term ([ST], e.g., 15-20 minutes duration each) daytime and nighttime sound measurements to help characterize the affected environment. Observations of perceived and identifiable sources of sound contributing to the ambient sound environment and the conditions during which they occur will be documented as part of the field survey. This survey will be conducted up to four times, associated with up to four distinct seasons (e.g., summer, fall, winter, spring) but for a minimum of two seasons consistent with NPS Natural Sounds Program (NSP) published guidelines (NPS 2012). To the extent practicable, the survey locations will be the same for each surveyed season.

NPS - When do we decide where the four LT and 16 ST locations will be? What if we think there should be more? Again, need to agree about this prior to 10/15/12. NPS would like to have enough advance detail to involve our Soundscapes staff in reviewing this methodology.

Modeling of Project Sound Levels.

Up to three scenarios or alternatives of future Project operational sound levels will be estimated with System for the Prediction of Acoustic Detectability (SPreAD). Computer Aided Noise Abatement (CADNA/A), an industry-accepted outdoor sound propagation modeling program, could also be used (Sound Advice Acoustics Ltd, 2012). Predicted sound level isopleths or

“sound contours” will be superimposed on suitable aerial photographs or maps of the Project vicinity and will include specific sound level prediction at selected measurement and/or assessment locations from the ambient sound field surveys of Task 2. Predicted sound emissions associated with both Project construction and operation using different transportation route options will also be assessed.

GIS Maps and Figures

Viewsheds, KOPs, and soundscapes will be mapped as GIS layers according to Project standards. Mapping will also identify relevant management standards within the study area. Significant visual features will be photographed for inclusion in the Aesthetic Resources Report. Visual simulations depicting the appearance of the proposed Project will be produced for a subset of KOPs, and used to inform the impact analysis.

10.6.5. Consistency with Generally Accepted Scientific Practice

The methods and work efforts outlined in this Study Plan are the same or consistent with analyses used by applicants and licensees and relied upon by the Commission in other hydroelectric licensing proceedings. The Aesthetics studies are based on the BLM’s visual resources methodology. The sound analysis is consistent with National Park Service Guidelines.

10.6.6. Schedule

Upon implementation, it is estimated that the term of the studies will be approximately two years.

Table 10.6-1. Aesthetic Resources Study Schedule. Description Start Date Completion Date Duration (months)

Description	Start Date	Completion Date	Duration (months)
Data Collection(including seasonal field visits and sound monitoring)	January 2013	November 2013	11
Inventory	January 2013	October 2013	10
Initial Study Report	October 2013	December 2013	3
Analysis	November 2013	March 2014	5
Updated Study Report	April 2014	December 2014	8

NPS - very short, and no work in any December. Initial study report is scheduled for 12/13 – will this allow integration of results of other biophysical studies?

10.6.7. Level of Effort and Cost

The estimate of \$500,000 includes the following components over two full years of study.

10.6.8. Literature Cited

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10.7. Recreational Boating / River Access Study

NPS– Consider changing the title of this study to “Flow Dependent Recreation,” reflecting the broader affected activities beyond boating and fishing. The Study’s title and some initial statements about scope are contradictory. Study goal is not merely to contribute data concerning recreational boating and access – it is to look at all forms of flow-dependent rec. That would include activities like fishing that are affected by flows (e.g. if salmon disappear because no more spawning habitat, or if you can’t ski, mush, or snow machine the river anymore due to unstable ice) regardless of whether you’re doing it in a boat or from shore.

NPS - Aesthetics can be flow dependent (stillwater in res. v. free-flowing stream, lost sight and sound of whitewater at high flows in DC, morphological and vegetation changes downstream due to changed flow regime). There is no mention of this in this or the Aesthetics PSP.

NPS – There is also no mention of whether impacts on rec access and experiences due to changed ice and snow cover resulting from changed flow regime will be assessed under this PSP. It should be included.

10.7.1. General Description of the Proposed Study

This study incorporates and contributes to data and analysis conducted as part of the Recreation Resources Study (Section 10.5). In the overall recreation study, recreational boating uses and river access points will be identified. Current and future use of the river by both motorized and non-motorized boat users will also be estimated therein. Because the Project will affect river flow regimes, including the inundation of about 39 miles of the river, and because changes in river flow regimes may directly impact boating and other flow-dependent recreation activities, a specific methodology of recreational flow analysis is also proposed.

Study Goals and Objectives

- The goal of the Recreational Boating / River Access Study is to contribute data to the Recreation Resource Study concerning recreational boating and access. The goal and objective of the study is to contribute to the Recreation Resource Study concerning the relationship between river flows and recreation opportunities and uses, by:
 - developing flow preference curves for each major river reach by type of use and equipment; NPS: Doubt you can develop a preference curve for winter activities that require stable river ice. It will either be present or absent. What method will be used to assess this effect?
 - describing the potential effects of altered river flows on existing and potential boating activity and other recreational uses of the Susitna River; and
 - describing any new boating or other flow-dependent recreational opportunities that may be created by Project construction and operation.

10.7.2. Existing Information and Need for Additional Information

Existing information was compiled in the Recreation Data Gap Analysis (AEA 2011a) and recreation resource descriptions and inventory presented in AEA's Pre-application Document (PAD) (AEA 2011b). A recreation study was initiated in 2012 to gather data to inform the 2013-2014 study plan, including the following elements:

- Interviews with key representatives of agencies and organizations, including Alaska Native entities, knowledgeable about regional and state recreation management and issues
- A compilation of existing recreation inventory and capacity information
- An inventory of Project area access
- Incidental Observation Survey Data (completed by field crews)
- Coordination with other study disciplines and incorporation of data
- Geo-referenced mapping
- Field reconnaissance
- Identification of future trends and issues
- A description of the management framework
- compilation of existing baseline boating recreation information and access;
- hydrology data review;
- field reconnaissance and photography;
- identification of future trends and issues; and
- description of the management framework and special river designations.
- compilation of existing baseline boating recreation information and access;
- hydrology data review;
- field reconnaissance and photography;
- identification of future trends and issues; and
- description of the management framework and special river designations.

Available information from the 2012 data gathering efforts will be used to develop the Revised Study Plan.

Through the consultation events including the FERC scoping process and work group meetings, other licensing participant recommendations including input on study methods were used for development of the 2013-2014 study plans.

10.7.3. Study Area

The reaches of the Susitna River, shown in Figure 10.7-1, will be subdivided into smaller units as a result of physical studies in other disciplines and field observations conducted in the Recreational River Flow Study. Areas of concentration will include areas where the proposed reservoir would create the most flow changes.

NPS – We do not understand the statement: “areas where the proposed reservoir would create the most flow changes.” What is the threshold for “most”? Who decides? When? Even assuming consensus on the standard to be used, how can this decision be made before the results of the instream flow, flow routing, ice processes, etc. studies are in hand? What if we and others disagree with AEA’s geographic scope decision? This needs to be nailed down by 10/15/12.

The Recreation River Flow Study will focus on those reaches of the Susitna River directly affected by the Project. These include the section of river that would be inundated by the proposed reservoir, Devils Canyon, and the reach downstream of Devils Canyon to the confluence with the Talkeetna River.

NPS - Again, it is totally unfounded for AEA to arbitrarily stop at Talkeetna River. This contradicts prior commitments to rely on the results of other studies to inform impacts on recreation. Those studies will not be completed for several years.

10.7.4. Study Methods

The Recreation River Flow Study is interdependent with analyses conducted in other disciplines, especially physical (e.g., hydrology) and social (e.g., transportation), and input of data from those study groups will be significant.

This Study is designed to identify the minimum and optimum instream flow needed for motorized, non-motorized, and whitewater boating, as well as other flow-dependent recreational activities, on the Susitna River.

Using accepted practices for recreational flow study design, as described in Whittaker et al. (1993, 2005), a progressive sequence of levels of study will be undertaken. These include: Level 1, desktop analysis; Level 2, limited reconnaissance; and Level 3, intensive field studies. This process maximizes study efficiency by characterizing recreation activities for respective river segments in the desktop phase, confirming assessments in the reconnaissance phase, and then focusing intensive field studies to those activities and river segments warranting detailed study and analysis. This process also contributes to early identification of potential Project effects and user conflicts, and information needed to evaluate potential Project effects on river-based recreation.

Level 1: Desktop analyses integrate existing information about channel characteristics, hydrology, river recreational opportunities, access points, and flows in order to determine what recreational boating resources are present that could be affected by the potential Project.

Level 2: Reconnaissance efforts gather first-hand information on the river resource, types of recreation opportunities, and associated attributes as well as the recreational user groups accessing the river. The reconnaissance also provides valuable information on access sites, logistics, travel to and from the site, local resources and people, and, lastly, potential safety concerns. Motorized and non-motorized watercraft may be used during the reconnaissance to better understand recreation opportunities on the river.

Level 3: Intensive field studies will document the existing flow-dependent recreation opportunities (motorized and non-motorized watercraft) and the associated attributes for the respective opportunities, and will quantify the flow preferences (minimum acceptable and optimum) for each opportunity. This is done through a combination of field observations, interviews with licensing participant groups, focus group sessions, and an instream flow recreation survey targeting recreation opportunities for a given river segment. The survey work will be conducted in coordination with surveys associated with the overall Recreation Study.

NPS – Again, this underscores why we need to see the proposed survey instruments, protocol, etc. to determine if the Rec Survey adequately addresses these issues.

Elements of recreational boating flow research include:

- *Data collection* - Water recreation attributes for discrete sections on the Susitna River will be described, including types of river recreation, reach length, gradient, character, whitewater difficulty classification, and recommended range of flows for respective recreation activities. Activities will be identified by type of motorized and non-motorized water craft, including whitewater kayaks and packrafts; commercial and non-commercial uses; and trip purposes, trip length, frequency of use, and seasonal considerations.
- *Reconnaissance* – River recreation opportunities and associated instream flow attributes will be observed and described. Existing and potential sites for recreational boating access along the river corridor and the area inundated by the proposed reservoir will also be described.
- *Consultations* - Boaters, land and resource managers, guides, user groups and others will

be interviewed to determine the types and locations of boating activity occurring on the Susitna River. Interviews will be conducted with boaters and other experts with experience on the Susitna River to determine a range of conditions generally acceptable to various types of watercraft and skill levels.

Consultation methods include the following:

- Interviews will be conducted with river recreation users with previous experience on the Susitna, including motorized, non-motorized, and whitewater boaters.
- Focus group sessions will contribute additional information about flow preferences, recreation use patterns for respective reaches and groups, whitewater difficulty, safety, campsites, significant rapids, and recreational access. The focus group sessions will be coordinated with national, regional, or local water recreation clubs.

Outcomes of the process include the following:

- Motorized and non-motorized boating opportunities and associated attributes for the range of flows will be examined. This includes, where applicable, the level of whitewater difficulty, portage requirements, length of trip, and characterization of experiences. Includes tourism boating up to Devils Canyon.
- Flow preference curves for each reach will be developed for respective river recreation opportunities.
- The frequency for the range of preferred flows for respective opportunities will be quantified for existing conditions and likely proposed Project operations.
- Put-in and take-out sites and related needs (e.g., scouting and remote camping) that may be associated with respective recreation opportunities in a particular river segment will be identified.

10.7.5. Consistency with Generally Accepted Scientific Practice

The methods and work efforts outlined in this Study Plan are the same or consistent with analyses used by applicants and licensees and relied upon by the Commission in other hydroelectric licensing proceedings. The proposed methodology is often used in analysis for development of hydroelectric license applications to fulfill the FERC's Exhibit E requirements for documentation and development of mitigation measures for flow dependent recreation.

10.7.6. Schedule

Upon implementation, it is estimated that the term of the studies will be approximately two years.

Table 10.7-1. Recreational Boating / River Access Study Schedule. Description Start Date Completion Date Duration (months)

Data Collection (including seasonal field visits and consultations)	January 2013	November 2013	11
Inventory	January 2013	October 2013	10
Initial Study Report		December 2013	
Analysis	November 2013	March 2014	5
Updated Study Report	April 2013	December 2014	8

NPS - No information about when/how the Level 1-3 analyses fit in with this schedule. Much of this study plan appears to have been cut and paste from the NPS/OSU guide, without an explanation of how the methods will be applied to this particular project. We need specifics and an agreement on who makes mid-point decisions to proceed, e.g., from Level 1 to 2, or 2 to 3, based on what criteria.

NPS - There is only one winter and one summer of study, and no Novembers or Decembers. This does not indicate a sincere concern for impacts on winter recreation. Arguably, AK's winter rec season is longer than its summer season. It is certainly important to users, as well as purveyors of equipment (e.g. snow machines) and the local economy. One year of study is also not an adequate sample size to support conclusions about important flow-dependent activities like sportfishing and float hunting. Note the emergency Chinook closure this year – how can you study the most sought-after fish species in SC AK if harvest is prohibited during the only year of study? Likewise, the upland game hunting season is dependent on variable weather etc. – one season is just not enough to document baseline opportunities and experiences when they are dependent on highly variable interannual conditions.

10.7.7. Level of Effort and Cost

The estimated cost of the two-year study is \$100,000.

10.7.8. Literature Cited

AEA (Alaska Energy Authority). 2011a. Susitna-Watana Hydroelectric Project, Socioeconomic, Recreation, Air Quality and Transportation Data Gap Analysis. Prepared by HDR, Inc.,

Anchorage.

- —. 2011b. Pre-application Document: Susitna-Watana Hydroelectric Project FERC Project No. 14241. December 2011. Prepared for the Federal Energy Regulatory Commission, Washington, DC.

Harza-Ebasco Susitna Joint Venture (Harza-Ebasco). 1985. Susitna Hydroelectric Project Recreation Survey Report. Prepared for the Alaska Power Authority. Anchorage, Alaska.

Reed, S.E., J.L. Boggs and J.P. Mann. 2010. SPreAD-GIS: an ArcGIS toolbox for modeling the propagation of engine noise in a wildland setting. Version 2.0. The Wilderness Society, San Francisco, CA. U.S. Department of the Interior, National Park Service, Alaska Regional Office. March 7, 2012.

Whittaker, D., B. Shelby, W. Jackson. 1993. Instream flows for recreation: a handbook on concepts and research methods. U.S. Department of Interior, National Park Service Rivers and Trails Conservation Program, Oregon State University, and National Park Service. Water Resources Division.

Whittaker, D., B. Shelby, and J. Gangemi. 2005. Flows and recreation: a guide to studies for river professionals. Report for Hydropower Reform Coalition and National Park Service – Hydropower Recreation Assistance.



Chickaloon Village

Traditional Council
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September 14, 2012

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Re: Susitna-Watana Hydroelectric Project Health Impact Assessment Study
Comments on section 13.8.1 General Description of the Proposed Study

Dear Paul,

Please find attached my preliminary comments on the proposed Susitna-Watana Hydroelectric Project Health Impact Assessment Study Plan.

On a first glance, one of the things that I can't stress enough is the importance of engaging community as early in the process as possible and in keeping the CHIA process as transparent as possible all the way through the process. This includes engaging the community to help contribute to and guide the potential impact analysis, what to do with data gaps, and in developing and proposing sound mitigation strategies.

Another area that definitely needs to be strengthened is the Tribal engagement process to allow for the provision and recognition of traditional knowledge as complementary to existing baseline health and other scientific information. Tribal people hold the history and knowledge of this area and there must be some mechanism made available in the study plan for acknowledging how this information will contribute to the legitimacy of the HIA study plan and data collection. Ultimately, this will strengthen this CHIA.

Specific comments pertaining to individual sections of the Study Plan are as follows:

13.8.1.1. Study Goals and Objectives

I recommend revising “The goals and objectives of the HIA include the following” section to add an engagement piece. We would add a bullet point to read:

- **Engage the community in a transparent process of identifying community health concerns for evaluation.**

In recognition of the federally recognized Tribal governments in the potentially affected areas, We would revise the second bullet point to read:

- Collect baseline health data at the state, borough or census area, **tribal**, and potentially affected community, as possible.

I question bullet point number three. Once data gaps are identified, how will this trigger additional studies to take place? Or, will there be some weighting of data gaps to determine which are priorities for further review? Can this be addressed somehow in this section?

We would revise bullet point number four to read:

Evaluate the baseline data against the Project description to determine **the magnitude of potential impacts both positive and negative.**

Additionally, we strongly believe a projective component for potential impacts and applied mitigation strategies should be attempted in this CHIA.

13.8.2. Existing Information and Need for Additional Information

This is the section where we feel very strongly that traditional knowledge should be gathered through qualitative discussions within Tribal communities to contribute to the completion of the HIA. This information should be given the same weighting as other scientific information gathered.

Data gaps should not just be noted, but should attempt to be adequately addressed in further studies to be determined by the community.

13.8.3. Study Area

Tribal communities should have the opportunity to weigh in on impact areas and in defining the study area. Additionally, tribal communities should have the opportunity to define key subsistence resources rather than simply relying upon the State of Alaska Department of Fish and Game or U.S. Fish and Wildlife Service as the only viable

source of information for the CHIA.

13.8.4.1. The community should have the opportunity to help identify the “Issues Summary.” Additionally, a comprehensive discussion pertaining to Social Determinants of Health (SDH) should take place to identify disparities affecting various community groups and the potential to project future impacts both positive and negative. This will ensure that the CHIA is transparent and comprehensive in addressing as many social impacts as possible and in providing adequate mitigation strategies for possible impacts once evaluated.

In many local indigenous cultures information is passed down orally. Traditional knowledge regarding past and present concerns related to similar development projects should be acknowledged as valid in addressing “Causal links between the proposed project and the anticipated health impacts.” In essence, there must be a consideration in the CHIA for undocumented and yet authentic experiences conveyed orally.

13.8.4.2. Phase 2: Baseline Data Collection

I would like a clearer definition for the study of subsistence issues and “reasonably close proximity.” This project will likely impact salmon and displace moose habitat significantly; therefore, this definition will need to be discussed with scientific experts and local Tribal experts.

13.8.4.3. Phase 3: Impact Assessment

Again, I would suggest that you add revise the following bullet point to include “An in-depth review of available state, regional, **tribal**, and local health data.”

I would suggest that a special analysis be performed for impacts to tribal peoples; especially in relation to social determinants of health and subsistence impacts.

A holistic approach to looking at health will definitely help with the development of a more effective Health Management Plan; however, if this CHIA finds no place for Traditional Knowledge, a HMP could be yet one more document which compartmentalizes health in a way that is not helpful or applicable to local Tribal peoples.

13.8.5. Consistency with Generally Accepted Scientific Practices

Again, I can’t stress enough the importance of traditional knowledge and how this CHIA should make a place for this type of evidence-based knowledge.

13.8.6. Schedule

I do not think you are allocating enough time on the front end to help with the development of the Project Overview and Issues Summary. This section is integral to getting community buy-in on the CHIA. If you don’t do work on the front end, it will not

have credibility on the back end. It is not enough to do this during the Baseline Data Collection process. CHIA's call for more of a community-based participatory research approach. The community, whenever possible, should be included to have ownership over contributing to the document.

This only constitutes my commentary on sections 13.8. As you can see, we have made several recommendations which we believe will strengthen your CHIA process. We also have similar concerns pertaining to other parts of Section 13. We would like additional time to review through these sections, as again, they all have direct impact on our Tribal citizens.

Please let me know if you have any questions regarding our comments or if I can provide additional clarification for you.

Sincerely,

A handwritten signature in blue ink that reads "Lisa Wade". The signature is written in a cursive style.

Lisa Wade

Director, Health and Social Services

AEA Team Member		Other Party	
Name:	<i>Maryellen Tuttell and Patrick Burden</i>	Name:	<i>Comm. Susan Bell, Wanetta Ayers</i>
Organization:	<i>DOWL HKM and Northern Economics</i>	Organization:	<i>DCCED</i>
Study Area:	<i>Socioeconomics</i>	Phone Number:	
Date:	<i>September 17, 2012</i>	Time:	<i>2:00 p.m. to 2:30 p.m.</i>
Meeting held by: <input type="checkbox"/> AEA Team <input checked="" type="checkbox"/> Other Party			

Others at meeting: NA

Subject: Potential Role of DCCED in socioeconomic studies for Susitna-Watana Hydroelectric Project

Discussion:

- Potential role of DCCED in socioeconomic studies for Watana Project–
 - The Department and particularly the Economic Development Division has limited resources that they can provide for the project.
 - The best role for the Department may be to review and vet the reasonably foreseeable future actions (RFFAs) and other major assumptions used in the modeling effort.
 - DCCED staff can also provide input to the RFFAs, particularly for mining and tourism, as well as other projects that organizations under DCCED’s umbrella, such as the Alaska Industrial Development and Export Authority, are aware of.
 - The Department can also provide a list of organizations and individuals that NEI might consider for interviews.
 - DCCED can also assist NEI in considering the industry response to the availability of relatively low cost electric power when the Watana Project comes online (e.g., server farms, minerals processing, seafood processing).
- Wanetta Ayers will be the primary contact for DCCED and she will coordinate with other organizations within DCCED.

Action Item:

Patrick Burden to email copy of public Project Study Plan to Wanetta Ayers.

Tuttell, Maryellen

Subject: FW: comments from DCCED
Attachments: Mineral_Resources_of_AK_interactive_Map_SW_Dam_railbelt.pdf; SW_10_12_12_Adleman.pdf; SWHP - Proposed Study Plan - NRG Comment.docx; Susitna Watana.docx

From: Ayers, Wanetta Jo (CED) [<mailto:wanetta.ayers@alaska.gov>]
Sent: Monday, November 05, 2012 5:50 PM
To: Patrick Burden
Subject:

Hi Pat:

The Division of Economic Development (DED) staff has reviewed the Proposed Study Plan for the Susitna-Watana Dam Project. Attached are Nicole Grewe's review of the study plan – perhaps more than you were looking for, but she , Jenn Adleman's write up on minerals activity, and a summary I did on data center potential based on a recent review of similar projects at IEDC.

I am not sure if we have hit the mark here, but below are some “free association” topics that were part of the discussion:

Agriculture

- Would increased demand for housing in the MSB further reduce farm acreage? Increased price pressure to convert?
- During construction, would increased demand for locally-sourced foods benefit local farmers in the MSB or in other growing regions (Nenana, Delta Junction)

Aviation

- Restricted airspace in and around the dam?
- Possible impact on Air Force and other military training range?

Logging/Forest Products – Cassie Pinkel

- Use/Capacity to use woody biomass cleared in and around construction site – feeder stock for FAI area pellet plants?
- Any ongoing need to remove woody biomass? (Some hydro projects do this after the fact – also any opportunities for controlled burns?)

Minerals/Mining – Jennifer Adleman and Lisa Harbo

- **SWHP – Parks Highway/Denali Highway Area Mineral Prospects** (*see links for mineral activity in the area of the dam project*).
Alaska Resource Data File Quad Map link
<http://ardf.wr.usgs.gov/quadmap.html>
Valdez Creek Mining District <http://www.mindat.org/loc-202758.html>
ARDF Healy Quad Mineral Prospects

http://ardf.wr.usgs.gov/ardf_data/Healy.pdf

Golden Zone <http://www.mindat.org/loc-197744.html>

<http://www.alixresources.com/index.php?page=projects&project=1>

“The Golden Zone gold-silver-copper deposit is located on the south flank of the Alaska Range in the Valdez Creek Mining District, about 12 miles west of the Parks Highway on State of Alaska owned lands.”

ARDF Talkeetna Mountains Quad Mineral Prospects

http://ardf.wr.usgs.gov/ardf_data/TalkeetnaMountains.pdf

ARDF Mount Hayes Quad Mineral Prospects

http://ardf.wr.usgs.gov/ardf_data/MountHayes.pdf

Tourism

- Congestion in and around the site during the construction phase
- Access/egress to other locations/points of interest
- Diminishment of the view shed in and around dam site – does not appear to be the case
- Loss of “natural quiet” and other natural values
- Increased recreational opportunities in and around the reservoir – campgrounds, boat launches, etc.
- Increased habitat for wetland birds, increased bird viewing opportunities
- Increased tourism in and around the dam site after operations begin – tours, overlooks – depending on the superlatives of the project
- Capacity at hatcheries to stock the reservoir?
- Increased railroad passenger traffic due to road congestion?
- Power cost reduction for Denali Princess Lodge, South Denali Visitor Center, other remote operators

Workforce Training Programs

- Crosswalk transferrable skills between job classifications
- Sufficiency of training facilities
- Sufficiency of Middle – High School Programs
- Sufficiency of Career and Technical Education Programs
- Need for a STEM Initiative to align with project needs
- Need for Middle Skill programs to align with project needs

Other Considerations

- Possible shared resources or complimentary coordination with other major projects such as AGDC or other gas line projects – Energy Corridor
- Possible shared infrastructure and construction resources

As the project progresses and more baseline data is available, I think DED can reflect further on opportunities and impacts from the dam.

Thanks,
Wanetta

Wanetta Ayers, Director - Division of Economic Development
State of Alaska | Department of Commerce, Community & Economic Development

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Jennifer N. Adleman
10/12/12

Comments on the

Proposed Study Plan

Susitna-Watana Hydroelectric Project

FERC No. 14241

Having recently sat down with other SOA agencies to review and respond to the EPA on their Bristol Bay Watershed Assessment and the Pebble Limited Partnership Environmental Baseline Data Keystone panel review process, I found that there were a few things in this document that seemed particularly interesting. But in the interest of time, I stuck to the initial charge question of identifying follow-on economic benefits related to expanded hydro capacity.

I highlighted the rail corridor and proposed dam location on the interactive *Mineral Resources of Alaska* map (attached) and also asked DNR folk if any of the relatively nearby project proponents have stated they perceive the dam and associated hydro power as their power source. No one has explicitly. That may have to do with the progress of the projects more than anything. [Chuitina Coal](#), in the permitting process (EIS) just ahead of Donlin, has projected utilizing Belgua Power Plant as their energy source thus far. DNR staff speculated they may need an additional source of power. Kiska, Terra, Golden Zone, those projects without immediate ties to the existing power infrastructure may benefit from an increased capacity / generation along the rail belt. I think it's worth noting that although there's consistent mention of Green's Creek using hydro power, from what I can recall of our staff tour there, they are 3, maybe even 5th in line to receive the generate hydro power and rely on diesel the far majority of the year (9, maybe even 11, months out of the year).

The associated transportation systems put in place during exploration and construction may lead to additional claims staking and exploration in the area and may increase the rate of exploratory projects in the area. This is due to access as well as a potential decrease in the cost and increase in the availability of goods, services, and equipment in the immediate vicinity.

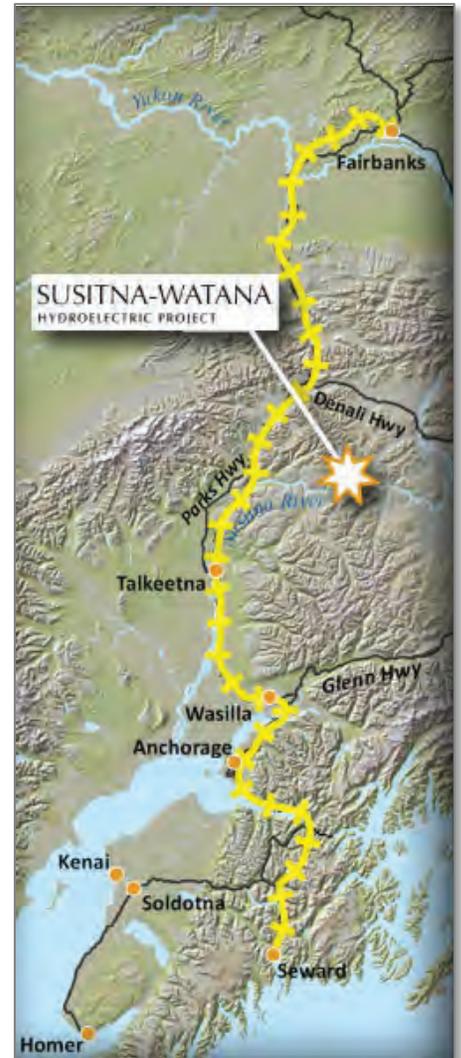
Additional discussion, even among those in the mining industry lead to the story of McMinnville, OR, their server banks and the city's targeted approach to server banks industry. "It's small enough to make connections and access information quickly and easily, yet large enough to handle infrastructure needs, like [reliable water](#), high-speed Internet access and [reasonably priced power](#)." from the [city website](#). I've heard leaders from farther north communities also discuss this as it relates to their cold climate, but lack of connectivity and power have been pointed to as obstacles.

BACKGROUND

The Alaska Legislature's House Bill 306 established a goal of using 50 percent renewable energy sources by 2025. One effort towards achieving this goal includes a large-scale renewable energy resource for Alaska's Railbelt region, a transportation corridor spanning Fairbanks to Seward. During 2010, the state legislature provided funding to AEA to pursue a large hydroelectric project for the Alaska Railbelt, coined the Susitna-Watana Hydroelectric Project (SWHP). As currently conceptualized, the SWHP would start operations in 2023, with a 50-year lifespan.

To date, the AEA has proposed 58 individual areas of study related to the Susitna-Watana Hydroelectric Project to meet federal licensing requirements to build the project. The studies were part of a detailed plan submitted to the federal Energy Regulatory Commission, the agency tasked with regulating hydroprojects. The dam is located approximately 184 miles up the Susitna River, above Devil's Canyon. Proposed areas of study generally include the following:

1. Geology and Soils
2. Water
3. In-Stream Flow
4. Fish and Aquatic
5. Wildlife
6. Botanical
7. Recreation and Aesthetic
8. Cultural and Paleontological
9. Subsistence
10. Socioeconomic and Transportation [DED Proposed Study Plan Review]
11. Project Safety



PROJECT WEBSITE

<http://www.susitna-watanahydro.org/>

DOCUMENT REVIEWED

Proposed Study Plan (PSP): Susitna Hydroelectric Project

Note, this is Northern Economics' *Proposed Study Plan (PSP)* to satisfy requirements related to the complete evaluation of the socioeconomic and transportation impacts of a large scale hydroelectric project. While it could also be considered a draft scope of work, it is likely incomplete because Northern Economics is proposing a general approach to study socioeconomic and transportation impacts at this time. It is unclear whether a full scope of work will follow at a later date.

GENERAL COMMENT [Note – These comments do not apply to any specific section, but rather the general approach to the study plan.]

Research Review

There are many large hydroelectric projects across the nation – and, all would likely have undergone similar impact studies per federal regulation. If there were more time, or if it is a DCCED priority, it would be good to conduct a quick review of other projects – especially if there were any shortcomings in the analyses of hydroelectric projects in rural western states. The *Proposed Study Plan* (PSP) cites Alaska-specific documents regarding the project, but it does not mention review of any other hydroelectric project socioeconomic impact research from other states. At a minimum, I recommend a review of other impact studies, conducted in a similar remote/rural region, that met federal requirements and provided a conceptual framework that is applicable to Alaska.

Impact Timeframe/Planning Alternatives

The PSP discusses various impacts in long narrative format and with broad generalizations. There is also narrative regarding the models and data sources to be used. While the methods are likely solid and there are many noted potential impacts, there is very little consideration or attention given to the types of impact. Specifically, the PSP applies a very broad “with project” and “without project” impact analysis framework. In contrast, to accurately assess the impacts for Alaska, it is more useful to apply the following planning scenarios:

1. No Change – Status quo for the region and communities without the project. What are the overall trends in the Railbelt regarding unemployment, income, population, and employment opportunities?
2. Short-Term Change – Construction period and shortly thereafter.
3. Long-Term Change – After the project is built and construction workers have departed the state, what are the long-term positive and negative impacts that will be realized in the Railbelt?

Additional Considerations

NRG Note – These are my opinions, unrelated to federal or state permitting requirements. Too often we treat Alaska as one state and population group, without significant difference in opportunity and general wealth.

1. Rural versus Urban Impacts – Which locales of the Railbelt will experience the greatest impacts?
2. Native versus Non-Native Impacts – Which population of the Railbelt will experience the greatest impacts?
3. Planning Alternatives – The PSP is a planning project and should include the proposal of multiple alternatives and comparison of direct and indirect impacts of each alternative. This comment is related to the above “Impact Timeframe/Planning Alternatives”. Currently, the PSP calls for “with project” and “without project”; however, there are other approaches to studying the project – with/without project, impact timeframes, and diverse project options. Apparently the scale of project is not under consideration – this will be a large hydroelectric project; however, impacts could be considered per relative timeframe.

SECTION COMMENT

[Note – This section contains specific blue-font comment, organized by PSP section. Many of these comments are related to the aforementioned general comments – and they may/may not be applicable to Northern Economics current work depending on federal requirements for current study. For example, perhaps the issues noted below will be resolved upon development of a full-scale scope of work. Finally, I have inter-mixed a general summary of the PSP section, along with my blue-font comment, to provide context for the comment.]

13. SOCIOECONOMIC AND TRANSPORTATION RESOURCES

13.1 Introduction

Scope of Work Summary:

1. Socioeconomic – social conditions, local and regional economy, public goods and services as provided by local, state, and federal governments.
2. Transportation – roads, airports, rail, and river transport.

3. Health Impacts – community health and safety
4. Air Quality

Comment:

Is this a federally-required scope of work or Northern Economics original creation? If it is federally-required and mandated, then there is not significant room for suggestion regarding substantive areas of inquiry.

13.2 Nexus between Project Construction/Existence/Operations and Effects on Resources to be Studied

The type, intensity, and extent of impacts on social resources needs to be understood... so appropriate measures to address and mitigate impacts can be considered and incorporated into the project license.

Comment:

This section is a long laundry list of potential impacts and the relationship between impacts. As it is still introductory in nature, that's probably okay; however, I found it to be a random list of potential impacts. Furthermore, it does not accommodate for different types of impact – short term, long term, and permanent. This is the difference between short-term construction and long-term operations impacts. While a long discussion of a variety of impacts is sufficient, the section would benefit from further development, organization, and conceptualization.

13.3 Resource Management Goals and Objectives

This section details the multiple public and private entities involved with the management of the lands surrounding the SWHP – and the stated goals and objectives for the land the project is located on and/or impacts.

Comment:

Are there any other land holder entities or stakeholders that were NOT mentioned?

- Surrounding communities – even without planning and zoning powers, they may have stated priorities and or values for the land in this particular area
- Mat-Su ARDOR – May or may not have a contribution
- Interest Groups – subsistence users, recreational groups, and other groups that access this general area.

Also, Northern Economics needs to thoroughly define and delineate the land area under consideration – perhaps this is already accomplished in other projects and/or studies related to the SWHP.

13.4 Summary of Consultation with Agencies, Alaska Native Entities, and Other Licensing Participants

No comment.

13.5 Regional Economic Evaluation Study [Topic 1 – Economy – Power Related]

13.5.1 General Description of Proposed Study

Goal is to assess potential economic impacts of: 1) operation of project; and 2) power generated from project. In short, these are direct (i.e., operation) and indirect (i.e., power) impacts. Non-power related impacts are discussed in the social conditions and public goods and services section.

1. Economic impacts as a result of improved electrical power grid.

2. Impact to Electric Prices
3. Economic impacts over time

Comment:

The impacts of the project generally include SWHP operations and energy-related impacts – this seems sufficient; however, the bullets may be incomplete and/or are very grandiose endeavors. This area of inquiry requires further consideration:

1. Project – Short-Term, construction
2. Project – Long-Term, operations
3. Operation – Power Rate Impacts
4. Direct Local/Regional Economy Impacts
5. Indirect Local/Regional Economy Impacts

Again, this comment is related differentiating type of impacts. While the PSP previously noted “with project” and “without project”, they are now further considering economic impacts, which are likely to be more far reaching and diverse than what has been proposed. More consideration should be given to defining and organizing types of economic impact prior to quantifying the impacts.

13.5.2 Existing Information and the Need for Additional Information

Comment:

No comment as the section discusses already-documented data gaps. I’m not well-informed on already-existing information regarding this project; however, there is no mention of consultation of similar research for hydroelectric projects in the Lower 48. If this study is required by federal mandate, I imagine very similar studies exist for similar projects elsewhere. A general recommendation is to consult already existing research and ensure there are no gaps in the proposed data and study methods.

13.5.3 Study Area

Railbelt Region – Fairbanks, Denali Borough, Mat-Su Borough, Anchorage, and Kenai Peninsula Borough.

No comment

13.5.4 Study Methods

Data Collection and Analysis

General approach includes “with” and “without project” scenarios. Analysis conducted via REMI software, which incorporates four models: 1) input/output, 2) general equilibrium, econometrics, and economic geography. Input variables include supply, demand, and price. Output variables include population, employment, labor income, output (sales), and housing.

Comment:

Lengthy discussion is dedicated to the use of sophisticated software, but little discussion is given to the output variables – these are socioeconomic impacts of the SWHP. Is population, employment, labor income, sales, and housing enough?

At a minimum, I recommend “with” and “without project” scenarios be expanded to include the reality of large-project construction in Alaska: 1) without; 2) with/short-term; 3) with/long-term; and 4) with/permanent. Further study of beneficiaries – rural/urban, railbelt/non-railbelt, Native/non-Native, community, and small business is also advisable. In other words, an assessment of impacts,

as aggregated by common Alaska beneficiary group. Later sections of the PSP discuss the “calibration” of methods for Alaska conditions; this calibration needs to be extended beyond software, but also include the conceptualization of the project.

Documentation of Regional Economic Analysis

No comment

13.5.5 Consistency with Generally-Accepted Scientific Practice

Methods to be “calibrated for Alaska”.

No comment

13.5.6 Schedule

Initial and Updated Study Report available 2013.

No comment

13.5.7 Level of Effort and cost

\$250,000 to \$400,000

13.5.8 Literature Cited

Comment:

Incorporate literature for similar projects in the Lower 48.

13.6 Social Conditions and Public Goods and Services Study [Topic 2 – Social – Non-Power Related]

13.6.1 General Description of the Proposed Study

Study Goals and Objectives

Study plan goal for this section include evaluation:

1. Social Conditions
2. Public Goods and Services

Comment:

Separate social conditions from public goods and services. Perhaps separate both public goods and public services. As the study is currently drafted, it studies: 1) regional economy (direct power-related impacts); and 2) social conditions and public goods and public services (indirect power-related impacts). Per the original introductory material, it might be easiest to consider impacts via discrete impacts. Clearly there are cross-over variables, but better conceptualization will lead to more effective communication and consideration of potential impacts. In addition to improved conceptualization of type of impact, it is advisable to adopt a more in-depth approach to quantifying impacts – without project, with project/short term, with project/long term, and with project/permanent.

Study Variables

1. Population
2. Housing
3. Public Goods
4. Public Services
5. Quality of Life

Objectives:

1. Current Socioeconomic Conditions
2. Already Existing Workforce
3. Total Worker Payroll
4. Total Material Purchases
5. Population In-migration
6. Population Increase Impacts – Public Goods and Services
7. Existing Housing Stock
8. Displaced Businesses
9. Non-Power Impacts on local and/or regional economy.
10. Impact of biophysical change on subsistence, recreation, community use patterns, and quality of life.

Comment:

The above list is not an exhaustive list of potential socioeconomic impacts, and it does not differentiate between short- and long-term impacts.

13.6.2 Existing Information and Need for Additional Information

Comment:

This section has a good list of publicly available information via various government agencies. It also has a long-list of unmet information needs – or, information that will need to be compiled. As in many impacts studies, it focuses on impacts gained and not impacts lost. For instance, significant attention is dedicated to workforce, construction materials, and wages. There is less attention given to lost opportunity – dislocated businesses, removed agriculture lands, etc. Perhaps further attention should be given to lost opportunity – and, this will likely occur as a variety of land managers are consulted regarding current use of the area. For instance, what is the economic value of the tourism currently occurring in this area (if any). What about environmental impact – displaced critters and consequences for subsistence activities?

13.6.3 Study Area

Primary Mat-Su Borough including Trapper Creek, Chase, and Talkeetna; Denali Borough and Cantwell.

13.6.4 Study Methods

Finally note on remaining consistent with licensing proceedings for other hydroelectric projects.

Comment:

Differentiate social conditions from public goods and public services – organize all study of variables accordingly.

Data Collection and Analysis

REMI Model/Output Variables – population, employment, labor income, output (sales), and housing.

Noted Areas of Impact Inquiry:

- Construction
- Immigration and impacts to public services – fire, medical, education, safety, etc.

- Quality Life – via survey with residents and area users
- Fiscal Impact – public goods and services
- Transportation
- Tourism impacts
- Property uses and values
- New jobs and labor income
- Harvest Yields – agriculture, grazing, logging, mining, and fishing
- Recreational use
- Wildlife importance

Comment:

This is likely the most complex part of the project - estimating impacts to: 1) social conditions; 2) public goods, and 3) public services. Currently the narrative is long laundry list of areas of inquiry that will cover the range of impacts to the socioeconomic impacts – noted above. This section would benefit from further conceptualization and organization. Socioeconomic impacts generally include the following:

1. Economic – wages, taxes, property values, government expenditures for goods/services
2. Physical – Physical infrastructure
3. Environmental – changes to watershed and all the impacts to critters
4. Social – Community perception regarding change to quality of life.
5. Cultural – impacts to subsistence and ways of life
6. Human – workforce development potential

And, again, I recommend differentiating between without project, with project/short term, and with project/long term for full disclosure of socioeconomic impacts.

Work Products

Initial and Updated Study Reports available 2013 and 2014.

13.6.5 Consistency with Generally-Accepted Scientific Practice

Methods calibrated for Alaska conditions and experience.

13.6.6 Schedule

Initial Study Report available 2013; Updated Study Report available due 2014.

13.6.7 Level of Effort and Cost

\$400,000 to \$500,000, including seven boroughs and census areas, associated communities, and surveys/personal interviews with stakeholders.

13.6.8 Literature Cited

Note, a document is listed that provides guidance for hydro project relicensing, as drafted by US Fish and Wildlife.

Susitna Watana:

New Opportunity: Data Centers

Digital economy powerhouses such as Google, Facebook, Apple, and others will continue to increase and expand data centers around the globe. With the opening of the Arctic, expanding terrestrial fiber in and around Alaska, and the availability of a green energy source, Alaska may become a viable location for large scale data centers that can bridge the Arctic and Pacific regions.

Cited economic impacts for recent similar projects include:

- **Facebook** – Rutherford County, NC
 - Capital Investment: \$450 million
 - Size: 300,000 SF
 - Full time jobs: 42
 - Incentives: \$ 11.95 million
- **AT&T** – King Mountain, NC
 - Capital Investment: \$200 million
 - Size: 470,000 SF
 - Full time jobs: 100
 - Incentives: \$ 0 million
- **Microsoft** – Mecklenburg County, VA
 - Capital Investment: \$499 million
 - Size: NA
 - Full time jobs: 50
 - Incentives: \$ 6.9 million
- **Apple** – Reno, NV
 - Capital Investment: \$1 billion
 - Size: 350 Acres
 - Full time jobs: 200
 - Incentives: \$ 89 million
- **Google** – Council Bluffs, IA
 - Capital Investment: \$300 million
 - Size: NA
 - Full time jobs: 50
 - Incentives: \$ 9 million
- **United Healthcare** – Elk River, MN
 - Capital Investment:\$124 million
 - Size: 189,000 SF
 - Full time jobs: 20
 - Incentives: \$ 1.9 million
- **Time Warner** –Charlotte, NC
 - Capital Investment: \$100 million
 - Size: 178,000 SF
 - Full time jobs: 225
 - Incentives: \$ 2.9 million
- **Discover** – New Albany, OH
 - Capital Investment:\$97 million
 - Size: 97,000 SF
 - Full time jobs: 160
 - Incentives: \$ 4.3 million

Key criteria for data center locations:

Power availability and reliability: Substation capacity of 7MW immediately, redundant feeds from separate substations, reliability, adequate access to natural gas.

Telecommunications/Conductivity: Available lit and dark fiber optic broadband service, ideally from multiple carriers. Dark fiber is important to address rapid growth, security, scalability, and cost concerns.

Security/Risk Analysis: All sites will have some inherent risk. Location decisions will seek to mitigate overall risk, including natural disasters and proximal hazards.

Building/Site Considerations: Conform to industry standards and land use ordinances, appropriately powered.

Labor Market and Supplier Network: Because of the smaller workforce for need for operations, labor availability and cost is not as critical as other factors. However, key positions and skill sets are needed and can be a determining factor in data center investments.

Cost: Power generally accounts for 80 percent of a data center's OpEx. The use of ambient air in cooler climates has led to data center being located in new markets such as Scandinavian countries.

Incentives: pricing tools that reduce the costs or financial risk associated with the investment, particularly during late stage evaluation and negotiation.

Source: BLS Strategies (2012). Data Center Trends and Market Update. Presented at International Economic Development Council Annual Conference at Houston, Texas.

Tuttell, Maryellen

From: Curtis.Jennifer@epa.gov
Sent: Tuesday, October 30, 2012 1:58 PM
To: Philip M. DeVita
Cc: Tuttell, Maryellen
Subject: Re: AEA SharePoint documents

Hello Phil,

Herman Wong in our Seattle office reviewed the Air Quality PSP and had the following comments:

1. Most of the impacts appear to be related to construction.
2. It was not specifically stated that the project proponent would model the construction emissions. The emissions should be modeled.
3. There was no mention of any type of combustion sources during operation of the hydro plant. It should be verified.
4. There is uncertainty if background air quality monitoring should be performed. Someone should decide particularly if EPA signs off on the plan.
5. It appears that there are only two alternatives, project and no project.
6. It was not clear if the project proponents intends to model for air quality benefits (i.e., emissions from nearby units that the hydro plant would replace). At least I think that is what they were implying.

The verification of the construction emissions could be huge, so I would recommend bringing a permit engineer to do that task.

If you have any questions concerning these comments, please let me know. Thank you for the opportunity to provide input on the Air Quality PSP.

Jennifer Curtis, NEPA Reviewer
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Email: curtis.jennifer@epa.gov

From: "Philip M. DeVita" <pdevita@hmmh.com>
To: Jennifer Curtis/R10/USEPA/US@EPA,
Cc: <mtuttell@dowhkm.com>
Date: 09/21/2012 09:05 AM
Subject: AEA SharePoint documents

Hello Jennifer, it was nice to talk with you yesterday. I have spoken to the AEA team and they suggested I send you the following information (see below) for accessing the PSP. I am also sending you a copy of the air quality PSP in case you want to forward to your appropriate air quality folks for review.

Did you want me to follow up with a specific person at EPA regarding air quality, or are the comments coming to you?

Please let me know if you have any questions.

Regards,

Phil

Philip M. DeVita, CCM

Director of Air Quality

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There are several ways to access the PSP.

AEA's website – the PSP is posted on our website (www.susitna-watanahydro.org). We also have a link to our general listserv and our workgroup listserv, which people can sign up for to be noticed about public meetings and periodic Project updates. Note the FERC license number for the Project appears on the website; it is 14241.

FERC's website – the PSP was electronically filed with FERC. That can be accessed, along with all other documents filed with FERC at www.FERC.gov or through the link on our website. The license number for this Project (14241) appears on our website and all electronically filed documents for this Project are referenced by FERC's Project number. FERC also has a listserv on its website that people can sign up for to be alerted to any FERC filings for this Project.

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APPENDIX 4
INFORMAL CONSULTATION DOCUMENTATION

SECTION 16 – PROJECT SAFETY

NTP #:

<input type="checkbox"/>	1010629 - NTP 10 Project Management and Planning
<input type="checkbox"/>	1010949 - NTP 6 & 11 Geotechnical Services
<input checked="" type="checkbox"/>	1010952 - NTP 7 Engineering Feasibility
<input type="checkbox"/>	1010950 - NTP 9 FERC Licensing Support
<input type="checkbox"/>	All NTPs - General Team Meeting

SUBJECT: Initial conference with FERC

DATE: Monday, August 20, 2012

LOCATION: Teleconference

ATTENDEES

NAME	ORGANIZATION		
	MWH	AEA	Subcontractor (Org Name) / Other Party (Org Name)
Bryan Carey		X	
Brian Sadden	X		
John Haapala	X		
Mike Bruen	X		
Paul Shannon			FERC
Bill Allerton			FERC
Bruce Brandt			FERC
Ken Thieron			FERC
Joe Meuller			FERC
Doug Johnson			FERC
Karl Swanson			FERC
Walt Davis			FERC

DISCUSSION ITEMS

ITEM	DISCUSSION	ACTION
1	Structure of the Board of Consultants was discussed. FERC are interested in the organization of the Board of Consultants. AEA suggested that there would be a main Board that would convene throughout the project, with some selected extra members seconded to the Board for particular subject matter. The example quoted was for the PMP studies for which a meteorologist and hydrologist would be added to the Board for (say) 18 months, but would then no longer participate on a regular basis. FERC reminded the meeting of the importance of a Board of Consultants for this very large project, and highlighted that the ILP increases the pressure to prepare a significant part of the final design before the submittal of the license application FERC will request that AEA prepare a paper outlining the structure of the Board of Consultants and operating guidelines.	FERC to prepare a letter to AEA setting out the role of the proposed Board of Consultants including its structure and operating guidelines, i.e. a Board of Consultants Operating Procedures.
2	AEA indicated to FERC the tentative list of Board members: <ul style="list-style-type: none"> • Joe Ehasz # – General civil, geotechnical, and seismic engineering • Brian Forbes – RCC technology • “Skip” Hendron # – Rock mechanics and foundation • Henry Falvey – Hydraulics • Yusof Ghaanat – F.E. Analysis • George Taylor* – Meteorologist • A.N. Hydrologist* – unnamed hydrologist # and * see item 3	AEA to formally transmit to FERC the suggested Board of Consultants members and their resumes – include with the note on proposed structure etc.
3	The requirement for Board of Consultants involvement in review of study plans was discussed. FERC wishes that both the PMP/PMF and the Seismic Hazard Analysis study plans be reviewed by Board members. AEA will convene at least two members of the Board for review of each plan – for the PMP/PMF plan the two members marked with an “*” will review the document, and for the seismic hazard study plan, the two members marked with a “#” will perform the same function.	AEA to schedule early review of the study plans by at least two members of the Board of Consultants.

- NTP #:**
- 1010629 - NTP 10 Project Management and Planning
 - 1010949 - NTP 6 & 11 Geotechnical Services
 - 1010952 - NTP 7 Engineering Feasibility
 - 1010950 - NTP 9 FERC Licensing Support
 - All NTPs - General Team Meeting

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DISCUSSION ITEMS

ITEM	DISCUSSION	ACTION
4	Once the <u>full</u> Board is convened for its first meeting, and from then on, the Board of Consultants meetings will be formal – with a briefing package provided in advance of board meetings, and FERC representation at the meeting/site visit.	Include in Board Operating Procedures.
5	Discussed the need for inclusion of a seismologist on the Board of Consultants. MWH informed FERC that Norm Abrahamson was one of its consultants working on the Seismic Hazard Assessment with MWH and Fugro (former William Lettis Associates staff). MWH suggested that as Joe Ehasz is on various ASCE committees for seismic design, he would suffice for this role on the Board of Consultants.	Norm Abrahamson to review seismic study plan.
5	FERC require that the PSHA incorporate as far as possible the Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on *Uncertainty and Use of Experts drafted by the Senior Seismic Hazard Analysis Committee (SSHAC) in 1997. Need to clarify how uncertainty is being addressed.	Define in Study Plan.
6	FERC noted the NOAA Atlas 14, Volume 7, Version 2.0, Alaska (2012) had become available this year. MWH noted that this new publication is for rainfall frequency only and contains no information on the PMP. Also, the rainfall frequency values are for point data (10 sq. mi.) and there are no areal reduction factors in the new publication, which means that the data cannot be directly applied to the 5,180 sq. mi. Susitna-Watana watershed.	No action required.
7	A schedule for the first 18 months was discussed. MWH undertook to provide AEA with a recommended Board of Consultants meeting schedule.	MWH to provide AEA with proposed schedule.
8	There was a discussion of long-term earthquake monitoring system being installed in 2012. Confirmed that a strong motion sensor would be added and installed on the dam crest following construction.	Include in dam Instrumentation a strong motion sensor.