Proposed Study Plan

Susitna-Watana Hydroelectric Project

FERC No. 14241

ALASKA ENERGY AUTHORITY

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Abbreviation	Definition
AAC	Alaska Administrative Code
ACHP	Advisory Council on Historic Preservation
ac-ft	acre-feet
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
ADOTPFCR	ADOT Central Region Planning
ADOTPFNR	ADOT Northern Region Planning
AEA	Alaska Energy Authority
AEIDC	Arctic Environmental Information and Data Center
AFB	air force base
AFFI	Alaska Freshwater Fish Inventory
AHRS	Alaska Heritage Resources Survey
AHMG	Alaska Habitat Management Guides
Ahtna	Ahtna, Inc.
AKNHP	Alaska Natural Heritage Program
AMP	Airport Master Plan
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act of 1980
APA	Alaska Power Authority
APA Project	APA Susitna Hydroelectric Project
APE	area of potential effect
APLICs	Alaska Public Lands Information Centers
ARRC	Alaska Railroad Corporation
AS	Alaska Statutes
ASCP	Alaska Shorebird Conservation Plan
ASFDB	Alaska Subsistence Fisheries Database
ASG	Alaska Shorebird Group
ASTM	American Society for Testing and Materials
ATV	all-terrain vehicle
AVC	Alaska Vegetation Classification
AWC	Anadromous Waters Catalogue
BCC	birds of conservation concern
BDPs	Best development practices
BIA	DOI, Bureau of Indian Affairs
BLM	DOI, Bureau of Land Management

Abbreviation	Definition
BLM-S	BLM sensitive species
BLM-W	BLM watch list species
BMC	birds of management concern
BMPs	best management practices
BOD	biochemical oxygen demand
BOF	Alaska Board of Fisheries
BP	before present
BPIFWG	Boreal Partners in Flight Working Group
CATC	CIRI Alaska Tourism
CDP	census-designated place
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIBW	Cook Inlet Beluga Whales
CIRI	Cook Inlet Region, Inc.
cm	centimeter
CNIPM	Alaska Committee for Noxious and Invasive Plants Management
COY	cubs of the year
CPOM	course particulate organic matter, particle size larger than 1 mm in size
CSIS	ADF&G Community Subsistence Information System
DBSD	Denali Borough School District
DCCED	Alaska Department of Commerce, Community, and Economic Development
DHSS	Alaska Department of Health and Social Services
DIDSON	Dual Frequency Identification Sonar
DO	dissolved oxygen
DOI	U.S. Department of the Interior
Doyon	Doyon, Ltd.
DPOR	ADNR Division of Parks and Outdoor Recreation
DSM	Demand Side Management
EARMP	East Alaska Resource Management Plan
EE	energy efficiency
EFH	essential fish habitat
EIM	Environmental Information Management
EIS	environmental impact statement
El.	elevation
EMS	emergency medical services
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act

Abbreviation	Definition
et al.	"*et alia*"; and the rest
FAA	Federal Aviation Administration
ft	feet
ft MSL	feet mean sea level
FBOM	fine benthic organic matter
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHA	USDOT Federal Highway Administration
FMP	Fishery Management Plan
FPOM	fine benthic organic matter
fps	feet per second
FR	Federal Register
FS	featured species
FY	fiscal year
g	gram
GIS	Geographic Information System
GMP	General Management Plan
GMU	Game Management Unit
GPS	global positioning system
GU	globally unrankable
GVEA	Golden Valley Electric Association
GWh	gigawatt-hours
HEA	Homer Electric Association
IFRR	Instream Flow Relationships Report
ILP	Integrated Licensing Process
in	Inch
IPCC	Intergovernmental Panel on Climate Change
ISER	University of Alaska Anchorage Institute for Social and Economic Research
ISR	Initial Study Report
kcmil	circular mils
kg	kilogram
km	kilometer
km^2	kilometer(s) squared
kV	kilovolt
L	liter(s)
licensing participants; Participants	Agencies, ANSCA corporations, Alaska Native entities and other licensing participants
LRTP	Long Range Transportation Plan
LOEL	Lowest Observable Effect Level

Abbreviation	Definition
LWCF	Land and Water Conservation Fund
m	meter(s)
M	million
m^2	square meter(s)
MAPS	Monitoring Avian Productivity and Survivorship
Mat-Su	Matanuska Susitna
MBTA	Migratory Bird Treaty Act
MEA	Matanuska Electric Association
mg	milligram
mg/L	milligrams per liter
mi^2; sq.mi.	square mile(s)
mi	mile(s)
ml	milliliter(s)
ML&P	Anchorage Municipal Light and Power
mm	millimeter(s)
MON	Museum of the North
MP	mile post
mph	miles per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSB	Matanuska-Susitna Borough
MSL	mean sea level
MVA	megavolt-Ampere
MW	megawatts (one million watts)
MWh	megawatt hour
n/a	not applicable *or* not available
NAAQS	National Ambient Air Quality Standards
NAWCP	North American Waterfowl Conservation Plan
NAWMP	North American Waterfowl Management Plan
NCI	Northern Cook Inlet
NCIMA	Northern Cook Inlet Management Area (sport fish harvest)
n.d.	no date
NCM	Newton centimeter
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NHPA	National Historic Preservation Act
NLCD	National Land Cover Dataset
NLUR	Northern Land Use Research
NMFS	NOAA National Marine Fisheries Service
No.	number

Abbreviation	Definition
NO2; NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOEL	No Observed Effects Level
NOI	Notice of Intent
NPS	DOI, National Park Service
NRCS	USDA Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTU	nephelometric turbidity unit
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
O_3	ozone
O&M	operations and maintenance
OHV	off-highway vehicle
OPMP	Office of Project Management and Permitting
ORV	off-road vehicle
PAD	Pre-Application Document
Pb	lead
PCE	primary constituent elements
PDD	Preliminary Decision Document
PHABSIM	Physical Habitat Simulation
PhD	Doctor of Philosophy
PIT	passive integrated transponder
PL	Public Law
PLC	programmable logic controller
PLP	Preliminary Licensing Proposal
PM	particulate matter
$PM_{2.5}$; PM2.5	particulate matter up to 2.5 microns in diameter
PM_{10}; PM10	particulate matter up to 10 microns in diameter
PM&E	protection, mitigation and enhancement
PMF	probable maximum flood
lb	pound
POW	palustrine open water (ponds under 20 ac)
ppb	parts per billion
Project	Susitna-Watana Hydroelectric Project
PSD	Prevention of Significant Deterioration
PSP	Proposed Study Plan
RASP	Regional Aviation System Plan
RCC	roller compacted concrete
Rd	recreation-dispersed

Abbreviation	Definition
RIRP	Railbelt Integrated Resources Plan
RM	river mile
ROS	recreational opportunity spectrum
RS	revised statute
RSP	Revised Study Plan
RTE	rare, threatened and endangered
s	second
SANPCC	Southcentral Alaska Northern Pike Control Committee
SaSI	Salmonid Stock Inventory
SB	Senate bill
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SCRO	ADNR South Central Regional Office
SD1	Scoping Document 1
SD2	Scoping Document 2
SDVCSC	South Denali Visitor Center Steering Committee
SES	City of Seward Electric System
sf; ft^2	Square foot (feet)
SHPO	State Historic Preservation Officer
SMAP	Susitna Matanuska Area Plan
SMP	Shoreline Management Plan
SO2; SO_2	Sulfur dioxide
SpUD	Special use district
SQL	Standard query language
SRMAs	Special Recreation Management Areas
STB	Surface Transportation Board
SVO	Successor Village Organizations
SWHS	Statewide Harvest Survey
TCP	traditional cultural property
TCW	Talkeetna Mountains and Chulitna-Watana Hills
TDG	total dissolved gas
TDS	total dissolved solids
TEK	Traditional Environmental Knowledge
TOC	total organic carbon
TSP	total suspended particulate
TWG	Technical Workgroup
UAAES	University of Alaska Agriculture Experiment Station
UAFAFES	University of Alaska Fairbanks Agricultural and Forestry Experiment Station
UCG	underground coal gasification
UCIMA	Upper Cook Inlet Management Area (commercial fish harvest)

Abbreviation	Definition
U.S., US	United States
USACE	U.S. Army Corps of Engineers
U.S.C.; USC	U.S. Code
USCB	U.S. Department of Commerce, Census Bureau
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFS	USDA, Forest Service
USFWS	DOI, Fish and Wildlife Service
USGS	DOI, Geological Survey
USR	Updated Study Report
USSCP	U.S. Shorebird Conservation Plan
VFD	Volunteer Fire Department
VHF	very high frequency
VOC	volatile organic compound
VRM	Visual Resource Management system
WSR	Wild and Scenic River
yd	Yard
^{14}C	Carbon 14
ºC	degrees Celsius
ºF	degrees Fahrenheit
µg	microgram
µg/L	micrograms per liter
µg/m^3	microgram per cubic meter
µL	microliter(s)

Proposed Study Plan (PSP)

1. INTRODUCTION TO PSP

This document provides the Alaska Energy Authority's (AEA) Proposed Study Plan (PSP) for licensing, which includes individual study descriptions for the licensing of the Project. The Federal Energy Regulatory Commission (FERC or Commission) regulations at 18 CFR §5.11 require the applicant to file a study plan with FERC after consultation with parties interested in the licensing.

On December 29, 2011 AEA filed with the FERC its Notice of Intent (NOI) and Pre-Application Document (PAD) to start formal licensing for the proposed Susitna-Watana Hydroelectric Project (Project), FERC No. 14241. The PAD provides licensing participants summaries of existing relevant, and reasonably available information related to the Project. Section 5 of the PAD identified issues and preliminary study concepts AEA believed were important to address the identified issues.

On February 24, 2012, FERC issued a public notice acknowledging the filing of AEA's NOI and PAD, officially commencing the licensing proceeding, and soliciting public comment on the PAD and study requests from licensing participants. In addition, FERC issued a Scoping Document to outline the subject areas to be addressed in its environmental analysis of the Project pursuant to
the National Environmental Policy Act (NEPA). FERC held six Scoping Meetings for the Project. The meetings were held the week of March 26, 2012 in Anchorage, Wasilla, Glennallen, Sunshine, Cantwell, and Fairbanks and focused on obtaining comments and input on resource issues related to Project operations from resource agencies, Alaska Natives, local governments, non-governmental organizations (NGOs), and members of the general public. The purpose of the meetings was for FERC to initiate scoping of the issues, review and discuss existing Project information, identify information and study needs; and discuss the process plan and schedule for licensing activities required under the ILP regulations.

Also since the filing of the PAD, AEA has held a series of monthly Technical Workgroup (TWG) Meetings with Federal and State agencies, Alaska Native entities, Non-governmental Organizations (NGOs), and other licensing participants (licensing participants) to present and discuss AEA's proposed study plans and study planning process. A listing of the meetings and topics covered is provided in Table 1-1. Documentation of the TWG meetings since filing of the PAD is found in Attachment 1-1 where the summary notes from 14 separate TWG meetings are provided and referred to in many of the ensuing sections. In addition, AEA and its consultant team have had many individual and small group meetings and follow-up discussions with resource agencies, Alaska Native entities and other licensing participants to discuss issues, existing information and information needs.

On May 18, 2012, AEA filed 46 preliminary draft study requests with the Commission. The AEA-filed study requests were not required by the ILP regulations, but were provided in order to facilitate the agencies' and other licensing participants' preparation of their formal study requests.

A total of 52 individual formal study requests, including those of the FERC staff, were made by nine Agency, Alaska Native entities and other licensing participant groups during the PAD and Scoping comment period that ended on May 31, 2012. Many of these study requests were similar in purpose and scope to AEA's proposed studies outlined in Chapter 5 of the PAD and further modified and updated in collaboration with interested parties as discussed and presented at technical workgroup meetings and shared with licensing participants throughout the first 5 months of 2012. In response to these 52 study requests, AEA is proposing to undertake all but one of these requested resource studies, with some alternations and adjustments. Most of the AEA proposed studies essentially consolidate the various study requests by specific resource areas. In this fashion, the overwhelming majority of the study requests have been incorporated into this PSP Document. These studies will provide information needed to investigate potential effects to environmental resources resulting from Project construction and operation.

This PSP contains a total of 58 individual study plans that have been prepared in consultation with licensing participants. The study plans are organized by corresponding natural resource topical areas and contained within each respective resource section of the PSP. For each proposed study within a resource area, the PSP provides all information specified under FERC's Integrated Licensing Process (ILP) requirements (18 CFR §5.11) along with additional information about the proposed study including specific documentation of consultation relevant to the study plan development. Prior to descriptions of AEA's proposed studies, in Section 3 of the PSP, AEA addresses a study that was requested by Natural Heritage Institute and American Whitewater that AEA has not adopted in the PSP. As noted above, for the remaining 51 study requests, AEA has substantially adopted these proposals, however we have not completely adopted each request (please refer to individual study plans for specific details).

The proposed study descriptions in this document have been developed to supplement the existing information summarized in the PAD and address issues associated with construction and operation of the proposed Project. Information obtained through these studies, when combined with existing information, will also be used to develop any necessary protection, mitigation, and enhancement measures (PM&E) to be included in the new Project license.

1.1. Process and Schedule Overview

From the filing of the NOI and PAD through May 2012, many interested parties including TWG participants filed comments on the PAD, on FERC's Scoping Document 1, and in some cases on AEA's proposed studies. In addition many parties have provided their own study requests or comments relating to the need for additional studies. AEA has taken these comments into account in developing its PSP. In addition, consistent with 18 CFR § 5.11(e), AEA will hold an initial study plan meeting within 30 days of filing of the PSP for the purpose of clarifying the PSP and any initial information gathering or study requests, and resolving any outstanding issues with interested licensing participants regarding the PSP. The initial study plan meeting will consist of five separate meetings organized by major resource topical area, in Anchorage at AEA's Susitna-Watana Hydroelectric Project offices, on August 8, 9, 15, 16 and 17, 2012. AEA is intending to work closely with all interested licensing participants on reviewing and updating the proposed study plans during the period leading up to filing of the revised study plan.

The ILP regulations allow 90 days for interested parties to comment on the PSP which will culminate in all comments being filed with FERC by October 15, 2012. In addition to the initial

study plan meeting, AEA will engage in further efforts, as needed, to attempt to resolve study issues through a series of TWG meetings scheduled for October 16, 17, 23, 24 and 25, 2012. By November 14, 2012, within 30 days of the due date from comments on the PSP, AEA will file its Revised Study Plan (RSP) containing all revised study descriptions and an explanation of all efforts made to resolve any remaining differences over study requests. Comments on the RSP will be due from interested parties by November 29, 2012.

FERC is scheduled to issue its study plan determination by December 14, 2012, within 30 days from filing of the RSP (18 CFR §5.13 (c)). A federal agency with FPA Section 4 (e) or Section 18 mandatory conditioning authority, or the agency with authority to issue Clean Water Act Section 401 water quality certification for the Project, may file a formal notice of dispute if its disagrees with an element of the Study Plan Determination directly applicable to its mandatory conditioning authority. If so, the formal dispute resolution process will be initiated, as provided for under 18 CFR §5.14. In that case, FERC will issue a final study plan dispute determination for the disputed study plan components no later than March 2013. Interim updates for all studies being conducted by AEA will be made through periodic technical workgroup meetings scheduled at least quarterly through 2013 and 2015. The intent of the meetings is to update interested parties with information on study progress, initial results, and changes to anticipated conditions or study methodologies. AEA will provide up to 30 days review on materials presented at workgroup meetings. All studies other than ice processes are expected to be completed by the end of 2014 and final results presented in updated study reports and the ensuing documentation included in AEA's license application. The ice processes study is expected to be completed by end of March 2015, with updated results also included in the license application. The updated process, plan, and schedule for the Project is provided in Table 1.1-1, which includes additional detail regarding specific study dispute resolution steps and milestones. AEA has included timeframes for Formal Dispute Resolution, highlighted in yellow [18 CFR 5.14] even though AEA hopes to resolve any study disputes informally by working directly with interested parties to reach consensus.

1.2. Project Facilities and Operations

This section provides a brief overview of the Project location, facilities and proposed operational characteristics. At this time there are no new updates from the descriptions in the PAD, other than the study area boundaries for the transmission and road corridors have been slightly revised, but those revisions have not changed the basic alignment or orientation of the study corridors. For more detail regarding the Project facilities and operational characteristics, please refer to the PAD (AEA 2011; available on the Susitna-Watana Hydroelectric Project website, http://www.susitna-watanahydro.org. The proposed Project is located in the Southcentral region of Alaska, approximately 120 miles (mi) north-northeast of Anchorage and 110 mi south-southwest of Fairbanks. As proposed, the Project would include construction of a dam, reservoir and power plant on the Susitna River starting at river mile (RM) 184, approximately 34 mi upstream of Devils Canyon. Transmission lines connecting into the existing Railbelt transmission system and an access road would also be constructed. Because engineering and environmental studies are helping define the locations and configurations of the Project components, the current study area for the Project is larger than that which will be proposed as the Project Boundary and includes alternative transmission and road corridors that may eventually be narrowed down to one or two proposed corridors (Figure 1.2-1).

Dam and Reservoir

As currently envisioned, the Project would include a large dam with a 20,000-acre (ac) reservoir. The type and height of dam construction are still being evaluated as part of ongoing engineering feasibility studies, but early comparisons have demonstrated that it will most likely be a roller-compacted concrete structure. The dam has a nominal crest elevation at elevation (El.) 2,025 ft mean sea level (msl) corresponding with a maximum height of approximately 700 ft above the foundation and a crest length of approximately 2,700 ft. Following completion of the feasibility studies, a nominal crest elevation up to El. 2,125 ft msl may be proposed in the license application; this would correspond to a maximum dam height of up to 800 ft above the foundation.

The Watana Reservoir, at normal operating level of El. 2,000 ft msl, will be approximately 39 mi long with a maximum width of approximately 2 mi. The total water surface area at normal operating level is approximately 20,000 ac. The minimum reservoir level will be 1,850 ft msl during normal operation, resulting in a maximum drawdown of 150 ft. However, a maximum drawdown of up to 200 feet is still being considered. The reservoir will have a total capacity of 4.3 million ac-ft, of which 2.4 million ac-ft will be active storage.

Construction materials for the dam and appurtenant structures will utilize, as far as possible, rock from the structure excavations to minimize the quarry development. Stable excavations and rock cuts will be designed with suitable rock reinforcement and berms.

Thick alluvial deposits will be removed from the river bed in order to found the dam on sound bedrock.

Hydroelectric Facilities

The powerhouse will be located immediately downstream of the dam, and will house three generating units, each with a nominal capability of 200 MW unit output under average net head (which will be close to the design head) for a total plant capacity of 600 MW under average head. However, based on discussions with Railbelt utilities regarding electrical system reliability, AEA may propose up to four units with a nominal capacity of 150 MW and a total capacity of 600 MW. The capacity of the Project eventually proposed for licensing could extend up to 800 MW. The exact sizing and number of units may change as a result of further transmission system studies.

The average annual energy of the project will be 2,500,000 megawatt hours. If only three units are proposed, the powerhouse will be designed and constructed with an extra empty generating unit bay for the potential installation of a fourth unit at a future time. There would be two outlet works facility structures and four power intake structures (one corresponding to the extra unused powerhouse bay if three units are proposed). The outlet works facility in conjunction with the three powerhouse units will be sized to allow discharge of a 50-year flood before flow would be discharged over the spillway.

Ancillary Facilities

Construction of the Watana Dam site development will require various facilities to support the construction activities throughout the entire construction period. Following construction, the operation of the Project will require a small permanent staff and facilities to support the permanent operation and maintenance (O&M) program.

The most significant item among the temporary site facilities will be a construction camp. The construction camp will be a largely self-sufficient community normally housing approximately 800 persons, but with a peak capacity of up to 1,000 people. After construction, AEA plans to remove most of the camp facility, leaving only those aspects that are to be used to support the smaller permanent residential and operation and maintenance facilities.

Other site facilities include contractor work areas, site power, services, and communications. Site power and fiber optic cabling will be brought either on the transmission line route, or along the side of the access road. Items such as power and communications will be required for construction operations, independent of camp operations.

Permanent facilities will include community facilities for O&M staff members and any families. Other permanent facilities will include maintenance buildings for use during operation of the power plant.

The airstrip and helicopter/airplane hard standing will be left in place after construction.

Transportation Access

There would be both temporary and permanent site access facilities to provide a transportation system to support construction activities, and to facilitate orderly development and maintenance of the Project. The current planning assumes restricted public access during construction for safety considerations. Another goal is to co-locate access roads and transmission facilities, to the extent possible, in the same corridor to minimize environmental impacts

Three possible alternatives for access roads and transmission lines have been identified for the Project (Figure 1.2-1). Two of the alternatives would accommodate east-west running transmission lines in combination with a new site access road connecting to the Anchorage-Fairbanks Intertie Transmission line and the Alaska Railroad. One of these corridors, designated as the Chulitna Corridor, would run north of the Susitna River, and extend to the Chulitna siding area. The other alternative, designated as the Gold Creek Corridor, would run south of the Susitna River, and extend to the Gold Creek area. A third corridor, designated as the Denali Corridor, would run due north, connecting the Project site to the Denali Highway by road over a distance of about 44 mi. If a transmission line is constructed along this corridor, it would be extended westward along the existing Denali Highway and connect to the Alaska Intertie near Cantwell.

If the Denali Corridor is selected the affected sections of the Denali Highway will be upgraded in order to facilitate safe construction of the Project. The Denali Highway would not be a part of the Project.

Regardless of which road is chosen, the majority of the new road will follow terrain and soil types that allow construction using side borrow techniques, resulting in a minimum of disturbance to areas away from the alignment. A berm type cross section will be formed, with the crown of the road being approximately 2 to 3 ft above the elevation of adjacent ground. To reduce the visual impact, the side slopes will be flattened and covered with excavated peat and other naturally occurring materials. A 200-foot right-of-way will be sufficient for this type of construction.

Permanent access to the Watana Dam site will connect with the existing Alaska Railroad either at Chulitna, Cantwell or Gold Creek, where at the chosen location a railhead and storage facility occupying up to 40 ac will be constructed alongside the existing passing bays. New sidings of a

length up to 5,000 ft will be constructed so that off-loading and transfer of goods and materials can take place without interrupting the operations of the Alaska Railroad Corporation (ARRC). This facility will act as the transfer point from rail to road transport and as a backup or interim storage area for materials and equipment, and as an inspection and maintenance facility for trucks and their loads. Within the 40 ac would be a small residential camp for drivers trucking equipment to the construction site, for laborers and staff operating the transfer, and for support staff such as cooks and maintenance workers.

If the Denali Corridor is chosen for road access, in the community of Cantwell the pavement on the first section of the Denali Highway will be extended for a distance of approximately 4 mi to eliminate any problem with dust and flying stones. In addition, the following measures will be taken:

- Speed restrictions will be imposed along appropriate segments;
- Improvements will be made to the intersections including pavement markings and traffic signals.

Electric Transmission Facilities

The transmission lines will begin at Watana Dam and consist of three 230-kV lines, in either single or double-circuit configuration The same three corridors under consideration for the access road are also those under consideration to connect the Project primary transmission lines to the Alaska Intertie. One or two corridors may be chosen. Depending on which corridor is, or corridors are, chosen, the transmission system will include a switching station in the point of tie in (at Chulitna, Gold Creek or Cantwell). From the Watana substation, the transmission corridors are essentially co-located with the corridors for the access roads except for two specific areas:

1) For the northern westward route (Chulitna Corridor), only the first five mi of the double circuit 230-kV transmission lines will not follow the coincident road corridor. The two lines will cross the river from the switchyard (together with the line destined for the northern route) in a northerly direction for two mi, after which the two lines will turn northwesterly to cross Tsusena Creek and three mi later will intersect the Chulitna road corridor. At the extreme westerly end of the corridor, it will widen to facilitate the divergence of the road and the transmission line which will continue to a switching station on the Alaska Intertie.

2) For the southern westward route (Gold Creek Corridor) the transmission lines would not follow the planned road corridor, rather the transmission lines can span the rough topography running more parallel to the Susitna River. Near the westerly end of the corridor, both the transmission lines and road can be co-located into one single corridor all the way to Gold Creek where the transmission lines would terminate in a new switching station on the existing Alaska Intertie.

For the northern route, the only divergence between the road and transmission line corridor will occur at Deadman Lake, at which location the road will be aligned west of Deadman Hill, while the transmission will follow a lower elevation corridor on the east of the hill. Both corridors will rejoin some 9 mi later on the north side of the Deadman Hill. At the Denali Highway, the northern transmission corridor will turn west and continue along the Denali Highway to the Cantwell switching station.

The right-of-way for the transmission lines within the corridors will consist of a linear strip of land. The width will depend on the number of lines. The transmission rights-of-way will be 200, 300, or 400 feet, depending on whether one, two, or three lines run in parallel.

The switching and substations will occupy a total of approximately 16 ac.

Rights-of-way for permanent access to switchyard and substations will be required linking back to the permanent site access road. These rights-of-way will be 100 ft wide.

Access to the transmission line corridors will be:

a) Via unpaved vehicle access track from the permanent access roads at intermittent points along the corridor. The exact location of these tracks will be established in the final design phase.
b) By helicopter, where there is no access road projected.

Within the transmission corridor itself an unpaved vehicle access track 25 ft wide will run along the entire length of the corridor, except at areas such as major river crossings and deep ravines where an access track would not be utilized for the movement of equipment and materials.

Project Operations

Project flexibility is important to Railbelt utilities. AEA proposes to operate the Project in a load-following mode such that firm energy is maximized during the critical winter months of November through April each year to meet Railbelt utility load requirements. To accomplish load following, the reservoir would be drafted annually by an average of about 120 ft to 150 ft, but a maximum drawdown of 200 feet is still under consideration. Minimum instream flow releases would be made through either the powerhouse or low level outlet works. Flow discharges through the powerhouse under this operating plan would range from the minimum required instream flow release (yet to be determined) to a high of about 14,500 cfs (based on 600 MW nominal installed capacity) during times of maximum power generation. On rare occasions when the power plant is off line during emergency outages, instream flow releases would be made through the low-level outlet works in Watana Dam. Daily power generation during the peak winter months would average about 6,000 MWh and powerhouse discharges would average approximately 6,700 cfs during that time.

For load following purposes, powerhouse discharges are expected to vary over a 24-hour period during the peak winter months, typically ranging from a low of 3,000 cfs to a high of 10,000 cfs. They could be as high as 14,500 cfs (at maximum plant output based on a 600 MW project) for short periods of time during the day to meet load spikes or emergency conditions. The daily flow variation may be constrained because of environmental needs. For a Base Case preliminary test case operating plan, initial model runs have been made using the Case E-VI minimum instream flow criteria developed during the 1980s project studies. Those criteria specified a minimum wintertime flow release of 2,000 cfs and a minimum summertime flow release of varying amounts at or above about 9,000 cfs. At this time, for planning purposes, AEA is considering a minimum winter flow of not less than 3,000 cfs. During the winter the average daily flow would be gradually increased to reflect colder conditions in January and February. The average daily flows would be gradually reduced during March and April.

The average annual generation from the Project is estimated to be about 2,500,000 MWh. This amount is equivalent to about half of the current annual Railbelt generation.

Construction Schedule

The current Project schedule allows 12 years for Project development including: FERC licensing, license implementation, design and contracting, construction, demobilization, and site restoration. Several assumptions have been made regarding the times required for the various activities.

The following are the time periods for major components of Project Development:

- Total schedule – 12 years, 2012-2023
- Pre-Application studies and related activities 3.5 years
- FERC and Cooperating agencies post-filing activities – approximately 1.5 years.
- Project Construction – 6.5 years
- Reservoir filling – one to two years
- Site Restoration – throughout construction.

Design work would be initiated or completed prior to issuance of the license, so that contracts critical to the schedule (such as access roads and construction support facilities) will be ready to be awarded shortly after issuance of the license and subsequent approvals.

Study Area

As show in Figure 1.2-1, the whole study area under evaluation consists of 186,275 acres. The reservoir study area includes all lands and waters up to elevation 2,200 feet that encompass approximately 45,321 acres. The transmission and road corridor study areas encompass the following acreages (approximate):

Gold Creek Corridor – 59,750 acres

Denali Corridor – 45,097 acres

Chulitna Corridor – 36,107 acres

1.3. 2012 Early Study Efforts

AEA is currently undertaking initial studies during 2012 in order to inform the study planning process and provide updated information that supplements existing information. In some cases, updating information consists of taking information developed in the 1980s and converting it into modern digital datasets for use in comparative analysis with the new information being obtained in the FERC formal studies. The following list identifies the specific 2012 studies; please refer to Attachment 1-2 for a summary of each study effort.

Water Resources

- Review of Existing Water Temperature Model Results and Data Collection
- Aquatic Habitat and Geomorphic Mapping of the Middle River Using Aerial Photography
- Reconnaissance-Level Geomorphic and Aquatic Habitat Assessment of Project Effects on Lower River Channel
- Documentation of Susitna River Ice Breakup and Formation

Instream Flow

- Instream Flow Planning Study
- River Flow Routing Model Data Collection

Fish and Aquatic Resources

- Synthesis of Existing Fish Population Data
- Adult Salmon Distribution Habitat Utilization Study
- Upper Susitna River Fish Distribution and Habitat Study
- Cook Inlet Beluga Whale Anadromous Prey Analysis

Botanical Resources

- Vegetation and Wildlife Habitat Mapping Study
- Wetland Mapping Study
- Riparian Study

Wildlife Resources

- Eagle and Raptor Nest Study
- Past and Current Big Game Harvest Study
- Wildlife Habitat Use and Movement Study

Recreation and Aesthetic Resources

- Aesthetic and Recreation Resources Study

Cultural Resources

- Cultural Resources Study

1.4. Tables

Table 1-1. Summary of TWG meetings since development of the PAD.

Comment Format	Date	Licensing participant	Affiliation	Subject
Technical Workgroup Meeting Notes	01/24/2012	USFWS, NMFS BLM, NPS, ADF&G, ADNR, FERC, The Nature Conservancy, Natural Heritage Institute, Alaska Conservation Alliance, Knik Tribe, Chugach Electric Association, Nuvista Light & Power, and other interested parties	Variety	• PAD Project Description • Formal Study Planning Process
Technical Workgroup Meeting Notes	01/24/2012	AEA, USFWS, NMFS, BLM, NPS, ADF&G, ADNR, The Nature Conservancy, Natural Heritage Institute, Alaska Conservation Alliance, Knik Tribe, Chugach Electric Association, Nuvista Light & Power, and other interested parties	Variety	• Instream Flow Studies
Technical Workgroup Meeting Notes	1/25/2012	AEA, USFWS, NMFS, BLM, NPS, ADF&G, ADNR, FERC, The Nature Conservancy, Natural Heritage Institute, Alaska Conservation Alliance, Knik Tribe, Knikatnu Inc, , Nuvista Light & Power, and other interested parties	Variety	• Flow Routing Model Transect Data Collection • Water Temperature Data Models • Geomorphology, Bedload/Suspended Sediment Studies • Ice Processes Study
Technical Workgroup Meeting Notes	1/25/2012	AEA, USFWS, NMFS, BLM, NPS, ADF&G, ADNR, FERC, The Nature Conservancy, Natural Heritage Institute, Alaska Conservation Alliance, Knik Tribe, Knikatnu Inc, Nuvista Light & Power, , and other interested parties	Variety	• Fisheries studies
Technical Workgroup Meeting Notes	1/26/2012	AEA,USFWS, NMFS, BLM, NPS, ADF&G, ADNR, FERC, Natural Heritage Institute, Knikatnu Inc, Knik Tribe, Nuvista, and other interested parties	Variety	• Terrestrial Resources Studies
Technical Workgroup Meeting Notes	02/27/2012	AEA, ADF&G, ADNR, BLM, DHSS, DOWL HKM, EPA-ADO, FERC, Knikatnu Inc., Natural Heritage Institute, NPS, USFWS, and other interested parties	Variety	• Recreation • Aesthetics • Socioeconomics • Transportation • Health Impact Assessment
Technical Workgroup Meeting Notes	02/28/2012	AEA, ADF&G, ADHSS-HIA, ADNR, BLM, EPA, FERC, USFWS, NPS, Chuck Akers, Ahtna Inc., Natural Heritage Institute, and other interested parties	Variety	• Cultural & Paleontological Resources • Subsistence Resources

Comment Format	Date	Licensing participant	Affiliation	Subject
Technical Workgroup Meeting Notes	03/01/2012	AEA, USFWS, NMFS, BLM, NPS, ADF&G, ADNR, FERC, Natural Heritage Institute, Hydropower Reform Coalition, Susitna River Advisory Committee, Alaska Ratepayers, and other interested parties	Variety	• Water Resources, River Routing Study • Geomorphology • Ice Processes Studies • Fish and Aquatic Resources Studies • Beluga Whale Studies
Technical Workgroup Meeting Notes	03/02/2012	AEA, USFWS, NMFS, BLM, NPS, ADF&G, ADNR, FERC, Natural Heritage Institute/Hydropower Reform Coalition, Alaska Ratepayers, and other interested parties	Variety	• Instream Flow Studies • Water Quality Studies
Technical Workgroup Meeting Notes	04/02/2012	ADF&G, USFWS, BLM, NPS, AEA,FERC, and other interested parties	Variety	• Wildlife Studies • Botanical Studies
Technical Workgroup Meeting Notes	04/03/2012	AEA, ADF&G, ADNR, BLM, FERC, Natural Heritage Institute, NPS, and other interested parties	Variety	• Socioeconomics • Transportation • Air Quality • Recreation & Aesthetics • Subsistence • Cultural & Paleontological Resources
Technical Workgroup Meeting Notes	04/04/2012	AEA, USFWS, NMFS, BLM, ADF&G, ADEC, ADNR, Natural heritage Institute/Hydropower Reform Coalition, Coalition for Susitna Dam Alternatives, Alaska Ratepayers, Mike Wood, and other interested parties	Variety	• Water Quality Study • HecRES/Hydrology
Technical Workgroup Meeting Notes	04/05/2012	ADNR, ADF&G, BLM-Glennallen, FERC, NMFS, USFWS,USGS, Mike Wood, Natural Heritage Institute, The Nature Conservancy, and other interested parties	Variety	• Cook Inlet Beluga Whale Studies • USGS Susitna Basin Hydrological Study Plan • Fish and Aquatic Resources Studies
Technical Workgroup Meeting Notes	04/06/2012	AA, USFWS, NMFS, BLM, USGS, ADF&G, ADNR, FERC, Natural Heritage Institute/Hydropower Reform Coalition, Alaska Ratepayers, Mike Wood, and other interested parties	Variety	• Fluvial Geomorphology Modeling below Watana Dam • Geomorphology Study • Ice Processes

Comment Format	Date	Licensing participant	Affiliation	Subject
Technical Workgroup Meeting Notes	06/06/2012	ADF&G, AHTNA, BLM, DNR OPMP, EPA, Natural Heritage Institute, NPS, USFWS, and other interested parties	Variety	• Mammals (not marine) • Avian & Amphibian Species • Other Wildlife Studies (Habitat Evaluation, Harvest Data, Mercury Risk Assessment) • Wetland & Riparian Studies • Vegetation Mapping, Invasive & Rare Plant Studies
Technical Workgroup Meeting Notes	06/07/2012	AEA, ADF&G/DOS, ADNR-OPMP, AHTNA, BLM, EPA, FERC, HDR Alaska, MSB, Natural Heritage Institute, NOAA Fisheries, NPS, , USFWS, Knik Inc., and other interested parties	Variety	• Socioeconomics (Including Regional Economics) • Transportation • Air Quality • Recreation & Aesthetic Resources • Subsistence • Cultural & Paleontological Resources
Technical Workgroup Meeting Notes	06/12/2012	AEA, USFWS, NMFS, BLM, Coalition for Susitna River Dam Alternatives, EPA, ADF&G, FERC, Natural Heritage Institute/Hydropower Reform Coalition, MSB Fish and Wildlife, Susitna River Advisory Committee, Alaska Ratepayers	Variety	Fish and Aquatic Resources Study Plan Development • Cook Inlet Beluga Whale Study • Fish and Aquatic Resources Studies
Technical Workgroup Meeting Notes	06/13/2012	AEA, USFWS, NMFS, ADF&G, ADEC, ADNR, BLM, EPA, USGS, FERC, Natural Heritage Institute/Hydropower Reform Coalition, Alaska Ratepayers, Coalition for Susitna Dam Alternatives and other interested parties	Variety	• Baseline Water Quality Study • Water Quality Modeling Study • Instream Flow and Groundwater-related Aquatic Habitat Studies • Riparian Instream Flow Study
Technical Workgroup Meeting Notes	06/14/2012	AEA, USFWS, BLM, NMFS, Coalition for Susitna River Dam Alternatives, EPA, ADF&G, ADNR, NPS, USGS, Natural Heritage Institute/Hydropower Reform Coalition, FERC, and other interested parties	Variety	• Geomorphology and Fluvial • Geomorphology Modeling Studies • Ice Processes Study

Notes
ADEC – Alaska Department of Environmental Conservation
ADF&G – Alaska Department of Fish and Game
ADHSS (DHSS) – Alaska Department of Health and Social Services
HIA – Health Impact Assessment Program
ADNR – Alaska Department of Natural Resources
OPMP-Office of Project Management/Permitting
BLM – United States Department of Interior, Bureau of Land Management
EPA – United States Environmental Protection Agency
AOO – Alaska Operations Office
FERC – Federal Energy Regulatory Commission
NMFS – NOAA National Marine Fisheries Service
NPS – United States Department of Interior, National Park Service
USFWS – United States Department of Interior, Fish and Wildlife Service
USGS – United States Department of Interior, Geological Survey

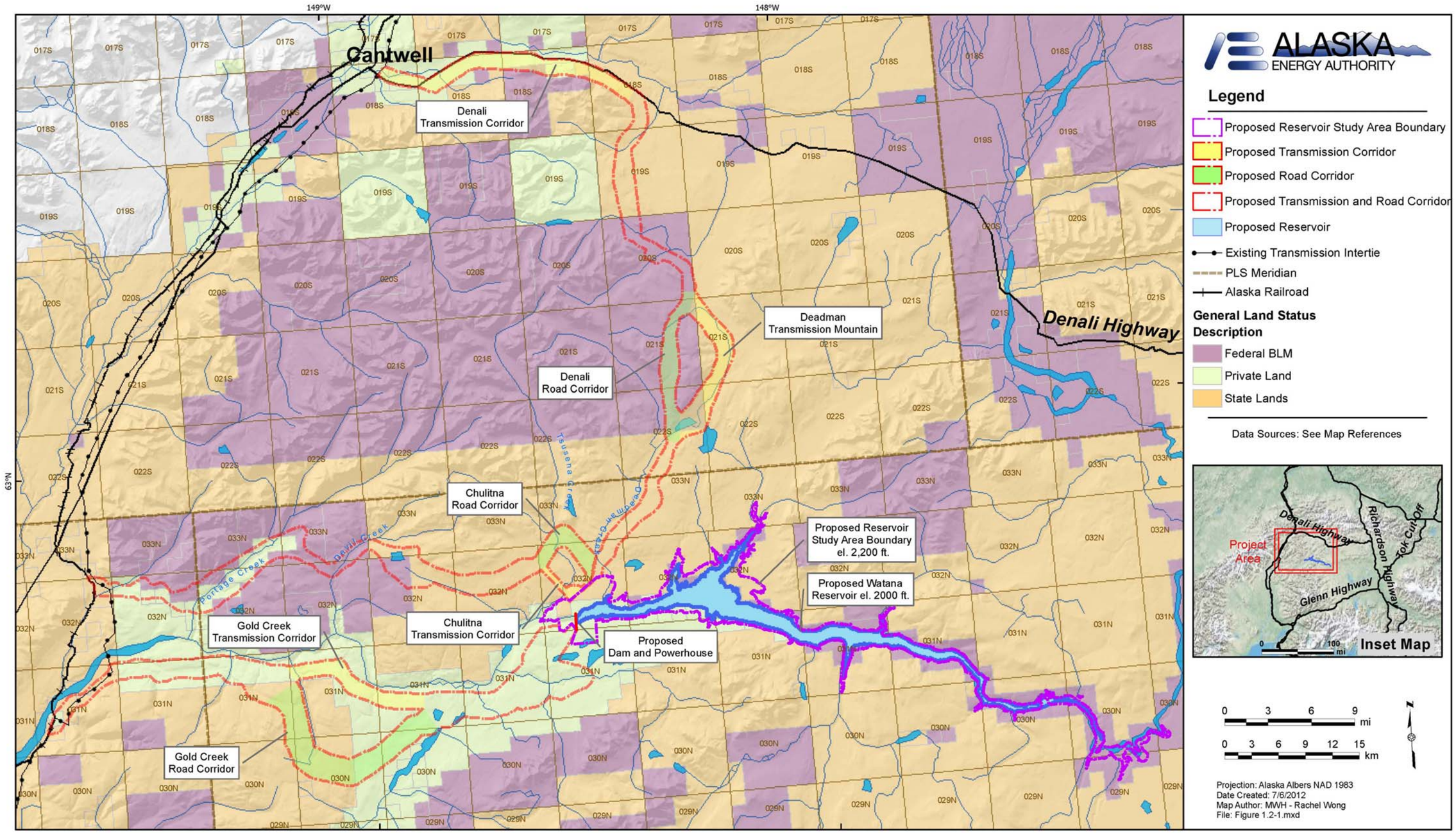
Table 1.1-1. Project Process Plan and Schedule (dispute process highlighted in yellow).

Responsible Party	Pre-Filing Milestone	Date	FERC Regulation
AEA	Issue Public Notice for NOI/PAD	12/29/11	5.3(d)(2)
AEA	File NOI/PAD with FERC	12/29/11	5.5, 5.6
FERC	Tribal Meetings	1/30/12	5.7
FERC	Issue Notice of Commencement of Proceeding and Scoping Document 1	2/23/12	5.8
FERC	Scoping Meetings	3/26-29/12	5.8(b)(viii)
All licensing participants	PAD/SD1 Comments and Study Requests Due	5/31/12	5.9
FERC	Issue Scoping Document 2 (if needed)	7/16/12	5.1
AEA	File Proposed Study Plan (PSP)	7/16/12	5.11(a)
All licensing participants	Proposed Study Plan Initial Meeting	8/8-17/12	5.11(e)
All licensing participants	Proposed Study Plan Comments Due	10/15/12	5.12
All Licensing participants	Proposed Study Plan TWG Meetings	10/16-25/12	N/A
AEA	File Revised Study Plan	11/14/12	5.13(a)
All licensing participants	Revised Study Plan Comments Due	11/29/12	5.13(b)
FERC	Director's Study Plan Determination	12/14/12	5.13(c)
Mandatory Conditioning Agencies only	Any Study Disputes Due	1/3/13	5.14(a)
Dispute Panel	Third Dispute Panel Member Selected	1/18/13	5.14(d)
Dispute Panel	Dispute Resolution Panel Convenes	1/23/13	5.14(d)(3)

AEA	Applicant Comments on Study Disputes Due	1/28/13	5.14(j)
Dispute Panel	Dispute Resolution Panel Technical Conference	2/4/13	5.14(j)
Dispute Panel	Dispute Resolution Panel Findings Issued	2/22/13	5.14(k)
FERC	Director's Study Dispute Determination	3/14/13	5.14(l)
AEA	First Study Season	March-November 2013	5.15(a)
AEA	Initial Study Report	12/16/13	5.15(c)(1)
All licensing participants	Initial Study Report Meeting	1/6/14	5.15(c)(2)
AEA	Initial Study Report Meeting Summary	1/21/14	5.15(c)(3)
All licensing participants	Any Disputes/Requests to Amend Study Plan Due	2/20/14	5.15(c)(4)
All licensing participants	Responses to Disputes/Amendment Requests Due	3/24/14	5.15(c)(5)
FERC	Director's Determination on Disputes/Amendments	4/23/14	5.15(c)(6)
AEA	Second Study Season	January – October 2014	5.15(a)
AEA	Updated Study Report due	12/15/14	5.15(f)
All licensing participants	Updated Study Report Meeting	1/5/15	5.15(f)
AEA	Updated Study Report Meeting Summary	1/20/15	5.15(f)
All licensing participants	Any Disputes/Requests to Amend Study Plan Due	2/19/15	5.15(f)
All licensing participants	Responses to Disputes/Amendment Requests Due	3/24/15	5.15(f)
FERC	Director's Determination on Disputes/Amendments	4/23/15	5.15(f)
AEA	File Preliminary Licensing Proposal	4/14/15	5.16(a)
All licensing participants	Preliminary Licensing Proposal Comments Due	7/13/15	5.16(e)
AEA	File Final License Application	9/11/15	5.17
AEA	Issue Public Notice of License Application Filing	9/11/15	5.17(d)(2)

1.5. Figures

Figure 1.2-1. Susitna-Watana Project Area.



1.6. Attachments

ATTACHMENT 1-1. TECHNICAL WORKGROUP MEETING NOTES

ATTACHMENT 1-2. LIST OF 2012 EARLY STUDY EFFORTS

ATTACHMENT 1-1
TECHNICAL WORKGROUP MEETING NOTES

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Aquatic and Terrestrial Resources Study Planning Meetings
January 24, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

PAD and 2012 ILP Activities Overview Meeting, January 24, 2012, 8:30 a.m. - Noon

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
AEA	Bryan Carey
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Jennifer Spegen
USFWS	Bill Rice
NMFS	Susan Walker (by phone)
NMFS	Eric Rothwell
NMFS	Tom Meyer (by phone)
BLM	Ben Kennedy
BLM	Tim Sundlov
BLM	Mike Sondergaard
BLM	John Jangala (by phone)
NPS	Cassie Thomas (by phone)
ADF&G	Joe Klein
ADF&G	Mark Burch
ADF&G	Joe Giefer
ADF&G	Ron Benkert
ADF&G	Jack Erickson
ADNR	Courtney Smith
FERC	David Turner (by phone)
FERC	Ken Wilcox (by phone)
The Nature Conservancy	Corrine Smith
Natural Heritage Institute	Jan Konigsburg
Alaska Conservation Alliance	Kate McKeoun
Knik Tribe	Theo Garcia
MWH	Kirby Gilbert
Long View Associates	Steve Padula
Long View Associates	Randall Filbert

Organization	Name
Cardno-ENTRIX	Craig Addley
Cardno-ENTRIX	Woody Trihey (by phone)
Northern Ecological Services	John Morsell (by phone)
R2 Resource Consultants	Dudley Reiser
ABR/GW Scientific	Dave Brailey
URS	Stephen Trimble
URS	Paul Dworian
HDR	James Brady
HDR	Michael Barclay
HDR	Laurie Cummings
HDR	Tracie Krauthoefer
HDR	Mark Dalton
Tetra Tech	Rob Plotnikoff
Tetra Tech	Christy Miller
DOWL HKM	Lana Davis
DOWL HKM	Hillary Lindh (by phone)
Northern Land Use	Richard Stern
E-Terra	Lars Gleitsmann
ARRI	Jeff Davis
Northwest Hydraulic Consultants	Dave Andres (by phone)
Crowther	Scott Crowther
Van Ness Feldman	Matt Love (by phone)
Chugach Electric Association	Ron Vecern
Nuvista Light & Power	Chuck Casper

Presentations

- Kirby Gilbert (MWH): Overview of PAD and List of Chapter 5 Study Plan Activities
- Kirby Gilbert (MWH): Overview of PAD Project Description and 2012 Engineering Activities
- Steve Padula (LVA): 2012 Formal Study Planning Process

PAD Project Description and 2012 Engineering Activities

Referring to the graph shown in Slide 12 of AEA's Susitna-Watana Project description presentation, Eric Rothwell (NMFS) noted that daily load following was presented only in terms of energy production (megawatts [MW]) and not flow. Eric asked for an estimate of the flow range corresponding to the range of energy production shown in the graph. Bryan Carey (AEA) stated that the minimum and maximum energy production values of 175 MW and 375 MW corresponded to flows of about 3,000 cfs and 10,000 cfs, respectively.

Eric stated that the impacts on aquatic resources due to daily and seasonal load following could be significant and expressed concern regarding AEA's proposed daily Project operations. Wayne Dyok (AEA) stated that AEA's final proposed daily and seasonal load following operations would be predicated to some extent on the nature and extent of resource impacts, including projected impacts on water temperature, ice dynamics, and fish habitat, among others, and that energy production would not be the sole driving force behind the Proposed Action. Mike Buntjer (USFWS) and Eric Rothwell (NMFS) requested that all graphs depicting potential Project operations show not only megawatts but flow (cfs) on their vertical axes. AEA agreed to provide both units on all future plots.

Eric Rothwell (NMFS) noted that AEA had identified potential alternatives that involved a larger dam than that proposed in the PAD and asked whether consideration had been given to alternatives involving a smaller dam. Bryan Carey (AEA) stated that AEA was currently making plans based on a dam with a nominal height of 700 feet but that the dam could be as low as 650 feet. Wayne Dyok (AEA) stated that the height of the proposed dam would be confirmed in 2012, adding that the Project would need to be integrated into the overall railbelt utility system and that railbelt system demand and potential environmental impacts would both be factored into the cost-benefit ratio that would ultimately dictate Project size. Bryan Carey added that developing a hydroelectric Project in a remote and severe environment such as the upper Susitna River would involve large fixed costs and that as a result too small a Project would not be cost effective.

Betsy McCracken (USFWS) noted that the effects of Project operation on river stage would vary with distance below the dam and asked how such attenuation would be addressed. Bryan Carey (AEA) stated that AEA was developing a hydraulic routing model that would be used to estimate flow-stage relationships along the river corridor.

Betsy McCracken (USFWS) noted that full build-out for the proposed Project would include four turbines and asked if natural resource studies would be based on the capacity of the Project with all four turbines in operation. Bryan Carey (AEA) stated that the Proposed Action involved building the Project with three generating units and a single empty penstock. Bryan stated that if AEA decided to install a fourth turbine in the future, such a modification would necessitate the filing of a license amendment for the proposed increase in Project capacity. At that time, said Bryan, environmental studies needed to assess operational changes would be undertaken.

Tom Meyer (NMFS) asked if the current timeline for the Project was based on the assumption that the proposed dam would be a roller-compacted concrete (RCC) structure. Bryan Carey (AEA) replied that a RCC dam would take less time to complete than a concrete rockfill dam and that the current schedule was based on construction of an RCC facility. Tom Meyer recommended that AEA make a final decision soon regarding construction methods, so that an accurate schedule, including potentially longer duration studies, could be established. Wayne Dyok (AEA) stated that the current plan was for 2013 and 2014 to be the main study seasons (with dam construction beginning in 2017), but studies would continue as needed, depending

on the results of the 2013-2014 studies and any unanticipated issues discovered during that time. Wayne added that a variety of monitoring programs would be established that would continue over the long term. Mike Buntjer (USFWS) asked how much longer a concrete rockfill dam would take to complete than a RCC dam. Bryan Carey replied that a concrete rockfill structure would take about two additional years to complete.

Mike Sondergaard (BLM) asked if a RCC dam would differ from a concrete rockfill structure in strength or other attributes. Bryan Carey (AEA) replied that the structures would be functionally equivalent; the primary difference would be duration of construction.

Jan Konigsburg (NHI) asked if the estimated cost of the Project included costs associated with transmission. Wayne Dyok (AEA) replied that estimates for the Project include the cost of establishing a transmission system from the powerhouse to the existing intertie, but did not include costs associated with any upgrades to the intertie. Wayne stated that AEA would coordinate with the railbelt utilities to apportion costs for upgrades to the intertie.

Betsy McCracken (USFWS) asked if there would be a railroad spur to the Project site. Bryan Carey (AEA) stated that there would not be a spur to the Project site. Materials would be shipped via the existing railroad to a siding constructed for the Project's use and then shipped by truck to the Project site.

2012 Formal Study Planning Process

Eric Rothwell (NMFS) asked if there was still time for stakeholders to comment on 2012 study plans. Kirby Gilbert (MWH) replied that 2012 study plans were still being developed and that agencies could comment on them through February 7, 2012. Kirby added that draft study plans would be posted on AEA's website during or immediately following the study planning meetings.

Betsy McCracken (USFWS) asked which of the 2012 aquatic and water resources studies would have lower river components. Kirby Gilbert (MWH) replied that many of the 2012 aquatic and water resources studies would have a lower river component and that AEA and its consultants would review the objectives of the studies during the upcoming meeting sessions.

Jenny Spegen (USFWS) asked if the impacts of proposed transmission lines would be addressed as part of a transportation resources study. Kirby Gilbert (MWH) replied that the impacts of the transmission lines would be assessed over a range of natural resources study areas, including, but not necessarily limited to, botanical, wildlife, cultural, and aquatic resources. Kirby Gilbert stated that the results of resource analyses would be used to refine the routes of transmission lines and access roads. Kirby explained that access roads and transmission lines would be co-located but that routes would diverge based on environmental conditions. Specifically, transmission line routes would be located at low elevations to avoid impacts to the lines from excess ice. However, low-elevation routes would be avoided for access roads in an attempt to minimize impacts to wetlands.

Tom Meyer (NMFS) asked what alternatives to the Proposed Action would be evaluated as part of FERC's National Environmental Policy Act (NEPA) analysis. David Turner (FERC) replied that FERC would evaluate a No Action alternative, the Proposed Alternative, and potentially a third alternative involving measures recommended by FERC staff.

Jan Konigsburg (NHI) asked how much information was needed by FERC in an ILP study request submitted by a stakeholder, specifically how much detail would be needed regarding proposed study methods. David Turner (FERC) replied that stakeholder study requests need not include detailed descriptions of study methods. What is needed is a clear description of objectives and the type and extent of information desired, i.e., sufficient detail to allow the applicant to develop a satisfactory study plan.

Tom Meyer (NMFS) stated that in other ILPs resource agencies had initiated dispute resolution because FERC had failed to clearly articulate the bases of its study determinations. David Turner (FERC) stated that FERC's ILP effectiveness study had shown that at times determinations based on project nexus and other criteria had not been adequately defined. However, FERC was now making a concerted effort to explain how all study criteria are factored into its study determinations. David added that he was aware of no instances in which necessary studies had been overlooked or omitted as part of an ILP process.

Steve Padula (LVA) explained that AEA was currently developing outlines of 2013-2014 studies and that AEA was willing to convert these into study requests that could be adopted by stakeholders and filed with FERC. In this way, stakeholders could avoid spending time writing requests for studies that AEA is planning to conduct and could instead focus their efforts on additional studies, if any, not identified by AEA. Stakeholders agreed that AEA's provision of study requests, as described by Steve, would be helpful and confirmed their acceptance of the proposed approach. Jan Konigsburg (NHI) noted that resource agencies have statutory authorities that make it possible that their study requests will identify needs beyond those addressed by AEA's study plans.

Joe Klein (ADF&G) expressed concern with the potential level of detail that would be included in study requests, i.e., to be filed by April 27, 2012. Steve Padula (LVA) acknowledged that implementation details would need to be worked out collaboratively following the filing of the study requests. Steve stated that the requests are meant to make sure that all information needs are being addressed, adding that AEA would work with stakeholders to finalize study implementation details during 2012. The process would culminate in the filing of the Revised Study Plan (RSP) with FERC in October 2012.

Jenny Spegen (USFWS) asked how the results of the 2012 studies would be factored into the 2013-2014 study planning. Steve Padula (LVA) replied that the completion dates of the 2012 studies would be staggered, that is, studies would be completed as soon as possible so that results could be used to refine the scopes of the 2013-2014 studies. Betsy McGregor (AEA) stated that the 2012 study plans included descriptions of the links between 2012 study efforts/results and 2013-2014 studies.

Jan Konigsburg (NHI) asked how study costs factor into FERC's determination of whether a study is warranted. David Turner (FERC) replied that FERC does not have specific criteria for evaluating the cost-benefit ratio of a proposed study. Rather, FERC evaluates whether the requested level of precision is commensurate with the stated information needs and makes a determination as to whether the cost is reasonable relative to the information that will be obtained. Steve Padula (LVA) stated that the FERC process also allows for the applicant to propose a less costly approach to a requested study, provided that the alternative approach would generate the information requested by the stakeholder.

Jan Konigsburg (NHI) asked if AEA had made progress on providing funding support to the federal agencies. Wayne Dyok (AEA) stated that AEA was still attempting to identify a means of providing support to some of the federal agencies involved in the licensing process, perhaps through the ADNR's Alaska Office of Project Management & Permitting (OPMP). Sue Walker (NMFS) said that NMFS had submitted a detailed letter to AEA in December 2011 that explained how AEA could provide support to NMFS. Sue said that as of January 24, NMFS had received no response from AEA regarding the letter.

Steve Padula (LVA) reviewed calendars showing proposed meeting dates and process milestones for February through May 2012. Betsy McCracken (USFWS) asked that the calendars be posted on AEA's website, and AEA stated that they would be posted following the meetings.

Cassie Thomas (NPS) stated that the National Park Service's primary areas of concern are recreation and aesthetic resources. Cassie noted that effects on these resources would be identified as the result of studies conducted in other resource areas, for example, instream flow analyses would shed light on potential Project impacts on recreational boating. Cassie stressed that it would be critical for stakeholders to be updated regularly on the comprehensive licensing program, i.e., the activities of all workgroups and subgroups, so that each stakeholder could be kept apprised of relevant issues and understand the links between resource areas. Cassie stated that stakeholders would require such updates in order to allocate their time effectively to the various licensing meetings and other activities. Steve Padula (LVA) stated that meeting summaries would contain details of workgroup/subgroup discussions, as well as lists of decisions and action items. Betsy McGregor (AEA) stated that meeting agendas would contain items to be addressed in meetings, as well as the time slots allocated to those issues. Betsy stated that between the agendas and the meeting summaries, stakeholder would have the information they need to make choices regarding how to direct their efforts. Sue Walker (NMFS) stated that AEA should appoint a dedicated note taker for all meetings and that meeting summaries should identify the individuals (and their affiliations) asking questions and making comments and clearly describe AEA's responses to the questions/comments. AEA agreed that meeting summaries would be structured in the manner requested.

John Jangala (BLM) noted that the data gap analysis report for cultural resources was not available on AEA's website. Steve Padula (AEA) explained that AEA could not post many cultural resources documents to the public website because they contain privileged

information. AEA agreed to send John Jangala (BLM) a copy of the cultural resources data gap analysis report.

Action Items

- AEA agreed to produce all future Project operations graphs so that they include both generation (MW) and flow (cfs).
- AEA agreed to post on its licensing website calendars showing proposed meeting dates and process milestones for February through May 2012, as well as all PowerPoint presentations given at the study planning meetings.
- AEA, with stakeholders' consent, agreed to provide draft 2013-2014 study requests that could be adopted by stakeholders and filed with FERC on April 27, 2012.
- AEA agreed to appoint a dedicated note taker for all licensing meetings and agreed that meeting summaries would identify the individuals (and their affiliations) asking questions and making comments and clearly describe AEA's responses to those questions/comments.
- AEA agreed to send John Jangala (BLM) a copy of the cultural resources data gap analysis report.

Instream Flow 2012 Study Planning Meeting, January 24, 2012, 1 – 4 p.m.

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
AEA	Bryan Carey
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Jennifer Spegen
USFWS	Bill Rice
NMFS	Susan Walker (by phone)
NMFS	Eric Rothwell
NMFS	Tom Meyer (by phone)
BLM	Ben Kennedy
BLM	Tim Sundlov
BLM	Mike Sondergaard
BLM	John Jangala (by phone)
NPS	Cassie Thomas (by phone)
ADF&G	Joe Klein
ADF&G	Mark Burch
ADF&G	Joe Giefer
ADF&G	Ron Benkert
ADF&G	Jack Erickson
ADNR	Courtney Smith
FERC	David Turner (by phone)
FERC	Ken Wilcox (by phone)
The Nature Conservancy	Corrine Smith
Natural Heritage Institute	Jan Konigsburg
Alaska Conservation Alliance	Kate McKeoun
Knik Tribe	Theo Garcia
MWH	Kirby Gilbert
Long View Associates	Steve Padula
Long View Associates	Randall Filbert
Cardno-ENTRIX	Craig Addley
Cardno-ENTRIX	Woody Trihey (by phone)
Northern Ecological Services	John Morsell (by phone)
R2 Resource Consultants	Dudley Reiser
ABR/GW Scientific	Dave Brailey
URS	Stephen Trimble
URS	Paul Dworian

Organization	Name
HDR	James Brady
HDR	Michael Barclay
HDR	Laurie Cummings
HDR	Tracie Krauthoefer
HDR	Mark Dalton
Tetra Tech	Rob Plotnikoff
Tetra Tech	Christy Miller
DOWL HKM	Lana Davis
DOWL HKM	Hillary Lindh (by phone)
Northern Land Use	Richard Stern
E-Terra	Lars Gleitsmann
ARRI	Jeff Davis
Northwest Hydraulic Consultants	Dave Andres (by phone)
Crowther	Scott Crowther
Van Ness Feldman	Matt Love (by phone)
Chugach Electric Association	Ron Vecern
Nuvista Light & Power	Chuck Casper

Presentations

- Craig Addley (Cardno-ENTRIX): 2012 Instream Flow Study

2012 Instream Flow Study

Joe Klein (ADF&G) stated that activities in 2012 would be critical to formulating a sound instream flow study that would address all pertinent resource issues. Joe stated that the 2012 study plan should make clear how the 2012 work will be incorporated into the larger multi-year instream flow study. Joe stated that it would be critical to properly delineate study reaches and identify the appropriate placement of representative transects. Joe stated that ADF&G would require a map showing the locations of all existing instream flow study transects. Betsy McGregor (AEA) stated that ADNR was currently developing a baseline map for the Project that would show transect locations from the 1980s studies. Corrine Smith (TNC) asked for clarification regarding ADNR's digitizing of 1980s data. Betsy McGregor replied that ADNR has assisted AEA in producing GIS products and has recently been tasked with producing a transect map. Betsy stated that historic data used in current analyses and data collected during 2012 and beyond, as applicable, would be incorporated into a geospatially-referenced relational database.

Referring to the proposed schedule in the 2012 Instream Flow Study Plan, Michael Barclay (HDR) suggested that November 2012 might be too late for a final technical memorandum, given that the schedule called for a final 2013-2014 Instream Flow Study Plan by the end of September. Betsy McGregor (AEA) acknowledged that the schedule was not ideal but stated

that the November deadline for the memo was selected to allow enough time to assimilate information gathered during the fall site visit and that interim materials would be prepared to inform the 2013-2014 study plan.

Steve Padula (LVA) stated that much of the results of the 2012 studies would be available to inform the scopes of the 2013-2014 study plans, but emphasized that implementation details would be refined by the workgroup into the beginning of 2013. Craig Addley (Cardno-ENTRIX) stated that any uncertainties would be addressed in the 2013-2014 study plans by identifying contingencies, i.e., explanations of how AEA would proceed depending on what is learned prior to the onset of the 2013 fieldwork. David Turner (FERC) stated that FERC's determination would function mainly to resolve potential disagreements, and conditional statements in the RSP would be acceptable, provided that there is a clear and defensible rationale for how to resolve any issues so that data quality and reliability are not compromised.

Joe Klein (ADF&G) stated that an important issue would be the proposed reservoir's impacts on fish access to tributaries flowing into the reservoir, including seasonal changes in tributary access resulting from variation in water surface elevation. Craig Addley (Cardno-ENTRIX) replied that the issue of tributary access in the reservoir reach would be addressed as part of the 2013-2014 studies.

Joe Klein (ADF&G) stated that researchers currently have a much better understanding of ice formation and breakup than they did in the 1980s and asked if AEA planned to employ new techniques to model ice dynamics. Wayne Dyok (AEA) stated that AEA intended to use state-of-the-art techniques to evaluate the effect of the proposed Project on ice dynamics downstream of the Project, adding that the faculty at the University of Alberta, which has expertise in this area, had employed the CRISSP model on the Peace River to assess the effects of hydropower projects on ice dynamics.

Joe Klein (ADF&G) stated that another important flow-related aspect of the river that required thorough analysis was the distribution and magnitude of groundwater upwelling. Betsy McGregor (AEA) stated that AEA could use thermal imaging to identify locations of groundwater upwelling. Joe Klein noted that the US Geological Survey (USGS) had floated portions of the Susitna River to map groundwater upwelling locations. Joe suggested that the USGS results could be used to ground-truth thermal imaging results. Craig Addley (Cardno-Entrix) stated that AEA could conduct a pilot study to assess the effectiveness of thermal imaging relative to the USGS data and if the results were favorable, apply the thermal imaging technique more widely.

Jenny Spegen (USFWS) noted that much of the 2012 Instream Flow Study Plan involved review, synthesis, and evaluation of 1980s data and asked what field data would be collected in 2012. Craig Addley (Cardno-ENTRIX) stated that preliminary study site selection would be initiated where appropriate data exist, and field visits would be conducted in September and October to refine potential study sites and assess modeling approaches. Craig stated that instream flow efforts would be coordinated with fieldwork conducted as part of the 2012

Middle River Habitat Utilization Study to select spawning sites for modeling where possible so that transect measurements could be collected over a range of flows starting in spring of 2013.

Eric Rothwell (NMFS) and Bill Rice (USFWS) stressed that all the aquatic and water resource evaluations were interrelated and that understanding the proposed Project's effects on fish and other aquatic biota would involve integrating the results of multiple efforts, including ice dynamics and geomorphology studies and modeling. Wayne Dyok (AEA) replied that AEA was aware of the interrelated nature of the analysis techniques and planned for its contractors to coordinate with each other and with the technical workgroups to ensure that Project effects are adequately assessed. Craig Addley (Cardno-ENTRIX) stated that the instream flow study would be the central element of the impact assessment for aquatic resources, with all other study and modeling elements providing input to the instream flow assessment. Craig acknowledged that ideally most of the fish studies would be conducted first to provide the input needed for modeling; however, the ILP schedule is such that efforts must be conducted in parallel. Craig stated that although the integration of studies and modeling would be challenging, it could be done.

Michael Barclay (HDR) asked what instream flow study methods were likely to be used. Craig Addley (Cardno-ENTRIX) stated that it was likely that a mix of methods would be applied, depending on the habitat being analyzed. For example, one-dimensional modeling would likely be most appropriate for the mainstem, whereas two-dimensional modeling or expert habitat mapping over a range of flows might be the best approach in smaller and potentially more complex habitats, such as sloughs or side channels. Joe Klein (ADF&G) noted that it would be critical to decide soon not only what methods would be used in which habitats but also to identify measurement locations and intensities, as well as the flows at which data collection would occur.

Joe Klein (ADF&G) noted that habitat suitability criteria (HSC) for certain resident fish species represented a data gap that would need to be filled before instream flow modeling could be conducted. Craig Addley (Cardno-ENTRIX) agreed, noting that upstream of Devils Canyon instream flow modeling would be focused primarily on select resident fish species. Craig stated that data would be needed to confirm which mesohabitats these fish species use and what their microhabitat preferences are within those habitats. Joe Klein added that HSC information for some of the resident species had been developed for use in Canada and that these HSC curves might be suitable for the Susitna River, pending their verification against some level of site-specific data. Joe Klein stated that ADF&G had documented the longitudinal distribution of nonnative northern pike in the Susitna River, but HSC curves would need to be developed/agreed upon to model pike habitat use.

Jan Konigsburg (NHI) stated that Project effects on anadromous fish species other than salmon, eulachon in particular, would need to be properly assessed. Betsy McCracken (USFWS) added that Pacific lamprey and humpback whitefish habitat use is not well understood, particularly that of lamprey ammocoetes. Betsy McGregor (AEA) stated that

eulachon would be assessed not only as part of the instream flow analysis but also as part of the beluga whale prey availability and access evaluation.

Tim Sundlov (BLM) asked if AEA had or planned to develop aerial imagery of the upper Susitna River. Betsy McGregor (AEA) replied that AEA had partnered with Matanuska-Susitna Borough to gather LiDAR data and associated imagery of the Susitna River in 2011. The imagery and data is being processed and would be made available to stakeholders when comnpleted, which is expected to be May 2012.

Dudley Reiser (R2) stated that for the next set of aquatic/water resource workgroup meetings it would be advantageous to have the technical contractors–the entities who would conduct the 2012 studies and refine the 2013-2014 study plans–hired. Betsy McGregor (AEA) agreed, stating that AEA hoped to hire the contractors by mid February 2012. Betsy McGregor (AEA) stated that AEA expected that an Instream Flow Subgroup would be formed and would meet frequently–at times as often as biweekly–in 2012 to develop the scope of the 2013-2014 analyses.

Woody Trihey (Cardno-ENTRIX) asked if he should prepare a summary of the 1980s instream flow studies and findings for the February/March workgroup meetings, and Betsy McGregor (AEA) agreed that he should.

Action Items

- AEA agreed to provide stakeholders with a map showing the locations of all instream flow study transects once they have been defined.
- AEA stated that it hoped to hire the technical contractors–the entities who would conduct the 2012 studies and develop the 2013-2014 study plans–by mid February 2012, so that they could participate more actively in the February/March resource workgroup meetings.
- Woody Trihey (Cardno-ENTRIX) agreed to prepare a summary of instream flow study results from the 1980s for use at the March workgroup meetings.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Aquatic and Terrestrial Resources Study Planning Meetings
January 25, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Water Resources Study Planning Meeting, January 25, 2012, 9 a.m. – Noon

Attendees:

Organization	Name
AEA	Betsy McGregor
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Jennifer Spegen
USFWS	Bill Rice
NMFS	Susan Walker
NMFS	Eric Rothwell
BLM	Ben Kennedy
BLM	Tim Sundlov
BLM	Mike Sondergaard
NPS	Cassie Thomas (by phone)
ADF&G	Joe Klein
ADF&G	Joe Giefer
ADF&G	Ron Benkert
ADF&G	Jack Erickson
ADF&G	Richard Yanusz
ADF&G	Lowell Fair
ADNR	Courtney Smith
ADNR	Gary Prokosch
ADNR	Kim Sager
FERC	David Turner (by phone)
The Nature Conservancy	Corrine Smith
Natural Heritage Institute	Jan Konigsburg
Alaska Conservation Alliance	Kate McKeoun
Knik Tribe	Theo Garcia
Knikatnu, Inc	Tom Harris
Long View Associates	Steve Padula
Long View Associates	Randall Filbert
Northern Ecological Services	John Morsell (by phone)
R2 Resource Consultants	Dudley Reiser
R2 Resource Consultants	MaryLou Keefe (by phone)

Organization	Name
Craig Addley	Cardno ENTRIX
Lynn Noel	Cardno ENTRIX
ABR/GW Scientific	Dave Brailey
URS	Paul Dworian
HDR	James Brady
HDR	Michael Barclay
HDR	Bob Butera
HDR	Erin Cunningham
Tetra Tech	Rob Plotnikoff
Tetra Tech	Christy Miller
DOWL HKM	Jessica Christianson
LGL Alaska	Michael Link
Normandeau Associates	Robert McDonald
E-Terra	Lars Gleitsmann
ARRI	Jeff Davis
Northwest Hydraulic Consultants	Dave Andres (by phone)
Northwest Hydraulic Consultants	Darren Ham (by phone)
Crowther	Scott Crowther
Van Ness Feldman	Matt Love (by phone)
Nuvista Light & Power	Chuck Casper

Presentations

- John Haapala (MWH): Reservoir and Flow Routing Model Transect Data Collection
- Craig Addley (Cardno-ENTRIX): WQ-S1 Review of Existing Water Temperature Data and Models
- Craig Addley (Cardno-ENTRIX): Determine Bedload and Suspended Sediment Load by Size Fraction at Tsusena Creek, Gold Creek, and Sunshine Gage Stations
- Craig Addley (Cardno-ENTRIX): Geomorphic Assessment of Middle River Reach Using Aerial Photography
- Craig Addley (Cardno-ENTRIX): Document the Breakup and Formation of River Ice on the Susitna River
- Craig Addley and Woody Trihey (Cardno-ENTRIX): Geomorphic Assessment of Project Effects on Lower River Reach

Flow Routing Model Transect Data Collection

Eric Rothwell (NMFS) stated that channel roughness values used in the routing model should be based on independently verified and current site-specific information and potentially vary longitudinally in the system. Bill Rice (USFWS) agreed, noting that site-specific substrate/geological characteristics should be used to develop values of Manning's roughness coefficient. Eric Rothwell, Bill Rice, and Joe Klein (ADF&G) emphasized the need to account

for accretion flow and the effects of ice dynamics when developing the routing model, noting that the model must be well calibrated to be useful. John Haapala (MWH) stated that MWH would apply appropriate roughness values and would account for accretion flow, likely by using spot measurements to verify accretion estimates developed during the 1980s. Craig Addley (Cardno-ENTRIX) agreed, stating that an evaluation of the effects of load following on habitat downstream of the Project could only be accomplished with an accurate routing model. Dave Andres (Northwest Hydraulic Consultants) stated that it would be useful to install pressure transducers (i.e., to measure water surface elevation) as soon as possible in 2012 so that stage-flow relationships throughout the river could be developed. Dave stated that these instruments, because they would produce continuous data and could be operated during the winter when ice is present in the river, would be superior to staff gages.

Dave Andres (Northwest Hydraulic Consultants) also expressed concern with the use of a HEC-RAS model, stating that a HEC-RAS model would suffice in summer but would not properly account for flow routing when there is ice in the river. Dave stated that the CRISSP model would function under winter conditions and would also work in summer when the river is free of ice. Craig Addley (Cardno-ENTRIX) reminded the workgroup that John Haapala was reviewing the 2012 efforts related to flow routing and that as 2013-2014 study plans are developed, there would be an opportunity to incorporate other modeling options.

Eric Rothwell (NMFS) stated that it would be important for AEA to explain in its study planning documents how studies would dovetail and input from one study or modeling effort would supply input to other studies or models. Eric stated that in addition to identifying linkages, it would be necessary to ensure that assumptions made at one level of study or modeling would remain valid when results or input are used in a subsequent phase of analysis or modeling. Craig Addley (Cardno-ENTRIX) replied that AEA was aware of the importance of the integration identified by NMFS and that AEA's contractors would identify and describe all such linkages as part of their development of the 2013-2014 study plans.

Betsy McCracken (USFWS) asked if the transects used for the development of the hydraulic routing model corresponded to those used for habitat modeling. Craig Addley (Cardno-ENTRIX) replied that transects for the two efforts were not equivalent. Craig explained that routing model transects would be used to provide continuous stage-flow relationships, via interpolation, for the entire river corridor. Transects for other purposes, e.g., fish habitat, would be established separately to address specific objectives. However, the stage-flow relationships provided by the routing model at a given location would serve as an input in the development of time-series analyses for other modeling efforts, for example fish habitat.

Water Temperature Data and Models

Joe Klein (ADF&G) stated that temperature modeling would need to account for Project effects not only in the mainstem but also in sloughs and side channels. Joe asked if AEA could specify the locations/habitat types of proposed monitoring locations. Betsy McGregor (AEA) and Woody Trihey (Cardno-ENTRIX) replied that Table 2 of the WQ-S1 study plan identified

the proposed mainstem temperature monitoring sites to be used for the 1980s SNTEMP model evaluation, but noted that temperature monitoring locations for the larger study program had yet to be identified and would be addressed in the 2013-2014 study plan. Joe Klein added that the temperature model would need to be capable of estimating the proposed Project's effects on groundwater upwelling, which in turn would affect conditions in sloughs and potentially in salmonid spawning areas.

Geomorphology, Bedload/Suspended Sediment, and Ice Processes

Darren Ham (Northwest Hydraulic Consultants) stated that it would be infeasible for field crews to measure bedload at high flows and asked how AEA planned to account for high-flow bedload dynamics. Craig Addley (Cardno-ENTRIX) stated that the technical contractors would assess logistics associated with field measurements of bedload, and if safety becomes an issue, modeling would be used to extrapolate high-flow bedload based on measurements made at lower flows and what is known about the relationships of coarse sediment movement generally. Craig stated that the technical contractors would gather as much information as possible to calibrate the sediment routing model. Woody Trihey (Cardno-ENTRIX) stated that bedload measurements could be made at some stations, e.g., Gold Creek, and that the sediment rating curves from these stations could be used to extrapolate the upper portions of curves at other stations. Darren Ham (Northwest Hydraulic Consultants) suggested sampling gravel bars for sediment size distribution as a surrogate to using bedload measurements to estimate transport. Dudley Reiser (R2) added that it would be important to measure sediment transport in areas used by salmonids for spawning.

Michael Barclay (HDR) stated that a primary assumption of instream flow analysis is that the channel remains the same under changing flow conditions and stated that potential changes in channel morphology would need to be factored into instream flow modeling. Craig Addley (Cardno-ENTRIX) agreed and said that AEA would use the results of its geomorphology modeling to account for any potential channel changes when modeling the relationship between flow and habitat for aquatic biota.

Michael Barclay (HDR) asked if the purpose of the geomorphic assessment of middle river reach was to assess whether the channel was in a state of equilibrium. Craig Addley (Cardno-ENTRIX) confirmed that comparing existing and 1980s geomorphic data would allow AEA to characterize the stability of the reach under unregulated flow conditions and added that the study may also provide insight into what other data from the 1980s studies might still be applicable under current conditions.

Joe Klein (ADF&G) stated that AEA should assemble a list of floods that have occurred since the 1980s data were collected to help interpret any channel changes that are observed when comparing aerial imagery of current and historic channel conditions.

Referring to the G-S4: Geomorphic Assessment of Project Effects on the Lower River Channel study, Eric Rothwell (NMFS) noted that aerial photography of the lower river would be used to assess pre- and post-Project flow effects in summer, when the reservoir would be filling, which

is expected to be when the proposed Project would have the greatest effect on flows. Eric cautioned that Project impacts on winter flows and flow-related variables in the lower river should not be overlooked. Woody Trihey (Cardno-ENTRIX) stated that the 2012 study was only a screening exercise and that geomorphic assessments conducted in 2013-2014 would be aimed at assessing Project effects over a wide range of flows during all four seasons.

Joe Klein (ADF&G) asked what effect daily Project operations are expected to have on flows in the lower river. Woody Trihey (Cardno-ENTRIX) replied that flow effects in the lower river due to daily Project operations would be muted relative to those in the middle river, and perhaps undetectable, noting that winter flows downstream of the confluence with the Chulitna and Talkeetna rivers ("three rivers confluence") are 2.0-2.5 times greater than those upstream of the confluence. Woody added that the presence of ice in the lower river would likely further obscure the effects of flow changes related to daily Project operations in winter. Sue Walker (NMFS) noted that the PAD indicates that daily winter releases at the dam could vary between 3,000 cfs and 10,000 cfs. Sue stated that this represented significant variability and AEA would need to document the effect of such flow changes throughout the river system.

Bill Rice (USFWS) asked how many lower river geomorphology transects had been established and evaluated during the 1980s studies. Woody Trihey (Cardno-ENTRIX) replied that four transects had been established in the area of the three rivers confluence because it was (and is) a highly dynamic area. Woody stated that given the dynamic nature of the area, conditions at these transects would need to be resurveyed as part of the current study program. Woody said that no geomorphology transects were established downstream of the three rivers confluence.

Dave Andres (Northwest Hydraulic Consultants) stated that it would be essential to fully document freeze-up and ice break up processes to set the stage for the collection of data to be used to develop and calibrate an ice dynamics model. Dave added that comparing ice dynamics to flow gage records would greatly enhance AEA's ability to interpret observed ice dynamics in 2012. Woody Trihey (Cardno-ENTRIX) stated that it would beneficial for specialists with a variety of backgrounds to be involved in the documentation of ice formation and breakup, including fisheries and riparian vegetation specialists in addition to physical scientists.

Aquatic Resources Study Planning Meeting, January 25, 2012, 1 – 4 p.m.

Attendees:

Organization	Name
AEA	Betsy McGregor
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Jennifer Spegen
USFWS	Bill Rice
NMFS	Susan Walker
NMFS	Eric Rothwell
BLM	Ben Kennedy
BLM	Tim Sundlov
BLM	Mike Sondergaard
NPS	Cassie Thomas (by phone)
ADF&G	Joe Klein
ADF&G	Joe Giefer
ADF&G	Ron Benkert
ADF&G	Jack Erickson
ADF&G	Richard Yanusz
ADF&G	Lowell Fair
ADNR	Courtney Smith
ADNR	Gary Prokosch
ADNR	Kim Sager
FERC	David Turner (by phone)
The Nature Conservancy	Corrine Smith
Natural Heritage Institute	Jan Konigsburg
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Knik Tribe	Theo Garcia
Knikatnu, Inc	Tom Harris
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HDR	Michael Barclay

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HDR	Bob Butera
HDR	Erin Cunningham
Tetra Tech	Rob Plotnikoff
Tetra Tech	Christy Miller
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LGL Alaska	Michael Link
Normandeau Associates	Robert McDonald
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Presentations

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- Craig Addley (Cardno-ENTRIX): Document the Breakup and Formation of River Ice on the Susitna River
- Craig Addley and Woody Trihey (Cardno-ENTRIX): Geomorphic Assessment of Project Effects on Lower River Reach
- Jack Erikson: (ADF&G) ADF&G Conceptual Plan for 2012
- Craig Addley (Cardno-ENTRIX): Distribution and Middle River Habitat Utilization

ADF&G Conceptual Plan for 2012 and Fish Distribution and Middle River Habitat Utilization

Woody Trihey (Cardno-ENTRIX) noted that based on ADF&G's 2010 data, the percentages of coho and chum salmon upstream of the three rivers confluence were similar to what was observed in the 1980s. Jack Erickson (ADF&G) replied that ADF&G had not yet compared data from the two periods, but it would not be surprising if current run apportionment of coho and chum salmon was similar to what had been observed in the 1980s.

James Brady (HDR) asked how ADF&G had arrived at a sample size of 50 tagged chum/coho for supporting the middle river habitat use study. Betsy McGregor (AEA) replied that 50 radio-tagged fish was not a recommended sample size, but only a number selected to illustrate how many fish ADF&G would need to radio tag in the lower river to provide 50 fish for tracking in the middle river (i.e., upstream of the three rivers confluence) and to illustrate the incremental cost of tagging those fish. Gary Prokosch (ADNR) asked if ADF&G would be tagging fish in the middle river reach for AEA. Jack Erickson (ADF&G) replied that any fish tagged upstream of the three rivers confluence would be tagged by AEA's consultants, because ADF&G will already be operating at capacity in conducting its own programs in the lower river.

Sue Walker (NMFS) asked if ADF&G could mobilize early enough in 2012 to tag Chinook for a basin-wide distribution study. Jack Erickson (ADF&G) replied that it would be possible but challenging given environmental conditions early in the season. Sue Walker asked if ADF&G planned to use sonar for assessing Chinook movements, and Jack Erickson stated that ADF&G's 2012 efforts would neither assess movement per se nor apportionment/abundance but would be aimed at documenting Chinook distribution. DIDSON would be employed, however, to identify potential recapture locations.

Michael Barclay (HDR) asked to what degree ADF&G would be attempting to document spawning locations of Chinook. Jack Erickson (ADF&G) stated that identifying spawning locations was not one of ADF&G's 2012 objectives. Betsy McGregor (AEA) stated that in 2012, AEA would track Chinook radio tagged by ADF&G in the lower river through the mainstem Susitna River to identify mainstem spawning locations and potentially collect HSC data. Betsy stated that in 2013-2014 AEA would continue to track Chinook tagged by ADF&G as well as Chinook tagged above three rivers by AEA.

Michael Link (LGL) stated that gear selectivity of fish wheels would bias the sample of radio-tagged Chinook toward fish of a certain size range. Mike also questioned whether it would be possible to obtain 400 Chinook from the existing recapture wheels. Jack Erickson (ADF&G) stated that he thought ADF&G would be able to obtain and tag the target sample size of Chinook and that size variability would be sufficient to provide for a representative sample. Betsy McGregor (AEA) stated that AEA's collection of Chinook for radio tagging in 2013-2014 may not rely solely on fish wheels and that AEA intended to capture and track enough fish to be confident that study results accurately represent Chinook distribution and activity in the middle river and above.

MaryLou Keefe (R2) questioned whether the number of fish tagged would be representative of the overall population. Craig Addley (Cardno-ENTRIX) replied that tracking of radio-tagged Chinook was a first step and that other means would be evaluated to locate Chinook spawning sites, both within side sloughs and the mainstem, to provide information needed to conduct instream flow modeling.

Joe Klein (ADF&G) stated that in areas where side-scan sonar data suggest Chinook are spawning but turbidity precludes positive identification during spawning, it would be necessary to excavate the substrate to verify that Chinook eggs/alevins are in the gravels.

MaryLou Keefe (R2) asked for confirmation that AEA intended to model habitat-flow relationships of all salmon life stages in the mainstem, sloughs, and side channels. Craig stated that all relevant fish species, lifestages, and habitats would be addressed as part of the instream flow analysis.

Jan Konigsburg (NHI) questioned whether handling and tagging of Chinook in the lower river could result in individuals that are less able to ascend Devils Canyon and thereby underestimate the extent to which Chinook use the river upstream of the canyon. Woody Trihey (Cardno-ENTRIX) stated that during the 1980s, many fish had received disk and Floy tags (which involved minimal tag-related stress) and that few of these tagged fish passed through Devils Canyon. Most of the tagged fish entered tributaries downstream of Devils Canyon.

Jack Erickson (ADF&G) stated that an alternative approach to estimating the number of adult Chinook passing upstream through Devils Canyon would be to conduct genetic analyses of juvenile Chinook collected upstream of the canyon reach. Results of the genetics sampling could be used to back-calculate the number of adult spawners that produced the juveniles. Tom Harris (Knikatnu, Inc) asked if otolith analysis might be used to assess the origins of Chinook juveniles found upstream of Devils Canyon. Craig Addley (Cardno-Entrix) replied that genetics analyses would likely be more effective for this purpose. Betsy McGregor (AEA) stated that otoliths from Dolly Varden and humpback whitefish would be analyzed in coordination with ADF&G to assess whether individuals in the middle and upper river have an anadromous or resident life history.

Tim Sundlov (BLM) noted that jetboat operators routinely observe adult Chinook in eddies in Devils Canyon, confirming that some level of upstream migration into the bottom of the reach is occurring regularly.

Michael Barclay (HDR) asked if AEA planned to track radio-tagged Chinook in tributaries to the middle river. Betsy McGregor (AEA) said that some of the Chinook tagged by ADF&G might be tracked in middle river tributaries by AEA's contractors, but there would be no attempt to document habitat use in below Devils Canyon tributaries except in the tributary mouths immediately adjacent to the mainstem.

Jack Erickson (ADF&G) cautioned that the tracking of radio-tagged fish with fixed and mobile receivers throughout the licensing study period would generate an enormous dataset, which would require much time to process. Michael Link (LGL) stated that AEA would likely benefit from hiring an information management specialist and that software is available to allow for efficient QA/QC and interpretation of such large datasets.

James Brady (HDR) asked how technical contractors would arrive at final sample sizes for radio-telemetry studies, questioning whether numbers of fish would be determined collectively by the Aquatic Resources Workgroup. Betsy McGregor (AEA) stated that the first step would be for AEA to consult with ADF&G to determine how many fish could reasonably be tracked, given the limitations of the number of unique codes per frequency then to coordinate with the workgroup before arriving at a final number.

Sue Walker (NMFS) acknowledged that studies related to adult Chinook would be logistically complicated but stressed that sample sizes and methods would need to be sufficient to address the main objective, which is characterizing the range of flows under which adult Chinook can migrate through Devils Canyon.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Aquatic and Terrestrial Resources Study Planning Meetings
January 26, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Terrestrial Resources Study Planning Meeting, January 26, 2012, 1-4 p.m.

Attendees:

Organization	Name
AEA	Betsy McGregor
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Jennifer Spegen (by phone)
NMFS	Susan Walker
NMFS	Eric Rothwell
BLM	Cara Staab
BLM	Ben Seifert
BLM	John Jangala (by phone)
NPS	Cassie Thomas (by phone)
ADF&G	Joe Klein
ADF&G	Mark Burch
ADF&G	Ron Benkert (by phone)
ADNR	Courtney Smith
FERC	David Turner (by phone)
Natural Heritage Institute	Jan Konigsburg
Knikatnu, Inc.	Tom Harris
Knik Tribe	Theo Garcia
Long View Associates	Steve Padula
Long View Associates	Randall Filbert
MWH	Heather Williams
3PPI	Sally Morsell (by phone)
ABR	Brian Lawhead
ABR	Terry Schick
HDR	Anne Leggett
DOWL HKM	Jessica Christianson
DOWL HKM	Hillary Lindh
LGL Alaska	Tamara McGuire
Normandeau Associates	Robert McDonald
E-Terra	Lars Gleitsmann
Van Ness Feldman	Matt Love (by phone)
Nuvista	Chuck Casper

Presentations

- Mark Burch (ADF&G): Susitna-Watana Dam Hydroelectric Project Terrestrial Wildlife Resources
- Lynn Noel (Cardno ENTRIX): 2012 Botanical Studies
- Lynn Noel (Cardno ENTRIX): 2012 Wildlife Studies
- Lynn Noel (Cardno ENTRIX): 2012 Beluga Whale Study

Meeting Summary

1. Steve Padula (Long View Associates) initiated attendee introductions.
2. Betsy McGregor (AEA) provided an agenda overview and highlighted the recent addition of a beluga whale study plan. She verified that all meeting materials, including those most recently added, are available on the project website (http://susitna-watanahydro.org).
3. Lynn Noel (Cardno ENTRIX) presented the study plan "F-S6: Cook Inlet Beluga Whale Anadromous Prey Analysis – DRAFT" dated 25 January 2012. Presentation slides and the study plan itself are available at the project website.
    a. Betsy McCracken (USFWS) noted that eulachon is a state species of concern and that there is a 2006 document containing relevant information.
    b. Lynn Noel (Cardno ENTRIX) indicated that the team is aware of the 2006 study and additional studies that were not mentioned in the presentation due to time limitations.
    c. Jan Konigsberg (NHI) indicated that the use of "FERC Study Area" in the F-S6 Figure 1 legend is confusing since that term in this study would refer to a larger study area extending to Cook Inlet. Betsy McGregor (AEA) indicated that she would have it changed for clarity.
    d. Steve Padula (Long View Associates) commented that the dates shown in F-S6 and other study plans are deadlines for contractor submittals to AEA and are therefore several weeks earlier than the corresponding target dates for AEA submittals to FERC. Betsy McGregor (AEA) added that this will give AEA and other stakeholders time to review. She stated that the study plan process is iterative with multiple opportunities for stakeholder input and revisions.
4. Mark Burch (ADF&G) presented three proposed ADF&G studies. Presentation slides and the project funding proposals themselves are available at the project website.
    a. Caribou: "Distribution, productivity, and timing of movements of Nelchina and Delta caribou in the vicinity of the proposed Susitna-Watana Hydroelectric Project in Game Management Unit 13E." 12 January 2012
        i. What is the range of the Delta herd?
            1. Mark Burch (ADF&G) suggested contacting the area biologists who manage it for further information.

ii. Is the population truly growing, or could it simply be appearing to grow based on changes in population estimating techniques (i.e. telemetry, etc).
    1. Mark Burch (ADF&G) indicated that caribou populations are cyclical, but that these are believed to be actually growing.

iii. Betsy McGregor (AEA) indicated that it would be very helpful for stakeholders to provide written comments to ADF&G on technical proposal details such as numbers of collars, frequencies, etc. in order to ensure the data gathered will be adequate for project needs.

iv. Question was asked regarding collar specifications.
    1. Mark Burch (ADF&G) relayed information he obtained from area biologist and Principal Investigator Becky Schwanke (ADF&G) indicating that collars are on 5 hrs/day and are rotated in order to cover daily variations. He referred the questioner to the funding proposal for additional detailed collar specifications.

b. Moose: "Abundance, distribution, productivity, and survival of moose in the vicinity of the proposed Susitna-Watana Hydroelectric project in Game Management Unit 13E." 18 January 2012
    i. What is the proposed method of determining calf survival?
        1. Mark Burch (ADF&G) referred the questioner to the funding proposal and/or Becky Schwanke (ADF&G).

c. Ptarmigan: "Population ecology of willow ptarmigan *Lagopus lagopus* in game management unit 13, south-central Alaska." (undated)
    i. Cara Staab (BLM) said that proposed sample size of 30 seems small for such a small animal in a large area.
        1. Mark Burch (ADF&G) clarified that sample size is 30 per year, per subunit, for a total of 90 per year. The collared birds will also be moved frequently. Increasing sample size is cost-limited due to both collar costs, and costs of moving collared birds.
    ii. Who is the Principal Investigator?
        1. Mark Burch (ADF&G) indicated that it is a cooperative project with UAF, and that Rick Merizon (ADF&G) is the PI.

d. Questions following all three presentations:
    i. Betsy McCracken (USFWS) asked how long are the three proposed studies?
        1. Mark Burch (ADF&G) indicated that there are tables showing schedule dates in the funding proposals themselves, though he didn't include that information in the presentation slides.
    ii. Will bears be studied?
        1. No field studies are proposed at this time. Literature and existing data study only.
    iii. One big data gap from earlier studies is use of the proposed reservoir area during winter, especially severe winters, since the 1980s study years were relatively mild. Is there enumeration planned specific to this

need? Given that this winter is proving to be severe, can we accelerate the field work to take advantage?

1. Mark Burch (ADF&G) said that GPS collars and flights are thought to be sufficient to address the reservoir area use question. He will look into feasibility of accelerating the field work to capture the current severe conditions.

iv. Lynn Noel (Cardno ENTRIX) asked whether remote monitoring stations could be used in addition to the proposed telemetry?

1. Mark Burch (ADF&G) said that the limited range of remote monitoring stations makes them cost-prohibitive and that flights are probably more valuable.

v. Will GPS data be sufficient to determine where animals are crossing the river given small sample sizes?

1. Confidence of obtaining a definitive answer is higher with moose than caribou since caribou tend to roam significantly. ADF&G will attempt to identify and collar caribou that are using the study area, but this is acknowledged to be a risk item. Sample size is limited by collar expense.

vi. Lars Gleitsmann (E-Terra) asked how hunting effort and harvests have trended over the decades in the area for all species.

1. Mark Burch (ADF&G) said that caribou are migratory and relatively easy to manage. Caribou hunting success tends to fluctuate with the population itself. He believes that the moose population has improved recently, though he is not personally familiar with variables such as predator control, winter severity, etc.
2. State and federal agencies have management reports that would contain relevant information.

vii. Will bears and wolves also be counted? Will comparisons be made to new and/or existing bear and wolf population data?

1. Mark Burch (ADF&G) said that there are existing bear population estimates and that wolves are also tracked. General trend comparisons may be possible.

viii. Will study area be increased per earlier discussions?

1. Mark Burch (ADF&G) confirmed that trend counts will be added back in to one particular area.

ix. What studies are planned beyond these three near-term studies?

1. Outyear studies have not yet been planned. Generally would get enough information from periodic spot checks.

x. Is there any existing data on annual caribou crossings?

1. No movement studies have been conducted to date. Currently only radio collars have been implemented, which require flyovers to locate and are not frequent enough to determine movement.

xi. Is it possible to determine caribou movement from satellite imagery?
    1. Lars Gleitsmann (E-Terra) said that satellite coverage is available daily, and of sufficient resolution to see caribou-sized objects, so theoretically yes. Limitations include cost and time involved to obtain and analyze sufficient imagery and likelihood that caribou would be visually camouflaged against surroundings and therefore invisible.

xii. Tom Harris (Knikatnu, Inc.) asked a question regarding overall impacts to the study area.
    1. Betsy McGregor (AEA) answered that additional studies are planned. The three ADF&G studies are components of the overall study plan that will be presented later in this meeting by Lynn Noel (Cardno ENTRIX).

5. Lynn Noel (Cardno ENTRIX) presented three wildlife study plans. Presentation slides and the study plans themselves are available at the project website.
    a. "W-S1: Wildlife Habitat Use and Movement Study - DRAFT" dated 26 January 2012.
        i. What location defined "upstream" and "downstream" in the historical APA moose studies?
            1. The proposed Devils Canyon dam site
        ii. What census methods were employed in the historical APA moose studies?
            1. Gasaway-type aerial survey in addition to telemetry
        iii. Is presentation information listing existence of recent caribou data accurate?
            1. Mark Burch (ADF&G) is not familiar with caribou data. Brian Lawhead (ABR) confirmed that he has seen relatively recent caribou data, from the 2000s.
        iv. Dave Turner (FERC) requested clarification on what additional work will be done between the current 2012 DRAFT study plan, and the next study plan deliverable. His understanding was that the bulk of the historical data gathering should have been completed prior to the PAD. Concerned about length of historical data gathering process and whether it can be accelerated to better inform stakeholders and study plan development.
            1. Lynn Noel (Cardno ENTRIX) said that the level of detail relative to the usability of the historical data will be greater in the next study plan deliverable.
            2. Brian Lawhead (ABR) responded that the historical data is in fairly rough shape, and that ongoing historical "data rescue" is being attempted in order to determine usability.
            3. Betsy McGregor (AEA) indicated that the information was summarized in the data gap analysis as well as the PAD. The data gathering referred to in the study plan was to collect specific

data sets and put them in a current digital format for the further analysis. She added that the current schedule for these tasks is very aggressive, with only about a 6 week turnaround time.

4. Brian Lawhead (ABR) said that modern telemetry data analysis techniques may be performed on historical data to yield new information, such as range use for example. Need more work to determine if this is possible.
5. Dave Turner (FERC) concurred that performing and incorporating new analyses of historical data and documenting in the next study plan deliverable would be useful, but re-summarizing available data would not be as useful.
6. Betsy McGregor (AEA) said that 13 April 2012 is deadline for identifying what historical data is usable and useful. She has been working with ADF&G to develop a process for data transfer and sharing so that this can be done efficiently.

v. Brian Lawhead (ABR) asked about Becky Strauch's (ADF&G GIS) availablity, since much of the GIS analysis would presumably be tasked to her as the historical data holder.
   1. Betsy McGregor (AEA) said that she and Lynn Noel had met in December with Becky, but does not know her current availability.
   2. Several attendees indicated that Becky has a long waiting list.
   3. Mark Burch (ADF&G) said that availability is a matter of prioritization and those are set by others.

b. "W-S2: Past and Current Big Game and Furbearer Harvest Study - DRAFT" dated 26 January 2012.
c. "W-S3: Eagle and Raptor Nest Study - DRAFT" dated 26 January 2012.
   i. Brian Lawhead (ABR) is concerned that the proposed survey period may be too late in the season for eagles, but he would need to check with his raptor expert.
      1. Lynn Noel (Cardno ENTRIX) said that the dates were taken from the original surveys and may need to be adjusted.
   ii. Is a historical vegetation map available?
      1. There is one, but it may not be available in a usable format in time to support 2012 field work. Looking into other alternatives.
   iii. Betsy McCracken (USFWS) requested that all proposed project features be shown on nest maps rather than just the reservoir.
      1. Lynn Noel (Cardno ENTRIX) replied that the nest data will be delivered in GIS format, which can be overlayed with other data layers (including project features) for future map production.
   iv. Betsy McCracken (USFWS) has information on recommended clearing times that should be considered.
   v. Have there been any indications of a need for additional types of information such as raptor foraging based on new regulations?

1. Lynn Noel (Cardno ENTRIX) said that the 2012 study goal is to identify nests so that other 2012 field investigations can avoid them as appropriate. The nest data will need to be communicated to other field teams almost real-time due to schedule constraints. More comprehensive regulatory compliance reviews will be conducted during 2013-2014 study plan development. Requirements may include electrocution analysis/mitigation for transmission line corridors.
2. Betsy McCracken (USFWS) has pertinent regulatory compliance information in rough format that she is compiling for Lynn.

vi. Terry Schick (ABR) indicated that some raptor habitat data can be obtained from the proposed habitat studies that will be discussed later in the meeting.
1. Lynn Noel (Cardno ENTRIX) added that some of the NWI mapping has been digitized and may be available soon to help inform study plans.

6. Lynn Noel (Cardno ENTRIX) presented three botanical study plans. Presentation slides and the study plans themselves are available at the project website.
   a. "B-S1: Vegetation and Wildlife Habitat Mapping Study - DRAFT" dated 26 January 2012.
   b. "B-S2: Riparian Study - DRAFT" dated 26 January 2012.
   c. "B-S3: Wetland Mapping Study - DRAFT" dated 26 January 2012.
   d. Discussion following presentation of all botanical study plans:
      i. Did 1985 vegetation map incorporate 1982 data?
         1. Lynn Noel (Cardno ENTRIX) said yes, for the overlapping portions. The 1982 data is not available digitally.
      ii. Advantages and limitations of imagery datasets shown on B-S2 Figure 2 and in the presentation slides were outlined.
         1. SPOT5 data is not useful for direct impact level analyses, might be useful for basin-wide analyses.
         2. Lars Gleitsmann (E-Terra) explained the three datasets his firm has procured for the project: Upper/Lower/Middle Susitna, primarily leaf-off for elevation contour generation, not as useful for vegetation mapping.
         3. Brian Lawhead (ABR) asked if AeroMetric is going to fly additional aerial imagery?
            a. Betsy McGregor (AEA) said that they will and that exact needs are being defined now. Geomorph needs multiple flights at different river flows, so trying to ascertain if other needs can be piggy-backed on one of those flights for efficiency.
            b. Lars Gleitsmann (E-Terra) cautioned that geomorph flights at specific river flows may yield narrower corridor than would be required for other purposes such as flood

zones, and that the specific flow requirements might fall on poor weather days when vegetation would not be visible. Studies of riparian corridor might be compatible use, depends on required corridor width.

4. Mat-Su LIDAR is thought to be generally the best dataset, but it is not processed yet and has some limitations since it was flown on multiple dates at different leaf-out stages, etc.
5. 2004 imagery is thought to have very limited value.
6. Lars Gleitsmann (E-Terra) said that as far as he knows, the 1980s aerial imagery is in the form of contact prints and that the calibration sheet has been lost, making ortho-rectification impossible. It is still useful for visual comparisons, change studies, etc.
7. Anne Leggett (HDR) raised the issue that imagery availability can impact study schedules significantly.

iii. Betsy McCracken (USFWS) suggested that the Corps of Engineers and the EPA should be contacted to determine 404 permitting requirements.
   1. Betsy McGregor (AEA) and Lynn Noel (Cardno ENTRIX) believe that this is addressed already in the study plan.

iv. Anne Leggett (HDR) asked if sensitive plant studies would be conducted.

v. Betsy McGregor (AEA) stated that an RFP will come out with details of study scopes including rare plants, invasive weeds, and revegetation plans for impacted areas.

vi. Ben Seifert (BLM) asked if there will be a study to quantify forest resources within the reservoir inundation zone and whether the plan is to clear prior to reservoir inundation?
   1. No decision has been made whether to clear prior to inundation and therefore no quantification is planned at this time.
   2. Ben indicated that quantification will likely be needed to determine fair market value of the public resource, whether or not clearing occurs prior to inundation. Also need to discuss resource salvage options if clearing is selected.
   3. Lars Gleitsmann (E-Terra) mentioned that some quantification may be possible using the recent imagery obtained by his firm as one option.

vii. Anne Leggett (HDR) asked when the Mat-Su LIDAR will be available.
   1. Betsy McGregor (AEA) said that the North Susitna block is last, around May or June 2012. The aerial imagery may be available earlier than the LIDAR.

viii. Anne Leggett (HDR) asked if there will be field verifications this year?
   1. Betsy McGregor (AEA) responded that there would be field verification of the aerial imagery interpretation these are iterative, multi-year studies that will require coordination

between contractors to determination appropriation sampling strategy to meet the data collection needs for multiple resources. She used riparian modeling component as an example.

ix. Lynn Noel (Cardno ENTRIX) commented that the reservoir operations modeling needs to be considered as well vs. botanical life cycle timing (wet/dry riverbed conditions during seed germination times, etc).

x. Relationships between wildlife habitat mapping and vegetation mapping were discussed. Betsy McGregor (AEA) said that responsibility for coordinating that effort will fall into the wildlife habitat mapping task. Tom Schick (ABR) confirmed that it is appropriate for wildlife biologists to verify that vegetation mappers are using appropriate scales for study species.

xi. Anne Leggett (HDR) asked when the RFP will be made public?
    1. Betsy McGregor (AEA) said botanical resources RFP will hopefully be out next week. There are likely to be multiple awards since it is a large amount of work. The RFP will include a task for a contractor to compile the individual Technical Memos that result into a comprehensive FERC license application section.

xii. Anne Leggett (HDR) asked if decisions have been made on how to coordinate field logistics?
    1. Betsy McGregor (AEA) said that AEA will provide helicopter support and AEA is looking into lodging options and boat access logistics for some areas also. AEA will also provide a site logistics coordinator.

xiii. Lars Gleitsmann (E-Terra) asked if it might be feasible and cost-efficient to use the existing trail/road off the Denali Highway that was used by military contractors recently to remediate a jet crash site relatively close to the proposed dam site.
    1. Betsy McGregor (AEA) said that AEA is working on lodging options and hasn't fully considered travel logistics yet. Jim Gill is looking into the other logistics at this time.
    2. Ben Seifert (BLM) said that he helped permit that access route for the Air Force and could speak to the question. The route is road-like for some distance from the Denali Highway intersection and then becomes more and more trail-like as you approach the Watana Canyon area. The remediation camp is shut down and will be fully removed this spring. The trail/road mostly follows an older trail used by placer miners. Ben thinks that there is potential for this project to use the trail/road.

xiv. Anne Leggett (HDR) asked if ADNR is still coordinating GIS data sharing.

1. Betsy McGregor (AEA) said yes and introduced Courtney Smith (ADNR GIS) who will be compiling and serving GIS data for the project.

7. General Questions and Next Steps
    a. Will the calendar showing FERC deadlines be posted?
        i. Betsy McGregor (AEA) said that yes, there is already an action item from another session to do so. Also working to get a Sharepoint site set up that would include a calendar function.
    b. Betsy McGregor (AEA) said that AEA is trying to post meeting notes and conclude action items within two weeks of meetings.
    c. AEA would appreciate written comments on all documents and study plans within two weeks of meetings to help support the overall project schedule.
    d. Next meeting series is tentatively 27 to 29 February 2012. Terrestrial resource meeting will likely be 29 February 2012.

Action Items

1. AEA will re-label the orange boundary depicted on F-S6 Figure 1 for clarity since the beluga whale study area extends to Susitna River confluence with Cook Inlet.
2. Betsy McCracken (USFWS) to provide data on recommended clearing times, and recent raptor regulation compliance requirements.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Social Science Resources Planning Meeting
February 27, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Subject

- ILP Study Request Outlines and Study Plan Development for Social Sciences.

Attendees:

Organization	Name
AEA	Wayne Dyok
AEA	Betsy McGregor
ADF&G	Mark Fink
ADF&G	Joe Giefer
ADNR	Courtney Smith
BLM	Denton Hamby
BLM	Elijah Waters
DHSS	Paul Anderson
DHSS	Sarah Yoder
DOWL HKM	Tom Middendorf
DOWL HKM	Maryellen Tuttell
EPA-ADO	Jennifer Curtis
FERC	Jesse Fernandes (by phone)
FERC	David Turner
FERC	Ken Wilcox
HDR Alaska	Laurie Cummings
Kleinschmidt	Marty Phillips (by phone)
Knikatnu, Inc.	Tom Harris (by phone)
Louis Berger Group	Lisa McDonald (by phone)
MWH	Sarah Callaway
MWH	Kirby Gilbert
Natural Heritage Institute	Jan Konigsburg
NPS	Cassie Thomas
NPS consultant	Harry Williamson (by phone)
Northern Economics	Patrick Burden
URS	Paul Dworian
URS	Bridget Easley
USFWS	Mike Buntjer

Presentations

- Kirby Gilbert (MWH): Overview of near-term project calendar through November 2012
- Kirby Gilbert (MWH): Overview formal Study Request template
- Kirby Gilbert (MWH): Overview project licensing calendar through 2015
- Kirby Gilbert (MWH): Review of Table of Preliminary 2013-2014 Formal ILP Studies – Social Sciences
- Dr. Paul Anderson (DHHS): State of Alaska Health Impact Assessment Program

Recreation

1. Kirby Gilbert (MWH) – Stated that the overall goal of the Recreation Resources Study is to develop a project recreation plan that incorporates findings from the resources assessment and anticipated project impacts.
    a. Cassie Thomas (NPS) – Stated that some impacts will not be known until the results from other resource studies are known. What is the timing going to be for developing the recreation plan, since other study results should really drive some of the plan?
    b. Wayne Dyok (AEA) – Stated that comparing the issues identified for the historic (1980s project), the current project, and those already identified by FERC, they are nearly one to one. A lot of things (resource- and impact-wise) have not changed, and will not change much. It is important to continue moving forward on parallel paths, not necessarily waiting for all the resource studies to be completed, before progressing on the recreation plan.
    c. Cassie Thomas (NPS) – Noted that things have changed since the 1980s. Impacts will likely be different than those anticipated in the original project. She noted that ECPA now requires equal consideration of environment and development, and preparing a recreation management plan too soon, before some of the resource impacts are fully understood would not be helpful. As public agencies, how can we help the public understand the different mitigation options and alternatives, if they don't know what the impacts will be or what they are losing?
    d. Kirby – Stated that the recreation plan won't be written this year, rather for 2013-14 timeframe; the 2012 work is mostly for information gathering.
2. Kirby Gilbert (MWH) – Stated that with the Recreation Resources Assessment, we want to understand the current state of the recreational framework (hunting, fishing, etc.), as well as ensure that we have an appropriate study area. What are the recreation use patterns now? And how might the project (road corridors, transmission corridors, etc.) impact those patterns? How might this project impact the recreation opportunities? Surveys might be one method of gathering information. The study plan needs to help us understand all the impact mechanisms.
    a. Cassie Thomas (NPS) – Asked if there is a plan for field staff, who might be at the site for other purposes (resource studies), to be provided with some type of form on which they could keep track of sightings of and/or encounters with

recreationists. She stated that it didn't need to be a survey itself, or a study proper, but simply a way of observing recreation opportunities.

b. Wayne Dyok (AEA) & Kirby Gilbert (MWH) – Stated that this is a great idea, but we need to be selective of the locations or how it gets applied, or it could be overwhelming (e.g. Montana Creek during high fishing season). How we use the information would still need to be determined, but something informal would definitely be useful.
c. Elijah Waters (BLM) – Stated that some dispersed recreation site information is available from BLM, as well as the Recreation Information Management System.
d. Cassie Thomas (NPS) – Stated that information may be available from boating clubs (Anchorage and Fairbanks), online forums, and air taxi operators.
e. Patrick Burden, (Northern Economics) – Stated that there will have to be cooperation between socioeconomic contractor and recreation contractor, since the topics have significant overlap.

3. Wayne – Asked the group if there were any general, big picture recreation considerations to be raised right now?
    a. Tom Harris (Knikatnu, Inc.) – Stated that it makes no sense, and native communities could not support, increasing access to a diminished resource, without taking actions to enhance the resources. Increasing access without increasing management is destructive.
    b. Mark Fink (ADF&G) – Stated that ADF&G is trying to maintain public access to a common resource (fish and wildlife); from a management perspective, they look at project components in terms of access to the resource. They also look at how increased access might change management strategies. However, they'd like to establish a good baseline first, before impacts can be assessed.
    c. Joe Giefer (ADF&G) – Stated that the use information that they have may show locations of where animals were ultimately taken, but the routes to those locations might not be known. Data gaps exist; trails are in place and used, sometimes regularly, that aren't mapped. GPS data points of unmapped trails would be useful, if observed during overflights for other resource studies.
    d. Wayne Dyok (AEA) – Stated that they are talking with ADF&G about possibly accelerating some of the moose studies. Since it's been a high snow year, ADF&G is planning a flyover of the reservoir area to determine how many moose use it.
    e. Tom Harris (Knikatnu, Inc.) – Stated that we should also consider not only what is lost (moose) but also a potential predator "explosion" if there is high moose mortality this year. Also, consider the potential user conflicts, if urban families begin hunting in more remote areas (as access increases); this competes with rural families.
    f. It was noted that the Project area is within an area managed by ADF&G for predator control.
    g. Cassie Thomas (NPS) – Stated that although important, subsistence is not recreation, so should be considered separately.

h. Wayne Dyok (AEA) – Stated that consultants will be required to provide schedules for study activities, so that all of the disciplines can be put into a big-picture schedule. Until we get the detailed schedules of the different study plans, we won't be able to articulate how they will fit together.
i. Harry Williamson (NPS consultant) – Asked if the gap analysis for recreation was posted. Betsy McGregor (AEA) replied that it will be posted.
j. Tom Harris (Knikatnu, Inc.) – Asked that a recreation trends analysis be included in the analysis.

Aesthetics

1. Kirby Gilbert (MWH) – Stated that the goal was to assess aesthetic conditions as they exist now, how they are used, and how the project (development and operation) might affect those resources. The 'night sky' is included under this topic, as an example of aesthetic resources. The project is in a fairly remote area, where not many people tend to recreate. However, aircraft overflights should be considered, and the impact to aesthetics from that standpoint. In 2012, we will start identifying key viewing areas, to establish where those locations might be. We know the project interfaces with public infrastructure at certain points (railheads, transmission corridors, etc.). We want to identify all these locations as well, so we can understand how to fully assess the current state of the resource.
2. Cassie Thomas (NPS) – Stated that in assessing the key viewpoints, trail identification will be important, particularly those that are unmapped (including winter trails).
3. Jennifer Curtis (EPA) – Stated that aesthetics/visual resources is a topic that often gets overlooked. It is encouraging to have this as a focus; however, it often can become contentious with regard to methodology. Point Thomson Draft EIS might be a good project to look at, in terms of how they approached this topic.

Socioeconomics

1. Kirby Gilbert (MWH) – Stated that there will be one contract team to do socioeconomic and transportation studies. The topic is broken into three components (social conditions & public goods and services, regional economics, air quality), but will likely need to be further broken down.
2. Kirby Gilbert (MWH) – Stated that air quality is a physical science, but has worked well under socioeconomics in other projects.
3. Kirby Gilbert (MWH) – Stated that with regard to the regional component, how does the project change the regional economy? The price of power, tourism, and multiplier effects of construction, etc.
4. Pat Burden (Northern Economics) – Inquired as to how the DCCED consultation process would move forward. Also, the benefit/cost analysis wasn't in the RFP that went out – is it going to be required? Kirby Gilbert (MWH) replied that DCCED would like to help contribute to the study, so it might look more like a partnership. They may be able to perform some tasks or subtasks. This is a potentially big study topic. Scopes

of work will be refined after contractor selection including the need for things like a benefit-cost analysis.

5. Kirby Gilbert (MWH) – Stated that the potential air quality impacts needs to be addressed. We may be looking at displaced fossil fuel emissions. What is the affected environment, what are the conditions now, and how might those conditions be impacted by the project? This topic is needed to help complete a FERC license application, and also for NEPA and for the health impact assessment. There is no specific work defined for 2012 for air quality, but information gathering activities may be appropriate.
6. Kirby Gilbert (MWH) – Stated that there will be crossover from other resources (e.g. subsistence). We are going to need some agreement on the methodologies and who is doing what pieces of work for socioeconomic information gathering activities.

Transportation

1. Kirby Gilbert (MWH) – Stated that transportation includes road, rail, and air transport systems. It is a cross over with recreation analyses, and will require integration with access management considerations. The final road corridor has not been determined yet, hopefully by the end of 2012 more information will be available.
2. Cassie Thomas (NPS) – Asked if the roads be maintained in the winter, during construction. If so, that would open the Denali Highway to the public during the winter, increasing access and recreation opportunities. Betsy McGregor (AEA) and Kirby Gilbert (MWH) answered. Betsy stated that the highway would likely be maintained during the winter if the Denali corridor is selected, but that has not been determined.
3. Transport considerations include construction in regards to how the physically large project components such as the turbine generators; will be brought to the site.
4. There will likely be some spur roads built during construction – how will this affect transportation for area users. Construction timing itself could be part of the mitigation.
5. Tom Mittendorf (DOWL HKM) – Asked whether the transmission line itself is being addressed in another resource study; is transmission access being looked at yet?
6. Kirby Gilbert (MWH) – Stated that the transmission line can be thought of as a project itself. It will need to be assessed for all resources and impacts. Transmission and transportation corridors would be co-located where practicable, but not always. If not co-located then some spur roads may be needed to access transmission towers. Some of the initial results of these studies will help to define some of the alignments, for both transmission and transportation.

Health Impact Assessment

Presentation by Dr. Paul Anderson
Department of Health and Social Services
Paul.anderson2@alaska.gov
(907) 269-8011

1. Kirby Gilbert (MWH) – Stated that for this project, AEA would like to dovetail the HIA with preparation of the FERC license application, rather than just have it as an appendix to the EIS. Also there is a need to start considering the HIA at an earlier point (ILP study plans), rather than waiting until the NEPA process.
2. Kirby Gilbert (MWH) – Stated that some of the HIA components will be collected during other resource studies (e.g. socioeconomics). These things would fit together with and for the HIA studies.
3. Cassie Thomas (NPS) – Asked to what extent an HIA informs some of the project decisions? Construction crews, small, fixed-wing aircraft workers, etc. It would be wonderful if investment in analysis and research could help make things safer for people who will be directly exposed to construction risks.
    a. Dr. Paul Anderson (DHSS) – HIA focuses on "outside the fence" of construction. Those things related to occupational safety for construction crews are generally covered under OSHA programs. They are not typically considered in the HIA. Where there is overlap with the people within a community is where the HIA will come into play.

Meeting Summary

1. Attendee introductions, meeting agenda and calendar overview by Kirby Gilbert (MWH).
    a. April 27, 2012 – important date; comments due on PAD and study requests. Study request template is available.
    b. June 11, 2012 – AEA to submit the formal study plan. Comments due by September 10, 2012.
    c. October 10, 2012 – AEA to file revised study plan.
    d. November 30, 2012 – FERC to issue study plan determination.
2. Overview of the template for formal study requests.
3. Overview of the licensing schedule through 2015.
    a. Harry Williamson – asked for clarification on the dates of study plan submittals (drafts, revised, proposed final, etc.).
    b. Jenny Seagon (USFWS) – asked for clarification on the relationship between the "Table of Preliminary 2013-2014 Formal ILP Studies – Social Sciences" and the study plan templates. Kirby clarified – on the table, each "Study Title" will essentially be a filled out in the template form.
4. Recreation
5. Aesthetics
6. Socioeconomics
7. Transportation
8. Health Impact Assessment – Presentation by Dr. Paul Anderson

Action Items

1. AEA to post recreation data gap analysis.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Cultural and Subsistence Resources Workgroup Meeting
February 28, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Subject

- ILP Study Request Outlines and Study Plan Development for Cultural Resources.

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Bruce Tiedeman
ADF&G	Mark Burch
ADF&G	James Van Lanen
ADHSS-HIA	Sarah Yoder
ADNR	Courtney Smith
ADNR-OHA	Richard VanderHoek
BLM	Elijah Waters
BLM	Dan Sharp
EPA	Jennifer Curtis
FERC	David Turner (by phone)
USFWS	Mike Buntjer
NPS	Cassie Thomas (by phone)
ABMC and AVI	Chuck Akers
Ahtna, Inc.	Gloria Stickwan (by phone)
CardnoENTRIX	Lynn Noel
DOWL HKM	Jessica Christianson
E-Terra	Frank McQueary
E-Terra	Lars Gleitsmann
HDR	Jeff Schively
HDR	Anne Leggett
HDR	Adinda Demske
HDR	Tracie Krauthoefer
MWH	Kirby Gilbert
MWH	Heather Williams
Natural Heritage Institute (NHI) / HRC	Jan Konigsburg
Northern Land Use Research (NLUR)	Pete Bowers
Northern Land Use Research (NLUR)	Richard Stern (by phone)
URS	Paul Dworian
URS	Pat Athey

Organization	Name
Van Ness Feldman	Jonathan Simons (by phone)

Presentations

- Kirby Gilbert (MWH): Overview of project licensing calendar through Draft EIS July 2016 (http://www.susitna-watanahydro.org/Schedule.html)
- Kirby Gilbert (MWH): Overview of Study Request Template (http://www.susitna-watanahydro.org/Docs/StudyRequestTemplate_draft_021612.docx)
- Kirby Gilbert (MWH): Review of Table of Preliminary 2013-2014 Formal ILP Studies – Cultural and Subsistence Resources (http://www.susitna-watanahydro.org/Docs/CulturalandSubsistenceResources_02162012.pdf)
- James Van Lanen (ADF&G): Overview of Susitna-Watana Hydroelectric Project: Subsistence Gap Analysis and Scope of Work (meeting handout)

Cultural Resources

1. Kirby Gilbert (MWH) – Stated that 2012 will likely be focused on setting the stage for data collection and not impact analysis. Need to identify linkages between studies, overlaps with other areas such as recreation and wildlife. Some historic property information exists from the 1980s work, but more is needed, and existing data needs to be put in GIS format.
2. Kirby Gilbert (MWH) – Stated that defining the Area of Potential Effect (APE) can be a typical challenge point for projects like this. Sometimes we can end up with two APEs, one for direct effects (ground disturbance) and a larger one including a buffer zone for indirect effects. Currently the reservoir area is better defined than the road and transmission corridors due to ongoing facility siting optimization studies. Engineering feature siting optimization would ideally incorporate cultural and resource study input. Avoidance is first desired option for mitigation. Design process needs to be somewhat iterative.
    a. Richard VanderHoek (ADNR-OHA) – Agreed that defining APE is a challenge, will have to look at all three proposed road and transmission corridors. The indirect APE will become significant later. 10 years of experience on Denali Highway and other projects indicates that foot traffic, OHV traffic will be significant. Need to do an assessment to determine where the attractive hikes, boat destinations, etc. are going to be.
    b. Kirby Gilbert (MWH) – Noted the study area is currently @ 2200'corresponding to the 2000' potential maximum pool elevation reservoir. Is that sufficiently large to serve as an APE for the inundation zone.
    c. Richard VanderHoek (ADNR-OHA) – Probably this is ok for now, but may need a larger APE later.
    d. Kirby Gilbert (MWH) – Timing of APE definition is tricky. He believes that Wayne Dyok's (AEA Susitna-Watana Program Manager) goal is to have preferred access & transmission routes selected by end of 2012.

e. Betsy McGregor (AEA) – There is an ADOT&PF report due out at the end of March 2012 evaluating the three road corridors. This report does not address transmission; that is in a separate report.
f. David Turner (FERC) – How might SHPO and agencies go about identifying or defining a visual impact area for purposes of establishing an indirect effects APE?
g. Richard VanderHoek (ADNR-OHA) – Agrees it is difficult to do; but it might be a matter of looking for easy access features (gravel ridges) that intersect proposed access routes that would likely become 4-wheeler trails. There are existing 4-wheeler routes almost to the reservoir.
h. David Turner (FERC) – Noted we need to define an APE reasonably.
i. Cassie Thomas (NPS) – During yesterday's recreation discussion, it was identified that there is a trail map data gap (including foot, 4-wheeler and snowmachine trails). That data gap will likely also need to be filled to help inform the cultural resources indirect effects APE definition.
j. Betsy McGregor (AEA) – ADF&G harvest location data may help inform as well.
k. Kirby Gilbert (MWH) – Indicated the value in adding trail mapping to the 2012 recreation study.
l. Anne Leggett (HDR) – Aerial imagery may help as well.
m. Elijah Waters (BLM) – BLM does have some trail inventory data in GIS format, known to be incomplete, but may still be helpful.
n. Lars Gleitsmann (E-Terra) – Archived satellite imagery also shows trails (summer).
o. Kirby Gilbert (MWH) – Would a predictive model be useful in the cultural resources investigations?
p. Pete Bowers (NLUR) – Predictive modeling extrapolates from known sites to help stratify the survey area in order to focus the field work. Area is too large to do 100% survey so the predictive model could help limit the need to do ground surveys in all locations.
q. Richard VanderHoek (ADNR-OHA) – Predictive modeling needs to make use of all available data layers (historic sites, caribou, etc).
r. Pete Bowers (NLUR) – Is there a plan to create/enhance some trails as part of the project?
s. Betsy McGregor (AEA) – Not yet. This will be determined later in the process (collect data, assess, plan, manage). Will write a recreation management plan later.
t. Kirby Gilbert (MWH) – Public access is a contentious issue. Some stakeholders want it, others do not.
u. Chuck Akers (ABMC and AVI) – Objected to "or" statement on criteria 1.3.6 of Formal Study Plan Template. Thinks it should be an "and" conversation between the scientific community and landowners. Existing trails and proposed features likely cross native lands, and landowners need to be included in all discussions about use of their properties.

v. Bruce Tiedeman (AEA) – Introduced himself as the native liaison for AEA. Noted that the southern route is predominantly native land. The middle route is mixed native and non-native land. The northern route is mostly state and federal land. It is important to note that native stakeholders are likely to give comment on indirect effects to non-native lands. Important to remember that we do not want to dictate to other landowners what to do with their land.

3. Kirby Gilbert (MWH) – Stated that Traditional Cultural Properties (TCPs) were not something researched during the 1980s work. AEA is responsible to advance this work, and would be studying TCPs on APE lands of all ownership categories. Typically this is done by ethnographers.
    a. Pete Bowers (NLUR) – Might want to consider tying in TCP research with subsistence studies since likely interviewing many of the same people.
    b. Betsy McGregor (AEA) – TCPs seem to be useful as inputs for predictive modeling.
    c. Pete Bowers (NLUR) – Yes, but may be a "cart before the horse" situation. Modeling is iterative.
    d. Tracie Krauthoefer (HDR) – If subsistence studies being done by ADF&G consist of household surveys, there may not be time for interviewers to ask TCP questions. If it is a Traditional Ecological Knowledge (TEK) setting, then would be more appropriate to ask TCP questions.
    e. Pete Bowers (NLUR) – Agreed that it needs careful thought and planning, would at least be a starting point.
4. Tracie Krauthoefer (HDR) – Experience shows that having a plan in place for dealing with human remains (Unanticipated Discoveries Plan [UDP]) is key.
    a. Pete Bowers (NLUR) – Agreed that having contacts identified ahead of time for clear and fast communications is critical.
    b. Kirby Gilbert (MWH) – On federal lands, the Native American Graves Protection and Repatriation Act (NAGPRA) comes into consideration. FERC requires that a Historic Properties Management Plan (HPMP) be written for the project, it will be folded into the license application. Also a paleontological screening/study/sensitivity analysis will need to be done, particularly on Federal lands.
    c. Richard VanderHoek (ADNR-OHA) – They are currently working with John Jangala of BLM and paleontological resources are of interest across all BLM lands in the area.
5. Bruce Tiedeman (AEA) – Will AEA's proposed fieldwork be accepted by the agencies? Does the group feel some agreement is being reached?
    a. Kirby Gilbert (MWH) – Agreement by all stakeholders is what the study plan development and submittal process is intended to achieve. Asked if everyone thinks AEA is on track at this time? Realizes there will be more discussions and deliberations once more specifics are put into Study Plan Request format for April workgroup meetings.
    b. Richard VanderHoek (ADNR-OHA) – Yes [planning process seems to be on track].

c. Kirby Gilbert (MWH) – AEA has been given permission by FERC to initiate Section 106 consultation and it will be needed not just for FERC but also for Army Corps of Engineers 404 permitting process and any BLM decisions granting use of their lands.
d. Tracie Krauthoefer (HDR) – Encourages broad thinking with respect to the APE. It is easier to narrow an APE that started too large than to add to one later. Cited an example of another hydro project that is having to widen their corridor.
e. Pete Bowers (NLUR) – They used a 5 mile boundary around the corridors in their initial search for historic properties during recent gap analysis work. Predictive model will help identify likely areas of interest.
f. Betsy McGregor (AEA) – Indicated that the alternative corridors have been changed since gap analysis was done and some have been further refined.
g. Tracie Krauthoefer (HDR) – It would be good to do some survey work soon to help validate the predictive model(s).
h. Pete Bowers (NLUR) – Maybe start by surveying the approximately 50 identified sites in the reservoir area, and extrapolate from there.
i. Richard VanderHoek (ADNR-OHA) – When thinking about multi-year collection, want to do soils first year (volcanic for markers, etc). This will give framework for 2nd and 3rd year studies.
j. Betsy McGregor (AEA) – Intent is for environmental contractors to put studies from outline into FERC Study Plan Request format.
k. Kirby Gilbert (MWH) – Goal is to get the updated Study Plan Request outlines posted by March 23, 2012.
l. Pete Bowers (NLUR) – It could be useful to take a "low-hanging-fruit" approach to 2012 work. Get the non-controversial and unlikely to change work out of the way (i.e. reservoir area).
m. Betsy McGregor (AEA) – Also preparing an unanticipated discoveries plan would be good to have in place in 2012.
n. Kirby Gilbert (MWH) – Corridors as defined in the PAD are the current direct impacts or "default" APE and should be considered so at this time, however these areas would be narrowed down to the proposed ground disturbing areas later, once those areas are known.
o. Tracie Krauthoefer (HDR) – May need to make sure an Unanticipated Discoveries Plan includes a curation plan as well.

Subsistence Resources

1. James Van Lanen (ADF&G) – Presented scope of work document for ADF&G subsistence work. Indicated that the Principal Investigator (Davin Holen) was unable to be here today due to Board of Fish meeting conflict. Discussed general study objectives, survey sample techniques, community involvement, local hire and training, limitations of 1-yr-data snapshot, harvest mapping process, interview process typically including traditional knowledge interviews (TKI), etc.

a. Kirby Gilbert (MWH) – Indicated that ADF&G scope of work document will be folded into the ILP study plans.
b. Kirby Gilbert (MWH) –Noted that EIS is not expected until 2016, so we may need to include additional communities whose data validity will expire before then.
c. Betsy McGregor (AEA) – Asked what criteria define a "community" for ADF&G subsistence survey purposes.
d. James Van Lanen (ADF&G) – Indicated that only census-designated communities are surveyed. There is no population size threshold. Talkeetna is outside the ADF&G subsistence management area, so is not included as a survey community per the ADF&G guidelines.
e. Lars Gleitsmann (E-Terra) – Why isn't Lake Louise included?
f. James Van Lanen (ADF&G) – Lake Louise is likely included with Tolsona, but he would have to check.
g. Elijah Waters (BLM) – Is the Copper Center survey, the NPS survey that was done recently?
h. James Van Lanen (ADF&G) – NPS was a partner, but ADF&G did the survey.
i. (Unknown)– Chase is a trainstop, why is it singled out from all similar small Railbelt communities in that area?
j. James Van Lanen (ADF&G) – Can't cover everything. Household lists are generated upon arrival in the community for the surveys; not before arrival. This helps get people that may be missed otherwise. Local researchers add people to the list. Davin Holen (ADF&G) would have more specifics.
k. Tracie Krauthoefer (HDR) – Working with community liaisons helps get clues for outlying households.
l. Betsy McGregor (AEA) – The schedule for the surveys takes into account other Projects that may require subsistence surveys in the same community. Interim reports will roll into the ILP study report each fall.
m. Kirby Gilbert (MWH) – This plan covers baseline data collection. Need to also think about the next step and how that might proceed – that is impact analyses based on the data collected.
n. James Van Lanen (ADF&G) – Impact analysis is not my specialty, but expect that it will be fairly subjective. Method of access questions are asked, and may help get at trail location/use to help inform the impact assessment.
o. Kirby Gilbert (MWH) – Public access during construction is an open question. Winter construction could mean that the Denali Highway would be open longer than normal, to the intersection with the project road.
p. James Van Lanen (ADF&G) – On recent surveys for other projects, ADF&G typically hears that opening up access to the areas is desired.
q. Sarah Yoder (ADHSS-HIA) – Did hear some "too much access" feedback on recent surveys for other projects.
r. Chuck Akers (ABMC and AVI) – General population might want more access, but landowners might not agree. CIRI villages have 12b selection lands in the area. Ahtna has land as well, may have traditional use also. Landowners need to be engaged in the discussion.

s. James Van Lanen (ADF&G) – During Copper Basin study, heard two basic commentaries. Non-natives were complaining about Ahtna restrictions and fees, natives were complaining about not being able to keep trespassers out.
t. David Turner (FERC) – Those on the phone don't have the handout. Please describe the ADF&G Subsistence Study implementation schedule.
u. Betsy McGregor (AEA) – First four communities are scheduled for survey January through March 2013, next set January through March 2014. Lots of work leading up to the actual surveys (local hire and training, etc). Timing of surveys is based on seasonality of subsistence lifestyle.
v. Gloria Stickwan (Ahtna) – Just joined the meeting and heard reference to Copper River study. Please describe.
w. James Van Lanen (ADF&G) provided overview for Gloria and others.
x. Tracie Krauthoefer (HDR) – Are there other resources or studies that could be utilized? Concerned that one year of data might not be enough.
y. James Van Lanen (ADF&G) – Not aware of any other information sources. ADF&G recognizes limitations of 1-yr-data surveys, but that is the standard. Concerns include survey burnout and limited survey resources. They try to get at trends and cycles with historical use mapping that is part of the interview process.
z. Kirby Gilbert (MWH) – Baseline descriptions of resources should not be static by definition. Baseline resource depictions should discuss trends and cycles to help all understand declining or improving conditions with regard to resource abundance, quality or utilization, etc.
aa. James Van Lanen (ADF&G) – Cited an example where a hunting moratorium in a particular drainage would have been missed by a 1-yr look. But historical use mapping helped illuminate the longer-term situation. Need to keep 1-yr-data separate from historical data for method clarity.
bb. Additional schedule questions and clarifications based on handout.
cc. Betsy McGregor (ADF&G) – Subsistence workgroup will typically be scheduled with social sciences in future. Cultural will usually follow that meeting. Room conflicts necessitated scheduling with terrestrial resources with cultural and subsistence resources this time.

Meeting Summary

1. Attendee introductions, meeting agenda and draft calendar overview by Kirby Gilbert (MWH).
    a. Last week of March 2012 – scoping meetings throughout the state.
    b. First week of April 2012 – next set of workgroup meetings.
    c. April 27, 2012 – important date; agency & licensing participants' comments due on PAD, FERC Scoping Document (issued 2/23/12), and study requests.
    d. May 2012 – workgroup meetings.
    e. June 11, 2012 – AEA to submit the formal Proposed Study Plan. Comments due by September 10, 2012.

   f. July 2012 – possible site visit and formal FERC study plan workgroup meetings.
   g. October 10, 2012 – AEA to file Revised Study Plan with FERC.
   h. November 30, 2012 – FERC to issue study plan determination.
   i. September 2015 – submit license application to FERC.
   j. July 2016 – FERC to release Draft EIS.
2. Overview of the template for formal study requests by Kirby Gilbert (MWH).
   a. Environmental contractors who will be hired next week will be asked to draft formal study plan requests for each item in the study plan outline (and any other studies identified during the workgroup process or other comment avenues) for project efficiency.
   b. Stakeholders wishing to make additional study requests must use the study plan template. Goal is to identify study needs as early as possible so that the contractors can draft the requests and minimize need for stakeholders to do so on their own.
3. Cultural Resources discussion led by Kirby Gilbert (MWH)
4. Subsistence Resources overview discussion introduced by Kirby Gilbert (MWH)
   a. Subsistence presentation by James Van Lanen (ADF&G)

Action Items

1. AEA to post ADF&G's Subsistence Gap Analysis and Scope of Work that was handed out during the meeting.
2. AEA to consider doing some trail mapping in 2012, to inform definition of APE.
3. AEA to investigate what GIS trail inventory data is available from BLM.
4. Workgroup to consider including TCP research with subsistence research, if feasible.
5. Make sure UDP includes a curation plan.
6. Consider adding TKIs to ADF&G subsistence scope, if not already there.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Aquatic and Water Resources Workgroup Meetings
March 1, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
AEA	Bruce Tiedeman
USFWS	Mike Buntjer
USFWS	Betsy McCracken (by phone)
USFWS	Bob Henszey
USFWS	Jennifer Spegun
NMFS	Susan Walker
NMFS	Eric Rothwell
NMFS	Mandy Migura
NMFS/University of Alaska	Kate Wynne (by phone)
BLM	Tim Sundlov
NPS	Cassie Thomas (by phone)
ADF&G	Joe Klein
ADF&G	Ron Benkert
ADF&G	Jack Erickson
ADF&G	Richard Yanusz
ADF&G	Kimberley Sager
ADNR	Courtney Smith
ADNR	Krissy Plett
ADNR	Kim Sager
FERC	David Turner (by phone)
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsberg
MWH	John Haapala (by phone)
Long View Associates	Steve Padula
Long View Associates	Randall Filbert
Cardno-ENTRIX	Craig Addley
Cardno-ENTRIX	Woody Trihey
Cardno-ENTRIX	Lynn Noel
HDR	James Brady
HDR	Robin Beebee
HDR	Heidi Weigner
HDR	Keri Lestyk
HDR	Scott Prevatte

MWH

Organization	Name
HDR	Erin Cunningham
URS	Paul Dworian
R2 Resource Consultants	Dudley Reiser
R2 Resource Consultants	MaryLouise Keefe (by phone)
R2 Resource Consultants	Stuart Beck (by phone)
Tetra Tech	Bill Fullerton (by phone)
Tetra Tech	Rob Plotnikoff (by phone)
E-Terra	Lars Gleitsmann
GW Scientific	Michael Lilly
Brailey Hydro	David Brailey
LGL	Michael Link
LGL	Sean Burril
Aquacoustics	Don Degan
ARRI	Jeff Davis (by phone)
Susitna River Advisory Committee	Bruce Knowles
Alaska Ratepayers	Scott Crowther
Citizen	Jim Ferguson

Presentations

- Lynn Noel (Cardno-ENTRIX): Table of Preliminary 2013 - 2014 Formal ILP Studies – Beluga Whale
- Craig Addley (Cardno-ENTRIX): Table of Preliminary 2013 - 2014 Formal ILP Studies – Water Resources
- Craig Addley (Cardno-ENTRIX): Table of Preliminary 2013 - 2014 Formal ILP Studies – Geomorphology
- Craig Addley (Cardno-ENTRIX): Table of Preliminary 2013 - 2014 Formal ILP Studies – Fish and Aquatic Resources

Introduction

Steve Padula (LVA) began by summarizing licensing progress to date. Steve (LVA) noted that FERC had issued its Scoping Document 1 (SD1) on February 23, 2012 and that scoping meetings would be held by FERC March 27-30, 2012.

Betsy McGregor (AEA) explained that AEA had hired its technical consultants for the period ending March 2013. Steve (LVA) stated that the technical consultants would be assisting AEA in finalizing 2012 study plans and preparing formal 2013-2014 study plans. The consultants would also be assisting AEA in preparing 2013-2014 study request documents and that it was AEA's intent that stakeholders could adopt these study requests as their own, revising or augmenting them as necessary. Steve (LVA) stated that this would result in a less onerous task for stakeholders, who could focus their effort on any study elements they thought to be missing,

rather than having to invest energy writing requests for studies AEA is already planning to conduct. Betsy (AEA) stated that both the final 2012 study plans and the draft study request documents would be provided to stakeholders by March 23, 2012. Betsy (AEA) then identified the study areas awarded to each of the technical consultant teams. Steve (LVA) stated that if stakeholders had comments on the content of the day's presentations (i.e., study summary tables); AEA would appreciate receiving that input soon.

Steve (LVA) stated that the goal of the April 2012 meetings would be to discuss revised 2012 study plans and 2013-2014 study tables. Craig Addley (Cardno-ENTRIX) explained that the 2013-2014 study tables would be revised to further clarify study objectives, refine general methods descriptions, and delineate approximate study areas. Craig (Cardno-ENTRIX) noted that specific study sites, sample sizes, and more detailed method descriptions would be defined later in the licensing process, prior to the filing of AEA's Proposed Study Proposal (PSP) with FERC.

Joe Klein (ADF&G) asked if 2012 study plans submitted to stakeholders on March 23 would identify specific tasks and include details related to methods, timing, study site locations, equipment to be used, QA/QC and procedures. Betsy (AEA) replied that the 2012 plans released on March 23 would include the elements identified by Joe (ADF&G).

Eric Rothwell (NMFS) expressed concern that stakeholders would be submitting 2013-2014 study requests to FERC on April 27, 2012, well before the results of 2012 studies would be available. Eric (NMFS) suggested that this arrangement could result in a situation where new information may warrant additional studies or study objectives and there would be no mechanism by which agencies could request them. Betsy (AEA) replied that the ILP process is iterative, with study objectives being refined and expanded as needed through the filing of the Revised Study Plan (in September 2012). Craig (Cardno-ENTRIX) added that FERC requires the assessment of findings after the first field season's results become available to determine whether studies need to be revised for the second year's fieldwork. Craig (Cardno-ENTRIX) noted that wherever there are uncertainties, study plans would be developed with contingencies, providing alternative paths forward depending on what is learned as study results become available.

Sue Walker (NMFS) stated that not enough information was available yet to preclude the need for fish passage at the proposed Project, so NMFS would likely file a request for a fish passage study.

Joe (ADF&G) stated that the agencies would benefit from a table or Gantt chart showing the major Project milestones, including a timeline depicting schedules for fieldwork, technical memoranda, reports, FERC filings, and interaction with stakeholders. Joe (ADF&G) added that the timeline should show approximately when output from various studies and modeling efforts would be integrated into other studies and modeling so that tools are ready on time to conduct impact analysis. AEA agreed to produce a Gantt chart showing the timeline showing Project licensing milestones and scheduling.

Sue (NMFS) stated that being notified by AEA regarding the availability of materials was helpful but would prefer if AEA could attach materials to email messages. Betsy (AEA) stated that AEA was working on a more efficient system to communicate and share materials with stakeholders.

Ron Benkert (ADF&G) stated that if AEA and its technical contractors planned to install any structures in the Susitna River or its tributaries, it would be necessary to secure permits from ADNR to do so. Ron (ADF&G) encouraged filing for permits as soon as possible, as ADNR was receiving a high volume of permit requests. Craig Addley (Cardno-ENTRIX) suggested that it might be most efficient for AEA to consolidate its permitting needs, to the extent possible, into a single application. Ron (ADF&G) agreed that a more programmatic approach would streamline the process.

2013 - 2014 Formal ILP Studies – Cook Inlet Beluga Whale Study

Lynn Noel (Cardno-ENTRIX) noted that one of the objectives of the Cook Inlet beluga whale study was to summarize the life history, run timing, abundance, distribution, and habitat of beluga whale prey species, i.e. eulachon and salmon, in the Susitna River. Concern had previously been expressed regarding whether lamprey should also be considered a beluga whale prey species. Mandy Migura (NMFS) replied that she was aware of no information indicating that beluga prey on lamprey. She added that although Cook Inlet beluga occur in the Susitna River delta area year round, NMFS has not collected whale stomach contents data during winter. Stomach contents have not shown that beluga consume lamprey, although without winter data, it is impossible to be certain. Mandy (NMFS) said AEA should direct its initial efforts toward assessing impacts on salmon and eulachon. If information arises to indicate that lamprey may be important as prey, study goals could be reassessed at that time.

Betsy McCracken (USFWS) stated that Pacific lamprey is a prey buffer species in the lower river, and USFWS considers them important. Betsy (AEA) stated that AEA would be studying lamprey as part of its Non-Salmon Anadromous Fish Study, so the species would not be overlooked. Stakeholders asked what the uppermost extent of lamprey distribution is in the Susitna River. Jeff Davis (ARRI) stated that the northernmost tributaries in which lamprey have been found are Trapper, Clear, and Whiskers creeks.

Mike Buntjer (USFWS) noted that one of the study's objectives was to summarize the distribution of Cook Inlet beluga whales relative to the availability of four of the five salmon species and asked why pink salmon had not been included. Betsy (AEA) stated that NMFS had only identified Chinook, coho, chum, and sockeye salmon as primary constituent elements (PCEs) for belugas.

Mandy (NMFS) noted that beluga require high prey densities to feed effectively and that study objectives should be revised to explicitly call for assessment of potential Project effects on the densities of salmon and eulachon in the section of river used by the whales. AEA agreed to

revise the objectives of the Cook Inlet Beluga Whale Study to explicitly state that salmon and eulachon densities would be estimated in the section of river used by the whales, so that potential effects of the Project could be assessed.

Mandy (NMFS) stated that in addition to evaluating run timing of salmon and eulachon, the study would need to address run duration. AEA agreed to revise the objectives of the Cook Inlet Beluga Whale Study to include run duration as well as run timing for salmon and eulachon. She also asked if fieldwork was included in the Cook Inlet Beluga Whale Study and Betsy (AEA) confirmed that fieldwork in 2013-14 and modeling would be conducted to assess the proposed Project's impacts on Cook Inlet beluga whale foraging and habitat.

The workgroup discussed the availability and value of acoustics data used to document whale use of the Susitna River delta. Workgroup members agreed that May through June was the period when whale use of the delta area is greatest and that additional tracking of whales would be unlikely to provide any information beyond what is known from existing studies.

2013 - 2014 Formal ILP Studies – Water Resources, River Routing Study

Craig (Cardno-ENTRIX) reviewed the objectives and potential study methods for the proposed River Routing Study, noting that an existing hydraulic routing model was being used to inform Project planning, but that the approach to routing used in the overall study program might need to be refined to provide the basis for the suite of models used to assess Project impacts. Craig (Cardno-ENTRIX) stated that it was possible that two routing models could be used, i.e., one for the ice-free period and one to simulate hydraulics when ice is present in the river.

Joe (ADF&G) noted that the routing model would be used to simulate stage-flow relationships longitudinally in the mainstem but asked how Project effects would be simulated in sloughs and side channels. Craig (Cardno-ENTRIX) replied that empirical data would be used to establish relationships between mainstem and slough/side channel conditions, i.e., associating side channel flows, breaching of side sloughs, etc. along the river with stage estimates provided by the routing model. This would allow for assessment of habitat effects and side-channel/slough access over a range of flows.

Joe (ADF&G) asked what time-step would be selected for output from the routing model. Craig (Cardno-ENTRIX) replied that typically a 1-hour time-step is considered sufficient, but a shorter interval could be selected if there is justification to do so. He noted, however, that a shorter time-step would result in a shorter simulation period.

Joe (ADF&G) asked how long the period of record would be for modeling. Craig (Cardno-ENTRIX) replied that modeling would be based on a 48-year period of record based on basin flow data obtained from the US Geological Survey (USGS).

Joe (ADF&G) asked where routing model transects would be located, and Craig (Cardno-ENTRIX) replied that the 2012 study plan included a map of potential transect locations, adding

that the routing model would be based to some extent on transect locations established as part of the 1980s studies but that some additional/different transects would also be established. Michael Lilly (GW Scientific) stated that coordination with other technical consultants and stakeholders regarding transect locations would be conducted prior to distribution of the revised 2012 study plan on March 23. Michael (GWS) stated that some new transect locations would be needed to account for channel changes that have occurred over the past 30 years. David Brailey (Brailey Hydro) added that velocities and depths at each routing model transect would be measured using acoustic Doppler current profiling (ADCP), which would provide a highly accurate basis for developing simulations.

Bob Henszey (USFWS) asked what had been the basis for selecting transects used in the 1980s studies. Craig (Cardno-ENTRIX) replied that transects had been established to account for variability in channel conditions and to represent the overall channel throughout the river downstream of the proposed Project, so that simulations produced by the routing model were accurate.

Eric (NMFS) stated that rating curves for specific locations could change seasonally, particularly given the role played by ice in the Susitna River. Eric (NMFS) stated that channel roughness could vary as a function of flow, especially in winter, over the potential range of daily discharges proposed for the Project (i.e., 3,000 - 10,000 cfs). He noted that flow models are predicated on the assumption that channel conditions are static over the range of conditions being simulated. However, channel conditions following construction of the Project would change relative to existing conditions, which could compromise the reliability of model output.

Craig (Cardno-ENTRIX) replied that AEA's technical consultants would use all available information, including what has been learned during studies of other similar river systems, to validate the assumptions of models being used, and would be aware of any potential violations of assumptions as well as the implications of those violations. Robin Beebee (HDR) stated that potential effects of ice on the routing model would be assessed to some degree by empirical observation of ice dynamics beginning in 2012. Robin (HDR) added that the underside of surface ice tends to smooth out over the winter so that roughness can be greater early in the season and then decline.

2013 - 2014 Formal ILP Studies – Geomorphology and Ice Processes Studies

Ice Processes Study

Robin (HDR) stated that HDR planned to measure ice thickness prior to breakup in 2012, noting that breakup could occur as early as April so it would be important to initiate fieldwork as soon as possible. Robin (HDR) would coordinate with AEA, its other technical consultants, and stakeholders to select representative measurement locations that would produce results useful as input to other study efforts, for example, locations such as entrances to side sloughs where ice dynamics could affect fish habitat. HDR would also seek input regarding the placement of cameras, which would be used to detect the onset of ice breakup in a number of key locations.

Eric (NMFS) asked how many flights would be undertaken in 2012 to observe ice breakup, adding that whatever is done in 2012 should be repeated in subsequent years to develop a more complete account of what occurs. Robin (HDR) replied that it was difficult to specify the number of flights that would be conducted, given that weather conditions will dictate whether and when flights are possible.

Eric (NMFS) asked if breakup conditions vary among tributaries at the three rivers confluence (i.e., among the Susitna, Chulitna, and Talkeetna rivers). Jeff Davis (ARRI) replied that breakup conditions in the three rivers vary a great deal among years, adding that in some years, sections of river open up and are then frozen over again following the formation of ice jams.

Joe (ADF&G) asked what the diameter of ice borings used to measure ice thickness would be, and Robin (HDR) replied a 4-inch-diameter auger would be used. Ice thickness will be measured along a transect of the channel at each measurement location to account for lateral variability in thickness.

Krissy Plett (ADNR) stated that at some parcels along the lower river, land owners are issued permits by ADNR to thicken ice bridges over which they transfer heavy equipment, such as agricultural machinery. Krissy (ADNR) said that the ice bridges are often the only way in which landowners can access the opposite side of the river and that AEA would need to evaluate the Project's potential effects on the ability of these landowners to use these ice bridges.

Geomorphology Studies

Joe (ADF&G) stated that when sampling sediment and bedload, it would be desirable to obtain as long-term a data series as possible. Joe (ADF&G) stated that the USGS had recommended the use of hydrophones to measure bedload, where feasible. Craig (Cardno-ENTRIX) stated that hydrophones are useful for identifying the flows at which bedload movement is initiated but questioned whether they could be used to develop bedload estimates. Joe (ADF&G) stated that based on his interaction with USGS personnel, hydrophones can be used to assess particle sizes being transported.

Eric (NMFS) stated that geomorphology work conducted in 2012 must be sound to set the stage for an accurate assessment of Project effects. Paul Dworian (URS) stated that an initial task would be the analysis of aerial photos to detect the extent of channel changes that have occurred over recent decades, which would help focus assessment on those areas where Project operations are most likely to affect channel structure and processes. Craig (Cardno-ENTRIX) added that AEA intended to assess the entire river downstream of the Project and that potential Project effects would be based on data and modeling, not speculation as to whether a certain reach, e.g., the lower river, is likely to be affected by the Project. Bill Fullerton (Tetra Tech) emphasized that work conducted in 2012 would not be aimed at trying to determine which reaches would or would not be affected by Project operations, but rather to develop the tools necessary to assess potential Project effects in 2014 and 2015.

Bob Henszey (USFWS) stated that it would not only be important to assess Project effects on lateral changes in channel morphology but also vertical changes. Bill (Tetra Tech) agreed, noting that modeling would be designed to estimate potential Project-related channel aggradation and degradation.

Jan Konigsberg (NHI/HRC) asked if the objectives of the geomorphology study included assessing the Project's effects on long-term channel degradation. Bill (Tetra Tech) stated that assessing long-term effects would be critical, because not all changes would occur rapidly. Craig (Cardno-ENTRIX) reiterated that AEA would be using a 46-year flow record to simulate potential Project impacts.

Tim Sundlov (BLM) asked how AEA intended to assess potential impacts at locations where planned access roads cross would cross tributaries. Craig (Cardno-ENTRIX) replied that assessing existing conditions along proposed access road corridors, as well as estimated impacts, would be an element of the study program, adding that geomorphology, water quality, and fish habitat impacts would all be addressed. Bill (Tetra Tech) added that study results would not only be used to assess impacts but also to make decisions about the siting and design of road crossings, to minimize or prevent impacts where possible.

Paul (URS) and Bill (Tetra Tech) stated that the team studying geomorphology would benefit from observations made by other crews while they are conducting fieldwork and asked that leads for other study efforts request that their field crews record incidental observations of geomorphic phenomena, such as large wood transport, locations of mass wasting, etc.

Betsy (AEA) instructed Bill (Tetra Tech) to coordinate with Lars Gleitsmann (E-Terra) to obtain all available aerial images useful for assessing channel conditions in the Susitna River. It was noted that Dave Meyer (USGS, Alaska Science Center) would be the appropriate contact at USGS. Betsy (AEA) added that AEA would provide technical contractors with a list of Project-related contacts during the week of March 5, 2012.

2013 - 2014 Formal ILP Studies – Fish and Aquatic Resources Studies

Craig (Cardno-ENTRIX) reviewed examples of historic aquatic resources study results from the 1980s, explaining the potential applicability of these data to the current study effort. Sue (NMFS) asked whether relevant historic data were available to stakeholders. Workgroup meeting materials are available online at Susitna-watanahydro.org. Although current information includes only a small sample of the overall dataset, a more comprehensive and targeted review and synthesis of useful historical data will be conducted by the technical contractors as a preliminary element of their respective studies.

Craig (Cardno-ENTRIX) and Dudley Reiser (R2 Resource Consultants) stated that development of habitat suitability criteria (HSC) for some fish species and life stages represented a good example of where historic data could be used, i.e., conducting limited fieldwork to validate the previously developed HSC curves, which would improve the efficiency of the current instream flow modeling effort.

Jack Erikson (ADF&G) reminded the technical contractors that Alaska regulations preclude the use of felt-soled waders and that all members of field crews should be alerted to this before any fieldwork is conducted.

River Productivity Study

Referring to Objective 4 of the River Productivity Study (see Table of Preliminary 2013 - 2014 Formal ILP Studies – Fish and Aquatic Resources), MaryLou Keefe (R2 Resource Consultants) noted that the intent was to select for a river with physical conditions similar to those expected for the Susitna River with the proposed Project/operating regime in place. MaryLou (R2) asked if the river selected for the basis of any inferences was to be a system affected by a hydropower project. Craig (Cardno-ENTRIX) said that the intent was to find a river located at comparable latitude with physical conditions–mostly turbidity and temperature, but also flow–similar to those expected for the Susitna River under the with-Project alternative. If a regulated analog could be found, it could be used as the basis of comparison, but if not, an unregulated system would likely suffice for providing an idea of how productivity might change in the Susitna River. Craig (Cardno-ENTRIX) noted that if a suitable analog river could not be found, then Objective 4 would not go forward.

MaryLou (R2) stated that it would be important to control for other variables before assuming that turbidity was the primary factor accounting for any potential differences in productivity between the existing and with-Project conditions. Rob Plotnikoff (Tetra Tech) stated that it should be possible to model benthic macroinvertebrate and periphyton production, or at least abundance, against a turbidity gradient. Jack (ADF&G) stated that a number of recent studies had been conducted to document the relationship between turbidity and the ability of fish to feed on invertebrate drift, and results from these studies could be useful when assessing potential Project effects.

Betsy McCracken (USFWS) asked if the study would focus on tributary mouths, which are likely to be productivity hotspots. MaryLou (R2) replied that it would be important to select study sites to address all habitats likely to be affected by the Project, adding that areas to be studied would be determined collaboratively with stakeholders during the development of the study plans.

Jan (NHI/HRC) acknowledged that increased light penetration due to decreases in turbidity could increase productivity but questioned whether potential reductions in nutrient input resulting from a dampening of high flows could offset such increases. Craig (Cardno-ENTRIX) stated that baseline nutrient level would be measured as part of the water quality study, and based on this information, nutrient levels under a range of potential with-Project operational scenarios would be modeled.

Referring to Objective 5 in the studies table, Sue (NMFS) asked if the bioenergetics model used to estimate with-Project juvenile salmonid growth would be calibrated based on actual site-specific fish growth data measured in the field. Craig (Carndo-ENTRIX) replied that empirical fish growth data from the Susitna River would be collected (or derived from existing information) for calibration of the model.

Reservoir Fish Habitat and Entrainment Risk Study

Referring to Objective 5, i.e., characterizing the reservoir fishery, Jack (ADF&G) stated that it would also be important to characterize the potential tailwater fishery. Mike (USFWS) asked if AEA intended to propose a management strategy for the reservoir. Wayne Dyok (AEA) stated that AEA would work with ADF&G and other relevant agencies to develop information needed to make decisions about the future management of the reservoir fishery but that the agencies were the only entities with the authority to propose a management strategy.

Mike (USFWS) noted that Objective 6 involved conducting a desktop analysis to evaluate entrainment risk for resident fish in the reservoir and asked if AEA would also be proposing measures to reduce the potential for entrainment. Wayne (AEA) stated that as part of Project engineering, AEA's engineering contractor would assess measures for reducing fish entrainment into the powerhouse intakes.

Fish Passage Study

Mike (USFWS) asked if the Fish Passage Study involved assessment of fish habitat in tributaries to the middle Susitna River or potential barriers to tributary access following construction of the proposed Project. Craig (Cardno-ENTRIX) replied that the passage study would address potential passage barriers in tributaries in and above the Devils Canyon reach. Craig noted that the Upper River Fish and Habitat Study would involve mapping tributary habitat in the proposed inundation zone below elevation 2,000 feet.

Upper River Fish and Habitat Study

Sue (NMFS) asked why identification of fish passage barriers would be conducted up to an elevation of 3,000 feet. Betsy (AEA) replied that 3,000 feet is the highest elevation at which Chinook have been observed in the Susitna River basin.

Referring to Objective 6, Jack (ADF&G) noted that AEA proposed to collect genetic samples from juvenile Chinook salmon to back-calculate the number of Chinook spawners that produced the juveniles. Jack (ADF&G) asked which technical consultant would be tasked with collecting the genetic samples. Craig (Cardno-ENTRIX) replied that HDR would be collecting the samples. Jack (ADF&G) stated that HDR would need to coordinate with ADF&G to ensure that sample sizes and methods are appropriate and consistent with ADF&G's overall Chinook genetics study program. The genetics lab might be capable of identifying tributary-specific lineages, depending on how fish samples are collected.

Adult Salmon Distribution and Habitat Utilization Study

Craig (Cardno-ENTRIX) pointed out that in the Relevant 2012 Components Column of the proposed studies table, the text stated, "ADF&G anticipates radio tagging and monitoring approximately 400 coho, 400 chum, 400 pink, 100 sockeye, and 500 Chinook adult salmon at Flathorn in 2012." Craig (Cardno-ENTRIX) stated that this was inaccurate, and the text would be changed to reflect the actual numbers to be tagged by ADF&G, i.e., 200 coho, 200 chum, 200 pink, 200 sockeye, and 400 Chinook.

Referring to Objective 4, Craig (Cardno-ENTRIX) stated that those managing field crews would need to coordinate with Dudley (R2) to ensure that fish habitat use data are properly collected for the development of HSC for spawning salmon. Dudley (R2) stated that it would also be necessary to develop HSC for adult salmon holding habitat.

MaryLou (R2) said that it would be necessary to ensure that data are collected to develop salmonid incubation HSC, or to verify existing incubation criteria. Wayne (AEA) stated that NMFS conducted a salmonid incubation study in the 1980s, which would provide valuable information, and Woody Trihey (Cardno-ENTRIX) noted that in the 1980s he had installed Vibert boxes in redds and fyke nets at the downstream ends of sloughs in an attempt to document chum and coho salmon fry emergence; fyke nets placed in sloughs with similar habitat characteristics, including groundwater upwelling, had shown that fry emergence varied among habitats with apparently similar conditions. Wayne (AEA) stated that these results underline the need to understand the mechanisms driving fish habitat use in the Susitna River basin so that Project effects could be predicted.

Tim Sundlov (BLM) stated that juvenile salmonids associate strongly with the interface of clear water and turbid water and that these areas of interface vary spatially as a function of flow. It’s important to model, or estimate in some other way, the relationship between Project flows and the availability and locations of areas where clear water and turbid water come in contact.

Mike (USFWS) stated that it would be critical to estimate fry stranding under proposed Project operations. Dudley (R2) agreed that fry stranding was a critical issue and stated that potential stranding under different operational scenarios would be estimated using a combination of data including bank slope, magnitude of flow change, and ramp rates, particularly downramping rates. Wayne (AEA) added that it would be important to develop a Project flow regime that would prevent or minimize redd construction in areas that would later be dewatered, thereby preventing desiccation of redds.

Juvenile Salmon Study

Eric (NMFS) asked whether HSC for juvenile salmonids were to be based on existing habitat use information or if field data were to be collected during 2012-14. Dudley (R2) replied that AEA would begin with the available data, determine where data may be lacking, and augment the data as needed to ensure that representative, site-specific HSC are available for modeling. Eric added that when developing and/or validating macrohabitat and microhabitat HSC for juvenile salmon, it would be critical to develop criteria that represent habitat use throughout the year, especially during winter.

Mike (USFWS) noted that Study Objective 2 involved characterizing juvenile salmon relative abundance in the middle and lower river reaches and asked if the intent was to measure fish densities in various habitats. Craig (Cardno-ENTRIX) confirmed that fish densities would be measured by field crews, wherever possible, given site-specific conditions and sampling methods. MaryLou (R2) stated that density estimates would only be possible in open-water environments, adding that during winter, when ice is present, relative abundance estimates may be all that is feasible.

Jan (NHI/HRC) stated that when conducting fieldwork, especially in the lower river, it would be important to differentiate between fish produced in the Susitna River and its major tributaries. In this way AEA could account for potential Project effects not only on fish production within the Susitna River but also on production in larger tributaries, for example the Yentna River. Jan (NHI/HRC) stated that without this differentiation, there would be no ability to detect whether the Project is affecting fish production in important tributaries.

Resident and Invasive Fish Study

Jack (ADF&G) stated that ADF&G would evaluate this study's objectives and make recommendations to AEA as to which species should be addressed and how they should be studied. Woody (Cardno-ENTRIX) stated that arctic grayling and rainbow trout had been the two primary resident species studied during the 1980s.

Wayne (AEA) asked whether ADF&G thought the Project could be operated to reduce the suitability of the river for northern pike. Jack (ADF&G) replied that there is no way to know what the future distribution and abundance of pike will be without the Project in place, making it difficult to speculate as to how the Project might affect pike.

Joe (ADF&G) asked if AEA planned to develop HSC for northern pike and use them to simulate potential Project-related changes in pike abundance and distribution. Craig (Cardno-ENTRIX) stated that Objective 5 of the study involved review of existing information and collection of limited new data to assess Project effects on northern pike distribution and abundance, but the plan was not to model northern pike habitat suitability.

Jack (ADF&G) stated that a new technique being used to detect invasive species involved collecting water samples and analyzing them to detect the presence of invasive species' DNA. He suggested that this approach could be useful in the Susitna River.

Non-Salmon Anadromous Fish Study

Betsy McCracken (USFWS) noted that Pacific lamprey ammocoetes remain in the river's substrate for up to six years, and because very little is known about their distribution in the Susitna River basin, it would be necessary to sample adequately to predict the Project's effects on this species. Craig (Cardno-ENTRIX) stated that AEA was aware of the work needed to formulate study methods and acknowledged that in some cases it would likely be necessary to develop species-specific approaches to study objectives. MaryLou (R2) noted that sampling approaches would vary not only by species but also by life stage, adding that unlike many other fish species, lamprey are not susceptible to electrofishing, so other sampling methods would be required.

Sue (NMFS) noted that the study called for sampling using a variety of methods in the middle and lower river mainstem, side channels, sloughs, and tributary mouths and questioned whether the spatial scope was too ambitious for the time allotted for study. Craig (Cardno-ENTRIX) replied that spatial and temporal scopes had not yet been defined and MaryLou (R2) added that AEA and its contractors would work with the resource agencies to collectively determine what information needs are critical and what constitutes an achievable scope. MaryLouise stated that an outline would be available soon, which would include a proposed approach to assessing the fish assemblage and the distribution, population structure, and abundance of the species of interest, noting that estimating abundance would be the most difficult objective to address.

Access Alignment, Construction Area, and Transmission Alignment Aquatic Investigation Study

Wayne (AEA) stated that AEA would work with the Alaska Department of Transportation (ADOT) to identify the best access road alignments and bridge crossings from the standpoint of structural longevity, transportation efficiency and safety. Following identification of a corridor based on these considerations, AEA would make adjustments in an iterative fashion, modifying the alignment based on the results of natural resource studies to minimize road-related impacts and then reevaluate the new alignment to assess its impacts. Wayne (AEA) noted that the US Army Corps of Engineers would require AEA to develop and evaluate at least two corridor alignment alternatives. Betsy (AEA) stated that the eventual goal would be to construct two

transmission line corridors and one access road, with one transmission line co-located with the access road.

Action Items

- AEA requested that stakeholders provide comments on the 2013-14 study summary tables (presented at the March 1 and 2, 2012 workgroup meetings) as soon as possible (i.e., by March 19).
- AEA agreed to revise the objectives of the Cook Inlet Beluga Whale Study to explicitly state that salmon and eulachon densities would be estimated in the section of river used by the whales, so that potential effects of the Project could be assessed.
- AEA agreed to revise the objectives of the Cook Inlet Beluga Whale Study to include run duration as well as run timing for salmon and eulachon.
- AEA instructed Bill Fullerton (Tetra Tech) to coordinate with Lars Gleitsmann (E-Terra) to obtain all available aerial images useful for assessing channel conditions in the Susitna River.
- AEA agreed to provide technical contractors with a list of Project-related contacts by March 9, 2012.
- AEA agreed to produce a Gantt chart showing the major Project milestones, including a timeline outlining the schedule for fieldwork, technical memoranda, reports, FERC filings, and interaction with stakeholders.

Agreement and Decisions

- Aquatic Resources Workgroup members agreed that May through June was the period when beluga whale use was heaviest in the Susitna River delta and that additional tracking of whales would be unlikely to provide any information beyond what is already known from existing studies.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Instream Flow and Water Quality Workgroup Meetings
March 2, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
USFWS	Mike Buntjer
USFWS	Betsy McCracken (by phone)
USFWS	Bob Henszey
USFWS	Jennifer Spegun
NMFS	Susan Walker
NMFS	Eric Rothwell
BLM	Tim Sundlov
NPS	Cassie Thomas (by phone)
ADF&G	Joe Klein
ADF&G	Ron Benkert
ADNR	Courtney Smith
ADNR	Krissy Plett
ADNR	Kim Sager
NPS	Cassie Thomas
FERC	David Turner (by phone)
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsburg
Long View Associates	Steve Padula
Long View Associates	Randall Filbert
Cardno-ENTRIX	Craig Addley
Cardno-ENTRIX	Woody Trihey
HDR	James Brady
HDR	Robin Beebee
HDR	Keri Lestyk
HDR	Scott Prevatte
URS	Paul Dworian
R2 Resource Consultants	Dudley Reiser
R2 Resource Consultants	MaryLouise Keefe (by phone)
Tetra Tech	Harry Gibbons
Tetra Tech	Rob Plotnikoff (by phone)
Tetra Tech	Andrew Parker
E-Terra	Lars Gleitsmann
GW Scientific	Michael Lilly

MWH

Organization	Name
Brailey Hydro	David Brailey
LGL	Michael Link
Alaska Ratepayers	Scott Crowther
Citizen	Jim Ferguson

Presentations

- Craig Addley and Woody Trihey (Cardno-ENTRIX): Table of Preliminary 2013-2014 Formal ILP Studies – Instream Flow, and select tables and figures from 1980s study program
- Craig Addley (Cardno-ENTRIX): Table of Preliminary 2013 - 2014 Formal ILP Studies – Water Quality

Introduction

Wayne Dyok (AEA) stated that AEA had been discussing the proposed Project with Railbelt utilities, including the extent to which the Project may be operated in a load-following capacity. AEA has also been in ongoing discussions with resource agencies and recognizes that resource constraints will limit the timing and extent of any load-following operations and that at times, load following might be precluded completely. Wayne (AEA) emphasized that determining the extent to which load following can-or cannot- be conducted would be based on the results of technical resource studies and modeling. The integrated suite of models developed and applied in 2012-15 will be used to identify a suitable operating regime that minimizes impacts to natural resources.

2013 - 2014 Formal ILP Studies – Instream Flow

Dudley Reiser (R2 Resource Consultants) outlined the approach the technical team, in coordination with AEA, would take to develop the 2013-14 Instream Flow Study plan outline for the March 23 delivery date to stakeholders: (1) describe main study components, (2) identify Project nexus, (3) identify general modeling approaches, e.g., one- and two-dimensional modeling, expert habitat mapping over a range of flows, etc., tentatively identifying which approach will be applied to which reaches/macrohabitat types, (4) describe steps for developing baseline data and HSC, including, where possible, use of 1980s data, (5) explain how modeling of flow and other physical processes will be incorporated into instream flow analyses, and (6) discuss general approach to assessing Project impacts. Dudley (R2) noted that the content of the plan would remain provisional for some time, as more is learned and AEA and stakeholders consult on study details, but that the general framework of the study would be provided on March 23.

Dudley (R2) asked if it would be permissible to conduct informal coordination with various stakeholders, individually or in small groups, while developing the plan. Betsy McGregor (AEA) said that so-called offline communications between technical consultants and stakeholders would be appropriate but that all substantive interchange would need to be

documented in writing. Betsy (AEA) emphasized that she should be kept apprised of all such activity and that it would be necessary to hold instream flow subgroup meetings during the development of the study plan, either in person or by teleconference/web-based conference. Wayne (AEA) stated that for all such coordination events the lead technical consultant would need to draft a brief summary, i.e., a bulleted list of agreements, decisions, and action items, which would then become part of the record and be distributed to relevant individuals.

Regarding the use of historic data to help develop HSC for fish, Mike Buntjer (USFWS) asked whether the 1980s studies provided a reliable quantitative record of habitat conditions in locations that were not used by fish. Woody Trihey (Cardno-Entrix) replied that documentation of microhabitat variables at sites with no fish was not a priority during the 1980s studies. Instead, the emphasis was on identifying sites where fish were present and then attempting to determine what effect the proposed Project would have had on those sites.

Mike (USFWS) noted that there are coho salmon in the Susitna River that complete their life cycles in the mainstem and do not enter tributaries. Woody (Cardno-ENTRIX) stated that researchers in the 1980s had not been aware of this and so no attempt was made to document the habitat use of these individuals.

Eric Rothwell (NMFS) stated that juvenile fish are selecting habitats for a reason and that for the proposed modeling to be useful it would be essential to identify where fish are, and why they are there. Eric (NMFS) stated that characterizing winter habitat use would be critical, emphasizing the importance of having a full understanding of environmental variables that will be affected by the Project, for example the seasonal dynamics of source water in side sloughs.

Following Woody's (Cardno-ENTRIX) presentation of select 1980s fish abundance and habitat use results (available at Susitna-watanahydro.org) Dudley (R2) asked Woody (Cardno-ENTRIX) if 1980s IFG4 data decks were available. Woody (Cardno-ENTRIX) replied that he possessed hardcopy versions of much of the fisheries information from the middle river but did not have any data in electronic format.

Michael Lilly (GW Scientific) noted that depth, velocity, substrate, and channel geometry data would be collected at many of the 1980s transects. He added that the locations of historic transects would need to be approximated because transect markers placed in the 1980s would be difficult or impossible to relocate and in some locations the channel will have changed since those transects were established.

The group discussed the availability of aerial imagery of the Susitna River, digitizing of information, and maps to be produced. Betsy (AEA) instructed technical consultants to coordinate with Lars Gleitsmann (E-Terra) to obtain relevant aerial images for use in instream flow study planning and execution.

2013 - 2014 Formal ILP Studies – Water Quality

Upper Susitna River Basin Glacier and Hydrologic Runoff Model Study

Wayne (AEA) stated that AEA would develop a glacier/hydrologic runoff model for the Susitna River basin above river mile 184 and use it to simulate the effects of climate change on the quantity and seasonality of runoff in the upper basin through the year 2100. Wayne (AEA) stated that AEA was coordinating with Gabriel Wölken (ADNR-DGGS) to develop the model and that the goal was to begin fieldwork to assess existing glacier conditions in summer of 2012.

Sue Walker (NMFS) stated that climate change will affect a wide range of environmental variables beyond temperature and precipitation, including evapotranspiration and permafrost dynamics, among others. It's critical to consult NMFS climate change experts, who have some of the most in-depth and broad expertise in the field. Sue (NMFS) stated that using NMFS experts would not only help to provide a better simulation of the proposed Project's effects but would also be useful in refining potential operations and assessing the long-term viability of the Project, both of which would have practical applications for AEA.

Wayne (AEA) stated that AEA would schedule a teleconference in March 2012 to discuss the approach to glacier and hydrologic runoff modeling; the call would include, among others, Bryan Carey (AEA), Michael (GWS), John Haapala (MWH) and representatives from NMFS. Wayne stated that John (MWH) would be tasked with drafting a 2013 -14 glacier and hydrologic runoff modeling study request for submittal to stakeholders on March 23, 2012.

Water Quality

Paul Dworian (URS) stated that useful water quality data had been collected during the 1980s in the Susitna River, as documented in AEA's Pre-Application (PAD) document. These data would be augmented with data collected during 2013-14, and a water quality model would be developed to simulate existing and with-Project conditions over the range of flows measured during the period of record. Paul (URS) stated that some parameters would be measured continuously, e.g., temperature, dissolved oxygen, pH, and specific conductance, and others, such as metals, would be sampled discretely.

Paul (URS) stated that it would be important to measure water quality throughout the year to detect any factors that could be limiting fish use, e.g., possible anoxic conditions in some sloughs during winter. Wayne (AEA) stated that water quality sampling would need to be conducted in habitats where fish are present and where fish are absent for results to yield valuable information about fish habitat use.

The workgroup discussed the timing of the pilot thermal imaging assessment, which would be undertaken to identify areas of groundwater upwelling. Michael (GWS) stated that the pilot study, and likely any subsequent thermal imaging studies, should be conducted in early fall. Temperature differences would be difficult to detect during summer because water is well mixed

during high flows. In the early fall, flows would be low and the differences between groundwater and surface water temperatures would be pronounced. Michael (GWS) added that when conducting thermal imagery it would be important to have an understanding of geologic controls in the system, i.e., locations where bedrock is likely to be forcing groundwater to the surface. Paul (URS) agreed that it would be useful to develop a set of predictors regarding the potential locations of upwelling.

Joe (ADF&G) stated that from a fish habitat suitability perspective, it would be important to differentiate between areas of true groundwater upwelling and areas where subterranean flow from the river channel is reemerging, the former being more important for providing year-round thermal refugia. Michael (GWS) stated that it should be relatively straightforward to differentiate between the two, because temperature and conductivity differentials between true groundwater and surface water will make it apparent where groundwater is emerging.

Craig Addley (Cardno-ENTRIX) said that temperature data from the 1980s could be evaluated in an attempt to fine tune the timing of the pilot study. Wayne (AEA) stated that it would be critical to document changes in thermal baseline since the 1980s data were collected, given that some degree of channel change has occurred.

Rob Plotnikoff (Tetra Tech) stated that it would be important to document mercury sources under existing conditions, adding that a single tributary could be the major source of mercury levels in the proposed Project area. Rob (Tetra Tech) recommended that multiple media (e.g., surface water and pore water) be sampled to assess metals concentrations, and that a pathways model be developed to identify potential bioaccumulation mechanisms and the Project's potential effects on those mechanisms.

Referring to the analysis of mercury levels in fish tissue, Harry Gibbons (Tetra Tech) asked whether AEA envisioned evaluating whole body burden or muscle tissue only. Craig (Cardno-ENTRIX) replied that the agencies' primary concern was human health, and as such, documenting muscle tissue concentrations would be most relevant.

Jan Konigsburg (NHI/HRC) questioned whether metals data from the 1980s were still valid, given that analytical methods have improved since that time. Paul (URS) replied that some analytical methods for metals detection are similar to what they were in the 1980s, but in instances where detection methods have improved significantly, additional data would need to be collected. In addition, metals concentrations will have likely changed, making it important to sample adequately to characterize existing conditions.

Sue (NMFS) stated that fires are ecologically important in the upper Susitna River basin and that AEA would need to evaluate the relationship between fire and water quality under baseline conditions and address any potential Project effects on that relationship.

Bob Henszey (USFWS) stated that it would be useful to establish observation wells along the river corridor to understand how groundwater influences the extent and species composition of

the riparian zone. Craig (Cardno-ENTRIX) replied that the relationship between groundwater and riparian vegetation would be addressed as part of the Instream Flow Riparian Study.

Betsy (AEA) stated that the water quality program lead would need to coordinate with Michal (GWS) and David Brailey (Brailey Hydro) regarding the placement of pressure transducers, which would also measure temperature, at transects surveyed for use in the hydraulic routing model.

Betsy (AEA) and Craig (Cardno-ENTRIX) noted that it would be important for AEA and its water quality consultants to coordinate soon with the Alaska Department of Conservation (ADEC) to ensure that the proposed water quality sampling design and parameters selected for measurement are adequate. Rob (Tetra Tech) added that it would be important to coordinate with ADEC regarding the content of the Quality Assurance Project Plan (QAPP). Craig (Cardno-ENTRIX) added that it would also be important to contact the USGS to determine what water quality data are being collected at the Tsusena, Gold, and Sunshine gaging stations.

Wayne (AEA) requested that URS/Tetra Tech develop a recommendation regarding the approach to water quality modeling, including which model to use and what variables to model and why. Craig (Cardno-ENTRIX) added that whatever water quality model is selected, it must have flow routing capability, interface with the other models being applied as part of the study program, and be capable of accounting for the effects of ice. Effects of tributary inflows on mainstem water quality would also need to be accounted for in the model. Andrew Parker (Tetra Tech) stated that CE-QUAL-W2, as modified by Alberta Environment and Water, would likely be the best choice. Craig (Cardno-ENTRIX) stated that Tetra Tech should recommend a few models, comparing and contrasting their capabilities and limitations. Based on this, AEA and the stakeholders would decide which model best addressed the needs of the study program. Craig (Cardno-ENTRIX) reminded the group that the output from the reservoir water quality model would serve as the upstream boundary condition for the riverine water quality model, so that approaches used in the two environments would need to be compatible.

Mike (USFWS) noted that in its PAD, AEA had proposed a multi-level Project intake to enable withdrawal of water from different depths within the reservoir to manage the downstream water temperature regime. However, if the low-level outlet were to be used discharges to the river would reflect temperature and other water quality conditions near the reservoir's bottom, which could have adverse effects on aquatic biota in the river. Wayne (AEA) replied that the low-level intake represented an approach to flow release that would only be used under extreme, very rare circumstances, perhaps in the event of a transmission system outage. However, it might be necessary to engineer the low-level intake so that water can be withdrawn from higher in the water column, to prevent adverse effects on riverine biota in the event of an emergency. Craig (Cardno-ENTRIX) stated that it would likely be a good idea to design the multi-level intake so that it could supply water to the bypass.

Action Items

- AEA agreed to schedule a teleconference with NMFS in March 2012 to discuss the approach to glacier and hydrologic runoff modeling.
- AEA stated that John Haapala (MWH) would be tasked with drafting a 2013 -2014 glacier and hydrologic runoff modeling study request for submittal to stakeholders on March 23, 2012.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Terrestrial Resources 2012/2013-2014 Study Plan Development,
April 2, 2012, 9 a.m. – 1 p.m.
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
ADF&G Wildlife Conservation	Lem Butler
USFWS	Mike Buntjer
USFWS	Maureen de Zeeuw
USFWS	Bob Henszey (by phone)
BLM	Sarah Bullock (by phone)
NPS	Cassie Thomas (by phone)
AEA	Betsy McGregor
AEA	Wayne Dyok
FERC	David Turner (by phone)
ABR, Inc.	Brian Lawhead
ABR, Inc.	Terry Schick
ABR, Inc.	Wendy Davis
ABR, Inc.	Janet Kidd (by phone)
ABR, Inc.	Alex Prichard (by phone)
ABR, Inc.	John Shook (by phone)
MWH	Kirby Gilbert
Solstice AK	Robin Reich

Presentations

Terry Schick (ABR, Inc.):

- Botanical 2012 Study Plans
  - Vegetation and Wildlife Habitat Mapping
  - Riparian Study
  - Wetland Mapping
- Botanical Resources 2013/2014 Study Plans (Requests)

Brian Lawhead (ABR, Inc.):

- Wildlife 2012 Study Plans
  - Wildlife Habitat Use & Movement
  - Big Game and Furbearer Harvest Study
  - Eagle and Raptor Nest Study
- Wildlife Resources 2013/2014 Study Plans (Requests)

General Questions/Discussion

Timelines

Kirby Gilbert (MWH) discussed that the team would like comments on the 2012 Study Plans in the next two weeks, since field work is beginning very soon. He said that there has been a request to extend the comment period on the PAD, Scoping Document 1 and Study Plans. Once AEA receives official word from FERC, the schedule will shift about one calendar month. David Turner (FERC) stated that FERC has acted on the request for time extension. Comments on the PAD, Scoping Document 1, and requests for studies are now due May 31, 2012. The FERC approval is now in FERC e-library.

Recent FERC Scoping Meetings

Wayne Dyok (AEA) indicated that there were a lot of all new issues raised during the FERC scoping meetings held the week of March 26, 2012, but AEA did get valuable input to help move the process forward. Comments will be available to the Project team and may influence study plan development. FERC transcripts will be available in a few weeks. People are interested in socioeconomic regional impacts. People in Talkeetna were interested in an analysis of tourism impacts. Although many of the comments received might not directly relate to the studies that we are discussing at this meeting, AEA still needs to account for public comments. Kirby Gilbert (MWH) mentioned that the team learned more details about the importance of issues to people, including: project access, road accessibility, access to the rail corridor, the importance of subsistence, socioeconomics and the need to analyze air quality.

David Turner (FERC) said that they did hear during the Wasilla scoping meeting about a large mining operation north of the Talkeetna Mountains. The commenter expressed concern that the mine may be influencing caribou migration behavior or use of habitat, but that the specific location was not described. Brian Lawhead (ABR) speculated that it may have been the current gold-mining operation at Valdez Creek, located adjacent to the upper Susitna River. Later in the discussion, Sarah Bullock (BLM) said that the mining development in question may be in the Tangle Lakes area on State of Alaska land. She said that Pure Nickel is now doing exploratory drilling for nickel, platinum, and copper. Wayne Dyok (AEA) said we'll need to carefully consider which projects will be including in the scope of the cumulative impacts analysis.

General Information on 2012 Study Plans and 2013/14 Study Requests

Kirby Gilbert (MWH) noted that the 2012 study plans are posted on the project website and are near final, but AEA is open to further comments within the next two weeks. Comments should be emailed to Betsy McGregor (BMcGregor@aidea.org or 771-3957).

Kirby Gilbert (MWH) also noted that draft 2013/14 study requests are posted (in MS Word format) on the project website for agencies to use to develop their study requests. He said that if

agencies want more information about the study request, they can contact Betsy McGregor at AEA (BMcGregor@aidea.org or 771-3957). The project team is focused on developing the 2013/14 study plans, which should be filed by July 16, 2012. Kirby said that the agencies are welcome to edit and submit the draft study requests that were provided. Betsy McGregor (AEA) said that AEA would like comments in writing, but if an agency doesn't have time to send comments, there would be meeting notes that agencies could accept in writing.

Kirby Gilbert (MWH) noted that some of the posted study requests don't have information regarding study cost. David Turner (FERC) said that cost is an element that the team should include in the study plans. He said that it is good to understand what any additional level of effort would cost. If there is no difference in cost with additional tasks, than cost information is not as important.

Vegetation Study Plans Questions/Discussion

Terry Schick (ABR) presented the Botanical 2012 Study Plans and Botanical Resources 2013/2014 Study Plans (Requests) following a PowerPoint presentation.

Wayne Dyok (AEA) discussed that the project facilities are currently sited based on the previous wetlands and vegetation data. He said that feedback to the locations for project components would be good, if there are important vegetation or wetland issues.

Terry Schick (ABR) highlighted that for developing wetlands delineation methods, ABR will organize a separate set of meetings to include USFWS, USACE, ADEC and EPA, with the goal being that everyone agrees before ABR begins field studies this summer. He said that the group needs to come to consensus on methodology for delineation and for determining wetland functions and values.

In reference to the riparian study, Betsy McGregor (AEA) said to make sure to coordinate with Kathy Dube who is doing the large woody debris study. Betsy said that they would have a consultant coordination chart that will be available on the website.

Bob Henszey (USFWS) asked what vegetation classification would be used. Terry Schick (ABR) said that they would use the Viereck (Alaska Vegetation Classification) Level 4 for vegetation types for the riparian study and for the habitat study; however, it is up for discussion. Bob Henszey (USFWS) said that the Viereck classification worked for him. Terry said another system might be needed for more intensive studies. Bob Henszey (USFWS) said that he was not opposed to modifying the Viereck types or creating new types if existing Viereck classes don't apply.

Kirby Gilbert (MWH) asked the extent of the previous work down the river. Brian Lawhead (ABR) said that previous (1980s) study went as far down as Willow. Brian said the active floodplain was mapped from Talkeetna upstream to Devils Canyon and then went basin-wide

above Devils Canyon. Terry Schick (ABR) said that they will follow the same study boundaries unless they hear that they need to go south of Willow.

Terry Schick (ABR) said that the team needs comments in the next two weeks to incorporate into this year's study. Betsy McGregor (AEA) said that it is important to get comments. She said that since these are multi-year studies, which will be brought into the FERC process, agencies need to accept the methods and the study area.

Terry Schick (ABR) confirmed that the same crews would be doing the vegetation, wetlands, and rare and invasive species surveys.

Betsy McGregor (AEA) said that AEA would be obtaining aerial imagery once they determine the holes in the existing imagery. Janet Kidd (ABR) confirmed that the team is determining the holes right now. Terry Schick (ABR) said that much of the imagery, as long as it is fine-scale and acquired during the summer months, should be suitable for botanical mapping studies.

Betsy McGregor (AEA) said that there may be LiDAR-quality issues in the North Susitna block, like shadows and smearing, and that reprocessing but could take longer. Janet Kidd (ABR) said that LiDAR sometimes is flown when the canopy is minimized. Betsy McGregor (AEA) said that they are waiting for the Mat-Su Borough data and will need to work on it once it is obtained. Kirby Gilbert (MWH) said that the imagery may not cover all areas of interest and there may be need to be different sources of imagery used for different areas.

Betsy McGregor (AEA) said that Kirby Gilbert and Jim Gill are working on narrowing the study corridors. Kirby Gilbert (MWH) said that the project area won't change much from what is in the PAD. He said that the study area will shift a bit as they move forward and learn more about the area in terms of the feasibility of placing new facilities in those locations. Betsy McGregor (AEA) said that the ADOT&PF access study results, expected in April, will have a nominal centerlines for the road options, which will help determine the study corridors.

Kirby Gilbert (MWH) said that sometimes there is an inclination to assume that we will be summing up results across the total project area; however, the current effort needs to compare and contrast the corridors as only one or two corridors will ultimately be chosen. As a result, the summary of information across all corridors is not going to be useful. He said that then the corridors will be compared and contrasted to help AEA decide which corridor is most favorable. He said that AEA is carrying all corridors forward at this point. The 2012 field study information will help to make corridor decisions if one is to be eliminated. Betsy McGregor (AEA) said that AEA will have to carry several corridors forward for the U.S. Corps of Engineers permitting effort. The Project team needs mapping and groundtruthing in all three corridors to help them determine the least environmentally damaging practicable alternative. Kirby Gilbert (MWH) said that they could drop a corridor if it is found to be not feasible or unreasonable, but right now can't assume any corridors will be dismissed from further consideration.

Kirby Gilbert (MWH) asked about the use of the National Wetland Inventory mapping. Terry Schick (ABR) said that NWI typically underestimates the area of wetlands.

Bob Henszey (USFWS) asked about the minimum mapping unit. Janet Kidd (ABR) said that for these studies, ABR normally maps to 0.5 acre. She said that the team would use 0.1 acre for waterbodies and aquatic habitats of interest. She said that NWI maps are based on vegetation and tend to miss small drainages that this work would catch.

Kirby Gilbert (MWH) mentioned that the corridors are generally about 1-mile wide so as to be able to accommodate a road and possibly transmission line together across varying terrain. Terry Schick (ABR) said that the team would map at a finer scale in the area of the Project footprint for the purpose of permitting and determining compensatory mitigation requirements. He said that for comparative and impact assessment purposes, the team would complete wetland mapping at a broader scale in areas surrounding the localized mapping in the project footprint area.

Janet Kidd (ABR) said that they want to hit the ground running once they have good imagery that they can use. The team would use a HGM (hydrogomorphic) approach for each wetland polygon, similar to the method developed by Mike Gracz.

Betsy McGregor (AEA) said that we need to set up a meeting with USACE, EPA, USFWS, and ADEC for next week. She said the Corps has provided some comments during a meeting and agreed with the methods. She said that the team needs to include William Aston at ADEC, Mary Leykom the Corps' project manager, and Matt LaCroix at EPA.

Janet Kidd (ABR) said that there may be some issues with the Cook Inlet (Gracz's) Method and the team needs to work with the agencies to come to a consensus on the approach. Bob Henszey (USFWS) said that he supports this approach even though his agency recommended using Gracz's method.

Betsy McGregor (AEA) said that it will be important for each team to remember other teams' work. She said that all teams need to be collecting information in the same way, and take notes and share the information. She said to remember to share information with Kathy Dube who is doing the large woody debris study and Kevin Fetherston (R2) who is doing the instream flow riparian study.

Mike Buntjer (USFWS) said that the team should contact Betsy McCracken at USFWS for more information on the wetland methods recommendations prepared by USFWS. David Henszey (USFWS) asked to be invited to the wetland focus group meeting. Kirby Gilbert (WMH) said that it will be important to have meeting notes from these meetings for the record of consultation.

David Henszey (USFWS) asked whether the group discussed the study area or the extent of study for the 2013/14 studies. Terry Schick (ABR) said that it is going to be a large area. He said that right now, ABR will is planning on looking at all three proposed transmission corridors.

Kirby Gilbert (MWH) asked if the riparian study area extended as far as Willow. He said that the current study area shown on the slide is the extent of the vegetation mapping, which AEA thinks is adequate for the Project. Terry Schick (ABR) said that the wetlands study area is a broader for making project decisions. It is assumed that the study area would be narrowed into areas where there is decent imagery for 2012. Betsy McGregor (AEA) said that the finer scale mapping would be needed within the corridors. David Henszey (USFW) agreed that wildlife habitat would need to be understood outside the general study area.

Brian Lawhead (ABR) said that the 1980s mapping for wildlife habitat covered the entire upper basin. Kirby Gilbert (MWH) said that the study plans need to include maps if possible.

Bob Henszey (USFWS) asked how far downstream the river corridor would be mapped. Terry Schick (ABR) said they would map pretty close to just south of the Deshka River confluence. Betsy McGregor (AEA) said that the instream flow study would look at the entire river or at least to where there is tidal influence. She said that there would be less study downstream away from the project impacts and that pressure transducers would help to understand the limits of the riparian study.

David Turner (FERC) said that it is important to maintain the characterization for habitat for wildlife in the downstream area, but this may only be needed at a higher scale. He said that the project needs to have consistent study areas in order to relate and compare the information.

Wildlife Study Plans Questions/Discussion

Brian Lawhead (ABR) presented the Wildlife 2012 Study Plans and Wildlife Resources 2013/2014 Study Plans (Requests) following a PowerPoint presentation.

Kirby Gilbert (MWH) asked whether ABR did a previous bald eagle nest survey in the project area. Brian Lawhead (ABR) said that ABR looked a small area in 2011 in a limited survey around drilling borehole sites and found a previously undiscovered nest. They have a good map and physical descriptions for historical sites from the 1980s studies.

Maureen de Zeeuw (USFWS) said that she wasn't prepared to provide specific comments on the study plans, since she had an older version. She said that for delineating suitable nesting habitat for eagles, it isn't necessary to map a 10 mile area from the corridors. She said that the USFWS is interested in nest locations. Maureen said that AEA would have to apply for eagle take permits. She said that the USFWS hasn't issued permits for take of golden eagles. The project studies should concentrate on information need for a permit, including information like inter-nest distance, breeding territory size, and how many breeding territories would be taken by the project.

Brian Lawhead (ABR) said they would set up a meeting with Maureen and Jordan (Muir) to discuss study methods. Maureen de Zeeuw (USFWS) said that bald eagle permitting requires many years of preconstruction surveys. She said it would be good to look at maps together

during the meeting. She said the maps should show the corridor locations, and that aerial photography would be helpful.

Betsy McGregor (AEA) said that it would be good to understand where nests have been found in the past. Maureen de Zeeuw (USFWS) said it would be good to know where the null data is, that is, where they surveyed in the past and did not find nests.

Lem Butler (ADF&G) said that ADF&G completed a preliminary survey (geospatial population estimator) for moose last week. Brian Lawhead (ABR) said that this was a good time to do this, since this winter had a heavy snowfall and concerns had been expressed during the original project studies regarding the use of the inundation zone by moose in severe winters.

Lem Butler (ADF&G) said that he didn't think that an aerial survey was needed for brown bears and black bears. He said that he didn't think it would change the agency's understanding of the population.

Brian Lawhead (ABR) asked the group their thoughts on whether wolverines were a big study concern. Lem Butler (ADF&G) said that he missed the discussion on it and that ADF&G may have dropped their interest.

Brian Lawhead (ABR) said that additional data on wildlife harvest would be added to the studies, as they become available from ADF&G's ongoing analysis of harvest patterns, including the newly instituted small-game harvest monitoring project. He said that the project's recreation analysis may be interested in these data. Betsy McGregor (AEA) said that Bridget Easley, URS' program lead for recreation and aesthetics, should be consulted to determine what they information they need.

Betsy McGregor (AEA) asked whether it would be possible to have a list of bird species expected in the upper river so other people in the field could document their presence.

Maureen de Zeeuw (USFWS) asked why the team wasn't conducting bird surveys (beside raptors) in 2012. She said that from the point counts, the team would be getting primarily presence/absence information, depending on the specific method used. She said in 2013, perhaps the team could look at determining bird densities. She said that to figure out project impacts, it would be helpful to have to bird densities.

Terry Schick (ABR) said that the team would use variable-radius circular plots for point count surveys. He said that with enough data, they could get densities. Maureen de Zeeuw (USFWS) said that it will be important to understand impacts to sensitive species, including rusty blackbirds and olive-sided flycatchers. Terry Schick (ABR) said that given enough data, they could calculate densities by habitat and could relate that information back to project impacts. He said that the analysis would be relative to habitats used by each species.

Brian Lawhead (ABR) asked whether transmission-line collision mortality was an issue to USFWS. Maureen de Zeeuw (USFWS) asked whether there was a plan to look at bird migration corridors. She asked whether migration corridors were studied in the past. Brian Lawhead (ABR) said that water bird migration corridors were mostly studied, but that studies of nocturnal migration had not been conducted in the project area, although they have been done farther east near Gakona and farther north on the Tanana Flats.

Sarah Bullock (BLM) asked whether there had been any thought given to how the provision of more raptor perches on transmission towers would affect ground-nesting bird populations and small mammals. Brian Lawhead (ABR) said the he expected that the implementation of BMPs, that is keeping the project from adding perches, would cut down on impacts to these animals.

John Shook (ABR) said that they did have data from the Eva Creek Wind project. He said that if poles are in a windy area, nests would not be sustainable, but perches could be available. He said more ravens could be attracted to the area, which could result in more small birds and mammal predation.

Maureen de Zeeuw (USFWS) said that the project still needs to understand bird migration corridors. She asked whether this issue was brought up in the past and dismissed. Brian Lawhead (ABR) said that previously the project examined migration of waterbirds only, and that the conclusion was that it was not an important migratory corridor, compared with other high-volume migration corridors such as the upper Tanana valley. Maureen de Zeeuw (USFWS) said that she would like to know the locations of bird migration corridors in relation to the transmission line corridors. She said understanding their location would help with project design. Wayne Dyok (AEA) challenged ABR to investigate what could be gleaned about bird migration corridors in the project area. John Shook (ABR) said that there is a pretty strong east-west bird migration in the Eva Creek area. Brian Lawhead (ABR) said that information collected near Tok and Gakona also shows east-west bird migration corridors.

Maureen de Zeeuw (USFWS) said that the bird migration corridors are important for locating the transmission line. She encouraged the team to think about where migration corridors might be an issue for locating the transmission line. She said that impacts to migration corridors might only be in specific locations where the elevation of the line might conflict with migration.

Terry Schick (ABR) said that there had been discussions of the level of detail needed for wildlife habitat mapping products. He said that ABR usually prepares one wildlife habitat map that shows 30 to 40 habitat types on it. Brian Lawhead (ABR) said that ABR can prepare different maps for birds and mammals, and could prepare specific maps for high-profile species (e.g., moose, bears, and species of concern). He said that if they are mapping to Viereck Level 4, the habitat types would indicate dominate species, such as willows, which are important for moose browse. Kirby Gilbert (MWH) mentioned that it might be better to have an ecosystem approach, unless there are questions about specific species.

Brian Lawhead (ABR) asked whether BLM has questions or whether there were particular mandates that the agency has for particular species or areas. Sarah Bullock (BLM) said that she don't know if she knew enough about the issue since she was new. She confirmed that the availability of game for subsistence harvests was important to BLM.

Lem Butler (ADF&G) said that ADF&G's work would extend below the proposed dam or the confluence near Talkeetna, but not down to Willow.

Wayne Dyok (AEA) asked that, assuming that there is some big game usage of the reservoir, would ABR be looking at the impacts of other hydroelectric projects in northern latitudes where fluctuations of reservoir levels was a concern for wildlife movements. Brian Lawhead (ABR) confirmed that they would be focusing on caribou movements and reservoir fluctuations.

Action Items

1. AEA agreed to begin investigating the potential for bird collisions with project infrastructure, and requested that ABR investigate what might be gleaned from other studies to help understand what broad-scale bird movements might be like in the project area.
2. ABR will organize and conduct a wetlands focus group agency meeting. AEA will provide updated transmission line corridor data for ABR to use in preparing more accurate study area maps for the wetland methods consultation meetings.
3. ABR will send copies of historical references describing LGL's eagle studies (in the 1980s) to Maureen de Zeeuw (USFWS).
4. ABR will contact Bridget Easley, URS's recreation and aesthetics program lead, to determine information needs related to wildlife harvest data from ADF&G.
5. ABR will prepare and share a list of bird species expected in the upper river with other field teams, so that other teams can document their presence.
6. ABR will organize and conduct a meeting with Maureen de Zeeuw (USFWS) and Jordan Muir (USFWS) to discuss bald and golden eagle study methods.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Social Sciences 2012/2013-2014 Study Plan Development,
April 3, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
AEA	Wayne Dyok
AEA	Betsy McGregor
AEA	Bruce Tiedeman
ADF&G	Joe Giefer
ADF&G/DOS	James Van Lanen
ADNR/OHA (SHPO office)	Richard Vanderhoek
BLM	Elijah Waters
DOWL HKM	Tom Middendorf
DOWL HKM	Maryellen Tuttell
McDowell Group	Donna Logan
FERC	Jesse Fernandes (by phone)
FERC	David Turner (by phone)
HDR Alaska	Tracie Krauthoefer
HDR Alaska	Alyse Roberts
Louis Berger Group	Lisa McDonald (by phone)
MWH	Kirby Gilbert
Charles Mobley & Associates	Chuck Mobley
NLUR	Pete Bowers
Natural Heritage Institute	Jan Konigsberg
NPS	Cassie Thomas
NPS consultant	Harry Williamson (by phone)
Northern Economics	Patrick Burden
Stephen Braund & Associates	Paul Lawrence
URS	Bridget Easley

A housekeeping discussion followed introductions. Kirby Gilbert (MWH) introduced the purpose of the meeting, to discuss both AEA-prepared 2012 study plans and ILP study requests.

Cassie Thomas (National Park Service) asked AEA to consider several housekeeping measures that she felt would allow the agencies to be more efficient in their participation in the study development process and their review of proposed study plans. Suggestions included:

- Making sure that all of the agencies and consultants are on the project list serve for updates and announcements.

- Having the Go-To Meeting link available on the website and listed on agendas.
- Send out an e-mail letting people know any time new material is posted on the website.
- Come up with a more consistent protocol for where things, such as study plans, are posted on the website so they are easier to find.
- Come up with a better protocol for file naming including either a version number or date so that agencies don't download materials thinking they are new if they are not.

Jan Konigsberg (Natural Heritage Institute) asked whether a list of all contractors for each study were listed on the website. Betsy McGregor (AEA) responded that a list is being prepared and will be available.

Kirby Gilbert (MWH) informed the group that FERC would release transcripts of the scoping meetings so that everyone could see what was said at each meeting. He also noted that there would be another site visit in July.

Socioeconomics

Maryellen Tuttell, AICP (DOWL HKM) introduced herself as the program manager for these studies. She introduced Pat Burden (Northern Economics) who will lead the socioeconomic studies. Maryellen (DOWL HKM) noted that she will be supported on the transportation studies by DOWL HKM staff: Tom Middendorf, aviation; Steve Noble, P.E., highways; and Dave McCourtney, P.E., railroad. Maryellen (DOWL HKM) noted that support for air quality studies would be from Harris Miller Miller and Hanson, a firm that specialized in noise and air analysis.

Pat (Northern Economics) introduced the two main components of the socioeconomic studies: Social Conditions and Public Goods & Services, and Regional Economics. Pat (Northern Economics) reviewed the goals of the study and noted that the Social Conditions and Public Goods & Services study will be focused more on communities and boroughs in proximity to the project site. He noted that any local, borough or state-adopted plans for standards of public services will be used. However in many cases no such standards have been adopted and in these cases the existing situation will be used as the standard. So, for example, if there are currently 10 police officers for every 1,000 people, the analysis will use that as the standard for police protection.

Pat (Northern Economics) discussed how the REMI model, developed by Regional Economic Models, Inc. and calibrated by Northern Economics to Alaska's economy, is proposed to be used to evaluate impacts to populations and public goods and services. Pat (Northern Economics) noted that some basic data collection would begin in 2012, but most activity in 2012 would be associated with coordinating with the Project design team and other consultants, and developing the socioeconomic study plans.

Pat (Northern Economics) then reviewed the regional economic evaluation and noted that the focus on this study will be on the communities within the Railbelt. Other communities may

need to be added if the transmission lines are extended into areas outside the Railbelt. He noted that one of the standards that would be used is the state's adopted policy for providing 50 percent of energy from renewable sources. Existing levels would be used where no standards have been adopted, such as existing income levels, employment levels, etc.

Pat (Northern Economics) described how the future scenario would be created through development of major assumptions about the Alaska economy and how it is likely to change over time. The assumptions are based on research and interviews with key industries and have been used in several economic studies, including the one for the Alaska Gas Pipeline Project. The REMI model would again be used to evaluate the economic effects of the project, including effects from stable energy prices in the Railbelt and how that might affect business opportunities and impacts on tourism businesses. The regional economic analysis would also evaluate how stable energy costs would change disposable income in the Railbelt and what effects that would have on purchased of other goods and services. He noted that, again, most of the work on this study in 2012 would be limited to coordinating with the project design team and other consultants.

Cassie (NPS) asked whether the evaluation of public goods and services would look at the services provided by green infrastructure, as well as built infrastructure. She noted in particular the Susitna River system provides public benefits associated with flood retention and other services. Pat responded that green infrastructure was not specifically in the scope of the study but that this was an interesting concept.

Jan Konigsberg (Natural Heritage Institute) asked David Turner (Federal Energy Regulatory Commission) how FERC would use the socioeconomic information to inform the licensing process. He indicated that it seemed easier to understand how biological and other resource studies would result in license conditions, but could the license requirements also address social and economics?

David (FERC) said that FERC does look at impacts to social and economic resources and could potentially have license conditions to address these.

Cassie (NPS) asked whether the regional economic evaluation will look at multiple potential future scenarios, instead of just one.

Pat (Northern Economics) answered that the proposed study would look at two future scenarios: one that includes construction of the project and one that assumes the project is not constructed. The study would develop Reasonably Foreseeable Future Actions (RFFAs) based on interviews with key industries and others. This is how the analysis was done for Highway-2-Highway and the Knik Arm Bridge projects. The scenario without the project would be based on the Railbelt Integrated Resource Plan (RIRP) that outlines future potential power sources.

There was also discussion of the timeframe for the project. Wayne Dyok (Alaska Energy Authority) stated that if the license was issued in 2017 construction would start then and the project could be online in 2023. Pat (Northern Economics) noted that the REMI model will look out 50 years. Once you get beyond 50 years, it is hard to confidently model effects.

Jan (NHI) asked whether the analysis would consider changes in power generation in other areas and/or changes in industries. Pat (Northern Economics) answered that it would look at both. There was discussion of the potential for attracting companies that currently aren't in Alaska and have high energy demands. They may be more interested in locating in Alaska if they have a low or more reliable source/cost of power.

Cassie (NPS) asked whether a project of this magnitude could result in changes to construction material prices, such as steel, gravel, etc. This could make other construction projects in Alaska more expensive if this project drives those prices up. There was discussion of the various types of equipment and materials, and how material supplies and costs from markets in the Lower 48, such as steel, would not be impacted by this project, but that local goods and materials (such as labor and gravel) could be affected and these impacts would be evaluated.

Jan (NHI) asked that the economic analysis look at the impact on state credit and potential indirect impacts to the state's ability to fund other needed projects if they commit to funding this project. Pat (Northern Economics) noted that the modeling effort does include a fiscal model to look at fiscal impacts on the state and boroughs.

Wayne (AEA) noted that AEA is hiring a financial consultant that will develop a financial plan for how the project would be funded.

Bruce Tiedeman (AEA) stated that the Alaska Native land owners and communities are very interested in the long-term effects on them from this project. Not all the Alaska Native entities will be affected the same and not all of them have the same interests, so they can't be lumped into one group. They are very interested in coordinating on the economic studies.

Kirby (MWH) noted that he heard comments from Alaska Native groups at the Glennallen meeting and concerns about the outmigration from rural communities and its impact on school enrollment and community stability. Some people commented that the price of energy was driving the outmigration. Changes in population profiles need to be addressed.

Jan (NHI) asked why Glennallen would be affected since there was no proposed transmission connection to Glennallen in the proposed Project. There was discussion about recreation and subsistence use and other indirect cumulative effects on the Glennallen area. Ahtna Inc. owns property adjacent to the Project area. Any area that could be impacted should be in some manner, evaluated in the study.

There was discussion of social survey efforts that would be underway in various resource areas. Betsy (AEA) noted that the Susitna area communities would be surveyed in 2013 and

the Copper River communities would be surveyed in 2014 for subsistence. Tracie Krauthoefer (HDR) said that the Institute of Social and Economic Research (ISER) has had Alaska Department of Fish & Game (ADF&G) add some socioeconomic questions to the subsistence survey. Joe Giefer (ADF&G) noted that it is hard to get participation if the survey gets too long, so he wouldn't recommend adding a lot of questions to it.

There was clarification that there will be some baseline information collected and informal interviews conducted in 2012, but no actual surveys for subsistence or recreation. There was a question about why the Copper River communities were surveyed in 2014. ADF&G has recent surveys for that area; the ADF&G survey data on Susitna communities is older and needs to be updated.

Jan (NHI) asked Pat (Northern Economics) if part of the socioeconomic study was to hold public meetings to get information from the public. Pat (Northern Economics) noted that typically for this type of study there are meetings with elected officials, industry officials and others. No public meetings would be held specifically for this study, but information gathered from the scoping meetings would be incorporated. Jan (NHI) asked if Pat (Northern Economics) thought that the results would differ with or without public input. Pat (Northern Economics) did not think the results of the analysis would change.

Mike Wood (Chase resident) asked whether the transportation use of the Susitna River in winter would be evaluated. He noted that Chase is the closest community council to the project site and that most of the communities in the area are unincorporated. He has concerns about how an influx of people could affect these unincorporated areas.

Jan (NHI) noted that if the Project decreases rates, new industries could develop potentially leading to increasing energy demand. Jan (NHI) continued that increased demand would require more power, or could raise rates again. Pat (Northern Economics) said that the average price will depend on the load generated. Wayne (AEA) also noted that the study would look at how energy needs would be addressed using different resources if the power demand increases. Jan (NHI) added that as an applicant, the State needs to be straight-forward about potential power prices. The proposed Project may produce lower cost energy if demand stays the same, but not if demand increases.

Cassie (NPS) asked about where other resource economics are addressed, such as the value of recreation. She was not referring to changes in income to recreation businesses, but the value of non-cash goods, such as the enjoyment of the river. Some of these things are not as easily monetized but would likely be addressed in the recreation and aesthetic studies. Tracie (HDR) noted that ISER does have information on the value of the fisheries resource.

Bridget Easley (URS) noted that the recreation study will collect information on recreation spending.

Mike (Chase resident) added that in six weeks the river will be inundated with bear hunters. In December the Denali Highway is crowded with people getting caribou. He noted that Dallas Seavey, Jeff King and other mushers use the Denali Highway area for training.

Transportation

Maryellen (DOWL HKM) went over the goals of the transportation study, the standards that would be used for evaluating transportation and the standard methodologies for forecasting traffic levels. She again noted that transportation studies would not start in 2012, but that the team would be coordinating with the design team and the other consultants and preparing the study plans.

Cassie (NPS) noted that she had heard concerns from residents that have cabins in the Gold Creek area about whether the studies would evaluate the potential for more trespass on their lands if a new western access road is constructed. Betsy (AEA) responded that if a link to the Parks Highway is identified as a reasonably foreseeable action, it could be addressed in cumulative effects. Cassie (NPS) noted that access from the railroad could also be an issue. Maryellen (DOWL HKM) responded that the study will evaluate the effects of possible change in access and proximity to road and rail corridors.

Mike (Chase resident) stated that winter is a major travel time on the Susitna River and changes in ice conditions could impact the ability to travel and travel safety on the river.

Ron Benkert (ADF&G) stated that ADF&G would like Tier 1 fish passage culverts on any new roads. For the Denali Highway, an analysis of fish passage through the existing culverts would be needed.

Kirby (MWH) noted that the DOT&PF is evaluating road corridors. Becky Long (Coalition for Susitna Dam Alternatives) asked when the DOT&PF study would be completed. Wayne (AEA) noted that it would likely be released near the end of April.

Air Quality

Maryellen (DOWL HKM) reviewed the purpose of the air quality study, the standards that would be used and the standard methodologies for evaluating emissions. She noted the lack of existing data for the project area.

Wayne (AEA) recommended that the air analysis study plan consider the analysis conducted on the recent Eagle Mountain Pumped Storage EIS. He asked David (FERC) whether the study can use the emissions information already developed in the RIRP, or whether emissions had to be modeled all over again. David (FERC) said that he would look into this question and get back to Wayne (AEA).

Jan (NHI) asked whether the power generated by the project would replace relatively inefficient peaking units. Wayne (AEA) responded indicating that the project could do a combination two approaches, load following or base loading, but that the two approaches provide the bookends (range) of emissions reduction for the Project.

Betsy (AEA) noted that people in Fairbanks were interested in whether this Project would change air emissions in Fairbanks where they are in non-attainment for some air pollutants. Maryellen (DOWL HKM) noted that the analysis would have to look at what the various contributors to the non-attainment pollutant levels were and whether they were related to power production or to other sources, such as wood stoves or vehicles.

Cassie (NPS) asked whether the study proposed to collect baseline data for air quality. She noted that without a baseline it is hard to determine the effect on visual and aesthetics at the project site and for road construction and operation (dust). There are currently issues with dust on the Denali Highway and localized effects from wood stove smoke in the winter. Maryellen (DOWL HKM) noted that the study team will meet with EPA and DEC to determine what level of analysis they want to see for the study and to see if there is other information or other studies that might have been done in the study area.

Wayne (AEA) added that there will be discussions with the Railbelt utilities to see which units would be displaced by the Project to help in determining any Project-related emissions reduction.

Recreation & Aesthetics

Cassie (NPS) asked if the landscape characterization process and quantification of aesthetic values would include the river downstream of the proposed dam as well as changes in downstream flow patterns. Cassie (NPS) emphasized the importance of having a baseline noise assessment and the potential for impacts on the region's soundscape by increased overhead flights and helicopter usage. Further discussion about potential impacts of noise on wildlife populations and the need for a different model to assess impacts on wildlife. Tracie (HDR) asked if it would be possible to coordinate URS's noise modeling efforts with efforts to determine the impact of noise on wildlife populations, potentially expanding the noise analysis and modeling efforts.

Betsy (AEA) emphasized that the region was not a noise free environment and that a significant amount of hunting, fishing, and snow machine activities occurred in the Project area. Betsy (AEA) brought up the possibility of coordination between the aesthetic group and the river and ice processes group to the match KOPs with river monitoring sample points. This would allow for river flow data to be used to be matched with the quantification of aesthetic values of the river, especially in relation to changes in river flow patterns.

The river and ice processes group will be collecting several types of data at multiple points along the river from the reservoir to River Mile 9. This data includes river transects to

determine bathymetry, audio and video to monitor changes in river flow, LiDAR data for the project area, pressure transducers, monitoring ice formation and break up, in stream flow and ice modeling.

Cassie (NPS) asked if the road would be open to public use. If it is not open to the public, then it may be better to select a road alignment that would conceal the road and reduce aesthetic impacts to the landscape. In particular, Cassie (NPS) suggested hiding the road from hikers on Krusig Ridge. Wayne (AEA) provided insight into the steps and timeline for determine if the access road would be open to the public. He emphasized that currently there is no easy answer and that it is essentially a policy question which will require a significant amount of dialog with all stakeholders (including landowners) and an assessment of all potential alternatives (road alignments). However, he highlighted that this would be a public-use project. In addition, the road will not be open to the public during the construction period.

There was discussion on how many Key Observation Points (KOPs) will be designated and where they will be located. Louise Kling emphasized that the designation of KOPs is an evolving process and the input from all groups was welcomed. The initial list of KOPs would be based on the 1985 FERC application KOP list, but that list would be adjusted as required. Wayne (AEA) brought up the July site visit and suggested that stops at the initial KOPs could be incorporated into the visit to help everyone coordinate efforts.

Wayne (AEA) discussed the ongoing assessment of the potential configuration of transmission lines (one line verses two lines), emphasizing that it would be based on reliability, but that a two-line configuration was likely. A decision would likely be made by the end of the year with potential routes becoming more defined.

Harry Williamson (NPS) asked if there would be a less formal coordination process that would allow agency input/vetting of 2012 survey questions. Donna Logan (McDowell Group) clarified that the 2012 interviews would be informal and would be conducted in a way to allow people to express their views and perspectives, rather than a series of questions normal associated with a survey. Donna (McDowell Group) emphasized that the interviews were not aimed at collecting "data", but rather designed to acquire impressions of the project and to gather information about who should be contacted and surveyed (prominent individuals, lodge owners, user groups, etc.) for the 2013-14 survey.

Cassie (NPS) asked how the informal trail network would be assessed and mapped and in particular, what would be the threshold for determining what the designation of "trail" versus "route" would be used. It was highlighted that current ADNR GIS layers may be inadequate and would need to be ground-truthed. They may be very out of date with many trails not shown or shown but currently abandoned. Betsy (AEA) brought up that AEA would be able to provide updated aerial photos and GIS layers showing rights of access and ownership.

Cassie (NPS) asked to ensure that trail's official designations and numbering systems are used.

Betsy (AEA) and Kirby (MWH) discussed the ADNR and BLM data sources that would be available for general land ownership designation and how they would be used to determine the specific owners of lands within the region. Betsy (AEA) confirmed that URS was not responsible for determining land ownership within the region.

John Gangemi (ERM) discussed the flow-dependent recreation assessment that could be conducted and the need for input from the hydrology group and the need to determine what information is used by locals to determine flow rates. Cassie (NPS) asked for clarification on the unique situation in Alaska where rivers freeze over in the winter and transition from flow-dependent recreational uses to ice-dependent recreational uses. John (ERM) said that this has not been done before and that ice-dependent recreation would likely be excluded from his portion of the study.

Wayne (AEA) pointed out that for winter recreational uses it will be important to determine how the river is used and how flow patterns will influence these recreational uses. The recreation group will need to coordination with the river flow and ice modeling group and the transportation group to determine these interactions.

Mike (Chase resident) emphasized that river flow will directly affect the ice formation and how local residents will be able to use the river in the winter (moving along and across the river) and that most out-of-state recreational users come from the railroad and professional boat charters.

Cassie (NPS) brought up that records of access might exist for private landowners within the region; however, it was likely that this is a very small portion of the actual usage of the lands. There was discussion about combining recreation and subsistence surveys; however, Tracy (HDR) and Donna (McDowell Group) both agreed that this would not be the appropriate methodology. Paul Lawrence (Stephan Braund & Associates) pointed out that discussions on sport uses during subsistence interviews are generally not productive or well-received.

Cassie (NPS) said that it is important to identify river access points for recreational users and that it will be necessary to determine how sensitive each of these points are to changes in river flow regimes, vegetation and geomorphology. Amy Rosenthal (URS) suggested that an initial site-condition analysis form could be developed to record vegetation, ground cover and general conditions.

Betsy (AEA) emphasized the need to coordinate field efforts and the recreational sites should be designated at key points for flow studies. Donna (McDowell Group) also suggested that a study group be established to coordinate public contact efforts in order to minimize the number of times that individuals in the public are contacted.

Subsistence

Tracie (HDR) provided an overview of the ADF&G Division of Subsistence survey and how certain communities were selected as they are in need of updated information whereas other communities already had been surveyed recently. In addition to the ADF&G work, the HDR team would also conduct subsistence surveys in "non-subsistence" communities as defined by ADF&G Division of Subsistence that included Talkeetna. Tracy (HDR) noted her group would also be attempting to gather Traditional Environmental Knowledge (TEK) which would include information useful to help identify Traditional Cultural Properties (TCPs) in the Alaska Native communities. The discussion then transitioned into cultural resources

Cultural Resources

Pete Bowers (Northern Land Use Research) presented an overview of the cultural resource studies proposed. He noted that the current effort has been to bring data into Geographic Information System (GIS) databases from the older paper resource studies relevant to the area. He noted that the 2012 scope is limited to developing a GIS predictive model to identify areas which would need further evaluation in field studies in 2013 and 2014. He also discussed ice patch studies which evaluate resources that are found as ice melts and reveals areas that have been undisturbed for long periods of time.

Wayne (AEA) asked when a protocol for handling resources found in the field would be available. It would be nice to have it in early June so that crews in the field this summer can be trained on it. Chuck Mobley (Charles M. Mobley & Associates) asked about the best way to brief field teams and whether there is a Project Health & Safety Plan for all field staff. Wayne (AEA) indicated that this would be a good topic for the consultant coordination meeting coming up next week. Betsy (AEA) added that there will be a site logistics coordinator that will ensure field crews are aware of important information. She noted that all field crews will be staying in one location and will be coordinated through her.

Pete (NLUR) noted that more data on Alaska Native place names and on Traditional Cultural Properties (TCPs) will still need to be gathered. Jim Kari at the UAF Alaska Native Language Center has gathered a lot of information and his studies will need to be incorporated into the GIS system along with new information gathered.

Betsy (AEA) mentioned that Alaska Native entities had indicated an interest in being intricately involved during the development of the study plans for cultural resources. Bruce (AEA) confirmed this and said that holding meetings out in their regions would help illustrate that we are aware of their importance in this study process. They take a long-term view on access and use of their lands and want to be sure that long-term effects are adequately addressed.

Pete (NLUR) mentioned that there would be testing of the predictive modeling with limited field reconnaissance in 2012.

Richard Vanderhoek (Department of Natural Resources, Office of History and Archaeology) expressed concerns about timing during multi-year studies. Key information needs to be identified up front. Richard (SHPO) suggested that field reconnaissance should be broad. He also asked if the predictive model was going to be based on biological data and noted that it couldn't wait for 2-3 years to get the fish and wildlife studies. Pete (NLUR) agreed and noted that existing data would be used initially and that later modifications would incorporate any new information available.

David (FERC) asked when the Area of Potential Effect (APE) would be identified. Pete (NLUR) responded that the model will start by looking at a very broad area, but then the study area would become more refined through field surveys. Kirby (MWH) noted that the direct effects APE could be identified fairly easily based on Project information, but defining the indirect APE will require more time and could be an iterative process as more information is developed. Wayne (AEA) asked if FERC had recent guidance on the direct-impact APE versus the indirect-impact APE. David (FERC) agreed that the direct-impact APE is easy to define based on areas that would be disturbed by project activities but that the indirect APE gets much more site specific and difficult to discern. He noted that the identification of these areas would have to be coordinated with the State Historic Preservation Office (SHPO).

There was a question about whether a Programmatic Agreement (PA) could accelerate the process. Wayne (AEA) indicated that Ann Miles (FERC) would consider a PA and David (FERC) said he would follow-up. However, David (FERC) said the PA would provide agreement on how to do the studies, but wouldn't necessarily affect the level of effort to identify the APE. He is unsure how a PA would help, as compared to the normal cultural consultation process in the ILP.

Mike (Chase resident) asked what Alaska Native groups would be contacted downriver. Bruce (AEA) suggested that these would include Knik, Chickaloon, Tyonek, CIRI, and others.

Pete (NLUR) discussed survey strategies being considered for the FERC study plans; most would begin with helicopter surveys and then more intensive ground surveys in key areas to test the predictive model results.

Wayne (AEA) questioned the process for archaeological sites that may be part of the inundation zone. If an Alaska Native group does not want the area disturbed, does the site need to be surveyed and tested? Pete (NLUR) and Richard (SHPO) explained that all sites would have to be tested and evaluated because the State needs to identify what types of sites there are. Some may be preserved after flooding, others may lose their value. Wayne (AEA) noted that he wanted to be able to respect the wishes of the Alaska Native communities to the extent possible.

Betsy (AEA) asked how disagreements would be handled if land was owned by a village or regional corporation who had a different perspective on impacts than the tribal government. Pete (NLUR) noted that this is why consultation with all affected parties is critical.

Bruce (AEA) added that Alaska Native groups have their own criteria to determine cultural importance. He noted that the Project team must have respect for the sites that the tribal groups feel are important. Richard (SHPO) responded that consultation is critical to try to not disturb sites with human remains or spiritual significant. It was agreed that consultation is key. The Section 106 requirements are not just about preservation of historic resources but also include consultation, consideration, and respect for Alaska Native sensitivities.

Bruce (AEA) noted that most regional corporations have now identified cultural sites. Villages are now working to identify these sites, including TCPs, but they may not want to share this data. This information would need to be kept confidential. Richard (SHPO) noted that the SHPO has a database with confidential cultural data in it. But, people with legitimate research needs have access to the data. People need to know where resources are so that they don't damage resources accidently. The SHPO works hard to get this information so that it can be used to review projects and prevent damage.

Kirby (MWH) noted that Pete (NLUR) should get Betsy (AEA) information on what dates access to different Alaska Native owned lands would be needed. Betsy (AEA) added that AEA has agreed to do programmatic permits for access to Alaska Native-owned lands for the Project studies. She needs dates from all groups that need access.

Pete (NLUR) talked about collection and curation. There is an agreement with the University of Alaska Fairbanks for resources found on state or federal lands. There would need to be coordination with landowners for curation of resources found on non-public lands. UAF may want an agreement with individual landowners for curation of artifacts from Alaska Native lands.

Tracie (HDR) asked about the GIS protocols and metadata standards. Betsy (AEA) responded that there were standards identified and Courtney Smith (DNR) added that there is a GIS coordination group across all disciplines that has started meeting on a weekly basis to ensure everyone is using the same protocol. Joetta Zablotney (R2) is coordinating the list of data sets and who is collecting what so that there are not multiple parties collecting the same information. Betsy (AEA) noted that the GIS data access will be set up so that people will have access to the data they need but that access to other data, such as cultural data, can be restricted.

Pete (NLUR) asked Richard (SHPO) if SHPO will want a separate data agreement with each contractor working on this project, or whether there would be a project-specific data sharing agreement with AEA and the technical team. Richard (SHPO) responded that there will have to be control over the sharing of data so he would give this more consideration.

Betsy (AEA) noted that she was looking at disseminating confidential data to a limited number of people. There would be a data-sharing agreement that would likely include ADF&G, NLUR, HDR, Stephen Braund, DNR, etc.

Pete (NLUR) noted that it was important to have a thorough understanding ahead of time of the geographic reference levels. He noted that the volcanic ash layers and other specific layers could be used as a framework for the cultural chronology to evaluate sties. He and Richard (SHPO) agreed that it was important to be sure to identify these references early in the study and not be encountering a new soil reference type two or three years into the study. Richard (SHPO) added that a lot of data is gathered in the first season and takes all winter before it begins to mean something. Betsy (AEA) asked whether this level of information gathering was in the current scope. Pete (NLUR) said that it would be in the 2012 cost estimate. Chuck Mobley (Charles Mobley & Associates) noted that stratigraphic information that is broadly applicable is needed in several areas. Richard (SHPO) explained that areas with thicker sediments would have more data layers. The samples need to be spatially complete across the region. After discussion about the timing of re-examining site locations, this action was moved to 2012. Richard (SHPO) did not anticipate it would be labor intensive.

Wayne (AEA) asked whether stratigraphic information was already collected for the region in the 1980s. Pete (NLUR) responded that radiocarbon dating technology has advanced from what was available in the 1980s and that some of the laboratories that used to do radiocarbon dating have been discredited. Richard (SHPO) added that crews only dug to 50 cm or to certain stratigraphic layers and then stopped. Our assumptions about when humans were first present have changed since then. Pete (NLUR) noted that we now know that people have been in Alaska for more than 11,000 years. Richard (SHPO) added that some of the new technologies allow radiocarbon dating of the actual soils.

ACTION ITEMS:

- Develop protocol for handling historic resources encountered by field crews – MOBLEY/NLUR.
- Disseminate protocol for handling historic resources to field crews. – AEA
- Check with Ann Miles regarding use of a Programmatic Agreement for the project. – Wayne.
- Get Betsy information on what dates access is needed on Alaska Native lands. – ALL TECH TEAM.
- Disseminate standards on GIS – AEA.
- Determine if there will be a project data sharing agreement between AEA and OHA. – DNR OHA – AEA.
- Set up SharePoint Site with access to sensitive data limited. – AEA.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Water Resources Study Development Workgroup Meeting
April 4, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
USFWS	Mike Buntjer
USFWS	Betsy McCracken (by phone)
USFWS	Lori Verbrugge
NMFS	Susan Walker
NMFS	Eric Rothwell
BLM	Tim Sundlov
ADF&G	Joe Klein
ADF&G	Ron Benkert
ADF&G	Mike Bethe
ADEC	William Ashton
ADNR	Terry Schwartz
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsberg
MWH	Kirby Gilbert (by phone)
MWH	John Haapala (by phone)
Long View Associates	Steve Padula
Long View Associates	Randall Filbert
Cardno ENTRIX	Craig Addley
Cardno ENTRIX	Jim Gill (by phone)
HDR	Robin Beebee
URS	Paul Dworian
R2 Resource Consultants	Dudley Reiser
Tetra Tech	Bill Fullerton
Tetra Tech	Rob Plotnikoff (by phone)
GW Scientific	Michael Lilly
Brailey Hydro	David Brailey
Coalition for Susitna Dam Alternatives	Becky Long (by phone)
Alaska Ratepayers	Scott Crowther
Chase Resident	Mike Wood (by phone)

Presentations

- Review of Existing Water Temperature Model Results and Data Collection – Draft Final (2012 study plan)
- Baseline Water Quality Study (2013-14 study request)
- Water Quality Modeling Study (2013-14 study request)
- River Flow Routing Model Data Collection – Draft Final (2012 study plan)

Introduction

Steve Padula (LVA) stated that FERC had granted a deadline extension to May 31, 2012, for stakeholders to provide comments on the Pre-Application Document (PAD), Scoping Document 1 and formal study requests as part of the ILP process. Steve (LVA) noted that FERC had adjusted subsequent ILP milestones commensurate with the PAD comment extension and AEA would soon post a revised Project licensing schedule on its website. The previously scheduled May 2012 workgroup meetings have been rescheduled to be held during the second week of June 2012.

Steve (LVA) said that during the next several months AEA intends to begin scheduling subgroup meetings, which would involve greater focus on the details of study planning and execution. Wayne Dyok (AEA) added that these meetings would be open to anyone who wished to participate but that the focus of the meetings would shift to more technically oriented topics.

Steve (LVA) stated that 2012 study plans were nearing completion and AEA requests stakeholders provide final input on the 2012 plans by the week of April 16, 2012. AEA will be finalizing and distributing the 2013-2014 formal study request documents during the next several weeks. In order to make the requests as comprehensive as possible, stakeholders are encouraged to provide input as early as possible. By submitting comprehensive study requests, AEA intends to reduce the amount of work required by stakeholders who would otherwise need to submit requests of their own.

Sue Walker (NMFS) stated that stakeholders needed contact information for AEA's technical consultants, particularly study program leads. Betsy McGregor (AEA) replied that AEA would provide the requested contact information. Although it would be acceptable for stakeholders to contact AEA's consultants, AEA would need to be kept apprised of all substantive dialogue. Betsy (AEA) noted that technical consultants were not authorized to make decisions regarding stakeholder requests; all study-related decisions will be made by AEA's Project managers.

Water Quality Study

Review of Existing Water Temperature Model Results and Data Collection (2012)

Eric Rothwell (NMFS) stated that stream temperature and meteorological data collection identified in the 2012 study plan represented a good initial step toward establishing a baseline, but noted that it would be necessary to soon begin identifying areas where groundwater upwelling was providing thermal refugia for fish. Paul Dworian (URS) acknowledged the need for this information and noted that thermal imaging and ground surveys planned for 2013-14 would be used to identify these areas. Eric (NMFS) added that thermal refugia needed to be mapped and integrated into AEA's analysis of groundwater dynamics so that the proposed Project's effects on fish habitat, especially spawning and overwintering habitat, could be assessed. Eric (NMFS) stated that it would be necessary to understand and document the relationship between river stage and groundwater upwelling to evaluate the effects of proposed alteration of the river's flow regime. This information is most critical for the middle Susitna River where Project effects would be most pronounced.

Craig Addley (Cardno ENTRIX) stated that the effects of the proposed Project on groundwater upwelling would be evaluated through synthesis of results derived from multiple study efforts, including instream flow modeling and geomorphology, ice processes, and riparian vegetation studies. Eric (NMFS) stated that AEA's study plans to date did not explain specifically how results of the aforementioned study efforts would be used to document groundwater dynamics and assess potential Project impacts. The plans need to clearly identify the links between the studies and various modeling efforts.

Dudley Reiser (R2 Resource Consultants) stated that AEA and its consultants acknowledged the importance of groundwater upwelling and that study details would be refined over the next several months as formal 2013-14 study plans are finalized. Eric (NMFS) proposed that AEA develop a stand-alone document to explicitly identify how groundwater dynamics would be addressed over a range of scales, with a description of detailed analyses at the mesohabitat level and an explanation of how small-scale results would be extrapolated to document reach-wide dynamics. The document would not need to be a study plan, per se, but rather an explanation of how results of the various study efforts would be brought together to address groundwater.

Terry Schwartz (ADNR) asked if wells had been established to assess groundwater in the vicinity of the proposed dam site. Wayne Dyok (AEA) replied that groundwater wells had been established by AEA's engineering team to document groundwater at the dam site. Terry (ADNR) said that it might be necessary to establish similar wells longitudinally downstream of the proposed dam site to establish baseline groundwater patterns. Terry indicated that AEA should conduct detailed, two dimensional modeling of groundwater and its link to river stage at several representative sloughs and side channels and then use an agreed-upon method to extrapolate results to the reach level. Terry (ADNR) added that the presence of the reservoir would have large-scale effects on groundwater beyond those associated with changes in flow regime resulting from Project operations.

Mike Bethe (ADF&G) stated that the importance of groundwater upwelling was not restricted to sloughs and side channels, noting that the suitability of mainstem habitat for salmonid spawning was also dependent on groundwater. However, evaluating groundwater upwelling in the mainstem is complicated by the fact that it often occurs in turbid areas where fish use is difficult to document, unlike in many of the sloughs. Mike (ADF&G) stated that upwelling areas in the mainstem also provide winter rearing habitat for juvenile salmonids by moderating temperatures and maintaining areas of liquid water beneath the ice cover. Betsy (AEA) stated that tracking radio-tagged salmon would help AEA locate areas of mainstem spawning, which would in turn aid in locating areas of groundwater upwelling.

Betsy (AEA) stated that AEA would schedule a meeting to discuss groundwater issues and assessment methods in greater detail and that based on the meeting make a determination as to whether a stand-alone groundwater document is needed.

Baseline Water Quality Study (2013-2014)

Wayne (AEA) asked how many sites had been identified for collection of baseline water quality data. Craig (Cardno ENTRIX) stated that the study plan identified 38 temperature monitoring sites but that other water quality parameters would likely be sampled at fewer sites, although the specific number of sampling/measurement locations was still being determined.

Eric (NMFS) asked if the water quality parameters identified for in-situ measurement (see Table 3 of the study request document) would be monitored continuously. Paul (URS) replied that plan was to take the measurements at discrete intervals, not continuously. Eric (NMFS) asked whether discrete sampling would be sufficient for calibrating a turbidity model. Rob Plotnikoff (Tetra Tech) replied that discrete sampling should be sufficient for calibration of a turbidity model at a level of resolution needed to evaluate the response of biota to Project-induced changes in turbidity. Mike Wood (Chase resident) stated that turbidity levels around the three rivers (Susitna, Talkeetna, and Chulitna) confluence increase dramatically following break up of surface ice in the spring.

Tim Sundlov (BLM) stated that it would be necessary to establish a reliable baseline time series for turbidity in the river to accurately assess the impacts of Project construction. Wayne (AEA) acknowledged that there would be a short-term increase in turbidity during the Project's construction, but construction activities would be timed and best management practices (BMPs) would be employed to minimize any impacts. Craig (Cardno-ENTRIX) noted that turbidity would be measured above and below the dam site during the construction period. Jan Konigsberg (NHI/HRC) stated that increases in turbidity would not only result from construction activities but also from the initial filling of the reservoir, when soils from the inundated slopes would be released into the water column.

Lori Verbrugge (USFWS) stated that fish tissue samples should be evaluated for heavy metals generally, not only mercury. In addition to the fish species identified in the study request document, tissue samples should be collected from burbot, lake trout, and northern pike. Lori

(USDWS) continued that liver tissue, in addition to muscle tissue, should be collected from larger fish, particularly burbot, because liver from this species constitutes a subsistence delicacy for Alaska Natives.

Lori (USFWS) acknowledged that bioaccumulation of metals would be detected in larger, long-lived species but stated that it would be important to sample muscle tissue from fish of early life-stages to assess the extent to which metals might be conveyed upward through trophic levels, e.g., from small fish to birds and furbearers. MaryLou Keefe (R2 Resource Consultants) stated that sculpin, one of the fish taxa identified in the study request document for tissue sampling, would be difficult to sample and would not likely provide useful information regarding metals accumulation because they would not use the reservoir habitat. Stakeholders agreed that no sculpin tissue would be collected for heavy metals analysis.

Ron Benkert (ADF&G) stated that tissue samples should be taken from Dolly Varden between 90 and 125 millimeters in length, to avoid inclusion of anadromous Dolly Varden in the metals assessment; because anadromous individuals have spent a portion of their lives in the ocean and farther downstream in the river, their tissues would not accurately reflect exposure to ambient conditions at the site of their collection.

Lori (USFWS) stated that it would be important to account for the effects of ambient water quality on the toxicity and bioavailability of metals, both under existing conditions and with the Project in place. Rob (Tetra Tech) stated that a pathways model would be an effective means of identifying potential bioaccumulation mechanisms, accounting for the effects of ambient water quality (e.g., pH, redox potential, hardness), as well as the Project's potential effects on those mechanisms.

Lori (USFWS) stated that there is often an increase in the potential for formation of methyl mercury (a bioavailable form) in newly-formed reservoirs, due in part to the inundation and breakdown of organic matter; this phenomenon is particularly common in reservoirs at high latitudes. Removal of vegetation prior to reservoir filling would be one way to reduce the potential for mercury methylation. Craig (Cardno-ENTRIX) agreed and stated that a reservoir's operational regime can also affect rates of methylation.

Terry (ADNR) asked when the pilot thermal imaging assessment would be conducted, adding that the best time might be just prior to ice-over because at that time differences between surface and groundwater temperatures would be significant. Michael Lilly (GW Scientific) said that the best time would likely be just after ice breakup, before runoff; at this time groundwater is likely to be about 2 ˚C warmer than surface water. MaryLou (R2) stated that the timing of breakup would be more predictable than ice-over, which would be advantageous in trying to schedule an over-flight.

Lori (USFWS) asked how thermal refugia would be identified and mapped if thermal imaging proved to be unsuccessful in the Susitna River. Craig (Cardno-ENTRIX) replied that a combination of ground surveys and aerial photographs of open leads in winter would be used to

identify areas of groundwater upwelling. Michael (GWS) stated that at best thermal imaging would only provide a partial representation of upwelling areas and that a variety of techniques, including tracking of radio-tagged salmon, would need to be used to complete a proper assessment.

Wayne (AEA) stated that dye injections can be used to track groundwater and Michael (GWS) agreed that dye injections can be successful in some environments. Paul (URS) stated that isotopic methods, i.e., the use of stable isotopes of hydrogen and oxygen as markers of water source, might also be useful for groundwater investigations. Mike W. (Chase resident) stated that observations of groundwater elevation in his well had revealed that dramatic changes can occur over very short intervals following ice-over, i.e., he has observed as much as a 4-foot change in the well's water level within 24 hours.

Betsy (AEA) stated that it would be useful to know soon to what extent thermal imaging would provide valuable information. If possible, the pilot study should be undertaken in 2012; if not in spring of 2013. Craig (Cardno-ENTRIX) stated that much of the expense of conducting thermal imaging would be associated with the fixed cost of the over-flight. The incremental cost of conducting additional imaging would be relatively small and recommended that imaging be conducted for the entire river rather than for a small segment, as indicated in the study request document.

Water Quality Modeling Study (2013-2014)

Wayne (AEA) asked which water quality models were being considered for use. Rob (Tetra Tech) replied that a model with capabilities similar to the Environmental Fluid Dynamics Code (EFDC) would be used for the reservoir and river modeling. Rob (Tetra Tech) confirmed that the EFDC model is approved for use by the Environmental Protection Agency (EPA). Wayne (AEA) requested that Rob (Tetra Tech) provide a technical memo, including a description of the pros and cons of available water quality models and a recommendation as to which model would be most suitable for use in the Susitna River basin.

Eric (NMFS) stated that it would not only be important to identify the pros and cons associated with the available water quality models but also to explain how the water-quality model would interface with the suite of other models that will be used to assess Project impacts. Eric (NMFS) asked specifically how the water-quality model would be linked to the flow-routing model. Craig (Cardno ENTRIX) replied that ideally there would be a single flow-routing model that would provide input to all the other models. Craig noted that the water-quality model, like the ice-dynamics model, might require the use of its own routing component. The EFDC model has its own routing function, but use of different routing tools should not represent a problem as long as steps are taken to ensure that the responses of the various routing models are consistent with one another.

Tim Sundlov (BLM) noted that inflow chlorophyll *a* concentrations were identified as a data need in the modeling study request document but not in the baseline water quality document.

Rob (Tetra Tech) stated that chlorophyll *a* concentrations would be small in a glacially-fed system such as the upper Susitna River and questioned the need for collection of chlorophyll *a* data. Wayne (AEA) requested that Rob (Tetra Tech) provide a rationale for why chlorophyll *a* data should or should not be collected as part of the baseline water quality study and be prepared to discuss it at the next water quality meeting.

HecRES/Hydrology

River Flow Routing Model Data Collection (2012)

Wayne (AEA) noted that no routing model cross sections were proposed for the Devils Canyon reach. Michael (GWS) stated that no cross sections had been proposed for Devils Canyon, an approximately 15-mile reach, because collecting data there would be too dangerous.

Craig (Cardno ENTRIX) said that as part of study planning it would be necessary to develop an alternative approach to surveying cross sections in this reach, which could consist of "fabricating" transects based on aerial photos and comparisons to cross sections in other reaches of the river. John Haapala (MWH) stated that one of the primary purposes of a routing model is to account for attenuation of flow. Because of the physical characteristics of the Devils Canyon reach, there would be little attenuation, so it was less important to have empirical data for this reach than for other reaches downstream of the Project. Michael (GWS added that the bedrock channel in Devils Canyon is typified by complex hydraulics, so obtaining representative data would be difficult even if cross sections could be established and surveyed. It will be most important to accurately model the flows that enter and exit Devils Canyon.

Craig (Cardno-ENTRIX) asked how many cross sections would be surveyed downstream of the three rivers confluence. Dave Brailey (Brailey Hydro) stated that 19 cross sections would be surveyed and based on MWH's analysis of these 19 transects, a determination would be made as to whether additional transects should be established and surveyed downstream of the confluence.

Eric (NMFS) stated that winter data would be needed to accurately calibrate the routing model. Eric noted that the USGS would be collecting limited winter flow data at select gage locations and asked what other winter flow data might be gathered to supplement those collected by the USGS. Craig (Cardno-ENTRIX) replied that the approach to assessing winter flow routing was still under development but that it would be addressed in the context of the ice processes modeling, which would be discussed at the April 6, 2012 workgroup meeting. Craig (Cardno-ENTRIC) stated that Robin Beebee (HDR) and her team would be collecting ice thickness data along transects and that it might be possible to measure flow by accessing the river through the holes drilled to document ice thickness.

Eric (NMFS) asked if cross-section measurements would be depth-limited in the channel margins and whether there were plans to measure depths and velocities by wading in the margins. David (Brailey Hydro) replied that there was no plan to conduct measurements via

wading, although a wading rod and current meter would be taken on the 2012 field trip in case they are needed. The Acoustic Doppler Current Profiler (ADCP) is capable of recording conditions at depths as shallow as one foot, and that it would therefore be possible to estimate flows from bank to bank. Dudley (R2) asked if the ADCP would be limited by water velocities. David (Brailey Hydro) stated that measurements could not be made at velocities exceeding 10 feet/second due to safety concerns.

Terry (ADNR) asked if roughness values for each transect would represent an integrated value for channel or if there would be multiple roughness coefficients for individual transects based on lateral variation in substrate. Stuart Beck (R2 Resource Consultants) stated that use of ADCP involves solving for a single roughness value for each cross section based on channel slope and substrate and that the roughness value would be adjusted for each transect as a function of river stage.

The workgroup discussed proposed winter Project operations, and John (MWH) stated that a maximum winter flow release of 8,000 cfs from the Project would be very large relative to winter accretion flows immediately downstream of the dam site. Wayne (AEA) stated that AEA understands that proposed winter load-following operations at the Project will be shaped based on potential effects on downstream resources. Wayne (AEA) reemphasized that understanding potential Project effects would require an accurate understanding of physical processes in the river basin, which makes it critical that a reliable set of simulation models be developed.

Eric (NMFS) stated concerned about the degree of uncertainty regarding how winter flow routing would be addressed, and as a result how all other modeling would be conducted. NMFS's comments on the study plans will reflect this ongoing concern.

Action Items

- AEA agreed to provide stakeholders with contact information for its technical consultants, particularly the study program leads.
- AEA agreed to schedule technical resource subgroup meetings in April and May 2012.
- AEA agreed to schedule a meeting to discuss groundwater issues and assessment methods in greater detail to make a determination as to whether a stand-alone groundwater document is needed.
- AEA agreed to add burbot, lake trout, and northern pike to the list of fish species from which tissue samples would be collected for metals analysis.
- AEA agreed to collect and analyze burbot liver tissue, in addition to muscle tissue, for mercury concentrations.
- AEA requested that Rob Plotnikoff (Tetra Tech) provide a technical memo describing the pros and cons of available water quality models and a recommendation as to which model would be most suitable for use in the Susitna River basin.
- AEA requested that Rob Plotnikoff (Tetra Tech) provide a rationale for why chlorophyll *a* data should or should not be collected as part of the baseline water quality study.

- URS/Tetra Tech will account for in-reservoir biomass (i.e., vegetation to be inundated by the proposed reservoir) in the reservoir modeling section (i.e., data needs) of the 2013-2014 Water Quality Modeling Study request document.

Decisions

- Stakeholders agreed that no sculpin tissue would be collected for heavy metals analysis.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Aquatic and Water Resources 2012/2013-2014
Study Plan Development
April 5, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
ADNR	Kim Sager
ADF&G	Joe Klein
ADF&G	Jack Erickson
ADF&G	Ron Benkert
ADNR	Terry Schwartz
BLM-Glennallen	Tim Sundlov
BLM-Glennallen	Mike Sundergaard
FERC	David Turner
NMFS	Mandy Migura
NMFS	Eric Rothwell
NMFS	Sue Walker
USFWS	Mike Buntjer
USFWS	Bob Henszey (on phone)
USFWS	Betsy McCracken
USGS	Dave Meyer
Citizen	Mike Wood
Natural Heritage Institute	Jan Konigsberg
The Nature Conservancy	Corrine Smith
Ratepayers	Scott Crowther
AEA	Wayne Dyok
AEA	Betsy McGregor
AEA	Bryan Carey
Cardno ENTRIX	Craig Addley
Cardno ENTRIX	Jim Gill (on phone)
E-Terra	Lars Gleitsmann
GW Scientific	Michael Lily
HDR	James Brady
HDR	Keri Lestyk
LGL Alaska	Michael Link
Long View Associates	Steve Padula
Long View Associates	Randall Filbert
MWH	Kirby Gilbert
MWH	John Haapala
R2 Resource Consultants	Dudley Reiser

R2 Resource Consultants	MaryLou Keefe
R2 Resource Consultants	Kevin Featherston
Solstice AK	Robin Reich

Presentations

Keri Lestyk (HDR)
- Beluga Whale Prey Analysis

Dave Meyer (USGS)
- USGS Flow Data

Alan Olson (R2)
- Existing Fisheries Data Synthesis

James Brady (HDR)
- Upper Susitna River Fish Distribution and Habitat Study

Michael Link (LGL)
- Distribution and Middle River Habitat Utilizations

MaryLou Keefe (R2)
- Timing Distribution and Relative Abundance of Juvenile Salmon in the Middle River
- Habitat Characterization for Off Channel Habitats
- River Productivity—Macroinvertebrate and Periphyton
- Reservoir Operations Fish Community and Risk Entrainment Study
- Non Anadromous/Invasive Species Study
- Access/Transmission Corridor Characterization Study

Dudley Reiser (R2)
- Instream Flow Study

Kevin Featherston (R2)
- Riparian Instream Flow Study

General Questions/Discussion

Steve Padula (LVA) stated that FERC had granted a deadline extension, to May 31, 2012, for stakeholders to provide comments on the Pre-Application Document (PAD), scoping document 1 and formal study requests as part of the ILP process. Steve (LVA) noted that FERC had adjusted subsequent ILP milestones commensurate with the comment extension. AEA will post a revised Project licensing schedule on its website. The previously scheduled May 2012 workgroup meetings are canceled and will be held during the second week of June 2012.

Steve (LVA) said that during the next several months AEA intends to begin scheduling subgroup meetings, which would involve greater focus on the details of study planning and execution. Wayne Dyok (AEA) added that these meetings would be open to anyone who wished to participate but that the focus of the meetings would shift to more technically-oriented topics.

Steve (LVA) stated that 2012 study plans were nearing completion and AEA was requesting that stakeholders provide final input on the 2012 plans by the week of April 16, 2012. Steve (LVA) stated that AEA would be finalizing and distributing the 2013-2014 formal study request documents over the next several weeks and asked that stakeholders provide any input as soon as possible, so that by the time the requests are filed they are as comprehensive as possible, which would reduce the amount of work required by stakeholders.

Cook Inlet Beluga Whale Prey Study Plan

Keri Lestyk (HDR) presented the Cook Inlet Beluga Whale Prey Analysis. See the corresponding PowerPoint presentation (Susitna-watanahydro.org).

Mandy Migura (MNMFS) said that the draft Cook Inlet Beluga Whale Recovery Plan would be completed in the next year.

Wayne (AEA) asked when the synthesis of existing data would occur. Keri (HDR) said that the team is beginning now and should be completed in the next two months.

Mandy (NMFS) said that the National Marine Mammal Laboratory (NMML) has an opportunistic database based on sightings of beluga whales. Mandy (NMFS) said these data might not be as accurate as those produced by systematic studies, but the database is still a good source of data. Mandy (NMFS) said that ADF&G had an acoustic recorder near the Susitna River delta that was collecting year-round data, which is important because there may be year-round use of the delta by Cook Inlet belugas.

Mandy (NMFS) said that other marine mammals' prey and habitat should be considered. She said that harbor seals, killer whales and harbor porpoise are seen in the area, and they are managed under the Marine Mammal Protection Act (MMPA). Mandy (NMFS) said that if there is the potential for harassment or take of these species as the result of Project activities, a permit would be required.

Wayne (AEA) said that AEA had scheduled a July field visit planned for interested agencies, during which agencies could visit the mouth of the Susitna River. Mandy (NMFS) said that June is the period of peak Cook Inlet beluga presence in the delta.

Keri (HDR) said that AEA will develop a no-impact protocol for the 2012 field studies. Mandy (NMFS) said that AEA should initiate informal consultation under the Endangered Species Act

(ESA) as soon as possible. Wayne (AEA) said that FERC would do formal consultation until it specifies that AEA is the designee for ESA consultation.

Wayne (AEA) asked how NOAA Fisheries studies belugas in riverine systems. Mandy (NMFS) said that NOAA Fisheries does in-house aerial surveys, which are conducted when whales are congregated and during low tides to increase success of findings. She said that June aerial surveys are lacking in temporal scope, which is needed for the Project. There are some satellite tagging data, which may show upriver movement of whales. Mandy (NMFS) said that the Alaska Sealife Center had a camera that showed how far Cook Inlet belugas travelled up the Little Susitna River, which could help understand how far upstream Cook Inlet belugas may go in the Susitna River. Keri (HDR) said that the Sealife Center is on the HDR team for installing cameras for this study.

Mandy (NMFS) said that there are critical habitat species that are not listed in the study plan, including gadus and yellowfin sole. During ESA consultation, all the critical-habitat species and the Project's effects on these species will need to be addressed. Mandy (NMFS) said that her comments at the meeting were informal and she would likely provide additional comments later. Keri (HDR) said that the beluga team would coordinate with other Project studies. Mandy (NMFS) said that NMFS has evidence that topography and bathymetry might be equally or more important elements of beluga whale habitat than prey species. Project changes to bathymetry could impact beluga predation success.

Mandy (NMFS) said that NMFS is interested in changes in habitat and how the Cook Inlet belugas might be affected. NMFS is also interested in changes in prey density, timing of prey species runs, and which prey species beluga feed on during winter. The Susitna River delta is the first place newborn Cook Inlet belugas are seen, so it is an important area to understand.

Wayne (AEA) asked whether winter studies of belugas can be successful and whether belugas will use iced-over areas. Mandy (NMFS) said that based on satellite data, belugas can be present in areas with 100 percent ice cover. There is a NMML report that might have in-depth beluga dive data from the satellite tags; however, the data needs to be fine-tuned. Mandy (NMFS) said that NMFS does not know how far belugas can travel or how long they can remain under the ice.

Mike Wood (Chase resident) asked whether eulachon studies would be conducted. Keri (HDR) said that the Cook Inlet beluga study will be a year-round study, but would focus on eulachon only when Cook Inlet belugas would be feeding on them. Mike W. (Chase resident) said that he had previously seen eulachon as far upstream as Willow, whereas currently they appear travel no farther upstream than Yentna. MaryLou Keefe (R2) said that the eulachon study area is focused on where they are preyed upon by belugas.

USGS Susitna Basin Hydrological Study Plan

Dave Meyer (USGS) presented the USGS Susitna Basin Hydrological Study. See the corresponding PowerPoint presentation (Susitna-watanahydro.org).

Dave Meyer (USGS) said that USGS would be using pressure transducers and that sensors would be placed in the best locations to collect good temperature and sediment data. Dave (USGS) said that USGS would collect data at cross sections to relate continuous water temperatures of the whole stream channel. Michael Lily (GWS) said that AEA will need to know where data are collected. Dave (USGS) said that no temperature or turbidity data would be collected in the winter, but that the thermistors would be left in place. The thermistors would not be in the deep areas that would remain ice free, so that records from these thermistors would not reflect ambient winter water temperatures.

Eric Rothwell (NMFS) asked for a description of the winter gauging. Dave (USGS) said that two to three discharge measurements are taken along a transect by boring holes through the ice, as soon as the ice is strong enough to safely support field crews. Dave (USGS) said that USGS estimates discharge between the initiation of freeze up and the time when field crews can safely work on the ice, i.e. no measurements are made during that period. USGS tries to take early, mid, and late winter discharge measurements. In cases where the USGS has collected winter data consistently, it has been shown that linear estimations between sampling points are reliable, characterized by about ±12 percent error.

Eric (NMFS) said that understanding winter flows would be critical for characterizing fish overwintering habitat. Dave (USGS) said that assessing winter hydrology is challenging because the relative amount of groundwater-surface water interchange is greater during winter. There is a need for more frequent sampling at more locations to more accurately characterize winter flows.

Joe Klein (ADF&G) asked whether hydroacoustics could be used to estimate bedload. Dave (USGS) replied that daily access to instruments and use of a permanent platform, such as a bridge or bridge pier, would be required to apply hydroacoustics. The use of hydroacoustics for measuring bedload is still an experimental technology and might not be a reliable means of developing daily load calculations.

Wayne (AEA) asked whether bedload measurements could be taken during a flood flows. Dave (USGS) said that USGS used heavy-duty bedload samplers that weigh between 150 and 300 pounds that would be capable of withstanding high-flow conditions. During high flows, routine discharge measurements are done with acoustic measurements from a boat. During floods, collecting load materials could be dangerous because of trees moving down the river. Dave (USGS) said that in 1980s, bedload transport rates varied each day. Total load estimates tend to be inaccurate without continuously collecting bedload data over a long period of time because the natural bedload rates are very variable. USGS would likely assume that bedload accounts for about 5 to 20 percent of the total sediment load and focus its efforts on measuring suspended sediment.

Dave (USGS) said USGS performs QA/QC on winter stage data and only publishes data considered to be representative. USGS measures ice thickness and provides data to the National Weather Service. He said these data could be made available to AEA.

Bryan Carey (AEA) asked which of the upstream gaging sites would be most useful for calibrating the hydraulic routing model and whether flow records could be synthesized based on rating curves from locations farther downstream. Dave (USGS) replied that the most reliable data would come from the MacLaren River at the Denali Highway (near Paxson) and Susitna River near the Denali Highway (near Denali) sites, but a synthesized flow record would be inadequate for calibrating the model upstream of Denali Highway, and it would be better to calibrate the model based on data from the Gold Creek or Tsusena gages.

Dave Terry Schwartz (ADNR) asked whether the same methods employed in 1985 to measure bedload would be used for the current study. Dave (USGS) said that there are slight differences in gear but that techniques were basically the same.

Fish and Aquatic Resources Study Plans Questions/Discussion

Existing Fisheries Data Synthesis Study Plan

Alan Olson (R2) presented Existing Fisheries Data Synthesis Study Plan. See the corresponding PowerPoint presentation (Susitna-watanahydro.org).

ADF&G requested that the study include an assessment of historical data related to *Elodea* and lake trout distribution and abundance.

Mike Buntjer (USFWS) asked how the study would assess fish-habitat selection (i.e., use relative to abundance of a given habitat), as opposed to simply habitat use. Craig Addley (Cardno ENTRIX) said that habitat suitability criteria (HSC) developed in the 1980s might be used.

Sue Walker (NMFS) said that the Aquatic Resources Data Gap Analysis does not document all the data needs. Betsy McGregor (AEA) said that all of the reference documents are available through ARLIS, but not all are linked and available on line. Betsy (AEA) said that AEA will be checking with ARLIS to get these documents linked, but that AEA is not finding additional or previously undiscovered materials, but there are some low-quality or missed pages in some of the reference materials.

MaryLou Keefe (R2) said that historical data may need to be extracted from written reports, which could require a lot of time. MaryLou (R2) said that R2 is doing an assessment of whether such data are could be used in current analyses. Sue Walker (NMFS) asked about the schedule. Betsy (AEA) said that the analysis should be completed by mid-summer 2012. Sue (NMFS) said that in discussions earlier, NMFS had asked for null data, i.e., where sampling had revealed habitats that were not used by fish. Dudley Reiser (R2) said that R2 would check with Woody Trihey (Cardno ENTRIX) to see what data he might have. Alan Olson (R2) said that ideally the

synthesis of existing data would be done as quickly as possible to make it useful for implementing the 2012 studies and for developing 2013/14 study plans.

Mike B. (USFWS) asked about nomenclature and labeling areas as river segments versus reaches. Betsy (AEA) said that the workgroup would have one system-wide classification based on reach and subreach designations. MaryLou (R2) said that everyone on the project will use the same system. Betsy (AEA) said that a map of reaches and subreaches would likely be available at the June 2012 workgroup meeting. MaryLou (R2) stated that there would be some refinement of the nomenclature during the summer 2012 field effort. Betsy (AEA) said that the Project will have one GIS layer, by river mile, which will include a naming convention for all streams that are unnamed.

Upper Susitna River Fish Distribution and Habitat Study

James Brady (HDR) presented the Upper Susitna River Fish Distribution and Habitat Study. See the corresponding PowerPoint presentation (Susitna-watanahydro.org).

Joe Klein (ADF&G) asked if resident-fish habitat lost as the result of reservoir construction would be documented. James (HDR) said that Objective 3 of the study would evaluate the quality of the habitat in the inundation zone. Betsy (AEA) said that the study would include an assessment of all barriers to fish migration in tributaries that exist now and would cease to exist after the reservoir is in place.

Ron Benkert (ADF&G) said that there is observer bias associated with collecting habitat data which could be compounded by different groups collecting information. Integration across disciplines is needed and training could be conducted to reduce bias. MaryLou (R2) said that AEA was developing habitat survey protocol and would be coordinating with the workgroup. There would be QC field checks by experienced scientists throughout the season.

Betsy McCracken (USFWS) said that the USFWS might recommend a different classification system than that developed by AEA. Joe (ADF&G) said that protocol would need to be consistent with the Montgomery Buffington System. MaryLou (R2) said that it would be. Joe (ADF&G) said that the AEA needs to make available all references used in the development of habitat survey protocol. Sue (NMFS) said that it would be helpful if AEA could provide draft protocol for review before the next workgroup meeting. Betsy (AEA) said that AEA would provide protocol, references, and a map at the June next meetings. Sue (NMFS) said that the team should look at NOAA Shorezone (mapping) Program (http://www.fakr.noaa.gov/shorezone/default.htm) as an example product.

Ron (ADF&G) said that he was concerned that some habitat types, for example undercut banks, could be overlooked because aerial photography is being used to select sampling locations. Sue (NMFS) said that the mapping would need to be groundtruthed. MaryLou (R2) said that the team would be doing ground surveys where there is poor imagery.

Mike Sundergaard (BLM) said that a separate smaller group needs to meet to develop habitat survey protocols. Betsy (AEA) said that it would be important to remember the objectives of the study when considering methods.

Mike B. (USFWS) asked whether there was any corresponding shift in the peak Chinook runs since the 1980s based on ADF&G findings. Betsy (AEA) said that they haven't observed any changes in timing based on recent work. Ron (ADF&G) said that there needs to be more attention directed toward assessing mainstem salmon spawning. Betsy (AEA) said that the team would fly the mainstem to do aerial surveys. Joe (ADF&G) asked whether carcass surveys would be conducted. Betsy (AEA) said that AEA would do carcass and redds surveys.

Wayne (AEA) asked whether upstream work would be done above fish migration barriers. Betsy (AEA) said that work would continue upstream to the first fish barrier that would remain intact after reservoir filling or to 3,000 feet, whichever is encountered first. Mike B. (USFWS) said that it would be useful to document resident fish habitat upstream of the inundation zone in the mainstem of the Susitna River. Betsy (AEA) said that AEA needed to better understand the extent to which Chinook pass through Devils Canyon to assess the Project's effect on habitat in the inundation zone.

Sue (NMFS) asked for the biological basis for limiting surveys to 1 mile above a barrier. Sue (NMFS) said that AEA should document habitat in tributaries upstream to the point where it is no longer suitable. MaryLou (R2) said that the team could sample for fish at 3,000 feet, and if fish are present then they could keep looking until the habitat suitable for Chinook is no longer available. Sue (NMFS) confirmed that that would be a good strategy. Jack Erickson (ADF&G) said that radio-tagged Chinook would be tracked, which would help define the upstream extent of the species' distribution.

Mike B. (USFWS) asked why no genetic information would be collected for adult salmon. MaryLou (R2) said that tissue samples would be collected from radiotagged (i.e., adult) salmon and could be used for genetic analysis. Jack Erickson (ADF&G) said that any adult salmon that are handled should be sampled for genetic analysis. Genetic samples should only be collected if the fish is living and still fresh and six or more individuals per tributary would be best. Jack (ADF&G) confirmed that the collections could be made over the next few years. ADF&G would like samples of all salmon species, if possible.

Betsy McCracken (USFWS) asked how far upstream the distribution of northern pike extends. James (HDR) said that pike have not been found above Devils Canyon.

Distribution and Middle River Habitat Utilizations

Michael Link (LGL) presented the Distribution and Middle River Fish Habitat Utilizations Study. See the corresponding PowerPoint presentation (Susitna-watanahydro.org).

Mike B. (USFWS) asked why there was not plan to locate a radio telemetry receiver station at the proposed dam site. Michael (LGL) said that they would be flying every five days to figure out whether the tagged fish would be going up tributaries. Any fish that make it above Devils Canyon would be tracked to their spawning locations. Mike B. (USFWS) said that the study plan should be revised to make that clear. Michael (LGL) said that there had been changes to the study plan since it had been provided to stakeholders.

Mike B. (USFWS) asked whether genetic differences would be expected between fish migrating to different areas in the watershed, mainly between those occupying the lower river and those above Devils Canyon. Jack (ADF&G) said that there would be.

Michael (LGL) asked whether it be better to collect Chinook genetic samples at the time of radio-tagging or from individuals on their spawning grounds. Jack (ADF&G) said collecting samples from fish on the spawning grounds would provide a better characterization of the genetic baseline and differences between upper basin fish and those elsewhere in the system. Michael (LGL) said that it would be best to avoid taking tissue samples from fish during radio tagging to minimize handling and, as a result, the risk of affecting the behavior of tagged fish. If many Chinook pass Devils Canyon, additional work would be recommended for 2013-2014.Sue (NMFS) asked whether eggs could be used for genetic analysis. Jack (ADF&G) said that it would be necessary to consult appropriate experts to make that determination.

Mike B. (USFWS) asked whether AEA was planning to do secondary tagging as was proposed in the original study plan. Sue (NMFS) asked what range of tag loss was expected. Michael (LGL) said that 5 to 10 percent tag loss was typical. Sue (NMFS) asked what risk was involved in ancillary tagging. Jack (ADF&G) said that any puncturing of a fish's body would increase the risk of altering its behavior.

MaryLou R2) said that the HDR team would be sampling in the upper watershed and could take genetic samples. Jack (ADF&G) said that whatever can be done to get accurate baseline genetic samples in 2012 would be best. Mike B. (USFWS) asked whether the team was planning on taking genetic samples from other fish that are found with the tagged fish. Michael (LGL) confirmed that samples would be collected from any aggregation of fish above Devils Canyon. Mike B. (USFWS) said that samples from tagged fish should be segregated from untagged fish.

Craig (Cardno ENTRIX) said that collecting genetic fish information is a secondary goal and that the main goal of the study is to figure out whether mainstem spawning is occurring and where the fish are going above Devils Canyon.

Jack (ADF&G) said that these are multi-year studies, which will be continued next year. When genetics samples are collected, sampling on the spawning grounds is needed to get a clean baseline.

Sue (NMFS) said that she still questions whether a secondary tag isn’t useful and suggests that a teleconference is needed to discuss the subject more. Michael (NMFS) said that the results of

2012 will help understand whether there is a need for secondary tagging. Betsy (AEA) said that ADF&G will be doing another tagging study.

Eric (NMFS) said that the methods for studying groundwater were discussed at the April 4 meeting, but that there was no ILP study request directed specifically at groundwater assessment. Betsy (AEA) said that AEA would set up a meeting with agencies to discuss groundwater study in April and requested that agencies send an email to her that includes specifically what the agencies would like to discuss.

Timing Distribution and Relative Abundance of Juvenile Salmon in the Middle River

MaryLou (R2) presented the Timing Distribution and Relative Abundance of Juvenile Salmon in the Middle River Distribution. See the corresponding PowerPoint presentation (Susitna-watanahydro.org).

Mike B. (USFWS) asked how the middle river was defined. MaryLou (R2) said the middle river extended from the confluence of Chulitna River to Devils Canyon. MaryLou (R2) said that AEA was not studying at juvenile salmon in the lower river.

Joe (ADF&G) asked how the juveniles would be marked. MaryLou (R2) said PIT tags and PIT tag arrays would be used to detect fish. Joe (ADF&G) said that it would be important to sample at the right time because the juveniles could be missed.

Mike B. (USFWS) asked why Whiskers Creek was selected. MaryLou (R2) said it was selected because it is at the lower end of the run. Mike B. (USFWS) said that the team might want to meet to go through the protocols in more detail. Mike B. questions why the lower reach wasn't being studied. Eric (NMFS) said that the Project needs to get the results of modeling to determine lower river impacts. Betsy (AEA) said that the team will be looking at the lower river for beluga prey species and that there would be other lower river work occurring.

Habitat Characterization for Off Channel Habitats

Joe (ADF&G) said that if the study only focuses on the physical aspects it would miss biological aspects, like macroinvertebrates and other parameters. Joe (ADF&G) said that he would like to see the ability to classify categories of off-channel habitat types; the team could modify and expand the data collected so that he could understand the range and variables that the habitats may have. MaryLou (R2) said that the goal of the work is to have consistent standards that can be used across studies. Dudley Reiser (R2) said that the instream flow studies will be consistent with the 1980s work and that some of the additional parameters that were brought up by Joe (ADF&G) might be covered.

Eric (NMFS) said he knew the studies are linked, but the Project should be able to tie habitat types and functions. The team needs to make sure that habitat type information can link back to

the entire river system. The plans needed to clearly identify the links between the studies and various modeling efforts.

River Productivity—Macroinvertebrate and Periphyton

Betsy (AEA) said that maps including historic data and 2012 information would be sent out soon.

Mike B. (USFWS) said that work was proposed in the lower reach in the 1980s and that work in the lower reach could be warranted.

Mike S. (BLM) said that currently the top predator is lake trout. Lake trout are in Sally Lake and would definitely have an impact on the resident fish. MaryLou (R2) said that "transitional" in reference to sloughs a temporal definition, not a geographic area. MaryLou (R2) said that the review of the 1980s data would give more information on where the transitional sloughs areas are located. Jan Konigsberg (NHI) said that transitional slough areas were mapped in the 1984 studies, assuming that the baseline hasn't changed. MaryLou (R2) said that AEA wants a minimum of three transitional slough sample sites.

Craig (Cardno ENTRIX) said that they found that during turbid water, there was a lot of drift, and during clear water, the available drift was down. MaryLou (R2) said that they would have to look at this type of habitat type two times-once when the water was turbid and again when the water was clear. Joe (ADF&G) said that APA documents from 1980s studies show 13 sites. MaryLou (R2) said that the team would repeat sampling at those sites with the goal to make the information consistent with the 1980s as much as possible and still maintain quality work and new, more informative methods.

Dudley (R2) said that the invertebrate sampling issue often comes up with instream flow. This piece will help us understand how habitat could change with the project. Dudley (R2) said that smaller workgroup meetings would help determine sampling sites and a classification system.

Reservoir Operations Fish Community and Risk Entrainment Study

Joe (ADF&G) said that it was important to look at primary productivity and how it would be affected. Jack (ADF&G) said that ADF&G manages the fisheries in the area; however, he didn't know what would happen if there was no fishery. Betsy (AEA) said that the team would be looking at sport harvest potential based on access to the reservoir in the recreation studies. Joe (ADF&G) said that whether the road is public is an important question. Betsy (AEA) said that this would be determined by looking at safety and the socioeconomics results.

Non anadromous/Invasive Species Study

Alan Olson (R2) asked whether agencies thought that burbot should be included in the study plan. Alan (R2) said that burbot may be important because have a different timing than other species. Mike W. (Chase resident) said that he sees grayling, long nose sucker, Dolly Varden,

hooligan, burbot, grayling and rainbow trout year round. Mike W. (Chase resident) said that he had not seen eulachon up river, but that he once got them in Talkeetna. He once could get them at Deshka Landing, but now he sees them at Yentna. MaryLou (R2) said that they could be checking for blackfish.

Access/Transmission Corridor Characterization Study

Ron (ADF&G) said that this study is important to ADF&G because they are looking at the structures. Ron (ADF&G) requested that if fish are not collected at a certain time to return to the area at another time of year.

Jan (NHI) asked why there was no juvenile salmon study planned for the lower river and said that during the last project effort (1980s), winter flow was load following and possible stranding of fish was a possible Project impact. Jan (NHI) said that he was interested in what juveniles are in the river and when. Craig (Cardno ENTRIX) said that AEA understands that this issue needs to be addressed. Steve Padula (LVA) said that AEA will want to continue this coordination and by November 2012, there should be agreement on studies to conduct.

Instream Flow Study

Dudley (R2) presented the Instream Flow Study. See the corresponding PowerPoint presentation (Susitna-watanahydro.org).

Joe (ADF&G) said that for the reconnaissance visit, it would be good to have the1980s data and a map to understand and plan the trip to see where to go and to observe habitats. Dudley (R2) said that they should be able to develop a selection of photo plates of locations to revisit to see whether the sites have changed since the 1980s. Michael (GWS) said that the cross-section studies would look at this. Dudley (R2) said that intensively modeled areas should be reexamined. Joe (ADF&G) said that there is a lot of complexity at locations and that the Project might need a two-dimensional model. Joe (ADF&G) said that this type of depiction as well as overall reach, the proportions of upland sloughs compared to side channels, will be important to plan the trip.

Betsy (AEA) said that the team was obtaining 1980s aerial imagery to use in comparing sites over time. Joe (ADF&G) said that he might have a box of old photos available. Betsy (AEA) said that the LiDAR photography would be available before the end of May 2012 and that other imagery would be available in reservoir area. A three-dimensional model will be built in GIS. Bob Henzley (USFWS) said that the LiDAR data could be used to do a three-dimensional model of the watershed and that it is better than a longitudinal profile. He added that the team should be looking for major breaks in gradient. Betsy (AEA) said that it would be tough to get water surface because it has changed.

Michael (GWS) said that a survey control for the mainstem would be tied to the LiDAR survey control and series of points that would help to show water level. Craig (Cardno ENTRIX) said

that 100 transects would be taken down the river plus more with geomorphology and riparian data.

Eric (NMFS) asked what the mechanism was for model selection and how the model decision would be made. Dudley (R2) said that there are times when you can use multiple methods, but is it necessary to address question. There might be some situations where habitat value and complexity needs to be more detailed in the modeling approach. Dudley (R2) said that part of the rational is site selection and part is what model is most suited for the habitat type. Eric (NMFS) said that there might be a need for an extra model for defensiveness. An agreement on what is important is needed, and that depends on what information is known. Eric (NMFS) asks how the dominate variables that control the habitat quality would be determined. Dudley (R2) said that he was confident that from review of 1980s data, the team would get an idea of where groundwater influence was a factor or where other physical features are controlling the system. The ice study may provide a better understanding of upwelling.

Betsy McCracken (USFWS) asked whether Google Earth could be used to identify areas based on a geomorphology concerns. Lars Gleitsmann (E-Terra) said that Google Earth would not work, since the data is too course, only covers a portion of the project area, and has ice and snow cover.

Joe (ADF&G) said that he didn't see when 2012 results would be available. Dudley (R2) said that the draft study plan technical memorandum would be available in June 2012 at the earliest and that the final tech memos would be completed by November 2012. Joe (ADF&G) said that the information is needed to review before go out in the field. Dudley (R2) said that they could prepare a tech memo to plan the agency field trip to focus the effort. Joe (ADF&G) said that it would be nice to visit a representative sample and biological hot spots as determined in the 1980s. Betsy (AEA) said that there would be interim deliverables given out prior to workgroup meetings like map products.

Michael (GWS) asked if the trip was planned in August 2012, there would be more information from earlier summer efforts. Dudley (R2) said that they want to plan the field visit around when the water is going down, so we can see what is going on in sloughs, for example. Joe (ADF&G) said that when the water is receding depends where you are at in the river, or when. Michael (GWS) said that late August or September will be the best time to go if targeting before ice and around 10,000 to 12,000 cfs.

Sue (NMFS) said that all the models seem to assume a before-project baseline and an after-project baseline; however, project effects would happen over a long time-frame, and it is difficult to predict over time. Eric (NMFS) said that although there would be an additive effect over the long term, with the geomorphological model it can be carried forward to the long term. Dudley (R2) said that they would be looking at a 50-year time frame and that flow, sediment transport, and other features would be used to understand what would happen to other features.

Joe (ADF&G) said that he would like to see the slow succession over the 50-year license. The habitat models concept is good to see what process is driving the fish species. Joe (ADF&G) said that the project needs to add fish behavior and response, when juveniles seek out cover, and feeding behavior and shelter. Turbidity needs to be understood and modeled, and groundwater needs to be understood. Sue (NMFS) said that temperature is important. Joe (ADF&G) said that when adult salmon like to hold in deep waters need to be added to the modeling.

Mike S. (BLM) asked how confident the team would be with the temperature modeling, Craig (Cardno ENTRIX) said that it would be harder because it is a new project, but the water temperature will be pretty good. Joe (ADFF&G) said that as he understands, the project would be a multi intake system, so it could control water temperatures. Craig (Cardno ENTRIX) said that they would have feedback loop in the modeling for operations and impact categories. Betsy (AEA) said that they may have flushing flows and maintenance or load following scenarios and that there would have to be a balance of the energy demand and economics, bracketed by environmental needs.

Terry Schwartz (ADNR) asked how groundwater would be addressed in the modeling. Dudley (R2) said that in terms of instream flow, there was a lot of work in the 1980s data where groundwater and stage connections were identified that will be tested. Dudley (R2) said that there may be sites where temperature intensively studied. Craig (Cardno ENTRIX) said that the team understands that how groundwater studies would be integrated needs to be integrated. Terry (ADNR) said that the geotechnical bores might give some information, like bedrock fractioning. Joe (ADF&G) said that there might be other processes that drive groundwater and he was interested in what influences upstream development might have on those processes.

Betsy (AEA) said that small meetings would be set up for the next two to three weeks to address and get help with developing study plans for the groundwater issue, routing, and fisheries studies protocols. Sue (NMFS) requested that AEA send out protocols to the group prior to the fisheries meeting, so that they can be reviewed.

Riparian Instream Flow Study

Kevin Featherston (R2) presented the Riparian Instream Flow Study. See the corresponding PowerPoint presentation (Susitna-watanahydro.org).

Joe (ADF&G) asked for a definition of domain. Kevin (R2) said that in terms of where there are similar geomorphic river processes. Kevin (R2) said that it is where there are difference disturbance process occurring for example, areas where only alluvial process are happening.

Kevin (R2) said that their group would work with the geomorphology group and the ice processes group to figure out where to do intensive studies. Bob (USFWS) said that the area right below the dam was not shown for study. Kevin (R2) said that they were planning on studying there and immediately below the three rivers confluence.

Kevin (R2) said that it is likely every 10 years that peak flow would occur, but this information would be determined by looking at the age of the forest, the plant community age, distribution, and the hydrograph. Wayne (AEA) said that this type of work has been done in other places and this study is the key to understanding the system.

Bob (USFWS) asked whether the team would measure the valley-wall to valley-wall. Kevin (R2) said that they would just look at riparian areas with their target being to look at the entire active valley that is the region which is flooded by a 100 or 200-year event. Kevin (R2) confirmed that the study would help to understand the effects of changes to water flow on plant communities.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Water Resources Study Development Workgroup Meeting
April 6, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
AEA	Bryan Carey
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Bob Henszey (by phone)
NMFS	Susan Walker
NMFS	Eric Rothwell
BLM	Tim Sundlov
BLM	Mike Sundergaard
USGS	Dave Meyer
ADF&G	Joe Klein
ADF&G	Ron Benkert
ADNR	Terry Schwartz
FERC	David Turner
FERC	Paul Makowski
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsberg (by phone)
Long View Associates	Steve Padula
Long View Associates	Randall Filbert
Cardno ENTRIX	Craig Addley
Cardno ENTRIX	Jim Gill (by phone)
HDR	Robin Beebee
URS	Paul Dworian
R2 Resource Consultants	Dudley Reiser
R2 Resource Consultants	Kevin Featherston
Tetra Tech	Bill Fullerton
GW Scientific	Michael Lilly
Watershed GeoDynamics	Kathy Dubé
E-Terra	Lars Gleitsmann
Solstice Alaska	Robin Reich
Alaska Ratepayers	Scott Crowther
Chase Resident	Mike Wood (by phone)

MWH

Presentations

- Aquatic Habitat and Geomorphic Mapping of the Middle River Using Aerial Photography – Draft Final (2012 study plan)
- Reconnaissance Level Geomorphic and Aquatic Habitat Assessment of Project Effects On Lower River Channel – Draft Final (2012 study plan)
- Geomorphology Study (2013-2014 study request)
- Fluvial Geomorphology Modeling below Watana Dam Study (2013-2014 study request)
- Documentation of Susitna River Ice Breakup and Formation – Draft Final (2012 study plan)
- Ice Processes in the Susitna River (2013-2014 study request)

Fluvial Geomorphology Modeling below Watana Dam

Wayne Dyok (AEA) stated that Bill Fullerton's (Tetra Tech) extensive experience with fluvial geomorphology would be augmented by the participation of Mike Harvey (Tetra Tech), an internationally recognized expert in the dynamics of glacially fed river systems.

Eric Rothwell (NMFS) questioned that given the one-dimensional (1D) sediment transport model for the Susitna River would be run using input from the flow routing model, would the number of routing model cross sections would be sufficient to adequately simulate sediment transport at the reach and sub-reach level.

Eric (NMFS) stated that flow routing transects, selected for simulating flow attenuation, are typically located in areas where the channel's cross section is simple, and that data from these locations might not be appropriate for modeling sediment transport. Bill (Tetra Tech) replied that more flow routing cross sections could be necessary for 1D sediment transport modeling, but that field reconnaissance would be needed to make decisions about whether- and where-additional cross sections may be needed. He encouraged the workgroup to be careful and patient when making decisions about the placement of additional cross sections to avoid wasting time and funds by establishing additional cross sections in inappropriate locations.

Wayne (AEA) asked how bathymetry would be developed for sections of river where two-dimensional (2D) geomorphic modeling is to be applied. Craig Addley (Cardno ENTRIX) replied that LiDAR would be used to map the terrain above the water-line, multi-beam sonar would be used to develop bathymetry within the wetted channel, and photogrammetry would be applied to characterize those areas not accounted for in the overlap of the previous two methods.

Jan Konigsberg (NHI/HRC) asked how 1D sediment transport modeling would be applied to account for geomorphic dynamics in tributaries. Bill (Tetra Tech) replied that the 1D model would account for flows and sediment input from significant tributaries. Bill (Tetra Tech) emphasized that 1D sediment transport models simulate large-scale dynamics longitudinally within a river basin and as such they respond to large sediment and flow inputs. Addressing smaller-scale geomorphic phenomena, such as sediment dynamics at tributary mouths, would

require 2D modeling or delta evolution analysis. Bill (Tetra Tech) again cautioned that the small-scale methods would be labor intensive and time consuming, so analysis locations would have to be carefully selected to make results as useful as possible for assessing potential Project impacts.

Wayne (AEA) asked if 2D modeling could be applied at the mouth of the Chulitna River, which is a major source of sediment input to the Susitna River. Bill (Tetra Tech) stated that the confluence of the Chulitna and Susitna rivers is a large and complex area and that applying 2D techniques there would be a very involved undertaking. The workgroup should be certain that this level of analysis is necessary before planning such a large-scale effort.

Craig (Cardno-ENTRIX) noted that USGS records would provide good estimates of the volume of flow and suspended sediment entering the Susitna River from the Chulitna River and asked Dave Meyer (USGS) if similar data were available for Indian and Portage creeks. Dave (USGS) replied that no data were available for these streams. Bill (Tetra Tech) stated that it would be necessary to estimate suspended sediment input from many of the tributaries using transport equations and to develop bedload estimates based on sediment deposition at tributary mouths.

Betsy McCracken (USFWS) stated that tributary mouths are often biological "hotspots" and locations where adult fish stage prior to entering tributaries for spawning, so it would be important to model these locations to understand potential Project impacts. Bill (Tetra Tech) asked if members of the workgroup could identify specific tributary confluences of high biological importance. Mike Buntjer (USFWS) and Joe Klein (ADF&G) replied that it would be easier to identify key tributary mouths after the 2012 fisheries studies, especially telemetry studies, are completed.

Terry Schwartz (ADNR) asked if output from the 1D model would be helpful in identifying locations for 2D modeling. Bill (Tetra Tech) replied that the 1D model is a gross tool for assessing large-scale sediment transport and deposition, and as such would not be that useful for identifying potential 2D sites. It would be more effective for 2D sites to be selected by experts, and vetted by the workgroup, based on empirical observations made during 2012.

Bob Henszey (USFWS) noted that during FERC's scoping meetings William Harrison, Professor Emeritus, Geophysical Institute, University of Alaska had stressed the importance of sediment pulses released by glaciers in the upper Susitna basin. Bob (USFWS) noted that these pulses are an important geomorphologic phenomenon, affecting island building and the distribution and persistence of riparian vegetation. He asked if the 1D model would be capable of accounting for these glacially induced sediment pulses. Bill (Tetra Tech) stated that the pulses could be accounted for in the 1D model at a gross level by modeling a range of sediment loading scenarios. However, the 1D model would not be capable of tracking the effect of a sediment pulse at specific downstream locations. Wayne (AEA) stated that Mike Harvey (Fluvial Geomorphology task lead, Tetra Tech) would contact William Harrison to discuss the effects of glaciers on sediment dynamics in the Susitna River basin.

Betsy McCracken (USFWS) asked if the 1D model could be used to assess differences in sediment transport associated with a variety of Project load-following scenarios. Bill (Tetra Tech) explained that the model would not be capable of modeling at such a fine scale and that other techniques would be required to address such questions. Craig (Cardno-ENTRIX) stated that geomorphic changes would result from effects on bedload movement and that bedload is moved by high flows. The magnitude of difference in flows among various load-following scenarios would be small and not sufficient to produce differences in bedload movement, i.e., bedload movement would not vary among load-following scenarios.

Bill (Tetra Tech) reemphasized that the 1D model would be insensitive to small-scale phenomena and would not be capable of identifying locations of erosion, deposition, shoreline sloughing, etc. The purpose of the model will be to understand baseline sediment transport generally and identify large-scale changes to sediment transport associated with Project construction and operation. The Project would dramatically alter sediment supply immediately downstream of the proposed dam site and that this level of effect would be accounted for by the model.

Joe (ADF&G) asked what the time step would likely be for the 1D sediment transport model, and Bill (Tetra Tech) replied that a daily time step would be appropriate given the purpose and capabilities of the model. Joe (ADF&G) asked what the proposed time step would be for 2D modeling. Bill (Tetra Tech) stated that 2D modeling would be conducted at a much finer resolution, not only spatially but temporally. However, the time step for 2D modeling was yet to be determined. Terry (ADNR) asked if the one-day time step proposed for 1D modeling would suffice for evaluating flushing flows. Bill (Tetra Tech) replied that assessing flushing flows with the 1D model would require use of a smaller time step than the overall sediment transport modeling, perhaps at a 1-hour interval rather than the 1-day interval.

Betsy McCracken (USFWS) asked what the first sediment transport model runs would be. Bill (Tetra Tech) replied that initially the model would be calibrated against existing conditions and then used to model the 56-year period of record (or some other agreed-upon period) without the Project in place, to establish baseline conditions. Results of model runs associated with various with-Project scenarios would then be compared to the modeled baseline.

Joe (ADF&G) asked how AEA would address potential indirect effects on salmonid spawning habitat resulting from Project-induced effects on fluvial geomorphology. Bill (Tetra Tech) and Craig Addley replied that 2D geomorphic modeling at representative sites would be needed to assess potential channel changes at this level of resolution, and based on the results of the 2D modeling, indirect effects on fish habitat, riparian vegetation, side channel access, and other resources could be evaluated.

Joe (ADF&G) referred to examples of sediment transport modeling presented by Bill (Tetra Tech) (presentation available at Susitna-watanahydro.org) and asked if sediment data for the Susitna River basin are less comprehensive than what are available for systems in the contiguous United States. Bill (Tetra Tech) replied that data availability varied widely among the river

systems he had modeled. Having access to the studies conducted on the Susitna River in the 1980s provided a significant advantage and that without the 1980s information the sediment transport modeling effort would more time consuming and difficult.

Joe (ADF&G) emphasized that it would be critical to identify and track the consequences of all modeling assumptions, across all tiers of modeling. Betsy McCracken (USFWS) stated that AEA would need to provide stakeholders with an account of the assumptions, uncertainties, and limits associated with the proposed geomorphic modeling approach.

Wayne (AEA) stated that Bill (Tetra Tech) would draft a technical memo (1) summarizing the geomorphic model selection process, (2) describing how geomorphic models will interact with other models, (3) describing the proposed schedule for completion of modeling, and (4) identifying the preferred geomorphic 1D and 2D modeling approaches for use on the Susitna River. The memo would discuss the assumptions, uncertainties, and limits associated with the proposed modeling approach. Wayne (AEA) stated that AEA wanted to avoid use of a proprietary model to provide maximum transparency regarding how model runs are conducted.

Geomorphology Study

Tim Sundlov (BLM) stated that the extent of clear-water habitat in the Susitna River, and its interface with turbid water, varies as a function of mainstem flow and that it would be important to understand how the relative amounts of turbid and clear water would change as the result of the proposed Project and how this might affect fish.

Eric (NMFS) noted that the 2013-14 study request document called for developing the mass balance of sediment above (Gold Creek data) and below (Sunshine data) the three rivers confluence to estimate current sediment contributions from the Chulitna and Talkeetna rivers. Eric (NMFS) asked if the large potential error associated with USGS measurements would potentially affect the accuracy of such an approach. Bill (Tetra Tech) stated that the goal of analysis will be to assess the overall effect on sediment balance brought about by the construction of the reservoir, so what is needed is an estimate of the relative contributions of the tributaries. Bill (Tetra Tech) emphasized that the resolution of the basin-level geomorphic studies will be low; it will not be possible to identify, for example, specific locations of channel aggradation or degradation.

Terry (ADNR) asked what proportion of the suspended sediment originating upstream of the Project would be expected to settle in the reservoir. Bill (Tetra Tech) replied that the extent of settling depends on reservoir retention time, surface area, and depth, as well as the particle sizes of the suspended sediment. He noted that the proposed reservoir would be large and that most of the suspended sediment would be expected to precipitate.

Jan (NHI/HRC) asked if suspended sediment in the reservoir would affect water temperature. Craig (Cardno ENTRIX) stated that reflection/absorption of solar energy by suspended sediment

affects water temperature and that the influence of suspended sediment on water temperatures in the reservoir would be accounted for by the reservoir water quality model.

Betsy McCracken (USFWS) asked what effect the Project was expected to have on geomorphic conditions, and as a result other resources, in the lower river. Bill (Tetra Tech) and Craig (Cardno-ENTRIX) stated that most sediment transport occurs during the high flow periods; the Project would only affect a small portion of the total flow during that time. This, coupled with the fact that a large proportion of the sediment supply to the lower Susitna River originates downstream of the proposed dam site, means the Project will likely have a small effect on channel morphology in the lower river.

Referring to the reservoir geomorphology component of the study, Wayne (AEA) asked if existing high-latitude reservoirs would be examined to gage the nature and extent of impacts that might occur in the Project reservoir. Kathy Dubé (Watershed GeoDynamics) stated that she would investigate other existing reservoirs with characteristics similar to the proposed reservoir to help shape general conclusions.

Tim (BLM) emphasized the importance of accurately characterizing delta formations associated with the upper Susitna River and other tributary inflows to the reservoir to estimate potential Project effects on fish access to riverine habitat upstream of the reservoir.

Mike Sundergaard (BLM) noted that removal of vegetation in the zone of inundation could increase soil erosion during and following the filling of the reservoir. Kathy (Watershed GeoDynamics) agreed, however noting that removal of the above-ground portion of vegetation while allowing the roots to remain in the soil can reduce erosion potential. Depending on plant species and soil conditions, roots can remain in the inundated soil for 5 to 10 years. Mike (BLM) noted that ice formation and thawing in the reservoir fluctuation zone would also have significant effects on shoreline erosion.

Terry (ADNR) asked how the effects on erosion associated with the melting of permafrost would be addressed. Kathy (Watershed GeoDynamics) stated that she had not worked on reservoirs with permafrost and would need to coordinate with others who had, likely in British Columbia or other Canadian provinces, to develop methods to address potential effects. Michael Lilly (GW Scientific) stated that useful information regarding effects of high-latitude reservoirs on permafrost and associated erosion might also be derived from studies of reservoirs in northern Europe.

Referring to the large woody debris (LWD) component of the study, Michael (GWS) stated that Jason Mouw (ADF&G) had conducted his PhD research on the effects of LWD on large braided rivers and recommended that Bill (Tetra Tech) and Kathy (Watershed GeoDynamics) coordinate with Jason (ADF&G) regarding potential methods during the refinement of the 2013-14 study plan. Michael (GWS) also recommended contacting the faculty of the Forestry Department at the University of Alaska, Fairbanks. Wayne (AEA) stated that Dudley Reiser (R2 Resource

Consultants) or Alan Olson (R2) would coordinate with Woody Trihey (Cardno-ENTRIX) to ascertain what, if any, LWD data are available from the 1980s studies of the Susitna River basin.

Craig (Cardno-ENTRIX) asked if AEA had aerial photos of the alternative access road and transmission line alignments. Bryan Carey (AEA) replied that AEA had identified alternative routes on aerial photographs but that the photographs were of low resolution.

Wayne (AEA) stated that the selection of alignments would be an iterative process, with the alignments refined based on information gained during field reconnaissance, with the goal of minimizing resource impacts. Wayne (AEA) stated that AEA's plan was to select preferred access/transmission line routes by the end of 2012 and then refine the alignments in 2013-2014. AEA's consultants would conduct studies, as described in the study request document, of all three corridors until the final routes are established.

Ice Processes

Robin Beebee (HDR) presented a series of aerial photographs taken during the March 2012 open lead mapping exercise (PowerPoint presentation available at Susitna-Watanahydro.org). Mike Wood (Chase resident) stated that ice breakup in the middle Susitna River has dramatic effects on stream geomorphology, including the cutting of new channels and the scouring riparian vegetation from islands. Robin (HDR) stated that beginning with the 2012 reconnaissance, AEA would produce a photographic record of breakup conditions, including channel changes and effects on riparian vegetation. A fish biologist and geomorphologist will accompany HDR's ice processes specialists on over-flights to help document the effects of breakup on a variety of resources. Betsy (AEA) asked if the mouths of Indian and Portage creeks were open during HDR's over-flight, and Robin (HDR) replied that they were.

Robin (HDR) stated that time lapse-cameras were being installed at 10 locations between river mile (RM) 9 and RM 184 to document ice breakup and ice-cover formation. Michael (GWS) stated that for a small incremental cost, additional cameras could be installed at the Tsusena Creek, Gold Creek, and Sunshine USGS gaging stations. If the cameras were mounted on the existing gage houses no permits would be needed from the state for their installation. Betsy (AEA) stated that cameras could also be mounted on the radiotelemetry tower at Portage Creek. Wayne (AEA) stated that a time-lapse camera should be placed at Slough 8a to monitor ice breakup and freeze-up at this location that was shown to be important fish habitat during the 1980s studies. Mike W. (Chase resident) said that another good location for a time-lapse camera would be Whiskers Slough, which could be accessed from his property adjacent to the Susitna River. Mike W. (Chase resident) stated that he would provide AEA with access if desired.

Joe (ADF&G) asked if single cameras were being installed at each location, and Robin (HDR) replied that there would be up to three cameras at a given location to capture a variety of views. Dudley (R2) asked if the cameras were motion-activated, and Robin (HDR) replied that they were not but were set to take photographs at timed intervals.

Photos of ice processes taken at the upstream end of Devils Canyon during the 1980s are available from the Alaska Resources Library & Information Services (ARLIS) but Robin (HDR) indicated they are poor quality. Craig (Cardno ENTRIX) stated that ARLIS had upgraded its scanner and replaced many of the old photos with new ones of better quality so it would be worthwhile to access the newly scanned photos for possible use in the current ice processes study. Lars Gleitsmann (E-Terra) stated that R&M Consultants (in Anchorage) possessed a large collection of historical photos from the Susitna River that could be useful in comparing existing to historic conditions.

Kevin Featherston (R2) stated that it would be useful to coordinate with those conducting the ice processes study to establish protocol to be used to develop photo documentation of ice-vegetation interactions during breakup. During the 2012 riparian vegetation reconnaissance, field crews could re-photograph the locations documented during breakup to characterize the vegetation and assess the effects of ice.

Dudley (R2) asked how frequently ice thickness measurements would be made in 2012. Robin (HDR) replied that one set of thickness measurements was being made in winter/spring 2012, with a possible second set in fall/winter 2012. Bill (Tetra Tech) asked if the transects where ice thickness was being measured were tied to benchmarks. Robin (HDR) replied that the transects were currently linked to temporary benchmarks but that they would eventually be tied to routing model transects.

Wayne (AEA) stated that ice on the Susitna River can be as thick as 10 feet. Robin (HDR) confirmed that the augers used by HDR were capable of drilling through the thickest ice on the river. Wayne (AEA) asked how many ice thickness measurements were being made at each transect. Robin (HDR) replied that ice thickness was being measured at approximately 10 locations at each transect to account for variability across the river and any side channels, but the actual number of locations would vary depending on conditions.

Eric (NMFS) suggested that AEA make flow measurements using the holes drilled to measure ice thickness, which would yield both a spatial and temporal expansion of the winter flow data available from the USGS gages. Wayne (AEA) stated that it would not be feasible to add this to the 2012 study but that it could be added to the protocol for the 2013-2014 ice thickness measurements.

Eric (NMFS) asked if there were existing projects at high latitudes that operated in a manner similar to that proposed for the Susitna-Watana Hydroelectric Project. Robin (HDR) replied that the Peace Canyon Dam on the Peace River in northern British Columbia operated in a similar fashion, with stage fluctuation taking place beneath the ice cover.

Betsy (AEA) asked if the ice processes study would extend upstream to the Oshetna River. Robin (HDR) replied that the study area would extend from RM 0 to RM 250. Betsy (AEA) stated that it would be important to document any open leads in the area immediately upstream of the proposed reservoir.

Craig (Cardno-ENTRIX) asked how various ice features, open leads in particular, will be documented. Robin (HDR) replied that GPS data collected during aerial reconnaissance will be used to produce GIS maps for each reconnaissance trip, showing the locations and basic dimensions of the leads and other key features, such as ice jams, ice bridges, etc. Betsy (AEA) emphasized that aerial photos should be provided to ADNR as soon as possible for digitizing.

Dudley (R2) asked how ice process modeling would be conducted. Robin (HDR) replied that ice-process routines would be developed and calibrated to augment the riverine water quality model, and if that approach proved to be infeasible it would be necessary to employ a separate ice processes model. Craig (Cardno-ENTRIX) reiterated that it would be preferable to use a single model for simulating both water quality and ice processes, but if two models must be used it would be essential that they are applied in a consistent manner. He added that the EFDC model does not have an ice routine, whereas the CRISSP model, for example, can model ice processes. Craig stated that AEA plans to schedule a technical subgroup meeting to discuss ice modeling approaches once technical consultants had more fully developed their study outlines. Wayne (AEA) stated that the model selected would need to have been tested and validated under conditions similar to those occurring in the Susitna River basin. David Turner (FERC) asked if the list of potential ice processes models would be finalized when AEA files its Proposed Study Plan (PSP). Robin (HDR) stated that the list of possible models would be finalized by the time the PSP is filed, although it might require longer to determine which one is most suitable for application.

Jan (NHI/HRC) asked how the ice model would be calibrated. Robin (HDR) replied that the model would be calibrated using a range of field data at multiple locations. If the model accurately simulates existing conditions along the longitudinal profile of the river, it will be considered calibrated and suitable for use in simulating ice processes under a range of with-Project scenarios. Mike W. (Chase resident) stated that he has recorded the timing of freeze up and breakup on the middle Susitna River for a number of years and would be willing to provide his records to AEA.

Mike Buntjer (USFWS) stated that in addition to documenting ice dynamics at sloughs that are known to be important to fish, it would be beneficial to conduct observations at sloughs that are not heavily used by fish to develop a better understanding of what is driving fish habitat selection. Craig (Cardno-ENTRIX) stated that the following side sloughs provide important fish habitat: 8, 9, 10a, 11, 22, and Whiskers. Robin (HDR) stated that HDR had documented conditions at sloughs 1, 9, and 21 in 2012.

Action Items

- AEA stated that Mike Harvey, Fluvial Geomorphology task lead, Tetra Tech, would contact William Harrison, Professor Emeritus, Geophysical Institute, University of Alaska, to discuss the effects of glaciers on sediment dynamics in the Susitna River basin.

- AEA requested that Bill Fullerton (Tetra Tech) draft a technical memo (1) summarizing the geomorphic model selection process, (2) describing how geomorphic models will interact with other models, (3) describing the proposed schedule for completion of modeling, and (4) identifying the preferred geomorphic 1D and 2D modeling approaches for use on the Susitna River. The memo will discuss the assumptions, uncertainties, and limits associated with the proposed modeling approach.
- AEA stated that Dudley Reiser/Alan Olson (R2) would coordinate with Woody Trihey (Cardno-ENTRIX) to ascertain what, if any, large woody debris data are available from the 1980s studies of the Susitna River basin.
- AEA stated that a time-lapse camera would be placed at Slough 8a to monitor ice breakup and freeze-up.
- AEA stated that its technical contractors would add "anticipated level of effort and cost" information to all 2013-2014 study request documents.
- AEA stated that it would issue a revised Project licensing schedule in April 2012.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Terrestrial Resources 2012/2013-2014 Study Plan Development
June 6, 2012, 9:00 a.m. – 1:00 p.m.
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	**Name**
ADF&G Wildlife Conservation	Lem Butler
ADF&G Habitat Division	Stormy Haught
ADF&G Habitat Division	Mark Burch
AHTNA	Joe Bovee
AHTNA	Bill Simeone
AHTNA	Katherine Martin
BLM	Dave Mushovic
BLM	Sarah Bullock (by phone)
BLM	Ben Seifert
DNR OPMP	Marie Steele
EPA	Matt LaCroix
EPA	Lisa McLaughlin
EPA	Jennifer Curtis (by phone)
Natural Heritage Institute	Jan Konigsberg
NPS	Cassie Thomas (by phone)
USFWS	Jenny Spegon (by phone)
USFWS	Mike Buntjer
USFWS	Maureen de Zeeuw
USFWS	Bob Henszey (by phone)
USFWS	Lori Verbrugge
AEA	Betsy McGregor
AEA	Wayne Dyok
AEA	Emily Ford
AEA	Bruce Tiedeman
ABR, Inc.	Brian Lawhead
ABR, Inc.	Terry Schick
ABR, Inc.	Wendy Davis (by phone)
ABR, Inc.	Janet Kidd (by phone)
ABR, Inc.	Alex Prichard (by phone)
ABR, Inc.	John Shook (by phone)
Cardno ENTRIX	Lynn Noel
E-Terra	Steve Colligan
MWH	Kirby Gilbert
Solstice AK	Robin Reich
TetraTech	Christy Miller

Presentations

Brian Lawhead (ABR, Inc.)

- Wildlife 2013 Proposed Study Plans

Terry Schick (ABR, Inc.)

- Botanical 2013 Proposed Study Plans

General Questions/Discussion

After introductions, Kirby Gilbert (MWH) gave an overview of all of the comments and study plan requests received from stakeholders, regulatory agencies, and other entities. Kirby said that the team is now reviewing the comments that have been received and trying to address them in the study plans. Kirby said that this meeting was to help clarify agencies comments on the study plans. Kirby encouraged an interactive dialog about the comments and stakeholder input on the study plans.

Wayne Dyok (AEA) said that some agencies submitted formal study request and some just embedded study requests within comment letters. Wayne said that all types of comments on study plans would be considered and addressed. He said that the team would compare what was being developed in study plans with the agency and stakeholder requests.

Lori Verbrugge (USFWS) said that USFWS listed a point of contact for each study that should be consulted regarding questions.

Kirby said that there were a few new studies requested that had not been previously identified. He said that the team was trying to capture all the study requests into the study plans.

Wildlife Study Plans Questions/Discussion

General discussion regarding large mammal, furbearer, and bat study plans

Brian Lawhead (ABR) said that the study requests are currently being developed into 16 wildlife study plans. Brian said that ABR is incorporating an internal review and evaluating all the comments received to modify the study plans. He said that there are a few contradictions among agency comment that need to be resolved.

Brian said that moose and caribou study plans are being developed from the Alaska Department of Fish and Game (ADF&G) proposal. The plan is to collar moose and caribou in the study area. He said that late winter surveys were conducted this year. He said that Alaska Department of Fish and Game (ADF&G) Division of Wildlife Conservation stated that they supported the moose and caribou studies.

Brian said that the bear study plan will be a retrospective analysis of how the existing data affects bears' home ranges and would involve working with ADF&G to get previous telemetry

data. Brian confirmed that ADF&G said that existing information is enough to do the analysis. Brian said that an investigation of bears' use of anadromous streams in the downstream Project area has been suggested to determine the minimum number of bears using the streams. Brian said that ADF&G supported the concept of looking at spawning in streams and an evaluation of berry resources in the inundation zone to understand bears' downstream use areas.

Brian said that one study will focus on estimating wolf and wolverine population density using tracks and aerial survey methods. Brain said that the Project area is in a wolf control area.

Brian said that Dr. Laura Prugh at University of Alaska Fairbanks is developing a study plan for terrestrial furbearers including coyotes, lynx, red fox, and martin using fecal and hair sampling to get density estimates. Brian said that ADF&G supports this methodology. Brian said that a prey abundance study by UAF graduate student is beginning this summer. He said that ADF&G did have comments for improvements to this study.

Brian said that ADF&G commented that they were not certain that an aquatic fur bearers study was necessary for use of the mainsteam river. Brian said that U.S. Fish and Wildlife Service (USFWS) commented that they wanted to see detailed methods for studying aquatic furbearers on the mainsteam. BLM commented that they would be interested in the over-winter survival of beavers in the area with changes in the flow regime after the Project was constructed.

Brian said that the small-mammal community is pretty well understood. He said that more sampling is planned to get information on populations in habitat that might be directly impacted by the project. Brian said that he had not seen any comments on the small-mammal study plan.

Brian said that there were several comments from ADF&G and BLM which supported the general approach for studying bats and included improvements to the study plan, which will be addressed. Brian said that aspects of the study plan that require work are related to passive acoustic monitoring arrays to understand bat occurrences and the habitat investigation planned for the second year. He said that ADF&G commented on the need understanding potential habitat for bat roosting and hibernation. Brian said that the ABR Team is looking at a desktop study of geologic information with the potential for some field survey work to determine bat roosting and hibernation.

Brian said that the moose browse survey that ADF&G requested is similar to what has been used in the rest of the State. He said that the question is whether it gets lumped into the overall moose plan or is a separate plan. Brian said that the BLM requested a study to understand the carrying capacity in the inundation zone and road corridors.

Matt LaCroix (EPA) said that he needed more details on the moose-browse study. Brian said that the study looks at removal of current annual growth to quantify browse within the inundation zone. Mark Burch (ADF&G) said that the study should be broader to understand what would be available to moose after the inundation zone is filled. He said that this would also help to guide mitigation for impacts to moose. Betsy McGregor (AEA) asked whether the study

should extend to the riparian area below the inundation zone. Mark said that he didn't recall the ADF&G comment but thought that it might be in the immediate area around the inundation zone.

Matt said that operations of the reservoir will have impacts on the riparian zone and icing. He said that the floodplain is important to moose and other species, and changes in flow might change access and availability of that type of habitat, including moose and other species' browse. Matt said that the Project needs to understand these changes.

Terry Schick (ABR) said that the riparian study should provide information on baseline moose habitat availability downstream of the inundation zone. He said that the riparian study is focused on mapping successional vegetation. In that study, ABR will map riparian ecotypes and wildlife habitat types. He said that the riparian study does not focus specifically on moose, but that a specific moose habitat map for the downstream areas could be made if desired.

Matt asked whether there would there be an analysis that ties the riparian study together with questions regarding browse. Wayne Dyok (AEA) said that how all the information fits together would be included in the entire study plan. Matt said that the EPA's comments state that the agency expects to see the National Environmental Policy Act (NEPA) document quantify the effects of the Project. Matt said that maps and numbers are great, but the EPA is interested in what this means in terms of likely effects. Terry said that the ultimate goal (in the riparian study) is to link information on geomorphology, icing, flow, and other downstream effects to wildlife habitat use and to predict the potential changes in wildlife habitat availability.

Kirby said that the Federal Regulatory Energy Commission (FERC) also asked to see study linkage information. Kirby said the front of the study plan will call out the early linkages, and the linkages will be listed in multiple places. He said that showing linkages is complicated but would be done.

Dave Mushovic (BLM) asked where the moose-browse survey would occur. Mark Burch said that ADF&G is interested in looking at the road corridor areas. Dave said that this is a particular interest to the BLM. Kirby said that it should include the downstream area and Betsy agreed. Mark said that it might be easier to combine the moose-browse study with the moose study. Wayne said that the moose browse information would help create habitat mitigation measures. Wayne said that the study plan goal is to inform the creation of protection, mitigation, and enhancement (PME) measures. Wayne said that the measures would be included in the hydroelectric project license application. Wayne said that the study plans will help to determine how to develop to the PME measures.

Bruce Tiedeman (AEA) asked whether there are agreements with Native landowners on how studies would be conducted on their lands. Mark Burch said that much of the work will be conducted by planes or helicopters that will not land. Mark said that ADF&G did understand that the landowner has to be involved. Bruce said that as AEA's native liaison for the project, it was his job to encourage involvement by Native landowners. Betsy said that AEA has been working with all the Native corporations that own land in the area to obtain land-use permits.

Dave Mushovic said that many of the studies would be conducted on Federal Native-selected lands. Dave said that most activities would be defined as casual use according to BLM. Dave said that more intrusive work could require a permit from BLM, which is a timely process. Kirby said that the study plan should have enough information to determine whether a land-use permit would be needed, and permitting requirements would be listed in the study plan.

Aquatic furbearers and mercury study plan discussion

Brian Lawhead said that the ADF&G and USFWS have differing comments on the aquatic furbearer study. Brian said that the USFWS has requested a population estimate of mink and river otter, and ADF&G didn't think that these species needed more study. Lori Verbrugge said that they had no time to discuss their comments with ADF&G prior to submitting their comments. Lori said that the impacts of mercury on aquatic furbearers are a concern and that the study request is extensively referenced. Lori said that maybe after ADF&G reads the USFWS' request, they might agree the Service's study request. Brian asked whether there were ADF&G river otters and mink experts. Mark Birch said that Howard Golden is in a different region but he is knowledgeable about these species.

Mark said that he did not think that direct population effects needed work, but he did not integrate the mercury concern. Lori said that maybe the ADF&G contaminate expert should review the study request. Mark said that ADF&G would take a look at the USFWS study request and see how it fits with their study requests. Brian requested that Lori and Mark meet with him to work through the differences.

Brian asked what the risk to otter and mink would be if the mainstem river is not important habit for the species (more foraging by these species occurs in clearwater habitats). Lori said that the information is references in the study request and that there have been otter and mink documented with higher mercury levels. Matt LaCroix asked whether there was baseline information that shows that these species use tributaries more than they use the mainstem. Matt asked whether AEA was planning on completing a baseline survey of the mainstem to understand how otter and mink might be impacted. Matt said that a survey might not be needed, but prior to saying that the study is not important, we should figure out whether it is an important issue.

Lori said that the impact of mercury depends on the project design, and it is not the same for all projects. Lori said that the methods recommended for getting a population estimate are similar to Dr. Prugh's methods for the terrestrial mammal surveys. Lori questioned why the Project was more interested in completing a terrestrial mammal study when aquatic species might be at more risk.

Brian said that he did not know whether the survey method for terrestrial furbearers would work for aquatic furbearers. He said that pelts from hunters might be able to be used and that the focus of the efforts would be along long stretches of stream. Brian said that the work would have to be conducted in the winter, and snow machine access would be difficult. Lori said that Dr. Prugh should be consulted or used for the field effort.

Betsy asked whether a mark/recapture study could be conducted in the middle Susitna River to understand terrestrial furbearers. Lori said that her study request did not go into that detail, but that the study area is probably larger than needed. Lori said that her office does not have river otter and mink experts and that the team needed to work together to develop the best study. Kirby said that the study area could be established from another study going on to see whether mercury bioaccumulation would be important. Lori said that the literature already indicates that mercury will be a problem. Lori said that a population assessment needs to be done to see whether otter and mink would be impacted by the bioaccumulation. Mark Burch asked whether determining presence or absence would be enough. Brian asked whether a population estimate could be done from existing roads. Matt said that agencies need to understand numbers, where the species are, what the accumulation of mercury levels would be, and whether mercury could affect a species to completely understand the issue. Matt said that this is a "trigger" model.

Betsy asked how the team would determine how far downstream to study. Matt said that the Project will need to understand fish moving downstream of the reservoir to determine the study area size. Matt said that bioaccumulation delivery methods need to be determined. Lori said that it is different for different species and their diet. Lori said that some of the papers referenced in USFWS' study request have models, which could be used. Wayne said that most of the impacts would be immediately downstream of the dam because with the reservoir's elevation change and 500 feet of head, it would be difficult for fish to survive and because surviving fish would be stunned and could be eaten right away (e.g., by predatory fish, birds, and/or mammals).

Kirby asked whether there was an established study methodology and trigger mechanism that could be used. Brian asked whether they could use a phased approach and do a portion of the study during year 1 and the next steps during year 2. Lori said that with such a short time period for studies to be conducted, a phased approach would be difficult. Betsy said that the fish study is looking at background levels of mercury this year. Lori said that in addition, her agency is interested in how mercury would bioaccumulate. Matt said that the EPA has experts that can discuss this with USFWS.

General discussion regarding bird study plans

Brian said that the USFWS developed study requests for eagles, raptors, and landbirds/shorebirds. The requests mostly revised the AEA study plans, but there were some modifications.

Brian said that BLM requested that their agency be involved in the eagle and raptor consultations and stated that an avian production plan would be needed on BLM lands. Brian said that BLM had comments on the ptarmigan study design, which will be directed to Richard Merizon at ADF&G, since they are conducting the study.

Brian said that since the last terrestrial group meeting, the Project Team had additional consultation with USFWS. He said that ABR had conducted raptor nest surveys and that more nests were found than in the 1980s. Brian said that the study team is considering what would be

needed to determine eagle take to determine study area size. He said that right now they are surveying a 2-mile buffer around the project components. Brian said that the USFWS requested a 10-mile buffer study area for next year around the reservoir in order to understand golden eagles and habitat take by the Project.

Brian said that a 15-mile buffer around the reservoir was requested for understanding other species. Lori said that part of the concern with the reservoir is that it would be an attractive nuisance and would collect water birds that currently use lakes and ponds nearby. Maureen de Zeeuw (USFWS) said that she would get back with Brian about the basis for the study area size.

Brian said that the use of the reservoir shoreline by nesting waterbirds would not be an issue since the area would not be vegetated and because the reservoir would be filling during nesting season. Wayne added that the shoreline would have steep slopes. Matt LaCroix said that there might be nest losses if shorebirds ground nests are inundated. Brian said that it is more likely that the reservoir would be used as a staging area for migrating birds. Wayne said that the upstream ends of the reservoir are usually more important bird habitat because there is less water level modulation in these areas. Kirby said that combining GIS data with the topographic information could help understand the lakeshore and its potential for providing nesting habitat. Brian said that they would plan a meeting with USFWS to address this issue.

Brian said that USFWS was interested in determining the relative importance of the area as a migration corridor related to power line placement. Maureen said that there could be about 100 miles of new power lines and collisions could be avoided if it is understood where potential collision areas exist. Kirby said that the transmission line could be placed in a different location based on the bird study. Wayne said he understood that baseline information was needed to determine the best location for the lines.

Maureen said that bird collisions with lighting at the dam site could also be an issue; however, the Project could plan ahead for bird safe lighting and a study would not be needed. Wayne said that lighting mitigation could be incorporated as long as human safety is protected. Maureen said that the USFWS would need to know details of the lighting. She said that two years of bird studies might not be enough to understand migration routes and that there could be a tragic event years after the Project is constructed.

Wayne said that lighting could be more of an issue during construction, especially in the spring and fall. He said that once the Project is constructed, lighting would be less likely to attract migrant birds. Maureen said that the Project should investigate construction lighting options, since many construction lights are not suited to protect migrating birds. Wayne said that the Project would work with USFWS on this issue. Kirby said that they might be able to time construction activities to avoid peak periods of bird migration.

Maureen said that she was more concerned with habitat fragmentation than with bird strikes. She said that the cuts of vegetation for the power lines would end up being used recreationally, which could affect birds. Maureen said that creating openings will increase the spread of

wildlife that like habitat edges. Maureen said that these birds could outcompete other birds and change the local assemblage of breeding bird species.

Maureen said that there should be more emphasis in the study plan on "oddball" birds that might not be captured during the proposed bird surveys (especially point counts for breeding landbirds and shorebirds). She said that examples of those birds are wintering dippers, mergansers, kingfishers, and tree-nesting ducks. She said that USFWS was particularly interested in those birds that would be affected in the inundation zone. Lori said that based on other studies, mercury might affect kingfishers the most. Brian said that these birds might be captured in the existing studies. Maureen confirmed that USFWS would probably be satisfied with brood-rearing surveys for tree-nesting ducks instead of searching every tree for nests, but that some effort should be spent on surveys for the riverine-specific species, at least in the inundation zone.

Maureen said that Rock Sandpipers feed on *Macoma* clams during the winter in the Susitna River flats area. Maureen said that understanding how *Macoma* clams would be affected by changes in flow is important. Terry said that nearly the entire population of the Bering Sea subspecies of Rock Sandpiper winters in Cook Inlet and that they use the mouths of several rivers in upper Cook Inlet when feeding on ice-scoured gouges in the mud. Maureen said that we already know that the sandpipers use the area and a bird survey isn't needed; the question is how a new flow regime would impact the clams that are important to their diet. Betsy said that answers to this question would come from modeling hydrology and the invertebrate study. Betsy said that this topic needs to be included in the macroinvertebrate study plan.

Maureen said that the study plans need to propose methods to get density information for breeding birds. Terry said that ADF&G has valid concerns over the statistical issues with determining reliable density estimates, especially if sample sizes are small. Brian said that regardless of these questions, we need to use existing study methodology and that ABR would like to use the Alaska Landbird Monitoring Survey. Maureen said that there are issues with that methodology, but she was willing to accept its use because it is a standard. Maureen said that she was open to discussing other methodologies.

Maureen said that the productivity estimates for water and landbirds were downplayed in the study requests and that productivity needs to be a focus in the study plans. Maureen said that the permanent loss of bird habitat and its long term effects needs to be addressed. Maureen said that additional surveys (e.g., brood-rearing surveys) may be needed for lake-nesting birds. Brian said that we need to determine what question we are trying to answer and more discussion was needed with USFWS. Maureen said that she was interested primarily with loons and grebes.

Brian said that BLM had concerns with the Ptarmigan study plan that ABR is addressing.

Wood frog study plan discussion

Brian said that ADF&G had some comments related to using waterbody habitat modeling to determine survey areas for wood frogs. Brian said that ADF&G was interested in sampling waterbodies for a fungus that might be affecting amphibian populations. Betsy said that this

could be an incidental sampling effort. Lori said that Meg Perdue is an expert at USFWS (Anchorage Field Office) and that she might know more about the fungus. Wayne asked whether understanding the fungus was really important to understanding the impacts of the Project. Kirby said that the Team would consult literature and talk with experts to determine how to move forward.

Brian said that ADF&G suggested putting the landbird/shorebird, bat, and frog surveys into one study plan; however, this may not be feasible because of seasonal and diurnal differences. Marie Steele (ADNR-OPMP) asked whether there might be linkages between the species and their survey methods. Brian said that the bird, bat, and frog study teams would be out in the field at the same time (roughly), but that there are few things that in common with the study methods.

Brian said that the wildlife habitat evaluation and developing the habitat map is vital to the wildlife impact assessment. Brian said that ABR would be creating the mapping for multiple species and would build a matrix of the mapped habitats and categorized habitat values for the species of concern. He said that by doing this assessment in the context of GIS, the Project Team will be able to quantify project impacts on wildlife habitats.

Brian said that ADF&G requested using the statewide Gap Analysis model outputs as a framework for data collection and reporting; however, he believes that a more detailed and project-specific (local-scale) assessment would be better than using the broad-scale statewide model. Terry said that ABR was not sure that the statewide model would apply specifically and accurately to the project area. Matt LaCroix said it is likely that the ADF&G is interested in having the Project baseline data incorporated into the Gap Analysis program. Betsy said that the Project should be able to share the data. Matt said that EPA would support integrating data with the statewide effort where this is possible. Terry said that the ADF&G actually was recommending that the Project use the statewide Gap Analysis model outputs to predict which waterbodies could support wood frogs because they thought the sampling, as proposed, would result in insufficient data to evaluate wood frog habitat use in the area. Matt said that the EPA is also interested in the statewide Gap Analysis program. Terry said that they needed to discuss this comment with ADF&G because there appear to be differing opinions at ADF&G. Brian said that using the statewide Gap Analysis framework may not change the way the teams would collect the data. Kirby said that the data could be delivered differently to ADF&G. Terry said that ABR would discuss the comment with Dave Tessler at ADF&G. Wayne said that this is a good action item to follow up with ADF&G, but that the study team might not be able to get resolution.

Botanical Resources Study Plans Questions/Discussion

Terry Schick said that the botanical resources work involves five study plans. He said that ABR prepared study requests and is currently working to incorporate comments on the requests into the study plans. He said that two study plans have been completed and that ABR would like to revise them with the additional comments received.

Wetlands study plan discussion

Terry said that most of the focus has been on the wetland mapping study. He said that there have been smaller meetings with EPA, the U.S. Army Corps of Engineers (USACE), and USFWS. He said that there has been considerable interest in using the Cook Inlet (Wetland) Classification System, which is a methodology primarily focused on lowland wetland types in the Matanuska-Susitna Borough (MSB) and on the Kenai Peninsula. He said that ABR is proposing a hybrid classification system, which would be "cross-walkable" with the Cook Inlet Classification. The MSB is interested in the Project using the Cook Inlet Classification and being able to incorporate the data collected for this Project into their existing GIS system. Terry said that ABR developed a system that is similar to the Cook Inlet Classification, but will allow the flexibility to address the different wetland types that will be encountered at higher elevations in the upper Susitna basin. Matt LaCroix said that EPA is very comfortable with what ABR is developing and appreciates that the Project is involving Mike Gracz in the methods discussion.

Terry said that the wetlands functional assessment methodology is being refined. Terry said that there are a number of approaches, most of which focus on habitats that have been significantly altered (e.g., developed for applications in the lower 48 states), and that many of those methods are not ideally suited to work in the remote and primarily undisturbed Project area. He said that ABR was planning on one more meeting to go through the final list of wetland functions and proposed field measurements before starting the field effort. He said that the goal was to send out a list of wetland functions and get responses in advance of the meeting.

Janet Kidd (ABR) said that ABR received good feedback on the functional assessment at the last (wetland-focused) agency group meeting and that ABR started to develop a list of parameters following the Hollands-Magee Method. Janet said that there are no cultural or social parameters in the Hollands-Magee approach. She said that ABR proposes examining data collected by other field efforts for the Project and incorporating those data into the wetlands functional assessment product.

Matt said that EPA would like to see the list of proposed wetland functions. Matt said that part of the reason that the EPA and USACE have funded the wetlands work in the MSB is because they believe that there is a lot that can be done with GIS. Matt said that cultural and aesthetic functions are something that do not need to be measured in the field; instead this information could be incorporated into the assessment as a GIS layer (i.e., after the field surveys).

Bob Henszley (USFWS) asked to see the wetland functions list.

Riparian vegetation study plan discussion

Terry said that questions arose as to whether jurisdictional wetlands need to be mapped as a part of the riparian vegetation study. Betsy said that the USACE has said that the wetlands below the dam do not need to be delineated because they will not be filled. Matt said that the wetlands below the dam do not need to be assessed using the three-parameter wetland assessment. He said that the EPA, however, does want to see wetland maps generated to identify wetlands using

the same classification system as the rest of the Project area. Matt said that it is not necessary to complete a preliminary jurisdictional determination; instead EPA is interested in baseline mapping with some field data points that ground-truth the vegetation work. Janet confirmed that the entire vegetation map of the study area would be seamlessly integrated.

Bob Henszey asked whether the areas would by identified as wetlands and whether there would be formal data on the sites. Matt said that the EPA is assuming that there would be some wetlands ground-truthing, but the majority of the area would not be field checked. Terry said that the ABR team could map wetlands throughout the Project area, but that they would prefer not to conduct USACE-approved wetland determination plots (because they are very time consuming and doing so would reduce the number of sites that can be visited). Terry said that for the riparian effort, they would produce fine-scale mapping of the riparian area in order to predict changes due to altered flow, icing, and geomorphology. Betsy added that the mapping would also be good enough to model vegetation changes due to groundwater changes.

Bob said that he was trying to figure out the riparian study outcomes. Terry said that the riparian vegetation study would be examining vegetation age structure and size to add to the understanding of vegetation succession. He said that the team would spend a lot more time at each plot to collect the data to conduct both fine-scale mapping of successional vegetation and broad-scale mapping of wildlife habitats. Terry noted that the riparian study will occur in 2 phases. First, they will map riparian ecotypes and wildlife habitats, then, in phase 2, they will work with the instream flow, ice processes, and geomorphology researchers to predict changes in riparian habitats from development of the Project.

Matt asked the current status of developing the vegetation mapping line work. Matt said that spending time in the field without having line work done might not be helpful. Terry said that the ABR team would be using the 1987 vegetation mapping and NWI mapping lines to help with their efforts. Terry said that they had not been able to do preliminary mapping because of the limited availability of aerial imagery. Matt said that the Team needed to understand the degree of diversity of the vegetation communities. Terry said that one of the first riparian study goals is to find and visit plots that were studied in the 1980s to document changes. Terry said that they are working with the instream flow and geomorphology teams to co-locate study plots. Matt said that it will be important to see the vegetation boundaries line work this winter. Matt said that there may be specific habitat types that need to be better understood. Terry said that there are areas that were sampled well in the past (in the 1980s). He said that the team needs to determine which areas were not sampled well in the past so those areas can be adequately studied now. The riparian study report for 2012 will include recommendations for study improvements, if needed, for 2013 and 2014.

Bob said that USFWS put in study requests for riparian vegetation, wetlands, and vegetation. He said that the Service did not have any major changes from the AEA's study requests. Terry said that the ABR team would review the USFWS study requests to see the changes. Wendy Davis (ABR) said that there was the request to coordinate with the statewide Gap Analysis program. Terry said that ABR would meet with ADF&G to discuss this request, but that the Project data could be shared with the statewide effort after mapping has been completed.

Invasive and rare plants study plan discussion

Terry said that they were working on rough drafts of the invasive and rare plants study plans, but that they had not received any comments of these study plans specifically.

Matt LaCroix said that the EPA did not submit comments on the invasive species plan specifically, but that the agency did have comments that would need to be addressed in the NEPA document. Matt said that invasive species issues raised in the EPA comments are consistent with nationwide and regional EPA comments and may not be specific to the Project. He said that, for example, feral cats are a regional issue, and although they are not a high priority issue in Alaska, they would need to be addressed.

Terry said that The Nature Conservancy (TNC) brought up aquatic invasive species as an issue. Matt said that invasive terrestrial plant species could be an issue. Matt said that invasive species are found on braid points on the Matanuska and Knik Rivers, and the Palmer Soil and Water Conservation District has had weed-pull efforts. Matt said that invasive species becoming established by construction activities is an operational issue that does not need to be studied. Terry said that one of the objectives of the study is to develop a method to minimize the spread of invasive plants. Janet said that along the Parks and Denali Highways there has been documentation of invasive species, but that management practices that could limit invasive species from becoming established. Matt said that that Project would need to quantify the likely risk of establishing invasive species.

Terry said that ABR is preparing the rare plant study plan and has requested a list of rare plant species from the Alaska Natural Heritage Program. Terry said that the rare plant study would interact heavily with riparian vegetation and wildlife habitat mapping studies. Matt asked whether there was documentation of rare plants in the 1980s work. Terry said that there was a rare pond weed species recorded from Watana Lake. Terry said that ABR would focus their rare plant survey effort on appropriate habitats where rare plant species could be directly affected within the Project footprint.

Betsy said that the Project might need to look at the potential for recreation to affect rare plants. Matt said that the BLM would get the data from the studies and would need to figure out how to manage activity and species on their lands. Terry questioned the rare plants survey study area. Kirby said that the study area is pretty big and perhaps the focus of the rare plant survey should be only within the inundation zone and dam site. Terry said that ABR will first determine whether there are suitable habitats available for the set of potential rare species within the Project footprint. He said that the 2013 study plan proposes completing the rare plant survey in the dam/reservoir area. Terry said that when the access road alignment is determined, the team would complete a survey along the centerline footprint (in suitable habitats).

General comments

Wayne said that AEA had 1980s photographs of sloughs in the downstream Project area taken at different flows. He said that these sloughs could be visited to see how the conditions have changed.

Wayne said that the EPA, Rural Utilities Service (RUS), and the USACE have requested cooperating agency status on the Project. He said that BLM has not made a decision about whether they would be cooperating agency.

Matt said that by law, the EPA is required to review all Environmental Impact Statements, and is requesting cooperating status to facilitate the process. Matt said that there was some discussion about whether the EPA would become a cooperating agency because they are not issuing a permit for the project, but given the project scope and the level of controversy, it makes sense for the EPA to be a cooperating agency.

Wayne said that related to the climate-change comments, AEA has taken a more open process than the FERC usually employs. Matt said that the Council on Environmental Quality (CEQ) has information on how to incorporate the analysis of climate change into a NEPA document. Matt said that the EPA does feel that climate change is very relevant to this project, especially looking ahead in the licensing period and the potential for climate change to change the water levels. Wayne said that AEA was thinking about addressing the climate-change issue in the water resources study plan.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Social Sciences 2012/2013-2014 Study Plan Development,
June 7, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Attendees:

Organization	Name
AEA	Wayne Dyok
AEA	Betsy McGregor
AEA	Bruce Tiedeman
AEA	Emily Ford
ADF&G/DOS	James Van Lanen
ADNR – OPMP	Marie Steele
Agnew::Beck	Shanna Zuspar
AHTNA	Joe Bovee
AHTNA	Bill Simeone
AHTNA	Katherine Martin
BLM	John Jangala
BLM	Dave Mushovic
BLM	Cory Larson
Charles Mobley & Associates	Chuck Mobley
DOWL HKM	Maryellen Tuttell
EPA	Jennifer Curtis
EPA	Lisa McLaughlin
FERC	Frank Winchell (by phone)
HDR Alaska	Tracie Krauthoefer
MSB	Fran Seager-Boss
MWH	Kirby Gilbert
MWH	Sarah Callaway
Natural Heritage Institute	Jan Konigsburg
NOAA Fisheries	Scott Miller
NPS	Cassie Thomas
Northern Economics	Don Schoden
Northern Economics	Patrick Burden
Stephen Braund & Associates	Stephen Braund
Stephen Braund & Associates	Paul Lawrence
Stephen Braund & Associates	Liz Sears
URS	Bridget Easley
URS	Tim Kramer
USFWS	Mike Buntjer (by Phone)
Knik	Bob Charles

After introductions, Kirby Gilbert (MWH) gave an overview of comments and study plan requests received from stakeholders, regulatory agencies, and other entities. Not all study requests were necessarily in the formal study plan request format, but all that were received are being considered during planning as the Project moves forward.

Socioeconomics

Pat Burden (Northern Economics) outlined two study plans under preparation: social conditions and public goods and services and regional economic evaluation study and discussed how the regional economic study will address potential changes in the price of electricity might affect the regional economy. Most comments received are being addressed in the study plans, but three major items not in the study plans: 1) FERC requested a survey of residents to evaluate potential changes in quality of life; 2) request to evaluate potential effects from the extension of a transmission line into the Copper River Valley – Betsy McGregor (AEA) AEA is conducting a feasibility study for this topic, but it would not be part of this Project – and; 3) request for a study of national economic evaluation for ecosystem services – however, this isn't a normal FERC practice.

Jan Konigsberg (Natural Heritage Institute) – The natural resource evaluation was put in only as a placeholder. FERC has a duty to make a licensing decision based on national economic interest, so the national interest level should be understood. Analysis of cost/benefit at the national level, not just within the Railbelt, is required under the Federal Power Act. It appears that the methods to do this type of work are feasible; it may be the scale for which the information is generated that might be the limiting factor.

Scott Miller (NOAA Fisheries) – If it moves forward, utilities will likely bear a substantial portion of the cost of developing the Project. When that cost burden is recovered through power rates, how will that offset benefits of regional reduced power rates? If utilities are expected to bear a substantial burden, rate payers can be expected to also bear that burden. Maybe a matrix could be developed showing the cost borne by utilities, and the potential rate effect on the end user. Or develop some scenarios showing a range of rates.

Cassie Thomas (NPS) – A goal is to develop PMEs and compensate for non-power values (recreation, etc.). It will be difficult for the NPS to perform its duty to come up with PMEs unless the value of recreational uses is assessed at a national level. Comments are coming in from outside of Alaska, so there is clearly a value to users outside of the railbelt.

Bob Charles (Knik Tribe) – From a financing perspective, how might other potential energy projects be affected by this project? What is the condition of the state's energy plan – is there one? If so, how does this project fit in to that plan? This starts to get in to the alternatives analysis, which are not included in the study plans. This plays into cumulative effects, so we need to be aware of what projects may be conducted in the future – the Integrated Railbelt Energy Plan as a starting point.

Jan Konigsberg (National Heritage Institute) – As supply increases, demand will as well. At what point will demand cause rates to increase to a level where it is no longer beneficial to rate payers? There is a substantial difference between the estimated cost of construction and the total cost of the Project.

Scott Miller (NOAA Fisheries) – Cost effective analysis comparing the Project to other reasonable power alternatives will be part of the NEPA process. As for EFH responsibilities, biological study plans are going to be key in determining the linkages to fish productivity. However, there didn't seem to be analysis of the impact of reductions in surplus for harvest in a 50 year timeframe. Also need to consider the uniqueness of the watershed with respect to its Chinook salmon runs. Would like to see attention paid to subsistence and personal recreation values, and potential effects the Project may have on them. Kirby Gilbert (MWH) – that is the intention, to bring interdisciplinary linkages to the study plans and the FERC licensing process.

Transportation

Maryellen Tuttell (DOWL HKM) Most of the comments on transportation, including those relating to winter river transportation, were already incorporated into the study plan.

Katherine Martin (Ahtna) – Does the study plan include impacts to other private land owners and access routes? Land ownership maps were not sufficient in the PAD to understand the selection status. Dave Mishovik (BLM) – BLM is working with AEA to update and standardize land ownership maps. BLM is conducting an in-depth land status review (for lands under BLM administration), as well as a boundary risk assessment. A comprehensive title search GIS layer is currently being produced, and will be available on the ADNR website.

Cassie Thomas (NPS) – A recreational management plan should include plans for trespassing, a boundary risk assessment, etc. Since there is new access being created for this project, it will need to cover a large area and a large range of topics.

Joe Bovee (AHTNA) – Perhaps an integrated plan could be developed, to incorporate subsistence, cultural, etc. since they are interrelated.

Air Quality

Dave Mushovi (BLM) – Dust is the biggest issue to be addressed in the study plan, and the methodology is being decided upon. Reliable information is really only available for the upper basin. How do we quantify project emissions for 50 years from now?

With respect to dust, the study plans should clarify the intention to consider how materials will be used; not only where they are coming from, but where they will be going as well.

Recreation & Aesthetics

Bridget Easley (URS) – Most comments were already incorporated into the draft study plan. Topics that FERC recommended to split out included recreation, aesthetics, and noise. A more robust noise analysis was requested than was previously planned. There was also a study

request for river flow and access, which will be conducted. There were several comments on how recreation and tourism users could be displaced. At this point, the questions moving forward include: how to present the study plans; how will they be split out, and; how to identify the timing of information flow between the different resource studies.

Cassie Thomas (NPS) – Perhaps call it a "soundscape" analysis, rather than "noise." Noise implies 'unwanted sound.' Kirby Gilbert (MWH) – the analysis is on the aesthetic experience, which includes the soundscape. Separating construction impacts, impacts to recreation specifically, and long-term impacts to recreationists should be addressed. A major task for URS is to break these study plans apart.

Cory Larson (BLM) – BLM will do the suitability determination for Wild and Scenic Rivers.

Bridget Easley (URS) – A future workgroup meeting to discuss the surveys might be necessary, since there are going to be so many potential subject areas, and since they are going to be a big part of the recreation study. There is not necessarily enough information yet to give the full methodology description in the initial Study Plan; that will come from 2012 efforts.

Bob Charles (Knik Tribe) – The cumulative impacts assessment will be very important, as Knik Tribe is commenting on multiple projects, many of which have overlapping impact areas.

Cassie Thomas (NPS) – Some survey respondents to a future survey may need more information on the impacts to natural resources in order to fully answer questions about the future in a survey. Kirby Gilbert (MWH) – baseline surveys can be conducted first as the surveys are trying to help us understand current use, use patterns and experiences. Maybe the survey instrument might not be ready by July study plan, but *how* the survey results will be utilized, and/or the goal of a survey can be described in the study plan.

Scott Miller (NOAA fisheries) – Comprehensive recreational demand model; will the survey include an angler survey for recreational demand that would allow this type of modeling to be done? And will that be available for review? Bridget Easley (URS) – Yes, we want to get at demand, but we are not at that point of knowing the survey questions, and won't probably be there by July.

Subsistence

Tracie Krauthoefer (HDR) – Not many comments were received. Many of the comments were addressing the fact that people use subsistence resources and that those resources are important. Caribou, and hoofed animals in general, appear to be of particular concern. Steve Braund (Stephen Braund & Associates) – Need wildlife/fisheries impacts assessments in order to assess subsistence. Looking at surveying a broad range of communities.

The current ADF&G harvest survey doesn't ask whether people are hunting under sport regulations or subsistence regulations, or federal versus state subsistence regulations.

Typically, respondents are hesitant to divulge information on hunting out of fear that the data will be used for law enforcement.

Betsy McGregor, (AEA) noted that ABR is doing a harvest survey. HDR should coordinate with them to ensure that the state-versus-federal subsistence question is being addressed.

Kirby Gilbert (MWH) – Study plan interim reports can be important for delivering data and coordination between the resource study groups.

Dave Mushovic (BLM) – With subsistence, we are thinking about the EIS. BLM also has to do an ANICLA 810 evaluation, and then make a determination on whether or not public hearings will need to be held (which are likely). We need to be sure that there is enough information for the 810 evaluation. BLM would like to have the preliminary 810 evaluation done before the draft EIS. This goes into 2014-15 timeframe.

Tracie Krauthoefer (HDR) noted that subsistence includes not only fish, waterfowl, mammals, etc. but also berries, trees, (traditional knowledge) etc. The study plan includes the list of communities and also will include a traditional knowledge survey.

Bob Charles (Knik Tribe) - Can the information be specified/organized by other stakeholders, entities, and tribes? Tracie Krauthoefer (HDR) – surveys are designed by community.

Cultural Resources

Kirby – TCP (traditional cultural properties) program needs to be included in the cultural resources study plan.

Chuck Mobley (Charles Mobley & Associates) – TCP study will incorporate information from other areas (e.g. subsistence).

Many comments were received. In 2012, field work to investigate geotech boreholes at the site was initiated. The inventory effort for 2012 is modest, four people for about four weeks. A curation agreement is in place that addresses what happens to any artifacts collected in 2012 (but collection is not anticipated). More extensive curation agreements are likely for 2013-14. Development of an 'unanticipated discoveries' document was done – for human remains in the study area. A second track, for inadvertent discovery of cultural resources, has also been developed. This document will be circulated to native groups and other entities. There are 200 already-recorded sites, so a way to discriminate from those sites was necessary. Cultural sites are handled differently from human remains. Cultural resources finds can have a few days lag, and allows for verification of whether or not it is a new or previously-recorded site. Human remains require immediate reporting. A one-page field sheet was developed for crews in the field.

Comments on the 2013-14 plan primarily addressed details of the cultural resource investigations. Some resource study approaches were lacking in the original study plan.

Another noted element was about where the study area itself is – better definition of the APE. More specificity on methods was also requested. Also to include ANCSA 14-H (1) sites. A comprehensive document of all sites was requested. Paleontological studies were deemed insufficient, and will be included, but kept as a separate section. The Traditional Cultural Properties (TCP) study will be somewhat delayed probably, because the place name study (to be done by Dr. Jim Carrey and AHTNA) needs to be completed first.

Bill Simeone (AHTNA) – Ethnographic interviews and also analysis of existing tapes and linguistic information will be conducted.

Chuck Mobley (Charles Mobley & Associates) – Regarding the question of study area, FERC requested a complete APE for both direct and indirect effects. The direction from AEA has been to focus on the direct impact area (Watana) and the three potential transmission/access corridors. Definition of an APE for indirect impacts may need to wait until some of the work is done. APEs will be resource specific.

Wayne Dyok (AEA) – Indirect impacts (or APE) may be different, depending on the access plans for the impact corridor. If public access is restricted, the indirect impact area may be smaller.

Kirby Gilbert (MWH) – Based on other recent hydroelectric projects, the indirect effects assessment will likely happen later after some impacts are assessed for some of the other resource areas. Additionally, there is more information currently available for some areas over others.

Dave Mushovic (BLM) – How much impact does dispersed recreational use have on cultural sites, and what is the risk to the resource? What is the high risk area? Talkeetna has an historic district (some buildings and the airstrip) which may be an indirect impact area, even though it is located well away from any corridors.

Frank Winchell (FERC) – For indirect effects, FERC is looking for auditory and visual effects.
Kirby Gilbert (MWH) – This encourages a direct impact APE that includes areas of likely induced recreation use.

Chuck Mobley (Charles Mobley & Associates) – A number of native groups commented with three points of emphasis: 1) concern for preservation of cultural resources; 2) desire to participate in studies, and; 3) desire for government-to-government relationship as the project moves forward.

Bruce Tiedeman (AEA) – Definitions of all the resources, particularly when it comes to “cultural resources” and “subsistence” should be very clearly defined. “Resources” can mean different things to different people.

ADDITIONAL DISCUSSION – SITE VISIT

Two site visits have been proposed. July 23/24th were the originally proposed dates, but may be moved closer to the 27th. Planning is underway, input is being solicited, and information to be forthcoming. Email Betsy McGregor and/or Emily Ford. Contractors should look at the SharePoint site, the helicopter site is posted there.

ACTION ITEMS:

- Betsy McGregor – timeline for the AEA feasibility study regarding possible transmission line to the Copper River Valley
- Workgroup meeting(s) for survey instrument discussion – multi disciplinary discussion to be scheduled for mid-August with workgroup participants. Need to propose date in study plan.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Fish and Aquatics Resource Workgroup Meetings
June 12, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Stakeholder PAD Comments/Study Requests and Study Plan Development for Fish and Aquatic Resources, June 12, 2012, 9:00 am - 1:00 pm

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
AEA	Brian Carey
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Danielle Thompson
USFWS	Brittany Williams
NMFS	Susan Walker (by phone)
NMFS	Eric Rothwell
BLM	Tim Sundlov (by phone)
BLM	Dave Mushovic
Coalition for Susitna River Dam Alternatives	Becky Long
EPA	Matthew LaCroix
EPA	Jennifer Curtis (by phone)
EPA	Lisa McLaughlin
ADF&G	Joe Klein
ADF&G	Ron Benkert
ADF&G	Jack Erickson
ADF&G	Stormy Haught
ADF&G	Kimberley Sager
FERC	David Turner (by phone)
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsburg
Long View Associates	Steve Padula
Long View Associates	Bao Le
HDR	James Brady
HDR	Keri Lestyk
R2 Resource Consultants	Dudley Reiser
R2 Resource Consultants	MaryLouise Keefe
R2 Resource Consultants	Phil Hilgert
GW Scientific	Michael Lilly

Organization	Name
LGL	Michael Link
MSB Fish and Wildlife	Larry Engel
ARRI	Jeff Davis (by phone)
Susitna River Advisory Committee	Bruce Knowles
Alaska Ratepayers	Scott Crowther
Alaska Ratepayers	Frank Mielke

Introduction

Steve Padula (Long View Associates) acknowledged the receipt, by AEA, of stakeholder comments and study requests that were received by the FERC prior to the May 31st deadline. Steve briefly summarized the extent of comments noting receipt from non-governmental organizations (NGOs), Alaska Native Entities, citizen's groups, utilities and individual comments from the public. Wayne Dyok (AEA) stated that AEA had reviewed the comments and that many of them were consistent with the study requests developed by AEA. Steve Padula stated that the goal of this week's set of meetings was to seek clarification regarding any stakeholder comments that would require the development of new studies, additional study tasks or differing approaches to existing study methods. Discussions from meetings will inform the revision of study plans for the development of the Preliminary Study Plan (PSP) document due to the FERC on July 16th, 2012. Steve noted that the meetings would be led by program leads and organized by studies where stakeholder comments received met the above criteria.

Cook Inlet Beluga Whale Study - discussion

Keri Lestyk (HDR), the Beluga Whale Study lead, stated that after reviewing comments, the only additional stakeholder issue was to ensure that the study be a systematic survey and assessment of impacts for all marine mammals, not just beluga whales. Keri also noted that surveying marine mammal prey species was also included in the request and that as a result of the study plan development process, this additional component has now been included as part of the Lower Susitna River Fish and Aquatic studies.

For the Beluga Whale Study, Keri stated that two technologies will be implemented; remote cameras and still cameras. Still cameras will be used to assess beluga whale presence at the furthest upstream extent. The camera work will be supported by staff from the Alaska Sea Life Center, which successfully used this camera technology in the Little Susitna River last year. Wayne Dyok (AEA) stated that it is important to note that information collected must support an evaluation of potential Project effects. Keri agreed and stated that it will be critical that the results of the beluga whale study be integrated with the other pertinent lower river studies to provide a holistic picture of the resource and potential impacts of the proposed Project (e.g., habitat, prey species, whale distribution and relative abundance, etc.). Wayne asked participants if there were any additional comments regarding this study while acknowledging that NMFS' marine mammal lead was not present at the meeting. There were no additional comments,

however, Eric Rothwell (NMFS) encouraged participants to engage appropriate NMFS staff if there were any additional questions regarding the study.

Fish and Aquatic Resource Studies - discussion

MaryLou Keefe (R2 Resource Consultants), the Fish and Aquatic Resource Studies Program lead, stated that she had reviewed the pertinent stakeholder comments and had attempted to isolate a subset of comments that 1) were not already addressed in existing AEA study plans and 2) could impact the continued development of fish and aquatic resource study planning. She encouraged stakeholders to introduce additional comments, if any, that she may not have identified, as comments for each of the studies, are discussed.

River Productivity Study

MaryLou stated that with regard to the River Productivity Study, there were five comments that required additional discussion.

A comment was received to conduct a trophic analysis of primary and secondary productivity; MaryLou expressed some concerns about how valid a trophic analysis would be given the number of variables and associated uncertainty inherent to this analysis. As an alternative, MaryLou proposed that a feasibility assessment be conducted first to determine the appropriate next steps. Mike Buntjer (USFWS) stated that this was his requests which he worked with in collaboration with experts from his agency. He continued by stating that this may not be an issue of concern but did encourage some follow up with the USFWS to resolve any potential issues.

A comment was received to characterize coarse particulate organic matter in the upper, middle, and lower Susitna River. MaryLou stated that this was appropriate and would be included in the study plan.

A comment was received to estimate benthic macroinvertebrate colonization rates toward evaluating future changes to productivity. Mary Lou stated her concerns about the accuracy of the information that would be collected using artificial substrate samplers (the preferred sampling technology). Mike Buntjer (USFWS) agreed with MaryLou on the shortcomings of artificial substrate samplers toward providing representative results. Mike Buntjer stated that similar work was conducted during the 1980s and that the results of this work were unclear. Mike supports further evaluation of the 1980s work to determine the value of collecting this information and that such an exercise would be the appropriate first step to determining whether any additional work is needed.

A comment was received to quantify large wood and characterize its use by macroinvertebrates. Mike Buntjer stated that the intent of this request was to better understand the importance of large wood. MaryLou asked Mike if his interest was to sample macroinvertebrates on large wood. Mike stated that this was his interest. MaryLou thought that this issue was being

addressed within the Large Wood Study and believed that a stratified sampling design would be most appropriate to addressing this issue. Mike agreed with this assessment.

A comment was received to document the presence and locations of invasive macroinvertebrates and algae. MaryLou noted that all studies will document the presence of invasive species, if any are observed.

MaryLou and Mike agreed that a follow up discussion would be valuable to resolve any outstanding issues related to the River Productivity Study.

Fish Passage Study

MaryLou Keefe (R2 Resource Consultants) stated that these fish passage comments should be considered a new study request since AEA had not yet developed a study plan to address these issues. Wayne Dyok (AEA) stated that a study plan describing a feasibility level analysis would be appropriate but that within this plan, it would be critical to develop triggers for future evaluation and/or next steps that might be needed. Sue Walker (NMFS) asked that triggers be defined. Wayne defined triggers as the criteria for implementing additional steps as it relates to technological feasibility of passage structures in the context of a cost/benefit analysis. Wayne also stated that AEA will consider these types of criteria. Sue stated and Wayne agreed that the evaluation of fish passage feasibility should be conducted within the conceptual design phase of the Project engineering process. Sue also noted that she had additional fish passage engineering issues that she would like to discuss with the appropriate AEA staff and consultant leads outside of this meeting. MaryLou will follow up with Sue to identify a time for a conference call to follow up.

Betsy McCracken (USFWS) asked if AEA had considered alternatives to fish passage such as mitigation. Wayne stated that currently, no alternatives are being considered but that the fish passage feasibility assessment should be the first step before any alternatives can be identified. Dudley Reiser (R2) noted that although mitigation should be a consideration, it is too early to begin discussing this as there is not enough information at this point in time to properly inform the development of alternatives.

Early Life History and Juvenile Fish Distribution and Abundance

MaryLou Keefe (R2 Resource Consultants) stated that many of the study comments were being addressed under different studies but that this confusion may have been the result of a past reorganization of study elements into different study plans. MaryLou noted the following comments that had been received that required further clarification as follows:

A comment was received to determine the timing of downstream movement of all anadromous salmon species and outmigration. MaryLou noted that this would be a very large task with various challenging components such as during ice conditions and for the fry life history stage. MaryLou stated that outmigration timing would be best captured through the use of technologies

such as migrant traps and that such traps may not work well to capture certain life history stages such as fry under ice. Mike Buntjer (USFWS) agrees and stated that when writing these requests, he tried to use existing information to develop his study objectives. Both MaryLou and Mike agreed that capturing sufficient information about downstream migration will be important.

MaryLou inquired whether Mike Buntjer had given any thought to sampling sites. Mike stated that he had not thought about the study at this level of detail but noted that Portage Creek was a selected site. MaryLou and Michael Link (LGL) believe this site would be effective for capturing and marking fish. Mike Buntjer also stated that trapping activities could be beneficial at different locations to examine reach scale outmigration metrics. MaryLou stated that there has been discussion about developing the concept of intensive study sites that would support the objectives of various resource studies and that this design would address Mike Buntjer's concerns. Mike stated that he is receptive to continuing discussions regarding study design details.

A comment was received to estimate juvenile salmon production. MaryLou asked Mike Buntjer (USFWS), if productivity, in this instance, was defined as CPUE or true total production and whether he thought that migrant traps could be used to address this. Mike stated that estimating true total productivity was not his intent but rather an index of abundance so that stakeholders can assess relative status both pre- and post-Project.

Sue Walker (NMFS) stated that having these comments provided in advance of the meeting would have been helpful to allow participants to prepare for discussions. Wayne Dyok stated that the objective of these discussions is to not force stakeholders to make decisions but to try and get clarification on the rationale used to develop specific requests. The feedback would be used to inform the PSP which is a preliminary step in the overall development of the study program. Betsy McCracken (USFWS) agreed with Sue Walker about having the questions in advanced.

A comment was received to evaluate salmon incubation in mainstem habitats with and without upwelling. MaryLou stated that her primary concern with this type of evaluation is the high level of uncertainty given the complexities around the drivers of hatching success. MaryLou referenced a study conducted in the Mid-Columbia River where results indicated that modifying alevin emergence timing using flow releases had high variability between individual redds. Mike Buntjer (USFWS) agreed that there would likely be a lot of natural variability but is most interested in the groundwater component (areas with and without). Dudley stated that given his past experience with this type of work, it would be difficult to control the large number of interactions between existing variables although it could be viable in a controlled area. Dudley presented another option which would be to monitor the parameters that drive incubation and emergence timing such as temperature and dissolved oxygen. He stated that there is a considerable amount of literature on how specific parameters affect emergence timing. Mike stated that he was receptive to pursuing this approach.

MaryLou asked the group for further clarification on the overall objective of the study request. Mike stated that his primary interest is emergence timing and success under pre- and post-Project conditions. To support this, Mike believes an overall characterization of natural mortality of various species of interest versus what the system would look like post-Project, would be useful. Wayne Dyok (AEA) noted that such information might also support the development of operational regimes to minimize impacts to emergence timing and success. MaryLou stated that to address this issue, integration of information from multiple study areas will be critical. Phil Hilgert (R2 Resource Consultants) noted that a topic of discussion tomorrow will be the integration of biological information and instream flow/operational scenarios. Such an integration will allow for the development of approaches such as tracking the fate of a redd through time (via flow releases/water level) to assess the probability of survival (assumptions included). Betsy McCracken (USFWS) asked how would this be done for multiple redds and multiple species. Phil stated that one way would be to identify an area using transects and 2D modeling to identify potential spawning habitat by species. Once areas were identified, one could then model the area's spawning, incubation, and emergence success through the entire spawning and incubation period under proposed operational scenarios. Betsy McCracken asked if this approach could also address the function of groundwater. MaryLou reiterated the importance of integration over many studies to acquire the appropriate information including the groundwater study. Michael Lilly (GW Scientific) stated that the groundwater study was never intended to be an independent study but rather its function is to provide critical information to other studies to better understand the processes and how they may impact potential resources. Michael Lilly noted that understanding the processes first toward informing next steps and solutions will be critical. Joe Klein (ADF&G) agreed and stated that marrying adequate physical data with fish distribution data would be a critical component to an integrated approach. Michael Lilly also noted the importance of knowing why fish may not be distributed in particular areas in order to better isolate the differences between presence and absence. Both Mike Buntjer and Sue Walker agreed. Mike Buntjer noted that there is some confusion around the conclusions that can be drawn from the 1980s studies given the incomplete reporting. Wayne Dyok (AEA) stated that R2 Resource Consultants is currently synthesizing the information collected from the 1980s studies and hopes to share this information, when available.

A comment was received to evaluate diel behavior and fry stranding. MaryLou (R2 Resource Consultants) requested more input regarding the expected scale of this request. Mike Buntjer (USFWS) referenced the 1980s studies and noted the work provided little in the way of conclusions. Mike would like to know when fish are most active and whether they can avoid being stranded by fluctuating water elevation. MaryLou stated that the video/DIDSON component of the fish proposal might suffice in addressing this concern. Dudley Reiser (R2 Resource Consultants) added that this issue relates to the varial zone and could also be addressed, in part, via modeling. Dudley also noted that stranding is only one component and that trapping would also need to be considered. Joe Klein (ADF&G) added that a year-round timeframe for study/analysis is important due to other species such as burbot that spawn in the winter and may be susceptible. Wayne Dyok (AEA) stated that future Project operations are not yet defined and that this type of information will be important to informing how the Project may operate to protect aquatic resources.

Eric Rothwell (NMFS) asked whether the methods identified in the study plan were adequate for characterization of seasonal distribution and relative abundance in the winter months and whether other methods could be used. MaryLou stated that the methods identified in the study plan were not intended to be all inclusive. Various methods will be used including radio-telemetry (RT) and passive integrated transponder (PIT) tags. MaryLou noted that the first year of study would employ a broad array of methods and this would help to refine the effort in subsequent years. Tim Sundlov (BLM) asked if anybody was aware of the successful data collection using PIT tags during winter ice conditions. Mike Buntjer (USFWS) stated that some USFWS work on coho salmon in the Matanuska Valley may provide some insight. Joe Klein (ADF&G) stated the importance of being able to extrapolate any information that is collected to larger spatial scales in order for it to be meaningful. MaryLou noted that the current study plan identifies a stratified random sampling design from a robust habitat classification system to address this concern.

Adult and Juvenile Non-salmon Anadromous, Resident and Invasive Fish Studies

A comment was received to characterize the synchronized life history strategies of these species and their potential behavioral response to Project-induced flow changes. MaryLou Keefe (R2 Resource Consultants) stated that the study employs RT technology and wanted to confirm that this would be appropriate to address this request. Betsy McCracken (USFWS) believed that RT would be sufficient but expressed the need to coordinate this work with other studies such as instream flow. Betsy also noted that they are primarily interested in broad migration patterns.

A comment was received to characterize trophic interactions by conducting a seasonal evaluation of the diet of all species by age class. MaryLou Keefe (R2 Resource Consultants) asked the group to confirm whether trophic interactions meant diet analysis and why it was necessary to conduct an analysis for all species, all life stages, and all seasons. Betsy McCracken (USFWS) stated that having this suite of information prior to Project construction would be important for assessing how these interactions change after construction. MaryLou asked whether there was an interest for this information above and below the proposed dam site. Betsy McCracken confirmed that there was an interest for this information above and below the dam site. MaryLou agreed that trophic interactions will likely change with Project construction but asked how this baseline information would help to assess Project impacts. Betsy McCracken stated that little information exists for many of these species and that baseline would be needed to evaluate Project impacts. Jack Erickson (ADF&G) noted that there is significant temporal variation in stomach content and that large sample sizes would be necessary. MaryLou concurred and believed that to conduct a scientifically rigorous analysis given 20 species, 3 age classes, and 4 seasons would require that approximately 60,000 stomachs be collected which is not feasible. MaryLou stated that she is not opposed to conducting some gut analysis for the study but that she would need to better understand the objective of the task. Betsy McCracken noted that she could consult with her agency and provide more information. Betsy also stated that her interest is to understand persistence in the new environment. MaryLou replied that if

this was the primary objective, there different type of approach can be designed to better understand trophic dependencies.

A comment was received to quantify marine-derived nutrients input into the system by estimating biomass of anadromous lamprey, eulachon, and Bering cisco. MaryLou Keefe (R2 Resource Consultants) asked if biomass was defined as a simple abundance multiplied by mass calculation. Betsy McCracken (USFWS) stated that it was and that her primary interest was to get an idea of relative contribution of these species to the system. MaryLou stated that the wildlife component of the marine-derived nutrients question is challenging since predation does not necessarily constitute a loss of nutrients but a transfer from aquatic to terrestrial systems. Betsy McCracken stated that any biomass information and indice development would be more than is currently available. Betsy McGregor (AEA) reminded the group that the terrestrial study will evaluate aquatic inputs/relationships with bear. MaryLou believes that an evaluation at some level can be conducted to address this request.

A comment was received to determine the economic, social, recreation and aesthetic value of fish and habitat in the Susitna River. MaryLou Keefe (R2 Resource Consultants) stated that these issues will be addressed in other studies.

Adult Salmon Distribution, Abundance, Habitat Utilization, and Escapement

A comment was received to estimate salmon escapement by mainstem reaches and tributaries. MaryLou Keefe (R2 Resource Consultants) believed that this work was being conducted by ADF&G. Michael Link (LGL) noted that the 2012 Radio-telemetry work would not address this issue. MaryLou asked that Mike Buntjer (USFWS) clarify what was being proposed with this specific request. Mike stated that he would review his notes and provide feedback to MaryLou on this issue.

Additional Issues and Requests

A comment was received to address methylmercury in fish. MaryLou stated that this is a concern and it will be addressed. This issue is not in the fisheries program and is spread out over several programs including water quality, wildlife, and geology and soils.

A comment was received to evaluate the presence of sockeye in the Upper Susitna River. Betsy McGregor stated that all five species will be radio-tagged by ADF&G and that this information can be used to characterize presence in the upper basin. If sample sizes had to increase to address this issue, that could be done. Becky Long (Coalition for Susitna Dam Alternatives) noted that at a previous work group meeting, Mike Beethie had shared anecdotal accounts of species presence.

MaryLou stated that she had no more questions regarding comments received and asked if there were any other comments. Frank Mielke (Alaska Ratepayers) stated that invasive species information would be useful for developing future management objectives. Joe Klein (ADF&G)

wanted to clarify the purposes of the two types of sampling; by habitat and the intensive study sites. Joe expressed that the intensive sites are areas where the information will allow us to understand relationships at the represented scale whereas by habitat sampling would allow for information at a broader scale.

Larry Engel (MSB Fish and Wildlife) stated he is currently involved with an environmental analysis of military operations and impacts from aerial activity in the Susitna area. He stated his concerns about the potential impacts of aerial operations during critical times associated with this Project and wondered if AEA has been involved in this process. Becky Long stated that comments are due on July 9th. Wayne stated that AEA needs to work with Tom Crawford at ADNR and make them aware that this project exists and the specific concerns to ensure they are adequately reflected in the EIS process.

Brian Carey (AEA) reminded participants that the site visit has been moved the July 26-27th. He requested that those interested in participating RSVP by June 30th. He also asked that participants provide information about sites of interest and specific requirements from federal agency participants about paying for their own participation. Information can be provided to Brian via email at bcarey@aidea.org.

Wayne stated that there may be the potential need for a plenary group to evaluate the process thus far. He thought that this could occur in August. Sue Walker supported this idea and requested that a detailed agenda be provided in advanced of the meeting. Sue also asked if this was the extent of agency interaction with AEA regarding finalizing study plans. Wayne noted that the filing of the PSP does not signify the end of input for comments to study plans. There are additional opportunities via the 90-day comment period and the Revised Study Plan.
A phone participant requested that members of her community be involved with the subsistence and traditional ecological knowledge assessments. Betsy McGregor stated that this work was being conducted by ADF&G and that they have hired local people to conduct these studies.

Mike Buntjer stated that there have been several requests for multiple years of study and that there was confusion as to AEA's position with regard to this request. Wayne asked if David Turner (FERC) could clarify on feedback that "studies must be completed" prior to filing a license application. David Turner stated that he views this as a study specific question. If multiple years above the current 2-year proposal, is needed, these should be done prior to filing the license application. Wayne stated that he expects that these studies can be conducted and filed by September of 2015.

Jan Konigsburg (NHI/HRC) asked if AEA plans to develop a comment table. Steve Padula notes that in the fall when the RSP is developed, AEA will be required to account for all comments and how they were addressed. David Turner noted that this requirement should be provided in the PSP as well. Steve clarified that completely new study requests/major issues will be clearly addressed in the PSP however, if adjustments are made to existing study plans such as minor changes, these will not be explicitly accounted for in an accompanying document but only within the study plans themselves given this would be a very lengthy exercise. Dave Turner agreed that

that the disposition of major issues will need to be clearly addressed in the PSP. Matt LaCroix (EPA) stated that a general status summary of comments would be useful for many who are not participating in all parts of the process. Wayne replied that AEA will consider this but to review and consolidate 2000 pages may not be feasible, certainly not by July 16th. Matt stated that this could be a valuable tool but is not necessarily asking for anything at this time.

Larry Engel asked where more information on ongoing Project activities can be found. Betsy McGregor noted that most Project information, when available, can be found on the Project website. Wayne noted that MSI Communications has been hired to better refine the AEA-public informational interface regarding Project activities. Next week – Access Corridor Alternatives Analysis should be available (conducted by ADOT). Joe Klein requested that the USGS studies and any FERC notices be included on the website. Mike Buntjer stated that regarding rock sandpiper overwintering at the mouth of the Susitna River may be an issue. Betsy McGregor replied that she has an action item to follow up on this potential issue

Action Items

- R2 Resource Consultants (MaryLou Keefe) shall include a characterization of particulate organic matter in the Upper, Middle, and Lower Susitna River as part of the River Productivity Study.
- R2 Resource Consultants (MaryLou Keefe) to schedule a meeting with the USFWS to discuss/resolve any outstanding issues related to the River Productivity Study.
- AEA will develop a Fish Passage Feasibility Study Plan for inclusion in the PSP.
- R2 Resource Consultants (MaryLou Keefe) will identify a time for a conference call with NMFS (Sue Walker) to discuss their additional fish passage feasibility concerns.
- USFWS (Betsy McCracken) will consult with others at her agency to provide additional information to R2 Resource Consultants on the scope of the trophic interactions comment noted in the Adult and Juvenile Non-salmon Anadromous, Resident and Invasive Fish Studies.
- For the Adult and Juvenile Non-salmon Anadromous, Resident and Invasive Fish Studies, R2 Resource Consultants (MaryLou Keefe) will add a study task to describe marine-derived nutrient inputs into the system.
- With regard to the comment in the Adult Salmon Distribution, Abundance, Habitat Utilization, and Escapement Study to estimate salmon escapement by mainstem reaches and tributaries, the USFWS (Mike Buntjer) will provide clarification to R2 Resource Consultants (MaryLou Keefe) regarding the intent of the request.
- AEA (Wayne Dyok) will follow up with ADNR regarding comments on the environmental analysis of military operations and impacts from aerial activity on the Susitna River area.
- AEA will post the USGS studies and any FERC notices to the website, when available.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Water Resources Workgroup Meetings
June 13, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK
Stakeholder PAD Comments/Study Requests and Study Plan Development for Water Resources (Instream Flow and Water Quality), June 13, 2012, 9:00 am - 1:00 pm

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
AEA	Brian Carey
ARRI	Jeff David (on phone)
USFWS	Mike Buntjer
USFWS	Betsy McCracken
USFWS	Bob Henszey
USFWS	Lori Verbrugge
USFWS	Lori Schtick (on phone)
NMFS	Susan Walker (on phone)
NMFS	Eric Rothwell
ADF&G	Joe Klein
ADF&G	Ron Benkert
ADF&G	Stormy Haught
ADF&G	Mike Beethie
ADEC	William Ashton
ADEC	Jim ???
ADNR	Melissa Hill
ADNR	Kim Sager
ADNR	Walton
BLM	Alan Peck
BLM	David Mushovic
BLM	Mike Sondergard (by phone)
EPA	Matt LaCroix
EPA	Lisa McLaughlin
USGS	Dave Meyer
FERC	David Turner (by phone)
FERC	Paul Makowski (by phone)
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsburg
Long View Associates	Steve Padula
Long View Associates	Bao Le

Organization	Name
HDR	Michael Barclay (on phone)
URS	Paul Dworian
R2 Resource Consultants	Dudley Reiser
R2 Resource Consultants	Stuart Beck (on phone)
R2 Resource Consultants	Phil Hilgert
R2 Resource Consultants	Kevin Featherston
Tetra Tech	Harry Gibbons
Tetra Tech	Rob Plotnikoff
Tetra Tech	Christy Miller
Tetra Tech	Bob Mussetter
Tetra Tech	Mike Harvey
Tetra Tech	Bill Fullerton
E-Terra	Lars Gleitsmann
E-Terra	Steve Colligan
GW Scientific	Michael Lilly
Alaska Ratepayers	Scott Crowther
Coalition for Susitna Dam Alternatives	Becky Long (on phone)

Presentations

- Phil Hilgert (R2 Resource Consultants): Effective Spawning Incubation Model.
- Kevin Featherston (R2 Resource Consultants): Riparian Instream Flow Studies.

Introduction

Steve Padula (Long View Associates) acknowledged the receipt, by AEA, of stakeholder comments and study requests and noted that many of them were consistent with the study requests developed by AEA. Steve Padula stated that the goal of this week's set of meetings was to seek clarification regarding any stakeholder comments that would require the development of new studies, additional study tasks or differing approaches to existing study methods.

Brian Carey (AEA) reminded participants that the site visit has been moved the July 26-27th. He requested that those interested in participating RSVP by June 30th. He also asked that participants provide information about sites of interest and specific requirements from federal agency participants about paying for their own participation. Information can be provided to Brian via email at bcarey@aidea.org.

Baseline Water Quality Study

Paul Dworian (URS) stated that in general, the study comments were consistent with what had been developed in the Baseline Water Quality Study Plan. There were, however, several water quality comments where he was seeking additional clarification as follows.

Paul stated that there were several comments related to concerns over water quality impacts during Project construction activities. Paul noted that these potential impacts are not currently known and that the intent of these studies is to establish baseline water quality information for the Project as opposed to assessing impacts to construction activities. Paul stated that as if/when construction occurs, permitting will be required but these are not activities at this point in time.

A number of comments were received regarding sampling and modeling mercury in the Susitna River. Paul believed that one potential challenge with mercury is that all of the related activities are spread out over many disciplines/studies. Paul added that there has been discussion about consolidating mercury into one interdisciplinary study where the primary objective would be to conduct basic sampling to determine the presence of mercury in the system. Lori Verbrugge (USFWS) asked if all media will be sampled. Paul noted that mercury would be sampled in a diverse set of media. Harry Gibbons (Tetra Tech) added that a pathways analysis would also be conducted. Rob Plotnikoff (Tetra Tech) expressed the need to collaboratively identify criteria for triggers that confirm pathways that support a step-wise approach.
A comment was received to conduct water quality sampling at a monthly frequency during the winter. Paul Dworian stated that this is not the current intent given the challenging field conditions in the winter and because the water quality team does not believe that the magnitude of change in water quality are not rapid enough to justify such a high level of temporal resolution. Eric Rothwell (NMFS) asked whether anything would be missed with just two winter sampling events. Harry Gibbons stated that the system is biologically constrained and not dynamic during this time period which results in little change in chemistry. Eric requested that this rationale be stated clearly in the study plan.

Betsy McCracken (USFWS) asked how all of this information will be integrated to give stakeholders a clear understanding of the system. Harry Gibbons replied that the data is collected to calibrate the predictive capability of the modeling for future scenario projections. Alan Peck (BLM) asked how many years of water quality data will be collected to calibrate the model. Rob Plotnikoff replied that it is dependent upon the situation but in this case, it may be that one year of data can calibrate the model and a second year can function as the independent data set. Matt LaCroix (EPA) stated that without a middle of winter sampling period, it would be difficult to confirm static conditions. Matt noted that the Susitna River transitions to a groundwater influenced system in the winter and wonders if the first sampling period would capture this transition. He did not know if additional sampling would detect this but believed based upon the results of the first year of study, that revisiting winter sampling frequency could be warranted. Wayne Dyok (AEA) stated that such an approach of first year informing activities in the second year seems appropriate.

Water Quality Modeling Study

A comment was received questioning the choice of selecting the EFDC model over the CE-QUAL-W2 model. Paul Dworian (URS) stated that the EFDC model was chosen due to its range. Rob Plotnikoff added that sediment transport and toxics could be addressed with EFDC in addition to the general suite of water quality parameters. Harry also believes the three-dimensional component of EFDC will be valuable for with regard to toxics modeling. Matt LaCroix clarified that (EPA) recommended the use of CE QUAL-W2 only because they were against the use of a one-dimensional model. Matt added that EPA would be happy with the EFDC model. Wayne Dyok stated that in the study plan, it would be helpful to add references about where this model has been used successfully.

A comment was received regarding the broad application of thermal imaging technology. Paul Dworian sensed that comments were generally optimistic about this technology and that he was remained cautious about its utility. Paul clarified that the first year of thermal imaging is intended to be a pilot study. Paul noted that the window of time to utilize this technology successfully in the Susitna River (late August/early Sept) is small. Differentials to support detection only exist during a small window of time. Eric Rothwell (NMFS) recognizes the small window of time to sample using thermal imagery and requested that the study plan acknowledge the constraints so that stakeholders understand that failure represents a data gap which may require alternative approaches.

A comment was received regarding the addition of meteorological stations (2 or 3) in the Upper Susitna River basin. Paul Dworian stated that he was not opposed to this. Rob Plotnikoff added that meteorological data is good for modeling but given that the terrain in this area is relatively uniform, it may not be necessary. In general, meteorological stations should be added in consideration of how much variability one would expect to see in this area. Rob Plotnikoff will provide in the study plan, a rationale for how many additional stations may be needed for the Upper Susitna River. Eric Rothwell stated that these comments were from NMFS and USFWS and that he would like to keep the discussion open to develop the best approach and get agreement from Bill Rice (USFWS) who also contributed to this comment. Bob Henszey (USFWS) has an interest in precipitation data. Kevin Featherston (R2 Resource Consultants) plans to have riparian meteorological stations where precipitation data will be collected.

A comment was received regarding the collection of additional water quality parameters at meteorological stations. Paul Dworian did not have an issue with this request however, a caveat is that existing stations need to be evaluated for feasibility of upgrades given the potential for different technologies. Michael Lilly (GW Scientific) stated that there are various meteorological stations in existence but the level of collaboration will depend upon the potential for integration. Paul noted the value in co-location of meteorological stations due to the potential for acquisition of historical data.

A comment was received regarding additional metals sampling. Paul Dworian stated that he was not opposed to this request but questioned why some metals were added and others were not with regard to the list. Lori Verbrugge (FWS) could not recall exactly why this is so. Paul asked whether it is acceptable to do a screen for all metals and then to reduce the metals sampled only

to those that have significant results. Lori believed that removing analytes that are not of concern after a robust first screen would be acceptable. William Ashton (ADEC) stated that he would like to see chromium, nickel, and selenium sampled during all events regardless of results. Paul noted that these are in the 2012 study plan. Paul will update the study plan to capture discussion.

Wayne Dyok (AEA) noted that comments were received regarding expanding the glacier melt study. Wayne stated that a long term approach to addressing this issue would be to engage the University of Alaska, Fairbanks, but for now Tetra Tech would develop a study plan to address this issue.

Instream Flow and Groundwater Aquatic Habitat Related Studies

Dudley Reiser (R2 Resource Consultants) began the discussion by presenting a figure that illustrated the instream flow study program, its component parts, and the linkages to other disciplines/studies. Dudley noted that similar to other study disciplines, the instream flow and groundwater comments were generally consistent with what is currently being proposed by R2 and AEA but as a result of reviewing stakeholder comments, some additional questions were identified as follows.

Instream Flow Comments

A comment was received requesting the study to quantify changes to the aquatic and riparian ecosystem due to operations over the expected life of the project, at least 100 years. Phil Hilgert (R2 Resource Consultants) stated that with regard to FERC-licensed projects, this impact analysis would typically be conducted over a maximum license term of 50 years. Betsy would ask that a copy of comment table available. R2 will provide. Eric Rothwell (NMFS) replied that 50 years of analysis is appropriate but wanted to make the point that the Project effects will much longer than a maximum license term. Eric added that this comment reflects NMFS' concerns with longer term impacts although he understands the need to conduct it within the FERC's appropriate timeframe.

A comment was received requesting the development of habitat flow relationships over a scale of 5 years. Phil Hilgert stated that currently, the study program is 2013-2014. However, once the models are developed and linked, an operational scenario can be developed over a 5 year increment. Eric Rothwell stated that problem is that the model is calibrated over a short time (2 years) and this may not be a representative time period; especially with regard to biological information. Eric stated that his concern was that 2 years of information may not encompass the variability for all resource areas. Phil Hilgert replied that the intent of the model is to extrapolate to conditions that may not be present over the next two years. With regard to operational scenarios, it is appropriate to begin with wet, dry and average water years as the basis for operations, but this would become refined as preferred scenarios are identified and would allow AEA to refine the period of record that is appropriate. Eric stated that his concern was having sufficient information for key life history stages that may overlap with operational changes and

that if assumptions were needed due to a lack of data that agencies would be forced to develop such assumptions conservatively. Dudley Reiser introduced periodicity as an example where variation can be considered conservatively within the modeling framework. Dudley stated that the modeling is intended to be a collaborative and iterative process.

A comment was received requesting that the future trend in hydrologic flow be projected for the expected life of Project. Dudley Reiser stated that this will be evaluated.

A comment was received requesting that the instream flow assessments have 2 years of data. Dudley Reiser stated that per previous comments, there are constraints to study program that currently won't allow the request.

A comment was received requesting that new HSC/HIS curves be developed for all fish species and lifestages, by season. Dudley Reiser noted that such a request would be a daunting task. Dudley added that all species will be evaluated but not all will have site specific curves developed. Dudley stated that the current approach is to implement a gilded approach where a representative umbrella species would be identified. This approach has been implemented for other projects. Betsy McKracken (USFWS) stated that although there may be some opportunity for overlap of some lifestages, the gilded approach is typically implemented in systems where there is a high species assemblage. Regardless, Betsy stated that she is receptive to providing overlap where it is reasonable. Dudley replied that confirmation that a gilded approach is important but reiterated that development of this approach will be collaborative with continuing discussions by the group.

Matt LaCroix (EPA) stated that there is a general lack of baseline data for habitat use to conceptually identify umbrella species and that he would be interested in seeing a preliminary analysis/organization of how a gilded approach would occur, when it is available. Dudley replied that after a year of study, more information should support the collaborative development of an acceptable HSC/HSI approach.

Dudley stated that currently, the details are not in study plans at this time but much of this will be developed and integrated in a step wise manner. Matt LaCroix stated that sampling effort should be sufficient to capture episodic events. Phil Hilgert added that this summer, to be proactive, some HSC data will be collected and methods tested to inform next year.

A comment was received requesting that model selection be determined in consultation with agencies. Dudley Reiser noted that they are open to this and that subsequent discussions will require a site visit and a discussion with agencies about best models to use to address various objectives. Dudley also reiterated that this is not one model but a suite of models. Phil Hilgert provided a presentation on varial zone modeling that tracks redd disposition during spawning and incubation period on the Skagit River in response to load following activities (effective spawning incubation model). Phil stated that such a model could be used for different conditions, different operations, different locations and different species. Phil also noted that this model could be used to integrate groundwater. Eric Rothwell (NMFS) stated that for redds, a

one-dimensional model would be appropriate; but for post emergence, uni-variate models are not appropriate which is why NMFS stresses the need for collaboration. Eric added that model selection must be justified in study plans. Phil Hilgert agreed that for the purposes of study plan development, concurrence on general direction/approach is the goal, however, working out the details locally with agencies/stakeholders would be preferred. Phil cautioned that a lot of specificity in study plans may reduce implementation flexibility from a FERC process perspective so it is important to have a balance between necessary detail and adaptability. David Turner (FERC) stated that he doesn't need all the study plan details worked out (i.e., transect selection) but also noted that the ILP is flexible enough to allow deviation in study approach, if needed. Dave added that FERC does not need a high level of detail but assurance is required that there is buy-in from stakeholders.

A comment was received requesting that Project alternatives should consider a two dam configuration. Dudley Reiser stated that the current analysis is only pursuing a single dam alternative. Betsy McGregor (AEA) stated, however, that the model will run a variety of flow/operational scenarios similar to a two dam configuration. Mike Buntjer (USFWS) noted that this request was not intended to replicate the 1980s analysis but to just evaluate the option of a re-regulating reservoir to lessen impacts as a component of potential mitigation. Brian Carey (AEA) noted that AEA is currently evaluating the importance of flow variation to better understand value of various flows as they relate to operational scenarios. Wayne Dyok added that this analysis will look at various conditions under various circumstances from load following/displacement to emergency conditions and that this information will be available in September. Eric Rothwell (NMFS) asked range of flows the current evaluation is considering. Brian replied that flows will be evaluated be up to 14,500 cfs. Eric noted this is the maximum flow and that the next steps could be to refine the range. Matt LaCroix (EPA) stated that the focus of EPA's similar comments were related to the need to look at the effects to alternatives for the purposes of NEPA analysis. Matt stated that this does not suggest a high level of modeling for these alternatives but that some modeling activity may be requested to inform a broader analysis required by NEPA. Wayne replied that the analysis of alternatives will be broader and could include a re-regulating structure.

A comment was received requesting that habitat studies be conducted along all affected areas between RM 0-233. Dudley reiterated that the instream flow work is being conducted in the middle reach but that there is habitat work being conducted in upper reach. Betsy McGregor added that the entire zone of influence such as tributary mouths and all reservoir inundation zone habitat, we'll be evaluated but that this would be covered under a different study. Instream flow modeling is from the proposed dam site downstream.

A comment was received requesting the characterization of the natural flow regime including magnitude, frequency, duration, timing and rate of change of hydrologic conditions. Dudley Reiser stated that the hydrologic analysis will address this request.

A comment was received to analyze tributary flow data, particularly Indian and Portage creeks is needed to understand flow inputs from major tributaries. Dudley Reiser stated that the hydrologic analysis to characterize natural flow regimes should address this issue.

A comment was received to map and type tributary habitat in the upper reach. Dudley Reiser noted that this information will be collected as part of the fish and aquatic studies in the Upper Susitna River Reach.

A comment was received requesting that the habitat typing and use information should be integrated into a GIS interface. Betsy McGregor stated that this topic is related to habitat utilization and geomorphology which Bill Fullerton (Tetra Tech) will be discussing tomorrow.

A comment was received requesting that historic salmon run return timing be correlated with available spawning area. Dudley Reiser stated that one could use historic information and information being collected by ADFG to try and address this question but that a correlation to spawning area would still be challenging, especially in the mainstem.

A comment was received that stated that habitat modeling should not be used to assess habitat availability. Dudley Reiser stated that this is the process; collect information on where they are, their utilization, and their availability to try and isolate preference.
A comment was received requesting that all modeling steps be agreed upon and signed off by all parties. Dudley Reiser agreed with this comment.

A comment was received stating that to achieve the desired level of resolution for 2-D modeling, after each field data collections step, the data should be projected in a computer topographic model to identify locations needing more data points. Phil Hilgert agreed with this comment but noted that the timing constraints may require that data is collected when the flows are opportune as opposed to the proposed process. That said, R2 will abide by this process, if possible.

A comment from the Center for Water Advocacy stated that 2-D modeling, such as SRH 2-D, by the BuRec, enable modeling many kilometers of river at fine resolution (<1 m) accurately and quickly. Dudley Reiser stated that there is no proposal to implement 2-D modeling on many kilometers of the river. The 2-D effort will be a strategic application and will be coordinated with Bill Fullerton (geomorphology) and Kevin Featherston (riparian).

A comment from the Center for Water Advocacy requested that effects be studied down to Cook Inlet and identify Project effects on the Cook Inlet ecosystem. Dudley Reiser stated that the first step is to get a sense as to how far downstream load following has effects and adjust appropriately. Phil Hilgert added that there are other water quality and biological issues that may also justify moving the analysis further downstream toward Cook Inlet.

Wayne Dyok (AEA) asked whether the model will extend down to Cook Inlet from the beginning. Michael Lilly (GW Scientific) noted that it will begin at RM 74 and if model outputs

outside the range of natural variability are observed to this point, this may justify expansion further downstream but the analysis will need to be conducted first.

Michael Lilly stated that there was only one groundwater study comment inquiring about the number of years groundwater-surface water interface would be evaluated. Michael noted that up to 3 years of data will be collected depending upon needs but he noted that there is other data available from other sources such as USGS as well. Michal added that the years of data are not as important as events and that collecting data during peak events would be highly beneficial to calibrating models. Other questions may require more extrapolation out over time. Michael also stated that data collection is only one potential source of information and there are other systems that are comparable and can be used to better our understanding.

Riparian Instream Flow Studies

Kevin Featherston (R2 Resource Consultants), the lead on the Riparian Instream Flow Study, stated that he has been working with Bob Henszey (USFWS) on design and noted that there were minimal comments relative to the proposed study design. The only comment that differed between what Kevin and Bob have currently developed goes back to the duration of the study which has been addressed earlier today.

Due to the lack of substantive study comments or requests, Kevin provided a brief overview of the effort developed with Bob Henszey. The Riparian Instream Flow Studies are a modeling effort that will involve synthesis of the 1980s studies but will also sample and model surface/ground water and relationship on recruitment/establishment of riparian species on the floodplain. This study, like others, is a collaborative study that will coordinate with the ice processes study to identify areas of ice break up as it relates to vegetation and with geomorphology leads to examine dynamic areas of channel migration and rates. The study will also interface with the other biological studies. This approach will allow for the characterization of the river into “riparian process domains” which follows an intensive representative reach approach. Bob Henszey stated that the study will also develop suitability curves called “riparian vegetation flow response guilds” grouping species that recruit under similar conditions. These will be developed for vegetation via flow and sediment regimes to achieve similar analyses to the HSC development for fish. Information collected at these sites will allow such guilds to be scaled up from the reach to the river scale. Wayne Dyok asked if the model be able to run scenarios, predict riparian response, and help to identify flow regimes Kevin replied that this is the primary goal of the study.

Agreements

- All Instream Flow Study modeling steps will be agreed upon and approved by all Parties.
- The EFDC Model as the preferred water quality model.

Action Items

- Paul Dworian (URS) will update the Water Quality Study Plan to update the metals sampling list to reflect the discussion at the meeting.
- Paul Dworian will update the Water Quality Study Plan to acknowledge the limitations to using thermal imaging technology.
- Paul Dworian will update the Water Quality Study Plan to provide rationale for proposing only two winter water quality sampling events.
- Rob Plotnikoff will provide in the Water Quality Modeling Study Plan, a rationale for how many additional meteorological stations may be needed for the Upper Susitna River.
- Rob Plotnikoff will provide in the Water Quality Modeling Study Plan, references to examples of successful implementation of the EFDC Model.

Meeting Summary
Susitna-Watana Hydroelectric Project Licensing
Water Resources Workgroup Meetings
June 14, 2012
AEA Project Offices, First Floor Conference Room
411 W 4th Avenue, Anchorage, AK

Stakeholder PAD Comments/Study Requests and Study Plan Development for Ice Processes and Geomorphology, June 14, 2012, 9:00 am - 1:00 pm

Attendees:

Organization	Name
AEA	Betsy McGregor
AEA	Wayne Dyok
AEA	Brian Carey
USFWS	Bob Henszey
USFWS	Bill Rice
USFWS	Mike Buntjer
NMFS	Susan Walker (by phone)
BLM	Dave Mushovic
Coalition for Susitna River Dam Alternatives	Becky Long
EPA	Matthew LaCroix
EPA	Lisa McLaughlin
ADF&G	Joe Klein
ADF&G	Ron Benkert
ADF&G	Stormy Haught
ADNR	Terry Schwarz
NPS	Cassie Thomas
USGS	Dave Meyer
Natural Heritage Institute/Hydropower Reform Coalition	Jan Konigsburg
FERC	David Turner (by phone)
FERC	Paul Makowski (by phone)
Long View Associates	Steve Padula
Long View Associates	Bao Le
HDR	Bob Butera
HDR	Ingrid Corson
R2 Resource Consultants	Dudley Reiser
R2 Resource Consultants	Kevin Featherston
R2 Resource Consultants	Phil Hilgert
GW Scientific	Michael Lilly
ARRI	Jeff Davis (by phone)
Watershed Geodynamics	Kathy Dube

Organization	Name
Tetra Tech	Bill Fullerton
Tetra Tech	Mike Harvey
Tetra Tech	Bob Mussetter
Tetra Tech	Christy Miller
E-Terra	Lars Gleitsmann

Presentations

- None.

Introduction

Steve Padula (Long View Associates) acknowledged the receipt, by AEA, of stakeholder comments and study requests and noted that many of them were consistent with the study requests developed by AEA. Steve Padula stated that the goal of the meeting was to seek clarification regarding any stakeholder comments that would require the development of new studies, additional study tasks or differing approaches to existing study methods.

Geomorphology Studies

Kathy Dube (Watershed Geodynamics) began the discussion by addressing a NPS request for a study of dust generated in the reservoir fluctuation zone, roads, and the Lower Susitna River. Kathy stated that to calculate dust from road activity, EPA procedures would be used. For wind erosion potential, Kathy Dube noted that the study is proposing to use USDA/NRCS procedures that have been applied to calculating erosion from croplands using climate and soil properties. Cassie Thomas (NPS) stated that her concern was with the fine glacial flower that will be deposited around the reservoir and when combined with high wind events could create fine particulate suspension. Despite few people living in the immediate vicinity of the Project, this could impact recreationists and residents in other areas. Kathy Thomas added that the issue is an air quality issue and potentially a wildlife issue. Kathy Dube requested confirmation that the areas of interest relate to how much fine particulate matter could be generated, mobilized in the air, and how far it might travel. Kathy Thomas concurred and added that the season of interest is spring into summer when the reservoir is low and filling. Wayne Dyok (AEA) stated that AEA could address this issue. Kathy Dube asked who could serve as a resource if more information was needed. Kathy Thomas stated that the recreation consultants may be the best source of information. Betsy McGregor (AEA) added that Bridget Easley and Paul Dworian (URS) could provide information on meteorological stations that will have wind data.

A comment was received by FERC requesting that studies consider deep rotational and block failure as part of the mast wasting/erosion along the reservoir shoreline. Kathy Dube stated that there are two studies being conducted; a study on large failures and dam safety by MWH and a study on shallow slide components of erosion which she is conducting. Paul Makowski (FERC)

asked where the MWH write-up could be found so that he could make FERC dam safety staff aware of its availability. Wayne Dyok replied that this information would be included in the PSP.

A comment was received from Trout Unlimited requesting that erosion from new road construction be evaluated. Kathy Dube stated that she would be calculating erosion and sediment delivery to streams at road crossings as part of the geomorphology work. Kathy Dube also stated that one could model erosion from entire road surface and link this to receptors of interest if those were identified. David Turner (FERC) stated that following up with Trout Unlimited would be appropriate. Kathy Dube stated that she would follow up with Trout Unlimited to identify the potential receptors of interest.

A comment was received from FERC regarding the effect of glacial surge on contribution to reservoir sediment accumulation rates. Bill Fullerton (Tetra Tech) stated that this issue was first introduced by Dr. Harrison (University of Alaska, Fairbanks) at a scoping meeting, has been included as an objective in the study plan, and will be evaluated in a stepwise manner. Mike Harvey (Tetra Tech) stated that the evaluation can only occur if Dr. Harrison can provide the necessary information. Mike Harvey added that in general, he is skeptical that glacial surge is a major contributor given that glacial systems are always in a state of transport and near their maximum. David Myers (USGS) stated that the system is energy limited and that there is sufficient river length between glaciers and the proposed reservoir to attenuate any high sediment loads. Mike Harvey reiterated the need to engage Dr. Harrison directly to assess the availability of information. Wayne Dyok stated that he would connect Dr. Harrison with appropriate Tetra Tech staff. Matt LaCroix (EPA) asked whether sediment transport models could run scenarios with large inputs from glacial events. Bob Mussetter (Tetra Tech) replied that the model could but that the critical question is whether such an event is realistic or not. Tetra Tech will consider glacial events and if appropriate, they can pursue it.

A comment was received from NMFS/USFWS to describe sediment removal procedures. Bill Fullerton stated that this is something that is not being evaluated at this point in time since previous work showed the reservoir life is hundreds of years long. Matt LaCroix (EPA) noted that there are concerns with sedimentation and tributary access from Project operations. Matt added that it is conceivable that limited dredging could be necessary. Sue Walker (NMFS) referenced the Oroville Project as an example where sediment wedges. Bill Fullerton replied that part of the reservoir geomorphology study plan is to evaluate processes in major tributaries to evaluate the potential of sediment accumulation as they relate to fish passage barriers. This component of the study will occur in coordination with the reservoir fisheries activities.

A comment was received by the USFWS to digitize river habitat types for three flows in the Middle and Lower Susitna River. Bill Fullerton (Tetra Tech) stated that the current study plan proposes to examine three flows in the Middle Susitna River (23, 12 and 5 kcfs) and one in the Lower Susitna River (36 kcfs). There would be an option to digitize river habitat at the two additional flows in the lower river but this would be dependent upon whether the geomorphology and instream flow work would need to be expanded into the lower river (below the Three Rivers Confluence). At this time, the criteria to determine expansion would be if the model shows

sediment transport and bed response are outside range of the natural variability. Bob Mussetter (Tetra Tech) stated that the relative contribution from upstream is relatively small (since sediment inputs at the Three Rivers Confluence is likely significant) and this needs to be evaluated first. Bill Rice (USFWS) concurred with this is approach but asked why the lower river flow was set at 36 kcfs and not a lower flow. Bill Fullerton replied that 36 kcfs is the middle range of the flows evaluated from the historical assessment. Wayne Dyok asked if the group supported the criteria for the expansion of modeling downstream as outputs outside of the range of natural variability. Matt LaCroix asked that AEA define "natural". Bob Mussetter replied that natural variability criteria would be associated with whether changes associated with the Project create a systematic change or are more consistent with what is currently seen. Matt LaCroix noted that variation occurs at a reach scale and on a seasonal basis and requested that this be considered.

Bill Rice asked what can be expected for bank erosion during load following operations. Mike Harvey replied that in general, load following may have impacts on bank erosion but it depends on specific areas and composition. Overall, Tetra Tech is planning on addressing these issues and can examine bank stability at specific sites. Joe Klein (ADF&G) asked about whether the rate of erosion on LWD pre and post Project will be examined. Kevin Featherston (R2 Resource Consultants) replied that the LWD study will examine size and distribution which will feed into modeling of how load following will affect the changes in patterns of wood mobilization. Michael Lilly (GW Scientific) stated that in the summer time, there is a constant effect of boat wake erosion which should be considered part of the natural variability. Jan Konigsburg (NHI/NHC) asked if boat wake contributions to erosion would be evaluated. Betsy McGregor replied that this would be part of the environmental baseline. Bob Mussetter stated that if this were to be included in the study, data about boat use would be needed. Betsy McGregor noted that the recreation team will be collecting these data. Joe Klein and Michael Lilly added that other studies could also provide additional data. Bob Mussetter will coordinate with Michael/Joe about what types of information would be needed to add this task to their scope of work.

Dave Mushovic (BLM) stated that the discussion seems focused on the lower river but if a reservoir is built, this will create additional boat traffic in this area and that this should be examined as well. Wayne Dyok replied that some information to address this issue is being collected in pieces through a variety of other reservoir resource studies but is not sure if this issue is being addressed explicitly. Paul Makowski (FERC) stated that there is always the option to make adjustments, as necessary, to the study program in the second study year. It may be that after year 1, this is an issue that could be added. Wayne Dyok stated that Kathy Dube's work (erosion) and the recreation data being collected could represent the preliminary phases of a step-wise process. Dave Mushovic supports this approach.

A comment was received from NMFS/USFWS to include two-dimensional model sites to include representation of each riverine habitat type, primary tributary deltas, and an unstable reach. Bill Fullerton asked if the Three Rivers Confluence would be considered a primary tributary delta. Bill Rice stated that he believed the area would be a primary tributary delta and would require two-dimensional modeling. Bill Fullerton replied that modeling this area would

be a very extensive study and believes that fisheries and other data should be collected and evaluated first to identify whether an extensive modeling approach is justified consistent with the step-wise approach being implemented for other aspects of modeling. Matt LaCroix stated that a step-wise approach would be appropriate. Bill Rice stated that this area is of high interest to the USFWS. Joe Klein and Mike Buntjer agreed noting fisheries concerns in the Three Rivers Confluence. Wayne Dyok reiterated Matt's point that an incremental approach would be most appropriate. Bill Rice stated that primary tributary deltas could be discussed further. Betsy McKracken added that she was interested in Indian River and Portage Creek as primary tributaries. Bill Fullerton stated that there are more than one primary tributary and that selection would be driven by fisheries and other environmental information. Christy Miller (Tetra Tech) stated that there has been some two-dimensional modeling done at Talkeetna but only for a specific portion. Michael Lilly added that the railroad may have had additional modeling done in this area as well.

After the break, Brian Carey (AEA) reminded participants that the site visit has been moved the July 26-27th. He requested that those interested in participating RSVP by June 30th. He also asked that participants provide information about sites of interest and specific requirements from federal agency participants about paying for their own participation. Information can be provided to Brian via email at bcarey@aidea.org.

A comment was received from NMFS/USFWS to conduct fluvial geomorphology modeling tied to warm and cold Pacific Decadal Oscillations (PDOs). Bill Fullerton stated that the study is already evaluating the wet and dry years and thought that PDOs would be nested in these years. David Myers (USGS) replied that PDO cycles wouldn't necessarily be represented consistently in wet and dry years. Wayne Dyok stated that AEA will address warm and cold PDOs but stressed the importance of integration and coordination amongst team members to address all issues. Bill Fullerton stated that they will start with the 6 scenarios (wet, dry, and average years and warm and cold PDOs) but as a group, may select a subset that is representative of everyone's concerns.

A USFWS comment was received requesting the use of tracers to assess bed material mobilization. Bill Fullerton stated that for a river this large, this would be very challenging and would likely not yield any useful results due to the inability of finding a significant number of tracers. Mike Buntjer replied that he would consult with Bill Rice on this request. Bill Fullerton stated that he would contact Bill Rice to discuss.

A NMFS/USFWS comment was received requesting a geomorphic evaluation of load following during the winter period. Bill Fullerton stated that if bed is not mobilized in the winter, that there would be no reason to run the model. However, re-suspension and increasing turbidity during a period where you'd see low turbidity could be examined. Matt LaCroix stated that tributaries are not just sediment sources but can also be areas of deposition. Bill Fullerton added that this is why two-dimensional modeling will occur; to examine the dynamics of transport or accumulation at these areas, as needed. As part of the sediment balance exercise, Bill plans to identify the major point sources. Bill Henszey asked if there is a time period where turbidity is

low enough to use LIDAR (green spectrum) to collect data. Bob Mussetter stated that green spectrum LIDAR is still considered to be experimental and has been used successfully in shallow mountain streams with extreme clarity but likely not applicable for this system. Sue Walker (NMFS) stated that this technology should not be dismissed. Lars Gleitsmann (E-Terra) added that aerial photos from just before freeze up (around Oct. 1) show extreme clarity to the river bottom. Bob Henszey reiterated his interest in evaluating if green spectrum LIDAR can be used.

A comment was received by the NRDC requesting that modeling include turbidity and sediment transport. Bill Fullerton stated that sediment routing will look at sediment load and will be routed through the system as a concentration. The model does not "route turbidity." Sediment is related to turbidity but it is not the sole factor. The Water Quality Modeling Study will model turbidity.

Betsy McGregor stated that two technical memos on one- and two-dimensional modeling were prepared by Bill Fullerton and are now available on the Project website.

Ice Processes Modeling Study

Ingrid Corson (HDR) provided an overview of recent field work related to the Ice Processes Modeling Study. Spring ice flights were conducted between March 21 and May 10. In total, 13 helicopter flights surveying RM 234 down to the mouth of the river were completed. Fourteen multigrain cameras were installed, seven flights had GPS tagged video, and 2000 GPS tagged photos were taken. Additionally, GIS data was collected for open leads and ice jams. Currently, the ice processes group is in the office geo-referencing all historical data into a database. All weather data during the surveys is being compiled in an Access database. All data including ARCGIS geodatabase containing ice jams, open leads (points and lines), ice survey hyperlinked to photos, all multigrain camera photos hyperlinked, and all flight lines hyperlinked to video will be available. Ingrid added that this year's ice breakup appeared to be "dull" noting that the break up was so mild that there were rarely interactions with vegetation (3 total observations) and that although ice jamming occurred, nothing out of the flood channel and interacting with vegetation was observed.

Bob Butera (HDR) stated that the 2012-2014 study period will continue with observations starting with freeze up (October to freeze up in late December/early January) using the same methods as in 2012 for ice breakup surveys. One additional task will be ice thickness measurements that did not occur in the last survey due to safety issues since this was a comment from agencies. Selection of the ice processes model is also continuing with two potential models; the KRISP Model and one developed for the Peace River. Wayne Dyok stated that the goal is to have full agreement on model selection for the RSP in November.

Bob Butera presented the ice processes comments from stakeholders that required additional discussion as follows:

ADFG provided a comment to examine ice processes under alternative operation scenarios which Bob believed will be built into the scope after the model is built.

Bob noted that a comment provided by ADNR and FERC was prevalent throughout the public comments reviewed and this was the use of ice as a transportation corridor. Bob stated that currently this is not a study plan task. Betsy McGregor noted that this task is part of the transportation studies.

A NMFS comment was received regarding the need to measure ice thickness. As stated earlier, this will be addressed in the ice processes study.

A NMFS comment was received regarding extending surveys to RM 250. Bob stated that the constraints of the helicopters range preclude expansion. In addition, the need to expand the study does not appear warranted.

Bill Rice (USFWS) asked about the collection of solar radiation data and its extent. Michael Lilly (GW Scientific) replied that there will be a series of solar radiation measurements taken by AEA as well as coordination with other agency data collectors, as appropriate. Bill Rice questioned whether these measures would be sufficient. Michael replied that the 2012 activity is the preliminary step to determine if more data is needed. Currently, the solar radiation monitoring has been focused on supporting the development of the temperature modeling, however, the ice processes model selection and evaluation may also inform other data needs.

In closing, Steve Padula stated that next steps will include AEA integrating into and developing new study plans per the discussions over the past two weeks. These study plans will be integrated into the PSP which will be filed with FERC on July 16th. He also noted that there was one study request that will not be adopted; the National Economic Study. But for most all other issues, it appeared that consensus was reached.

Action Items

- As part of the erosion assessment, AEA will evaluate the mobilization of fine particulate matter by wind and its potential impacts to recreationists and residents in other areas near the Project.
- AEA will put Tetra Tech in contact with Dr. Harrison regarding the acquisition of historical information on glacial surge and sedimentation in the vicinity of the proposed Project reservoir.
- Kathy Dube (Watershed Geodynamics) will contact Trout Unlimited to identify the eceptors of interest in aquatic systems that may be impacted from erosion due to new road construction.
- Bob Mussetter (Tetra Tech) will coordinate with Michael Lilly and Joe Klein about the types of information needed to add boat wake erosion as a task to the geomorphology studies.

- AEA will add additional scenarios to the fluvial geomorphology modeling to address warm and cold PDO cycles.
- Bill Fullerton (Tetra Tech) stated that he would contact Bill Rice (USFWS) to discuss the request to utilize tracers to assess bed material mobilization.

ATTACHMENT 1-2
LIST OF 2012 EARLY STUDY EFFORTS

Water Resources

Review of Existing Water Temperature Model Results and Data Collection

The objective of the 2012 Review of Existing Water Temperature Model Results and Data Collection Study is to provide a foundation for water temperature modeling of the Susitna River and the proposed reservoir that will be conducted in 2013-2014. Specific objectives include: (1) an evaluation of 1980s water temperature modeling (i.e., SNTEMP and DYRESM) results, (2) determination of whether past modeling results are applicable to the currently proposed Project, and (3) initiation of the collection of stream temperature and meteorological data needed for future modeling. The study area includes the Susitna River from river mile (RM) 10.1 to RM 233.4.

SNTEMP and DYRESM assumptions and predictive capabilities are being evaluated to determine if previously developed model results are appropriate for application to current conditions. The models' configurations, input parameters, and calibration/validation are being assessed. Flows and proposed release schedules from the 1980s are being analyzed and compared to recent records to determine the applicability of historic flow and release data to the proposed Project. If existing temperature models are applicable, results will be synthesized to evaluate potential effects of the proposed Project on water temperature and guide the design of 2013-2014 study plans.

Water temperature data and monitoring locations from the 1980s were evaluated to determine which historic locations should be monitored in 2012. Locations were evaluated based on (1) adequate representation throughout the Susitna River and tributaries, (2) preliminary consultation with AEA and licensing participants, and (3) understanding of other proposed studies and study sites (e.g., instream flow, ice processes). During 2012, water temperature data loggers are being installed at 39 sites, and meteorological (MET) data collection is being conducted and/or upgraded at up to eight locations between RM 25.6 and RM 224.

Aquatic Habitat and Geomorphic Mapping of the Middle River Using Aerial Photography

Understanding the extent to which current aquatic habitat and geomorphic features are similar to or different from conditions in the 1980s will provide information on the long-term equilibrium of the Susitna River channel and inform the extent to which datasets collected in the 1980s can be used to describe and supplement more recent data. Quantifying geomorphic features and aquatic habitat types will provide a basis for selecting future study sites, understanding flow-habitat relationships, and assessing geomorphic conditions. The objectives of the 2012 Aquatic Habitat and Geomorphic Mapping of the Middle River Using Aerial Photography Study are as follows: (1) identify the surface area of riverine habitat types over a range of stream flows, (2) compare existing and 1980s geomorphic feature/units and associated aquatic habitat type data to characterize the relative stability of the channel under unregulated flow conditions, and (3) delineate large-scale geomorphic river segments to stratify the river into study segments for use in 2013-2014 study design and implementation. The study area includes the Middle Susitna River from RM 98 to RM 184.

Color aerial photographs of the Middle River (RM 98 to RM 184) obtained in 2012 will be combined with existing information to create a digital, spatial representation (i.e., GIS database) of geomorphic features/units and macro- and meso-scale riverine habitat types. This information will be used to analyze and compare aquatic habitat and geomorphology under 1980s and current

conditions. Based on this information, the Middle River will be delineated into large-scale geomorphic river segments with relatively homogeneous characteristics, including channel width, entrenchment ratio, sinuosity, slope, geology/bed material, single/multiple channel, braiding index, and inflow from major tributaries.

Reconnaissance-Level Geomorphic and Aquatic Habitat Assessment of Project Effects on Lower River Channel

The objective of the 2012 Reconnaissance-Level Geomorphic and Aquatic Habitat Assessment of Project Effects on Lower River Channel Study is to assess at a reconnaissance level the potential for the Project to affect aquatic habitat and channel morphology in the Lower Susitna River. Specific objectives include: (1) evaluating the relative magnitude of changes to the flow regime, with and without the Project in place, (2) assessing potential changes to channel morphology and aquatic habitat, with and without the Project in place, (3) evaluating the relative magnitude of changes to the sediment regime, potential impacts on sediment/substrate gradations, and the vertical and lateral stability of the channel, with and without the Project in place, (4) delineating large-scale geomorphic river segments with relatively homogeneous characteristics, (5) conducting a geomorphic assessment of historic channel change and its drivers and determining if changes have affected the frequency and distribution of meso-habitat units, and (6) providing information to assist AEA and licensing participants in developing 2013-2014 study plans. The study area includes the Lower Susitna River from RM 0 to RM 98.

The study will quantify the magnitude of change associated with stream flow, riverine habitat features, and sediment transport under the existing pre-Project and proposed post-Project conditions. A geomorphic assessment of channel change will also be conducted. Specific analyses being performed include a stream flow assessment, riverine habitat-flow relationship assessment, sediment transport assessment, geomorphic assessment of channel change, and delineation of large-scale geomorphic river segments with relatively homogeneous characteristics (e.g., channel width, lateral confinement by terraces, entrenchment ratio, sinuosity, slope, bed material, single/multiple channel, and hydrology). Additional studies will be planned for 2013-2014 if the results of the 2012 study identify a potential for channel adjustments and associated changes to important aquatic habitat in response to the proposed Project.

Documentation of Susitna River Ice Breakup and Formation

The overall objective of the 2012 Documentation of Susitna River Ice Breakup and Formation Study is to document baseline ice conditions and initiate assessment of potential effects on ice processes downstream of the proposed Project. Specific objectives are to: (1) document the timing and progression of breakup and ice cover formation on the Susitna River between RM 0 and RM 234, (2) document open leads between RM 0 and RM 234 throughout the winter, (3) document the interaction between river ice processes and channel morphology, vegetation, and aquatic habitats, and (4) provide baseline data to help identify the river reaches most likely to experience changes in river ice formation as a result of Project construction and operation.

Information on Susitna River ice studies conducted in the 1980s will be reviewed and synthesized, as appropriate, for use in developing 2013-2014 study plans. Information will be compiled in a geospatial format for comparison with present day observations. Recent studies of the effects of hydroelectric projects on river ice in arctic and sub-arctic climates will also be reviewed and synthesized.

Aerial mapping of open leads was conducted in March 2012 from RM 0 to RM 234. Open leads in the Middle River will be compared with the location of open leads documented in 1984-1985. Time-lapse cameras were installed in spring 2012 at 11 locations between RM 9 and RM 184 for observing ice breakup and ice-cover formation. Ice breakup progression was documented in spring 2012 between RM 0 and RM 234 via aerial observations. Documentation of freeze-up progression will be conducted in fall/winter 2012 and will include observations of the presence of frazil ice, ice bridges, ice cover, and snow cover. Meteorological and stream temperature data compilation will occur in fall/winter 2012, and river stage data from the National Weather Service observer at Sunshine Station and Gold Creek gage will be obtained daily. Telemetered stage and camera installations from the 2012 flow routing and transect study will be observed daily for signs of ice formation.

One or more physical ice processes models will be used to predict the effects of the proposed Project on river ice processes. The model and/or modeling approach will be selected in consultation with the Army Corps of Engineers Cold Regions Research Engineering Laboratory (CRREL), AEA, other technical experts, and licensing participants during the 2012 study year so that the model can be approved for use in 2013-2014.

Instream Flow

Instream Flow Planning Study

The 2012 Instream Flow Planning Study outlines the objectives and methods for characterizing existing information that will provide a foundation for future flow-habitat studies. This study will initiate a multi-year effort, which will include data collection activities beginning in 2012 and carrying over into 2013-2014.

A comprehensive instream flow study plan will be developed during 2012 as part of the Project licensing process. The 2013-2014 instream flow study will describe the response of aquatic habitats to Project-induced changes in river flow, water temperature, turbidity, and other river channel/water quality parameters, as appropriate. The objective of the 2012 Instream Flow Planning Study is to provide information that will be the foundation for the 2013-2014 Instream Flow Study and will assist in its development. The specific objectives are to: (1) synthesize the 1980s instream flow study information and evaluate the applicability of the studies to the currently proposed Project, (2) identify appropriate fish species/life stages, study reaches, study sites, and instream flow modeling methods for the 2013-2014 Instream Flow Study, (3) conduct a site reconnaissance survey with agencies and stakeholders during which preliminary study sites and potential transect locations will be identified and analytical methods will be discussed, (4) commence collection of habitat suitability criteria (HSC) data at selected locations on the Susitna River, (5) coordinate instream flow study data needs across resource disciplines and studies, and (6) assist AEA in the development of the 2013-2014 Instream Flow Study Plan. The study area includes all aquatic habitats and riparian areas related to river flow in the Susitna River downstream of the proposed Watana Dam (RM 184 to RM 0).

The 2012 study methods address the following tasks: (1) review of 1980s instream flow study documents, (2) preliminary identification of fish target species, life stages, and/or guilds, (3) preliminary determination of species periodicity, (4) compilation and review of habitat utilization data by life stage/guild, (5) identification of physical habitat processes, (6) river stratification and

study site selection, (7) review of existing HSC data/initiate collection of new data, (8) review and selection of habitat modeling methods/components, (9) assist in assessment of temperature modeling, and (10) develop the 2013-2014 study plan.

River Flow Routing Model Data Collection

A hydraulic flow routing model of the Susitna River downstream of Watana Dam will be required to support a variety of other models used to assess the Project's impact on river hydraulics, temperature, ice processes, sediment transport, aquatic resources, and terrestrial resources. The U.S. Army Corps of Engineers' HEC-RAS model is being considered for this purpose. The 2012 River Flow Routing Model Data Collection Study will initiate data collection required for developing a routing model.

The purpose of the 2012 field effort is to provide input, calibration, and verification data for a river flow routing model that extends from the proposed dam site (RM 184) to RM 75. Specific objectives include: (1) surveying cross sections to define channel topography and hydraulic controls between RM 75 and RM 184, excluding Devil's Canyon (for safety reasons), (2) measuring stage and discharge at each cross section during high and low flows, with the potential addition of an intermediate flow measurement, (3) measuring water surface slope during discharge measurements and documenting substrate type, groundcover, habitat type, and woody debris in the flood-prone area for the purposes of developing roughness estimates, and (4) installing and operating water-level recording stations in collaboration with other studies.

The primary study area includes the Susitna River mainstem channel between RM 75 and RM 184. Additional measurements will be made at inactive U.S. Geological Survey (USGS) stations at RM 26 (Susitna Station) and RM 223 (Susitna River near Cantwell), and in the Susitna delta, to support other studies taking place in these regions.

Up to 100 cross sections will be surveyed overall, with a minimum of 50 cross sections surveyed in 2012 and, if needed, the remaining cross sections surveyed in 2013. At each cross section, water level, surface slope, and discharge measurements will be made concurrently with bathymetric surveys. At each cross section, a survey team will record main channel and overbank locations, substrate and vegetation descriptions, water temperature, estimated D84 substrate size, and field roughness estimates following USGS guidance. Water-level monitoring will be conducted at approximately 8 to 10 stations.

Fish and Aquatic Resources

Synthesis of Existing Fish Population Data

The 2012 Synthesis of Existing Fish Population Data Study has two objectives: (1) consolidate and synthesize contemporary and historical fisheries resource data from the study area into a concise, comprehensive reference document and (2) develop a geospatially-referenced relational database of fisheries resources from which information can be obtained for use in analyses and studies to be conducted in 2013-2014 and beyond. The data synthesis will improve the understanding of baseline conditions and refine the list of potential fisheries data gaps, which together will contribute to developing well-focused aquatic resource studies for 2013-2014.

The following types of information are expected to be compiled: (1) river mile locations for geographic landmarks used in historical studies, (2) resident and anadromous fish species composition within the Upper Susitna River (upstream of RM 184), Middle Susitna River (RM

184 to RM 99), and lower Susitna River (RM 99 to RM 0), (3) distribution of resident and anadromous fish species among riverine habitat types, (4) relative abundance of fish species in river segments and riverine habitat types, (5) run timing, spawning, and incubation periods for resident and anadromous species, (6) representative indicators of fish growth, condition factor, age structure, and genetic information, (7) physical habitat attributes that appear to be beneficial to or preferred by fish species and life stages, (8) physical habitat attributes that appear to limit fish populations, (9) fish communities, benthic macroinvertebrate communities, and habitat conditions at stream crossings associated with proposed transmission line and access corridors.

Adult Salmon Distribution Habitat Utilization Study

The 2012 Adult Salmon Distribution and Habitat Utilization Study is the initial component of a multi-year data collection and interpretation effort. The goals of the 2012 study are to: (1) characterize the distribution, migration behavior, and proportional abundance of adult salmon and determine their use of mainstem, side channel, and slough habitats in the lower, middle, and upper Susitna River, (2) determine whether historical study results and conclusions are consistent with the current distribution and relative abundance of spawning adult salmon in the mainstem Susitna River, (3) provide spawning habitat data to support the selection of sites for the instream flow study, develop site-specific habitat suitability criteria, and develop habitat sampling protocol for 2013-2014, and (4) develop information to refine the scope, methods, and study sites for assessing habitat use by adult salmon during the 2013-2014 studies.

Study objectives include: (1) capturing, radio-tagging, and tracking adults of the five species of Pacific salmon in the middle Susitna River in proportion to their abundance, (2) determining the migration behavior and spawning locations of radio-tagged fish in the lower, middle, and upper Susitna River, (3) assessing the feasibility of using sonar to determine spawning locations in turbid water, (4) characterizing salmon migration behavior and run timing above Devils Canyon, (5) comparing historical and current data on relative abundance, locations of spawning and holding salmon, and use of mainstem, side-channel, slough, and tributary habitat types by adult salmon, (6) locating individual holding and spawning salmon in clear and turbid water and collecting habitat data from holding and spawning salmon in the middle and lower river mainstem consistent with developing HSC for instream flow modeling, and (7) evaluating the effectiveness of methods used in 2012 to address study goals and objectives, and assessing their suitability for future years' studies.

The study area encompasses the Susitna River from Cook Inlet (RM 0) upstream to the Oshetna River (RM 234.4), with an emphasis on river reaches between its confluence with the Chulitna River (RM 98) and Devils Canyon (RM 154). This study will be coordinated with basin-wide radiotelemetry studies that are being conducted by the Alaska Department of Fish & Game (ADF&G). This study differs from the ADF&G studies in that spatial data will be collected from radio-tagged fish on a finer scale, with the objective being to obtain locations of spawning and holding salmon at the macro- and microhabitat levels.

Upper Susitna River Fish Distribution and Habitat Study

The goal of the 2012 Upper Susitna River Fish Distribution and Habitat Study constitutes the first year of a multi-year effort aimed at characterizing the existing distribution of Chinook salmon and other fish species in the Susitna River and its tributaries above Devils Canyon. In addition, the study will begin to characterize fish communities and aquatic habitat in the proposed reservoir inundation zone. Specific objectives include: (1) determining the distribution

of adult and juvenile Chinook salmon and relative abundance of juvenile Chinook salmon in the Susitna River and its tributaries above Devils Canyon, (2) characterizing aquatic habitat in the Susitna River and its tributaries/lakes from Devils Canyon upstream to, and including, the Oshetna River and determining the suitability of that habitat for Chinook salmon, (3) determining fish species composition and relative abundance in the proposed reservoir inundation zone, (4) characterizing the type and amount of aquatic habitat within the proposed reservoir inundation zone; (5) identifying the locations of potential fish barriers in tributaries between Devils Canyon and the Oshetna River, (6) collecting genetic samples of Chinook salmon, and (7) providing information for the development of plans for studies to be conducted in 2013-2014. The study area includes the mainstem Susitna River, tributaries, and several lake systems associated with the Susitna River between Devils Canyon (RM 154) and the Oshetna River RM (234.4) (including the Oshetna River).

Habitat mapping will be conducted in tributaries, the mainstem Susitna River, and in lakes. Adult Chinook salmon spawning surveys will be conducted in tributaries and the mainstem; timing of the surveys will be based on existing run-timing information and when clear water habitat conditions are anticipated. Juvenile Chinook salmon and other fish species will be sampled in tributaries, the mainstem Susitna River, and in lakes; sampling will be scheduled based on typical outmigration timing. If appropriate, a simple geomorphic and biologic model will be developed with appropriate criteria (e.g. channel gradient, confinement, sediment size, presence of barriers, fish sampling results) to identify the distribution of juvenile Chinook habitat in the mainstem river and tributary streams.

Cook Inlet Beluga Whale Anadromous Prey Analysis

Project-induced changes to discharge and stage may impact beluga whale access to the lower Susitna River and/or to available prey. Therefore, an understanding of beluga distribution (both spatially and temporally) and their prey species is necessary to evaluate potential Project impacts on whales and their critical habitat.

The Cook Inlet Beluga Whale Anadromous Prey Analysis consists of literature and data reviews of the use of the Susitna River by beluga whales and by their important anadromous prey species (eulachon and adult Chinook, sockeye, chum, and coho salmon). Study objectives include: (1) summarizing the life history, run timing, abundance, distribution, and habitat of beluga whale anadromous prey species in the Susitna River and in other Cook Inlet tributaries used by beluga whales, (2) summarizing temporal and spatial distribution of beluga whales in Cook Inlet, the Susitna River delta, and the Susitna River relative to the availability of eulachon and adult Chinook, sockeye, chum, and coho salmon, and (3) consulting with the National Marine Fisheries Service (NMFS) for Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) permitting and requirements for the Project study program.

Existing information on pink salmon (juveniles and adults) and all life stages of Chinook, sockeye, chum, and coho salmon above RM 50 will be compiled as part of the Synthesis of Existing Fish Population Data Study, and additional data will be collected during fisheries studies conducted in 2013-2014. This study will focus on compiling and synthesizing life history and habitat use information of eulachon; adult Chinook, sockeye, chum, and coho salmon; and beluga whales. The study area includes the Susitna River within the range of anadromous fish distribution, with an emphasis on the lower river (RM 0-50), and the area of the Susitna River delta that could be affected by Project operations. Fish escapement and run timing

data will also be compiled for other Cook Inlet tributaries where significant salmon and/or eulachon predation by beluga whales occurs. Results of the study will be used to begin identifying potential Project-induced impacts to beluga whales and their critical habitat and identify data needs to be addressed as part of the 2013-2014 beluga whale study.

AEA, in consultation with NMFS, will address MMPA and ESA permit requirements for the Project studies program and begin preparation of appropriate permit applications. A "No Impact" protocol will be developed for implementation in association with all studies that have the potential to affect beluga whales.

Botanical Resources

Vegetation and Wildlife Habitat Mapping Study

Project construction, facilities, and operation and maintenance will affect vegetation both upstream and downstream of the proposed dam, as well as along access and transmission line routes. Project effects will include direct, indirect, and cumulative effects to vegetation. This study will characterize and quantify direct loss of vegetation communities and wildlife habitat within the Project footprint; evaluate baseline wildlife habitat in the Project vicinity; and evaluate potential direct and indirect effects of Project maintenance and operations on vegetation communities and wildlife habitat. This is a multi-year study that will begin in 2012 for locations where aerial imagery is currently available. Upon a complete assessment of the Project area, mitigation alternatives will be developed from the data to address adverse Project-induced impacts.

The overall, multi-year objectives of the Vegetation and Wildlife Habitat Mapping Study are to:

- Characterize the vegetation communities and wildlife habitat in the Project area;
- Quantify the potential impacts due to Project construction;
- Evaluate potential changes to the vegetation communities and wildlife habitat from Project maintenance and operations and related activities; and
- Develop the 2013–2014 Vegetation and Wildlife Habitat Mapping Study Plan.

A complete assessment of the Project area vegetation and wildlife habitat will be completed as aerial imagery becomes available and the Project area is refined (e.g., preferred alternative access and transmission corridors). The study objective for 2012 is to develop a vegetation map using existing habitat delineations, current aerial imagery, and field verification.

Wetland Mapping Study

Project construction, facilities, and operation and maintenance may affect wetlands upstream and downstream from the dam site, and along access and transmission line routes. A thorough understanding of how project activities will affect wetland resources in the study area will be critical for developing best management practices, rehabilitation options for promoting recovery of wetlands exposed to short term impacts, and compensatory mitigation for permanent wetland losses. Wildlife use is related to the impact of Project activities on wetlands; therefore, the results of this study will be necessary to evaluate baseline and future wildlife use of the Project area. The results of the Wetlands Mapping Study will also be used to supplement the Vegetation and Wildlife Habitat, Riparian, Rare Plant, and Invasive Plant studies.

The overall, multi-year objectives of the Wetlands Mapping Study are to:

- Characterize wetlands in the Project area;
- Quantify the potential impact to wetlands and wetland function from Project construction;
- Evaluate potential changes to wetlands and wetland functions from Project maintenance and operations and related activities; and
- Develop the 2013–2014 Wetlands Mapping Study Plan.

The 2012 study will include the following study components:

- Determine appropriate scales and areal extents for wetland delineations in consultation with USACE and compile available wetland mapping at various scales for development of wetland delineations based on current aerial photography.
- Incorporate data from the Vegetation and Wildlife Habitat Mapping Study and available data on natural fire patterns along the reservoir reach of the Susitna River.
- Identify wetland delineation field sites and data from the 1980s studies for potential resampling, if possible.
- Identify sample locations and conduct initial field surveys.

Report study results, including reporting that is coordinated with other pertinent studies.

A complete assessment of the Project area wetlands and wetland functions will be completed as aerial imagery becomes available and the Project area is refined (e.g. preferred alternative access and transmission corridors). The study objective for 2012 is to develop a wetland map using existing habitat delineations, current aerial imagery, and field verification.

Riparian Study

Construction and operation of the Susitna-Watana Hydroelectric Project will alter the natural flow regime of the Susitna River. A thorough understanding of how project activities will affect riparian communities and hydrologic processes in the study area will be critical for developing best management practices, developing predictive models of potential changes in riparian ecosystems downstream of the proposed dam, assessing potential impacts to wildlife, and preparing environmental impact statements and FERC documentation.

This study will characterize and quantify riparian habitats and successional stages downstream from the dam site and will evaluate potential direct and indirect effects of Project operations on riparian habitats. This is a multi-year study that will begin in 2012 at locations where aerial imagery is currently available. Upon a complete assessment of the Project area, mitigation alternatives will be developed from the data to address adverse Project-induced impacts.

This study addresses the following issues:

- Losses of vegetation and wetland communities and productivity from reservoir inundation and the development of other Project facilities (direct effects).
- Changes to vegetation and wetland communities along access roads, transmission corridors, and reservoir edges due to alteration of solar radiation, temperature

moderation, erosion and dust deposition, reservoir fluctuation, pathogen dispersal and abundance.

- Potential changes in wetlands, wetland functions, riparian vegetation, and riparian succession patterns related to altered hydrologic regimes below the dam.

Wildlife Resources

Eagle and Raptor Nest Study

The Project may result in eagle nest site loss or alteration and disturbance due to increased human activity. Information on eagle and other raptor nest site locations will be necessary to develop avoidance and mitigation measures in compliance with the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and associated Executive Orders. Current nest site locations and nest activity in areas potentially affected by the Project, as well as areas that could potentially be disturbed during field study activities for other resources, will be obtained. This information will be used to develop avoidance areas for field study activities, and to estimate potential Project-related impacts.

The 2012 study will identify and compile existing nest site and habitat use information, develop survey areas, and complete multiple inventory and monitoring surveys for Bald and Golden eagles consistent with current guidelines. The 2012 study will identify potential Project-related impacts to eagles and raptors, identify critical data gaps, and develop 2013–2014 study plans in consultation with AEA, U.S. Fish and Wildlife Service (USFWS), and other licensing participants.

Inventory and monitoring methodologies will follow established aerial and ground-based protocols for eagle nest surveys, using appropriately trained observers and suitable survey platforms (helicopter, fixed-wing aircraft). Reporting of inventory and monitoring data will comply with the protocols and standards described in the Memorandum of Understanding between the FERC and the USFWS regarding implementation of Executive Order 13186. Although the primary study focus will be to evaluate the potential for the Project to affect eagles and eagle nests all nests of raptors and Common Ravens will be recorded during surveys. Recommendations for survey extent and methods will be developed in coordination with the USFWS before beginning surveys.

The data gathered in 2012 will form the basis of future studies to evaluate the potential impacts of the Project on Bald Eagles, Golden Eagles, and other raptors. Delineation and survey results of all suitable habitats within the Project area will identify occupied habitats and may be used in the future to evaluate occupied versus available habitats. Eagle nest sites and ground-based observations may be compared to determine pair territory size. Data on territory size can be used to determine whether raptors displaced from nest sites due to Project-related habitat loss, alteration, or disturbance maintain alternative nest sites within their territory that would be unaffected by the Project, or whether nesting pairs may be displaced into already occupied territories. Historical and current data may also be compared to evaluate trends in raptor populations and habitat use.

Past and Current Big Game Harvest Study

The Project would create an access road to the dam site, as well as a large water body that could be used for floatplane access to the region. These Project features, along with transmission line

corridor(s), have the potential to facilitate human access to the Project area and change the pattern of human harvest of big game, furbearers, small game mammals, and upland game birds.

This study addresses the following issues:

- Potential impact of changes in predator and prey abundance and distribution related to increased human activities and habitat changes resulting from Project development; and
- Potential impacts to wildlife from changes in hunting, vehicular use, noise, and other disturbances due to increased human presence resulting from Project development.

The objective of this study is to identify, acquire, and analyze available big game and furbearer harvest and population data from the Alaska Department of Fish and Game (ADF&G) for identification of past and current trends in hunter access modes, hunting locations, and harvest locations. Existing data from harvest reports will be compiled and reviewed for its adequacy to address Project-specific changes in human access. The analysis will also determine whether the watershed tributary-scale Uniform Coding Unit (UCU) data are adequate for detecting and predicting potential Project-related changes in total harvest and harvest locations due to potential changes in human access.

The wildlife data-gap analysis conducted for the Project identified the need for an updated drainage-specific compilation of subsistence, sport hunter, and trapper harvest data for all game animals and furbearers. Hunter access to this region has changed since the 1980s, but potential changes in patterns of harvest at this scale have not been evaluated or compared to movements of moose or caribou. Compilation of historic data could also be useful for identifying any potential trends in human access and harvest locations over the past decades and will provide input to ADF&G's management goals for big game and furbearers in the Project area.

Initial efforts will focus on compilation and analysis of hunter harvest and effort within harvest report units contained within the ADF&G harvest record database. Movement and aggregation patterns of game resources will be evaluated from available ADF&G telemetry databases (moose and caribou) or other available data maintained by ADF&G. The spatial resolution, adequacy, and completeness of the harvest data record for detecting potential changes in use of wildlife resources in the Project area will be evaluated. Collection of additional harvest data may be recommended if existing data are determined to be at an insufficient resolution to detect potential changes in harvest due to changes in human access. Additional information gathering may involve interviews with trappers, upon approval and in coordination with subsistence interviews that will be conducted in the affected communities in 2013–2014.

Wildlife Habitat Use and Movement Study

Construction and operation of the Project will result in wildlife habitat loss and alteration, blockage of movements of mammals, disturbance, and changes in human activity due to construction and operation of the Project from the proposed dam site, and along access and transmission line routes. The Project may result in loss of, or displacement from, seasonally used sensitive habitats in the middle and upper Susitna River basin, such as caribou calving areas, bear foraging habitats, and Dall sheep lambing areas and mineral licks. This study plan outlines the objectives and methods for characterizing and further defining critical data gaps based on existing Project area wildlife abundance, distribution, movements and sensitive habitat data in order to evaluate potential Project-related effects and inform subsequent studies developed under

the ILP. This study is the initiation of a multi-year data-synthesis effort beginning in 2012 and continuing in 2013–2014.

This study is broken into tasks by resource (species), each with specific objectives, study areas, methods, and analytical outputs. Information on the current use of critical moose and caribou calving areas, rutting areas, wintering areas, and migration or movement corridors; bear foraging and den habitats; Dall sheep lambing areas and mineral licks; and wolf den and rendezvous sites will be compiled from various sources and evaluated to determine the need for additional aerial surveys, ground-based monitoring, and/or the potential establishment of remote surveillance. This information will be used to develop 2013–2014 study plans.

Recreation and Aesthetic Resources

Aesthetic and Recreation Resources Study

Construction and operation of the Project may impact recreation resources by increasing activity, altering portions of the Susitna River and adjacent land, and/or restricting or increasing access. These impacts could result in changes in the nature of the recreation experience, changes in hunting or fishing opportunities, and/or changes in other recreation opportunities. Temporary recreation impacts could be generated by construction personnel, traffic, materials, staging areas, the worker camp, and noise. The Project is likely to also have positive recreation impacts. The proposed access roads and transmission line corridors, reservoir, and recreational facilities would provide new recreational opportunities to the public.

Construction and operation of the Project also may alter the character of aesthetic resources as a result of increased human activity, noise and development. Temporary visual and noise impacts would be generated by construction personnel, traffic, materials, staging areas, and worker camps. The dam and reservoir would become a new visual feature in the middle Susitna River basin. These structures could be viewed by various categories of persons, including Project personnel and support staff, recreationists, subsistence users, and individuals flying overhead. The Project could have positive visual impacts as a result of the access roads, reservoir, and recreational facilities providinge new recreational and viewing opportunities to the public.

The study objectives for the 2012 Recreation and Aesthetics Program focus on information gathering activities to identify relevant recreation and aesthetic resource information that will inform the formal study planning process and environmental and social effects analysis for Project construction and operation. Information will also be used to guide Project design and mitigation of construction, operation and maintenance activities to minimize impacts, and identify opportunities for design and siting refinements that maximize opportunity and access to recreation opportunities and/or important views. Coordination across social resources (i.e., cultural, subsistence, and socioeconomic) from the outset of information gathering is considered an essential component of the Aesthetics Program. Interdisciplinary coordination will focus on identifying location of sensitive aesthetic and/or recreational resources such as cultural properties, cultural vistas, and areas used by local outfitters (i.e., rafting, fishing, and hunting).

The 2012 work effort concentrates on data collection, and an evaluation of the comprehensiveness and applicability of existing data. An evaluation of further measures that may be required to collect appropriate data will also be provided for application in 2013/14. Both recreation and aesthetics resource areas include 2012 fieldwork, because early validation of recreation uses, trails, and viewpoints will be essential to other resource areas, and for gaining

trust and input from the public. All tasks are in support of and in preparation of a draft and final FERC license application.

Cultural Resources

Cultural Resources Study

Construction and operation of the Project may result in damage or loss of cultural resources from construction or increased human activity in upper Susitna River basin. Documentation of currently known cultural resources sites will help to inform the 2013-2014 studies and this information along with a plan for unanticipated cultural resource discoveries will be useful to prevent inadvertent disturbance from other field studies for the Project.

Construction and operation of the Project may impact sites of cultural significance along transportation and powerline alignments, as well as in the area to be inundated by the reservoir. It is important that these resources be inventoried and evaluated, so that the Project can identify protection, mitigation and enhancement measures as appropriate. It is expected that potential impacts to many cultural resources in the Project area can be mitigated either via removal (data recovery/ archaeological excavation), or minor changes to project alignments (avoidance).

The cultural resources study objectives are designed primarily to continue laying the foundation of information to enable the applicant and lead federal agency to meet the requirements of National Historic Preservation Act (NHPA) and its accompanying regulations (36 CFR 800). The major objectives for 2012 work are as follows:

- Create GIS database to help enable development of predictive models and management of cultural resources information for 2013-2014 studies;
- Develop predictive model, identifying areas of high, medium, and low potential for the occurrence of cultural resources;
- Continue to identify and document cultural resources within the Project study area, building upon work done between 1978-1985; and
- Prepare plans and procedures addressing unanticipated discoveries of cultural resources, human remains, and paleontological resources.

2. PROPOSED 2013 AND 2014 ILP STUDIES

AEA is proposing to perform 58 individual studies in eleven resource sections listed below. Each study description follows a standard study plan template to provide a consistent presentation across disciplines. The study descriptions include: fundamental discussions of existing information and why the study is necessary to augment existing information; a description of the objectives and scope of the study; and how the information could be used to inform the development of license conditions for the Project.

Implementation of the studies will commence soon after FERC's study plan determination. Each study description has information regarding the scheduling of the work efforts but in general each study will include:

- Preparatory Phase, January–March 2013 and 2014;
- Field Phase or Deployment Phase, spanning April – October (typically September) 2013 and 2014;
- Analysis Phase, June – November 2013 and 2014; and
- Reporting Phase, November and December, 2013 and 2014.

Upon FERC's approval of the final study plan, AEA will finalize a comprehensive schedule for all studies. Because the studies are interdisciplinary in nature, most have direct input or output needs from other resource studies. Each study plan provides a description of these interrelationships for specific information needs and requirements that will be obtained via other study efforts. The general relationships, key information flow patterns, and interdependencies among studies are shown in Figure 2-1 (Riverine-based Studies) and 2-2 (Upland-based Studies).

Some general concepts that apply to each study plan implementation effort include:

- The schedule for each proposed study is reasonably flexible to accommodate unforeseen problems that may affect schedule.
- Field crews may make reasonable modifications to a study in the field to accommodate actual field conditions and unforeseen problems. When modifications are made, AEA's contractor field crews will follow accepted protocols to the extent possible. When modifications are made, AEA will work to advise licensing participants of the change, particularly for any substantial modifications.
- When a number of alternative modifications are available to the field crew and with all other things being equal, the contractor field crew will chose the low-cost alternative.
- Implementation of many studies will require access to private property. AEA is in the process of obtaining permission from land owners for access. Specifically excluded from study areas are locations where access is unsafe (very steep terrain or high water flows) or private property for which AEA has not received specific approval from the landowner to enter the property to perform the study.

The following studies are described in the PSP, as listed below.

<u>Geology and Soils (Section 4)</u>

1. Geology and Soils Characterization Study (Section 4.5)

Water Resources (Section 5)

1. Baseline Water Quality Study (Section 5.5)
2. Water Quality Modeling Study (Section 5.6)
3. Groundwater-related Aquatic Habitat Study (Section 5.7)
4. Geomorphology Study (Section 5.8)
5. Fluvial Geomorphology Modeling below Watana Dam Study (Section 5.9)
6. Ice Processes in the Susitna River Study (Section 5.10)
7. Glacial and Runoff Changes Study (Section 5.11)
8. Mercury Assessment and Potential for Bioaccumulation Study (Section 5.12)

Instream Flow (Section 6)

1. Fish and Aquatics Instream Flow Study (Section 6.5)
2. Riparian Instream Flow Study (Section 6.6)

Fish and Aquatic Resources (Section 7)

1. Study of Fish Distribution and Abundance in the Upper Susitna River (Section 7.5)
2. Study of Fish Distribution and Abundance in the Middle and Lower Susitna River (Section 7.6)
3. Salmon Escapement Study (Section 7.7)
4. River Productivity Study (Section 7.8)
5. Characterization of Aquatic Habitats in the Susitna River with Potential to be Affected by the Susitna-Watana Project (Section 7.9)
6. The Future Watana Reservoir Fish Community and Risk of Entrainment Study (Section 7.10)
7. Study of Fish Passage at Watana Dam (Section 7.11)
8. Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries (Section 7.12)
9. Aquatic Resources Study within the Access Alignment, Transmission Alignment, and Construction Area (Section 7.13)
10. Genetic Baseline Study for Selected Fish Species (Section 7.14)
11. Analysis of Fish Harvest in and Downstream of the Susitna-Watana Hydroelectric Project Area (Section 7.15)
12. Eulachon Distribution and Abundance in the Susitna River Study (Section 7.16)
13. Cook Inlet Beluga Whale Study (Section 7.17)

Wildlife Resources (Section 8)

1. Study of Distribution, Abundance, Productivity, and Survival of Moose (Section 8.5)
2. Study of Distribution, Abundance, Movements, and Productivity of Caribou (Section 8.6)
3. Study of Distribution, Abundance, and Habitat Use of Dall's Sheep (Section 8.7)
4. Study of Distribution and Abundance, and Habitat Use by Large Carnivores (Section 8.8)
5. Study of Distribution and Abundance of Wolverines (Section 8.9)
6. Study of Terrestrial Furbearer Abundance and Habitat Use (Section 8.10)
7. Study of Aquatic Furbearer Abundance and Habitat Use (Section 8.11)
8. Study of Species Composition and Habitat Use of Small Mammals (Section 8.12)
9. Study of Distribution and Habitat Use of Little Brown Bat (Section 8.13)
10. Survey Study of Eagles and Other Raptors (Section 8.14)

11. Waterbird Migration, Breeding, and Habitat Study (Section 8.15)
12. Breeding Survey Study of Landbirds and Shorebirds (Section 8.16)
13. Study of Population Ecology of Willow Ptarmigan in Game Management Unit 13, Southcentral Alaska (Section 8.17)
14. Study of Distribution and Habitat Use of Wood Frogs (Section 8.18)
15. Evaluation of Wildlife Habitat Use Study (Section 8.19)
16. Wildlife Harvest Analysis Study (Section 8.20)

Botanical Resources (Section 9)

1. Vegetation and Wildlife Habitat Mapping Study (Section 9.5)
2. Riparian Study (Section 9.6)
3. Wetland Mapping Study (Section 9.7)
4. Rare Plant Study (Section 9.8)
5. Invasive Plant Study (Section 9.9)

Recreation and Aesthetic Resources (Section 10)

1. Recreation Resources Study (Section 10.5)
2. Recreation River Flow Study (Section 10.6)
3. Aesthetics Resources Study (Section 10.7)

Cultural and Paleontological Resources (Section 11)

1. Cultural Resources Study (Section 11.5)
2. Paleontological Resources Study (Section 11.6)

Subsistence Resources (Section 12)

1. Subsistence Baseline Documentation Study (Section 12.5)

Socioeconomic and Transportation Resources (Section 13)

1. Regional Economic Evaluation Study (Section 13.5)
2. Social Conditions and Public Goods and Services Study (Section 13.6)
3. Transportation Resources Study (Section 13.7)
4. Health Impact Assessment Study (Section 13.8)
5. Air Quality Study (Section 13.9)

Project Safety (Section 14)

1. Probable Maximum Flood Study (Section 14.5)
2. Site Specific Seismic Hazard Study (Section 14.6)

As noted in Section 1, interested parties have submitted a total of 52 formal study requests of which AEA is proposing to undertake all but one of these requested resource studies, with some alternations and adjustments. For the 51 study requests that align with studies AEA is proposing, AEA is not necessarily adopting each element or aspect of the proposed study request. Rather, AEA is incorporating many, if not most of the elements, with alterations or adjustments, or by providing similar approaches to the requested studies.

To the extent there are remaining differences between AEA's proposed studies and the study requests, AEA intends to discuss further with the interested parties during Final Study Plan development meetings.

The sections of this PSP where the 51 study requests align with studies AEA proposed studies are presented in Table 2-1. This table presents a listing of the individual study requests, identifies the study requestor(s), and identifies where in AEA's study plan the study topic is addressed.

2.1. Tables

Table 2-1. Summary of formal study requests filed with FERC.

Study Request Title	Requestor	Date filed with FERC	PSP Section Study Request is Addressed
Probable Maximum Flood	FERC	05-31-2012	Section 14 – Project Safety, 14.5
Geology and Soils Assessment	FERC	05-31-2012	Section 4 – Geology and Soils
Site-Specific Seismic Hazard Evaluation	FERC	05-31-2012	Section 14 – Project Safety, 14.6
Noise Assessment	FERC	05-31-2012	Section 10 – Recreation and Aesthetic Resources, 10.7
Recreational Boating and River Access Study	FERC	05-31-2012	Section 10 – Recreation and Aesthetic Resources, 10.5 and 10.6
Recreation Resources Study	FERC	05-31-2012	Section 10 – Recreation and Aesthetic Resources, 10.5
Study of Eagles and Other Raptors	USFWS	05-31-2012	Section 8 – Wildlife Resources, 8.14
Study of Waterbird Migration, Breeding, and Habitat	USFWS	05-31-2012	Section 8 – Wildlife Resources, 8.15
Study of Landbirds and Shorebirds	USFWS	05-31-2012	Section 8 – Wildlife Resources, 8.16
Piscivorous Wildlife and Mercury – Risk Assessment Study	USFWS	05-31-2012	Section 5 – Water Resources, 5.12
Vegetation and Wildlife Habitat Mapping Study	USFWS	05-31-2012	Section 9 – Botanical Resources, Section 9.5; Wildlife Resources, 8.19
Riparian Habitat Mapping Study	USFWS	05-31-2012	Section 9 – Botanical Resources, 9.6
Wetland Mapping and Functional Assessment Study	USFWS	05-31-2012	Section 9 – Botanical Resources, 9.7
Instream Flow for Floodplain and Riparian Vegetation Study	USFWS	05-31-2012	Section 6 – Instream Flow, 6.6
River Productivity Study	USFWS	05-31-2012	Section 7 – Fish and Aquatic Resources, 7.8
Fish Passage Study	USFWS	05-31-2012	Section 7 – Fish and Aquatic Resources, 7.11

Study Request Title	Requestor	Date filed with FERC	PSP Section Study Request is Addressed
Early Life History and Juvenile Fish Distribution and Abundance in the Susitna River	USFWS	05-31-2012	Section 7 – Fish and Aquatic Resources, 7.5, 7.6 and 7.7
Adult and Juvenile Non-Salmon Anadromous, Resident and Invasive Fish Studies in the Susitna River basin (RM0-233)	USFWS	05-31-2012	Section 7 – Fish and Aquatic Resources, 7.5 and 7.6
Adult Salmon Distribution, Abundance, Habitat Utilization and Escapement in the Susitna River	USFWS	05-31-2012	Section 7 – Fish and Aquatic Resources, 7.5
Susitna River Instream Flow and Habitat Utilization Study	USFWS	05-31-2012	Section 6 – Instream Flow, 6.5
Groundwater-Related Aquatic and Floodplain Habitat Study	USFWS	05-31-2012	Section 7 – Water Resources, 5.7
Water Quality Study	USFWS	05-31-2012	Section 5 – Water Resources, 5.5
Geomorphology Study	USFWS	05-31-2012	Section 5 – Water Resources, 5.8
Flow Routing Study	USFWS	05-31-2012	Section 5 – Water Resources, 5.6, 5.9, 5.10 and Section 6 Instream Flow, 6.5 and 6.6
Ice Processes in the Susitna River	USFWS	05-31-2012	Section 5 – Water Resources, 5.10
Project Effects Under Climate Change Condition Study	USFWS	05-31-2012	Section 5 – Water Resources, 5.11
Fish Passage Study	NOAA-NMFS	05-31-2012	Section 7 – Fish and Aquatic Resources, 7.11
Early Life History and Juvenile Fish Distribution and Abundance in the Susitna River Study	NOAA-NMFS	05-31-2012	Section 5 – Water Resources, 5.7 and Section 6 – Instream Flow, 6.6
Adult Salmon Distribution Abundance, Habitat Utilization and Escapement in the Susitna River	NOAA-NMFS	05-31-2012	Section 7 – Fish and Aquatic Resources, 7.5 and 7.6
Susitna River Instream Flow Study Request	NOAA-NMFS	05-31-2012	Section 6 – Instream Flow, 6.5
Susitna River Groundwater Study	NOAA-NMFS	05-31-2012	Section 5 – Water Resources, 5.7

Study Request Title	Requestor	Date filed with FERC	PSP Section Study Request is Addressed
Susitna River Water Quality Study	NOAA-NMFS	05-31-2012	Section 5 – Water Resources, 5.5
Susitna River Geomorphology Study Request	NOAA-NMFS	05-31-2012	Section 5 – Water Resources, 5.8
Susitna River Flow Routing Study Request	NOAA-NMFS	05-31-2012	Section 5 – Water Resources, 5.6, 5.9, 5.10 and Section 6 Instream Flow, 6.5 and 6.6
Susitna River Ice Processes Study Request	NOAA-NMFS	05-31-2012	Section 5 – Water Resources, 5.10
Susitna River project Effects Under Changing Climate Conditions Study Request	NOAA-NMFS	05-31-2012	Section 5 Water Resources, 5.11
Susitna-Watana Marine Mammal Study Request	NOAA-NMFS	05-31-2012	Section 7 – Aquatic Resources, 7.16 and 7.17
Recreation Resources Assessment	USDOI – NPS	05-24-2012	Section 10 – Recreation and Aesthetic Resources, 10.5
Aesthetic Resources, Assessment of Visual and Auditory Impacts	USDOI – NPS	05-24-2012	Section 10 – Recreation and Aesthetic Resources, 10.7
Adult Chinook and Coho Salmon Spawner Distribution and Abundance Studies	ADF&G	05-30-2012	Section 7 – Fish and Aquatic Resources, 7.5, 7.6, and 7.7
Fish Genetics	ADF&G	05-30-2012	Section 7 – Fish and Aquatic Resources, 7.14
Moose Browse survey in the Susitna-Watana Hydroelectric Project Area	ADF&G	05-30-2012	Section 8 – Wildlife Resources, 8.5
Instream Flow Study	ADF&G	05-30-2012	Section 6 – Instream Flow, 6.5
Evaluation of Surface Water and Ground Water Exchange	ADF&G	05-30-2012	Section 5 – Water Resources, 5.7
Request for Information or Study Effects of the Project and Related Activates on Hydrology for Anadromous Fish	Center for Water Advocacy	05-31-2012	Section 6 – Instream Flow, 6.5
Recreational Flow Study	American White Water	05-31-2012	Section 10 – Recreation and Aesthetic Resources, 10.6
Mineral Resources	Cook Inlet Region INC	05-31-2012	Section 4 – Geology and Soils

Study Request Title	Requestor	Date filed with FERC	PSP Section Study Request is Addressed
Assessment			
Temperature Impact on Aquatic Community	Natural Resources Defense Council	05-30-2012	Section 5 – Water Resources, 5.6; Section 6- Instream Flow, 6.5
Altered Flow, Turbidity and Sediment Transport	Natural Resources Defense Council	05-30-2012	Section 5 – Water Resources, 5.8
Salmon Viability Criteria	Natural Resources Defense Council	05-30-2012	Section 7 – Fish and Aquatic Resources, 7.7
National-Level Economic Valuation	Natural Heritage Institute	05-31-2012	Section 3 – Studies Not Proposed
National-Level Economic Valuation	American Whitewater	05-31-2012	Section 3 – Studies Not Proposed

2.2. Figures

Figure 2-1. Interrelationships amongst Riverine-based Studies.

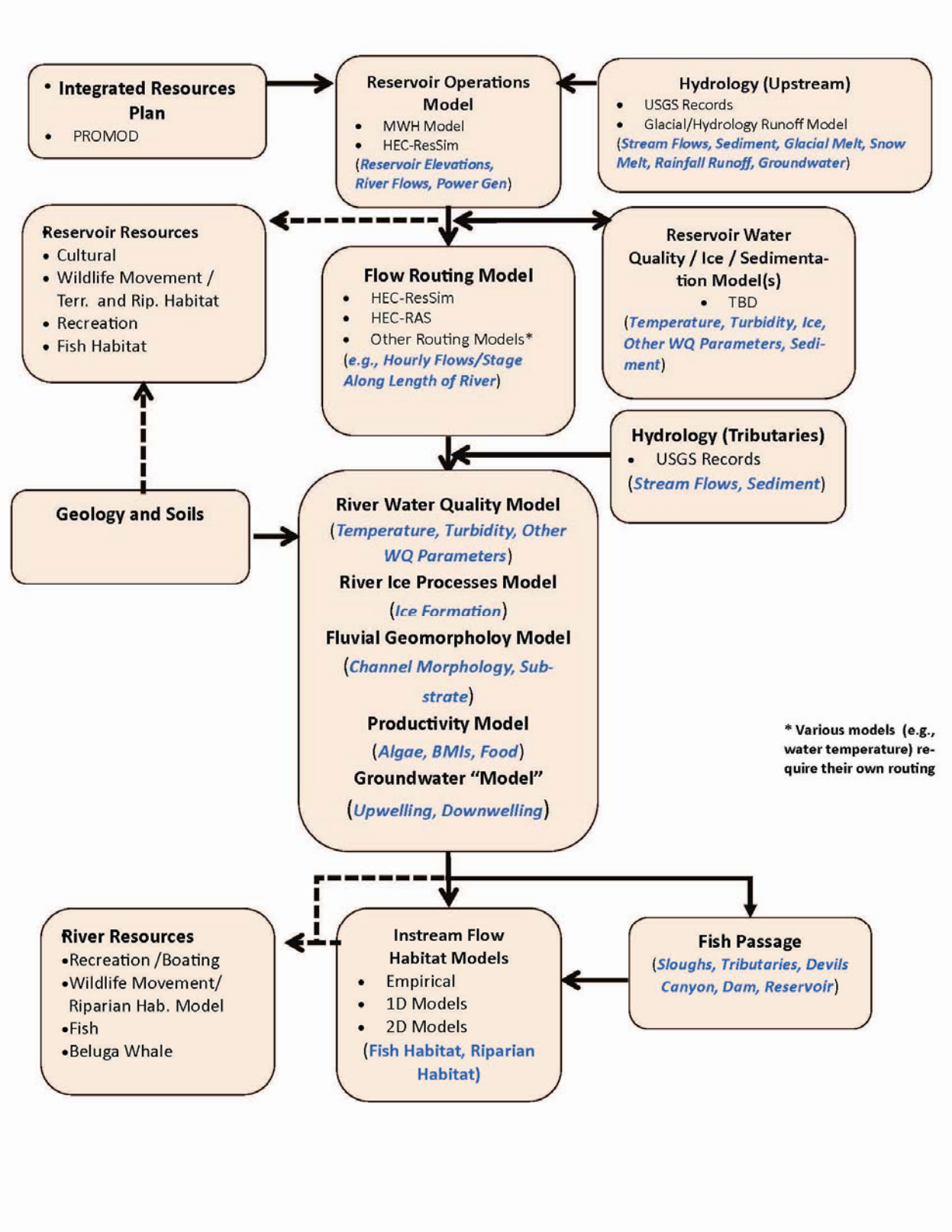
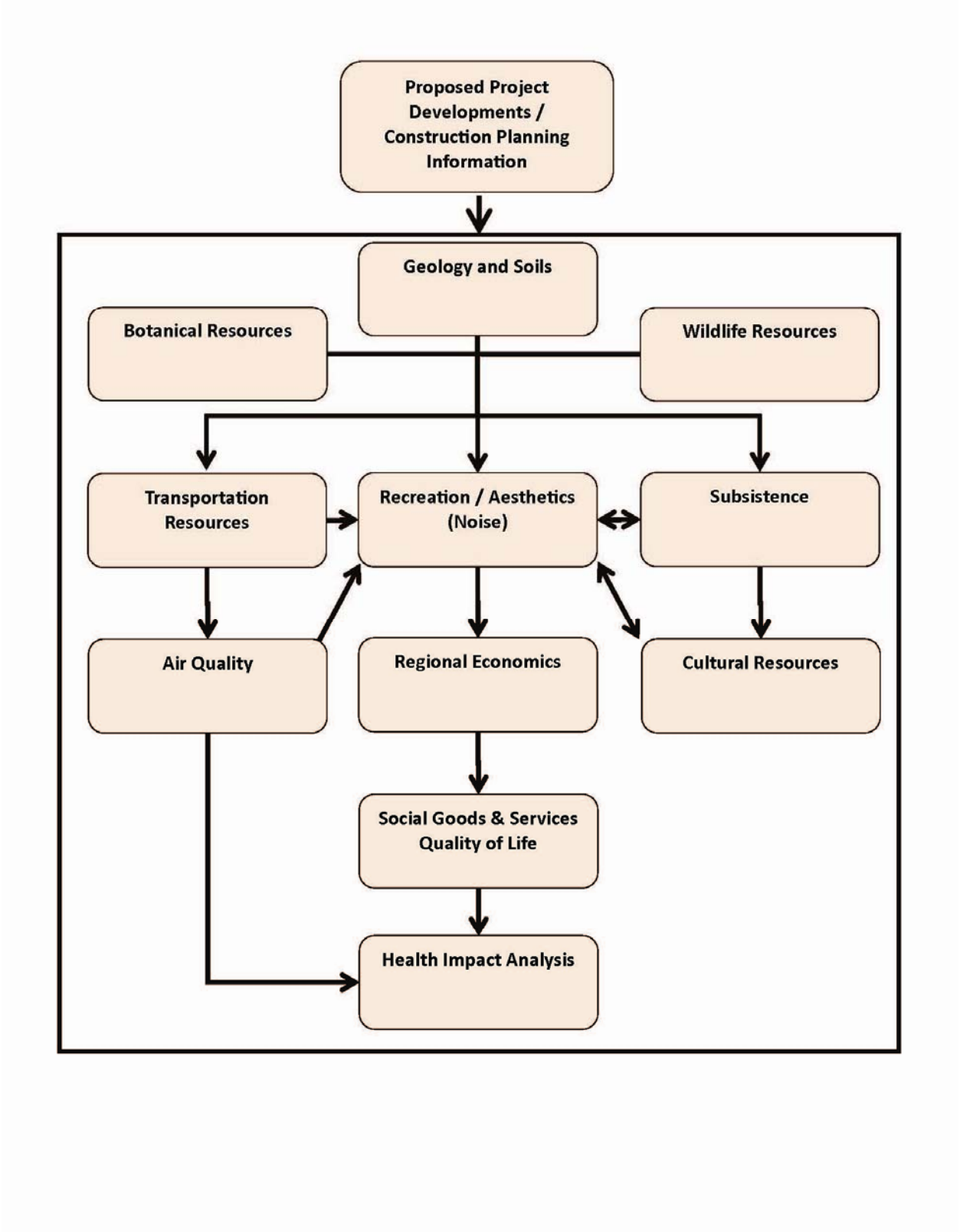


Figure 2-2. Interrelationships amongst Upland-based Studies.



3. STUDIES NOT PROPOSED

Under FERC ILP regulations, if an applicant does not adopt a requested study, the applicant must provide in its Proposed Study Plan an explanation of why the request was not adopted with reference to the criteria set forth in 18 CFR § 5.9(b). In total there were 52 study requests filed with FERC that followed the formal study request formats. As outlined in Section 2, AEA intends to perform studies relating to each of the study topics requested, except for one study request that is for a National-Level Economic Valuation Study proposed by the National Heritage Institute and American Whitewater. This section describes that study request and AEA's rationale for not adopting the study.

3.1. Requested Study Not Adopted in the PSP

3.1.1. Information Regarding Study Request

Both National Heritage Institute and American Whitewater requested the National-Level Economic Valuation Study. The following three subsections provide information directly from the study requests and these extracts are taken directly from those study requests, both filed May 31, 2012.

3.1.2. Requester's Description of Study Goals and Objectives

The National Heritage Institute and American Whitewater study objectives are stated as follows:

"*The study will identify and analyze the economic values associated with constructing and operating project compared to alternatives, including the no-action alternative, at the national scale. If it were to be licensed by the Federal Energy Regulatory Commission (FERC), the proposed 700-foot-high Susitna River dam, with an installed capacity of 600 MW, will significantly change the hydrograph of the Susitna watershed for 220 miles upstream from its mouth at Cook Inlet and transform an unregulated river into a regulated one. The construction of the project will preclude, limit, or otherwise change the existing uses of the river and other extant attributes of the river and its watershed that people value. The study will obtain information to ascertain the value of the change from the proposed project is more or less than the value of an undammed watershed the no-action alternative and in the public interest.*"

3.1.3. Relevant Resource Agency Management Goals

The National Heritage Institute and American Whitewater study relevant resource management goals are stated as follows:

"*The U.S. Fish and Wildlife Service and National Marine Fisheries Service have stewardship responsibilities for public-trust fish and wildlife resources in the basin.*

The resource management goal of the Fish and Wildlife Service is no net loss of fish and wildlife resources, to conserve the nation's existing fish and wildlife and their habitats in the Susitna River Basin, and to prescribe fishways pertaining to this project pursuant to Section 18 of the Federal Power Act.

National Marine Fisheries Service has jurisdiction over the nation's marine, estuarine and anadromous fishery resources, with the goal of maintaining native and natural aquatic communities for their intrinsic and ecological value and their benefits to people, including the authority to prescribe fishways pertaining to this project pursuant to Section 18 of the Federal Power Act.

The applicant should confer with resources agencies, tribes, nongovernmental organizations to develop this study."

3.1.4. Sponsor's Description of Existing Information and Need for Additional Information

The Natural Heritage Institute and American Whitewater study description of existing information and need for additional information is stated as follows:

"*The PAD (Section 4.12 "Socioeconomic Resources) contains no information relating to value of products and services that businesses, such as tourism and sport and commercial fisheries, extract from the existing ecosystem, which would be useful for designing the research instruments (e.g. surveys, focus groups) to ascertain the value that the broader American public (a statistically significant sample of the national population) places on the extant watershed in comparison to the changes to the watershed that would result from the proposed project.*

This information is necessary for the Commission to give equal consideration to non-power and power values."

3.1.5. AEA's Rationale for Not Adopting the Proposed Study in the PSP

Several organizations and individuals requested that the socioeconomic study plan address the economic value of environmental goods and services provided by the Susitna River system, including non-market benefits. In fact, the Social Conditions and Public Goods and Services Study as proposed by AEA includes analyses that will evaluate a number of the potential changes in the environmental goods and services derived from the river system and surrounding areas in dollar terms. That study will not, however, include a national level economic valuation study.

As described below, AEA's proposed analyses address both market (e.g. jobs, revenue) and non-market (e.g. recreation, aesthetics) values. However, economic (i.e., monetary) valuations of environmental goods and services are not required, nor may they be sufficient, in order for the positive value of the environmental assets of the Susitna River system to be given full and equal consideration in the licensing decision making process for the proposed Project.

As some commenters noted, there are significant challenges and obstacles to the quantification of environmental values of river systems in dollar terms. Consequently, the environmental review will incorporate a variety of qualitative and quantitative measures of impacts to the physical, biological, and socioeconomic environment. These multiple measures will be obtained through an array of biological, physical, socioeconomic, transportation, recreational, aesthetics, subsistence and cultural studies.

As demonstrated below, this approach does not preclude the monetization of some impacts to environmental goods and services. Rather, a combination of monetized and non-monetized measures offers the advantage of bringing a wide range of insights to the licensing decision. In

accordance with FERC guidelines and practice, the environmental review will focus on reasonably foreseeable significant impacts on the human environment; remote and highly speculative consequences will not be considered.

Data Collection and Analysis for Social Conditions and Public Goods and Services Study

The Social Conditions and Public Goods and Services Study proposed by AEA will use a variety of methods to derive estimates of the value of affected environmental goods and services, including goods and services that are not priced in conventional markets. Methods will be used to monetize the value of some goods and service, while the value of others will be expressed in qualitative terms.

The proposed Project would not start operations until 2023 under the current schedule. The Project is anticipated to operate for more than 50 years, similar to other large hydroelectric developments around the world. Given the long time frame for construction of the Project and its operations, the Project's socioeconomic effects will be estimated by comparing future socioeconomic conditions with and without the Project.

The forecast of socioeconomic conditions with and without the Project will be based in part on estimates derived from the REMI model described for the Regional Economic Analysis. While the REMI model provides a wide range of output variables, the variables of interest in the socioeconomic impact analysis for the proposed Project are population, employment, labor income, output (sales), and housing. The REMI model extends economic and demographic forecasts through 2060, which is consistent with the temporal scope of the socioeconomic impact analysis. The REMI model can provide projections for all of the boroughs and census areas within the Railbelt, including the MOA, FNSB, KPB, MSB, and Denali Borough. The current REMI model also includes the Yukon-Koyukuk Census Area and Valdez-Cordova Census Area.

The forecast analysis performed by the REMI model will be guided by assumptions about reasonably foreseeable future actions that would have an important and measurable effect on Alaska's economy. As the Project design becomes more developed, specific requirements for the types of construction specialties (e.g., firms with roller-compacted concrete experience) will be identified and compared with current expertise of regional construction companies to see which opportunities can be filled by Alaska firms. This evaluation would improve the model estimates of future economic activity, and provide recommendations to increase the percentage of these opportunities captured by Alaska businesses.

Here is a summary description of other AEA efforts pertinent to the planned socioeconomics study that will evaluate a number of the potential changes in the environmental goods and services derived from the river system and surrounding areas in dollar terms.

- The effect of potential immigration during Project construction and operations on municipal and state services, such as police, fire protection, medical facilities and schools, will be assessed. If projected immigration would potentially burden existing municipal and state services, proposed plans to alleviate this impact will be identified.
- A fiscal impact analysis will be conducted to evaluate incremental local government expenditures in relation to incremental local government revenues that would result from construction and operation of the Project. Incremental expenditures include, but are not limited to, school operating costs, road maintenance and repair, public safety, and public

utility costs. Incremental revenues include, but are not limited to, property taxes and hotel/motel occupancy taxes.

- Transportation of construction equipment and materials through communities on the transportation routes to and from the Project could result in increased traffic volumes, and associated noise and congestion effects. Such conditions might require additional police and emergency response calls for traffic accidents and other incidents. These impacts will be assessed based on the results of the Transportation Resources Study.

- Utilizing the results of the Recreation and Aesthetics Study (Section 10), AEA will analyze the economic impact of the Project on local tourism establishments (e.g., river sport fishing, whitewater boating) and the regional economy will be estimated. 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. Utilizing the results of the Subsistence Study (Section 12), the regional economic impact of changes in subsistence-related expenditures due to the proposed Project will be estimated. The approximate cash expenses to generate each pound of subsistence harvest will be based on information in Goldsmith (1998). Changes in spending for recreational or subsistence related goods and services will become inputs to the REMI model to calculate regional economic impacts.

- The Project, including access roads, could affect surrounding property uses and values. These effects will be described identifying the properties that are on, or in close proximity to the Project area, including the access road(s) that will be built; determining the degree to which the use of the properties would change as a result of the Project; and estimating the extent that properties' values will change as a result of the change in use.

- If Project features (i.e., reservoir and access roads) stimulate residential location, spending by new residents in the local economy will generate new economic activity, including additional jobs and labor income. Interviews will be conducted with regional businesses to identify potential opportunities for residential development and estimate the economic impacts should this development occur.

  To the extent that Project construction and operations will change the level of production of commercial farming, grazing, logging, mining, and fishing operations, these effects will be approximated by the change in production multiplied by the market price of the resource in question. Information on the quantity and value of market-based natural resources is available through state and federal resource management agencies. Changes that result in increases or decreases in commercial resource extraction will become inputs to the REMI model to calculate regional economic impacts.

- AEA will utilize the travel cost method or random utility model to estimate changes in recreational use values associated with sport fishing, sport hunting, boating, wildlife viewing, hiking, and camping in the study area. 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 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. 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). For example, an extensive number of previously conducted studies estimated the value of sport fishing in various regions of Alaska. Similarly, several existing reports estimated the value of Alaska wildlife.

- The value of changes in subsistence activities in the study area will be estimated by applying a wage compensating differential model that examines tradeoffs between time spent on subsistence and cash employment (Duffield 1997). The advantage of latter method is that it captures the cultural and social value of participating in subsistence activities as well as the product value. It requires community-specific per capita income levels and subsistence harvest per capita data, both of which will be obtained from the subsistence survey conducted for the Subsistence study.

  Following the methodology of Braund and Lonner (1982), information on the values, attitudes, and lifestyle preferences of residents in the Talkeetna, Trapper Creek, and Cantwell areas will be collected through informal interviews with community residents, Matanuska-Susitna Borough officials, and other knowledgeable people. Interview questions will be oriented toward identifying how the Susitna River corridor and upper basin is used and valued by local residents to identify the importance of the various bio-physical aspects important to area residents. Once the types of Project-induced changes in riverine and basin resources are known, a further analysis will be undertaken to identify how such changes might alter the resources used and valued by area residents. The results of the project effects on subsistence, recreation and transportation can be used to further evaluate the overall effects on the residents of the region.

Proposed National-Level Economic Valuation

By contrast, the American Whitewater Association (AWA) requests[1] that AEA conduct a "National-Level Economic Valuation" study in order to "identify and analyze the economic values associated with constructing and operating project compared to alternatives, including the no-action alternative, at the national scale" [sic].[2] We disagree. AEA's proposed Social Conditions and Public Goods and Services Study is more than adequate and, as set out above, more closely tracks FERC's study request standards in 18 CFR § 5.9.

AWA reasons that "[t]he requirement of the Federal Power Act (FPA) that FERC give equal consideration to non-power values affirms the Commission's duty to evaluate the trade-offs that would be involved in authorizing" the Project.[3] AWA further argues that, "[t]o ensure a reliable comparison of all relevant values, the Commission should use economic valuation as a means of

[1] AWA's proposal is supported by other advocacy groups, including the National Heritage Institute, Trout Unlimited (Alaska), the Coalition for Susitna Dam Alternatives, and the Alaska Center for the Environment.

[2] *Comments of American Whitewater on the PAD, Scoping Document 1, and Study Requests*, at 7 Docket No. P-14241-000 (filed May 31, 2012) (AWA Comments).

[3] *Id.* at 8.

evaluating the trade-offs involved in the licensing action; an assessment of benefits and costs should be part of the information-set available to FERC in deciding among alternatives."[4]

The Commission should reject this request. FERC has consistently found that the monetization of non-market goods and services is inadequate in the context of assessing non-power values under Sections 4(e) and 10(a)(1) of the FPA. As explained by the Commission in *Great Northern Paper, Inc.*[5] and *City of Tacoma, Washington*:[6]

> The public-interest balancing of environmental and economic impacts cannot be done with mathematical precision, nor do we think our statutory obligation to weigh and balance all public interest considerations is served by trying to reduce it to a mere mathematical exercise. Where the dollar cost of enhancement measures, such as diminished power production, can be reasonably ascertained, we will do so. However, for non-power resources such as aquatic habitat, fish and wildlife, recreation, and cultural and aesthetic values, to name just a few, the public interest cannot be evaluated adequately only by dollars and cents.[7]
>
> . . . . . .
>
> In the context of public interest balancing for long-term authorizations, it is inappropriate to rely too heavily on the accuracy of current dollar estimates of nonpower resource values, calculated using any number of reasonably disputable assumptions and methods.[8]

Specifically, AWA's request fails to meet the Commission's requirements for requesting additional information gathering and study requests under FERC's Integrated License Application Process. 18 C.F.R. 5.9(b)(6) requires that any information gathering or study requests be "consistent with generally accepted practice[s] in the scientific community . . . ." Economic valuation of nondevelopmental values, however, while obviously having some support, is not generally accepted within the scientific community.[9] Further, AWA has not

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[4] *Id.*

[5] 85 FERC ¶ 61,316 (1998), *reconsideration denied*, 86 FERC ¶ 61,184 (1999*), aff'd*, *Conservation Law Foundation v. FERC*, 216 F.3d 41 (D.C. Cir. 2000) (nothing in the FPA requires the Commission to place a dollar value on nonpower benefits; nor does the fact that the Commission assigned dollar figures to the licensee's economic costs require it to do the same for nonpower benefits.). *See also*, *Namekegon Hydro Co.*, 12 FPC 203, 206 (1953), *aff'd*, *Namekegon Hydro Co. v. FPC*, 216 F.2d 509 (7th Cir. 1954) (when unique recreational or other environmental values are present such as here, the public interest cannot be evaluated adequately only by dollars and cents); and *Eugene Water & Electric Board*, 81 FERC ¶ 61,270 (1997), *aff'd*, *American Rivers v. FERC*, 187 F.3d 1007 (9th Cir. 1999) (rejecting request for economic valuation of environmental resources that were the subject of 10(j) recommendations).

[6] 84 FERC ¶ 61,107 (1998), *order on reh'g*, 86 FERC ¶ 61,311 (1999), *City of Tacoma v. FERC*, 460 F.3d 53 (D.C. Cir. 2006).

[7] 85 FERC at p. 62,244-245.

[8] 84 FERC at pp. 61,571-72.

[9] *See, e.g.,* Steven Shavell, CONTINGENT VALUATION: A Critical Assessment at 372 (1993). "Contingent valuation should not now be used to attempt to measure nonuse values of natural resources, either in public decision

demonstrated why a national economic valuation study is necessary under 18 CFR 5.9(a) (7)[10] to augment or supplant FERC's NEPA evaluation of the Project's impacts on aesthetics, cultural, and socioeconomic resources, among others.[11] AWA argues that FERC's proposal is inadequate because it will only assess the regional, as opposed to the national impacts of the Project. On this point, we strongly disagree. FERC's inquiry under the FPA focuses on the waterway as a starting point and extends to reasonably connected interests in a manner consistent with the revised plan for the Social Conditions and Public Goods and Services Study. There is simply no evidence that public-interest balancing of environmental and economic impacts requires a national perspective to weigh and balance all public interest considerations consistent with FERC's statutory obligations under FPA.

Finally, the AWA proposal does not meet the 18 CFR 5.9 standards (6) and (7) respectively by failing to describe the methodology to implement their proposal[12] and by ignoring the requirement to describe either the level of effort and cost, as applicable, of the proposed AWA study[13] and not addressing how or why the proposed Social Conditions and Public Goods and Services Study would not be sufficient to meet the stated information needs.[14] It is well settled that contingent value surveys are expensive, subject to bias[15] and even "[s]tudies conducted in controlled experimental settings suggest that …contingent valuation…methods may overestimate values[16] producing "implausible" results[17] that fail by trying to reduce FERC's public interest test to a mere mathematical exercise. The proposed National-Level Economic Valuation study should not be adopted.

making or in liability assessment. In these contexts, society is likely to be better off not seeking to estimate nonuse values with contingent valuation because of the serious problems that this would engender."

[10] 18 CFR 5.9(a)(7) provides that "[a]ny information or study request must . . . [d]escribe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs."

[11] *See Scoping Document 1 for Susitna-Watana Hydroelectric Project,* Docket No P-14241-000 at §§ 4.2.7-9 (filed Feb.2 2012).

[12] AWA Comments at 9 "We describe the necessary elements of the study . . . but do not explain how the study would be designed and implemented."

[13] AWA states only that "the level of effort is significant, as the study will likely require focus groups and survey instruments." AWA Comments at 11. American Whitewater ignores cost projections entirely.

[14] AWA does not address the revised plan for the Social Conditions and Public Goods and Services Study, but only generally states that a regional study is not appropriate for the project.

[15] Peter A. Diamond, and Jerry A. Hausman, *Contingent Valuation: Is Some Number Better than No Number?,* Journal of Economic Perspectives, Volume 8, Number 4, Fall 1994, pp 45-64 at 45,46.

[16] National Research Council, Committee on Assessing and Valuing Aquatic and Related Terrestrial Ecosystems, *Valuing Ecosystem Services: Toward Better Environmental Decision-Making*, 2004, at 122.

[17] Kenneth Arrow et alia, *Report of the NOAA Panel on Contingent Valuation*, 1993 at 12, 13.