INSTREAM FLOW PLANNING STUDY – DRAFT FINAL

INTRODUCTION

The Alaska Energy Authority (AEA) is preparing a License Application that will be submitted to the Federal Energy Regulatory Commission (FERC) for the Susitna-Watana Hydroelectric Project (Project) using the Integrated Licensing Process (ILP). The Project is located on the Susitna River, an approximately 300 mile long river in the Southcentral region of Alaska. The proposed Project would be located on the Susitna River at RM 184, which is roughly 90 river miles northeast of the community of Talkeetna. As currently envisioned, the Project would include a large dam with a 20,000-acre (ac), 39-mi long reservoir. The type and height of dam construction are still being evaluated as part of on-going 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 studies mentioned above, a nominal crest elevation up to El. 2,125 ft msl may be proposed in the license application, corresponding to a maximum dam height of up to 800 ft above the foundation. Preliminary studies have indicated the surface powerhouse should have three generating units and have a nominal installed capacity of 600 megawatts (MW). However, optimization studies are ongoing and the capacity of the Project eventually proposed for licensing could extend up to 800 MW.

Project construction and operation, as described in the Pre-application Document (PAD, AEA 2011), would have a substantial regulatory effect on the flows downstream of the dam, the degree of which will ultimately depend on its' final design and operating characteristics. With a proposed elevation of 700 ft resulting in the creation of a 39 mi. long reservoir (20,000 acre) and a nominal generating capacity of 600 MW (PAD AEA 2011), the project would be capable of dramatically changing the timing and magnitude of flows in the river below the powerhouse. The alteration in the timing and magnitude of flows in a river can influence many downstream resources/processes, including fish and aquatic biota and their habitats, channel form and function including sediment transport, water quality, ice dynamics and riparian and wildlife communities, all of which have been alluded to in the PAD (AEA 2011).

This study plan outlines the objectives and methods for characterizing the 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.

STUDY OBJECTIVES

A comprehensive instream flow study plan (2013-2014 SWIFS Plan) will be developed during 2012 as part of the Project licensing process. The 2013-2014 SWIFS studies 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:

- Synthesize the 1980s instream flow study information and evaluate the applicability of the studies to the current Project;
- Identify appropriate species/life stages, study reaches, study sites, and instream flow modeling methods for the 2013-2014 Instream Flow Study;
- Conduct a site reconnaissance survey with agencies and stakeholders during which preliminary study sites and potential transect locations will be identified, and analytical methods discussed;
- Commence collection of Habitat Suitability Criteria data at selected locations of the Susitna River;
- Coordinate instream flow study data needs across resource disciplines and studies; and
- Assist AEA in the development of the 2013-2014 Instream Flow Study Plan.

STUDY AREA

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).

EXISTING INFORMATION

Existing information was compiled and reviewed in the Aquatic Resources Data Gap Analysis (ARDGA) prepared by HDR (2011) and the PAD (AEA 2011). Information for the study area includes, but is not limited to, recent and historic aerial photography; fish distribution and relative abundance from recent and early 1980s studies; and data from the 1980s instream flow studies. Some key instream flow documents include the Instream Flow Relationships Report (Trihey & Associates and Entrix 1985a and b) and its associated four volume Technical Report Series; the Aquatic Habitat and Instream Flow Reports by ADF&G in 1983 and 1984 (ADF&G 1984), Photo Documentation of the Response of Aquatic Habitat Surface Areas to Mainstem Discharge 2 volumes (Trihey & Associates 1985; R&M and Trihey & Associates 1985), and various ADF&G 1983 and 1984 Resident and Juvenile Anadromous Fish Studies. The ARDGA (HDR 2011) lists and discusses the existing information related to the following instream flow components:

- Study methods
- Baseline or reference conditions
- Geographic extent of study
- Major channel/habitat types
- Selected evaluation species/lifestages
- Species/lifestage longitudinal distribution and utilization of major channel/habitat types
- Seasonal timing of utilization of evaluation species/lifestages

- Habitat suitability criteria for evaluation species/lifestages
- Macrohabitat variables affected by flow alterations
- Hydrologic record for with-project and without-project.

METHODS AND ANALYSIS

The 2012 study has been organized into the following 10 sub-tasks.

- Sub-task 1: Review of 1980s Instream Flow Study Documents
- Sub-task 2: Preliminary Identification of Target Species, Life Stages and/or Guilds
- Sub-task 3: Preliminary Determination of Species Periodicity
- Sub-task 4: Compilation and Review of Habitat Utilization Data by Life Stage/Guild
- Sub-task 5: Identification of Physical Habitat Processes
- Sub-task 6: River Stratification and Study Site Selection
- Sub-task 7: Review of Existing Habitat Suitability Curve (HSC) Data/Initiate Collection of New Data
- Sub-task 8: Review and Selection of Habitat Modeling Methods/Components
- Sub-task 9: Assist in Assessment of Temperature Modeling
- Sub-task 10: Develop 2013-2014 Study Plan

These sub-tasks are described further below. A schedule for completion of the 2012 study is provided at the end.

Sub-task 1: 1980s Instream Flow Study Documents

This subtask will focus on the identification, compilation and review of all of the key 1980s instream flow study documents. Information generated during the 1980s studies included topics such as current and historic channel morphology, water quality, fish distribution and abundance, fish species life history, habitat availability and use, and species and life stage specific instream flow needs assessments. Although much of the information related to these topics has been identified and collected as part of the Aquatic Resource Data Gap Analysis, a thorough search of the Alaska Library Information Service (ARLIS) system will be completed to ensure that all available information has been reviewed. A systematic search of the ARLIS database will include searches on key word, subject, author, and date. Both electronic (scanned) and hard copies of all relevant documents will be obtained from ARLIS and included in a Microsoft Access database. Each document collected will be cataloged, summarized, and assessed for its project relevance. This will include documents prepared by ADFG, consultants working on the project at the time, and all FERC related documents.

Sub-task 2: Preliminary Identification of Target Species, Life stages and/or Guilds

The Susitna River supports numerous fish species including all five species of Pacific salmon. Each of these species exhibits their own unique life history strategies and timing. Utilizing reports and information reviewed from the 1980s reports, a preliminary list of priority fish

species and life stages will be generated. Considerable information also exists on habitat needs and life stage timing (periodicity) for most of the affected species. This information will allow for the grouping individual species and life stages into habitat guilds based on similar habitat needs. Each habitat guild can then be treated as a "super species" for which data collection and analysis of instream flow needs can focus. This will allow the option of moving away from a species specific analysis to an aquatic community analysis. A draft species and life stage specific periodicity table will be developed that presents the timing of specific life history stages (i.e., spawning, incubation, rearing, holding, and migration) for each of the three assessment reaches. This information will be reviewed and continuously updated with new information.

Subsequent to completion of the review, a preliminary selection list of and rationale for target species/life stages/guilds will be developed by river segment. The rationale will also discuss species that were not identified as target species and how they will be considered in the instream flow studies. The process and rationale for developing the preliminary list of target species will be described in a joint Technical Memorandum (to include Species Periodicity– Sub-task 3) that will be circulated for agency and stakeholder review.

Sub-Task 3: Preliminary Determination of Species Periodicity

This work will be coordinated with the 2012 Synthesis of Existing Fish Population Data Study F-S1 and will focus on obtaining fish timing and distribution information from the 1980s studies and from recent ADF&G studies. Based on this review, a target species/life stage periodicity will be developed for each river segment. The review will identify and list any important data gaps in the periodicity information. The preliminary species periodicity information will be described in a joint Technical Memorandum (to include Target Species – Subtask 2) that will be circulated for agency and stakeholder review. It is anticipated the species periodicity information will be continuously updated based on new information collection during 2013-2014.

Sub-task 4: Compilation and Review of Habitat Utilization Data by Life stage/Guild

This sub-task will involve the review and synthesis of the macro-, meso-, and micro-scale habitat utilization data collected (by species/life stage) as part of the 1980s studies. The relative proportions of species/life stages that utilized macrohabitat types such as turbid/clear water; mesohabitat types such as riverine habitat types (main channel, side channel, sloughs, tributary mouths, tributaries) or runs, pools, riffles; and microhabitat habitat utilization data (depth, velocity, substrate, upwelling, cover) including observed passage requirements into habitats (e.g., water depth) will be identified and compiled.

This information will be compared/contrasted with current state of knowledge regarding habitat utilization in similar river systems in Alaska. This will include but not be limited to recent studies that have identified spawning habitats (turbidity, upwelling, etc.) and rearing habitats for target species/life stages (e.g., Eiler et al. 1992; Yanusz et al. 2007; Anderson and Bromaghin 2009; Burril et al. 2010; Merizon 2010; Yanusz et al. 2010).

This work will be coordinated with the 2012 Middle River Habitat Utilization Study (F-S3) to ensure that the study methods and results provide appropriate habitat utilization data for the instream flow study. This will include training and necessary field oversight of the habitat utilization study crews to provide for proper collection of utilization data. This work will focus on adult holding and spawning locations in the middle river.

Sub-Task 5: Identification of Physical Habitat Processes

Based on the review of physical habitat processes identified during the 1980s studies of the Susitna River, areas exhibiting special physical habitat characteristics or processes will be identified and a GIS layer prepared noting locations. These areas will include but not be limited to areas of groundwater upwelling, clear water-turbid water interfaces, notable spawning and rearing areas, and substrate areas as they relate to potential spawning areas. The location of these areas will be shared with the F-S5 study crew so they can be included for consideration of sampling. The identification and assessment of downwelling areas will require review of contemporary literature and discussions with the resource agencies for development of methodologies. Results of the Reservoir and River Flow Routing Model Transect Data Collection Study (WR-S1) may be used to detect macro-scale losses in river flow indicating potential downwelling areas. Identifying the impact of ice formation and water temperature with respect to migration, holding, spawning, incubation and rearing habitats will rely on results from other study components.

Sub-Task 6: River Stratification and Study Site Selection

As part of the 1980s study, the portion of the Susitna River from the proposed Watana Dam site to the confluence with Cook Inlet was divided into segments, sub-reaches, and study sites based on hydrology, channel morphology, tributary input, macro and meso habitat features, and fish use. This task will review and synthesize the scheme and rationale used, and verify the validity of that segmentation under current channel conditions.

This will require coordination with G-S2 and F-S3 teams, and therefore, one team member from F-S5 will work consistently with the G-S2 and F-S3 contractor to provide oversight and input when defining macro and meso habitat types, defining locations of potential fish use (e.g., upwelling, clearwater, off-channel rearing, spawning) and trapping/stranding areas. This coordination will ensure that the geomorphic channel type mapping is at a scale that can be used to stratify the Susitna River into segments/reaches for the SWIFS, and that the digitizing of riverine habitat types is conducted over a suitable range of flows, in the proper river reaches, and at a suitable level of quality that it can be used for assisting in the development of habitat versus flow relationships in the instream flow study. This task will also review the proposed channel change analysis (historic imagery versus current imagery) to ensure it is completed at a scale applicable to the instream flow study's need to assess channel dynamic equilibrium/stability assumptions and the stability of important 1980s study sites.

Although preliminary segments/sites can be identified from existing information and photography, field visits will be necessary and therefore this task will include a 5-day field reconnaissance effort with the agencies to review and finalize the stratification scheme, identify candidate study sites and study segments, and assess potential modeling approaches. Given the length of river, consideration should also be given to developing an approach that will allow extrapolation of results from measured sub-reaches to unmeasured areas. Cluster analysis may be used to group the sub-reaches into homogenous strata which would guide site selection.

Results of this sub-task will be presented in a Technical Memorandum that presents a preliminary approach(s) to (1) segment/reach scale river stratification, (2) sub-reach habitat stratification, (3) study site selection, and (4) expansion of instream flow study site results to river segments and the Project area. This TM will be presented to the Working Group for review and comment.

Sub-Task 7: Habitat Suitability Criteria for Evaluation - Species/Life stages

Determining the macro, meso, and micro habitats used by specific species and life history stages is critical to defining and quantifying the Project-induced changes to aquatic resources of the Susitna River. One of the major components in completion of the SWIFS study is the selection and use of species and life stage Habitat Suitability Criteria (HSC) curves. HSC curves reflect the species and life stage specific use of micro habitat parameters (depth, velocity, substrate, cover) (Bovee 1986). The initial determination of macro, meso, and micro habitats used by the fish species in the Susitna River will rely heavily on information obtained as part of the 1980s assessments, in particular, the Instream Flow Relationships Report (Trihey & Associates and Entrix 1985 a and b) and a four volume series on the aquatic habitat and instream flow assessment produced by ADF&G (1984). This information will be synthesized and compared to findings of other studies and data gaps will be identified. Comparisons will be made to an available set of library based Habitat Suitability Criteria (HSC) curve sets including a data set of over 1,300 recently obtained field microhabitat observations for most of the same species found in the Susitna. Study gaps will be identified and plans to fill the gaps integrated into the 2013-2014 SWIFS plan.

Although several different methodologies (curve enveloping, habitat guilds, bootstrapping, roundtable/expert opinion, statistical approaches, and site-specific curves) may eventually be used in the development of HSC curves, in addition to the review of existing data, the 2012 effort will include a focused field effort to collect data to 1) confirm or validate the 1980s HSC curves, and 2) test the use of new/previously unused sampling techniques. The 2012 field work will initially encompass several different sampling periods depending on species periodicities. Field efforts will focus on mainstem, side channel, and slough habitat areas. The 2012 HSC curve field effort will focus primarily on collecting field measurement of micro habitat use to validate or verify the HSC curves develop as part of the 1980' study of the Susitna River (EWTA 1985). A summary of the species and life stages, macro-habitat types, potential sampling techniques, and proposed sampling timing for this effort are presented in Table 1.

Specific objectives of the 2012 field effort will be to:

- Survey and measure microhabitat utilization data for selected target fish species and life stages;
- Confirm, validate, and or develop HSC curves for use in developing the habitat versus flow relationships for the Susitna River;
- Delineate and describe different habitat types and parameters utilized by the different species and life stages;
- Recommend additional/new data collection to be completed during the 2013/2014 field season.

Components of the 2012 HSC curve development study will include selection of field data collection sites, determination of survey dates, and field data collection. The target fish species for this effort will include:

- Sockeye salmon (Oncorhynchus nerka)
- Chinook salmon (O. tshawytscha)
- Coho salmon (O. kisutch)
- Pink salmon (O. gorbuscha)
- Chum salmon (O. keta)
- Rainbow trout (O. mykiss)
- Grayling (Thymallus arcticus)
- Dolly Varden (Salvelinus malma), and
- Round whitefish (Prosopium cylindraceum).

However, not all of these species are readily observable (given flow characteristics) or sufficiently abundant to allow collection of site-specific data. Therefore, while the derivation of HSC curves for some of the target species will likely be based on site specific data, HSC curves for others may be based on a combination of methods.

Both spawning and juvenile rearing surveys were conducted during the 1980s studies. The selection of study sites for the 2012 surveys will be based on several factors concluded from the 1980 studies including:

- Distribution of most highly utilized macro habitat types (main channel, slough, side channel, tributary mouth) by species and life stage
- Longitudinal location – spatial representation;
- Proximity of areas sampled to proposed flow routing and instream flow transects;
- Linkages with other 2012 fish studies;
- Flow conditions/visibility; and
- Accessibility and safe sampling conditions.

As reported by ADF&G (1983) few salmon, primarily chum salmon, spawn in the mainstem river or side channels. Tributaries provide the primary spawning habitat for Chinook and coho salmon, whereas sloughs and tributary mouths provide the principle spawning habitat for chum, pink, and sockeye salmon. Table 1 provides a summary of the specific macro habitat types that will be targeted for sampling during the 2012 HSC curve surveys.

Based on a preliminary review of the 1980s study reports, HSC field surveys are proposed for the following range of dates:

- Spawning and Juvenile rearing surveys
    - July 15-21, 2012
    - August 12-18, 2012
    - September 9-15, 2012

These dates are based on a generalized periodicity chart that depicts the timing of habitat use of anadromous salmonid species for different life stages within the Susitna River as reported in the Susitna Hydro Aquatic Studies Phase II Report (ADF&G 1983). Final survey dates will be made based on agency discussions and in coordination with the Fisheries Program Lead.

The timing and location of spawning surveys will be based in part on the periodicity data presented in Table 1 as well as information obtained during aerial (helicopter) spawner escapement surveys conducted by LGL in 2012. Active spawning locations will be identified during helicopter surveys conducted during the open water period. This information will be used to identify areas with the highest concentration of spawning activity for the four main salmon species (sockeye, coho, Chinook, pink, and chum salmon). Redd surveys will be conducted as part of a larger fisheries program surveys to identify macro habitat use and timing of spawning activities in the Susitna River basin. Active spawning locations will be identified during pedestrian and helicopter surveys of the river completed as part of the fisheries program spawner surveys. For the HSC curve surveys, individual spawning redds will be identified during pedestrian surveys of the sample sites identified in Table 1. All surveys will be conducted by walking the stream channel or slough in an upstream direction and identifying the location of newly constructed redds or actively spawning fish. For each identified redd, the following measurements will be made:

- Location of sample area on high resolution aerial photographs and/or GPS location for individual or groups of measurements.
- Species of fish occupying the redd or responsible for construction
- Redd dimensions (length and width in feet to nearest 0.1 ft)
- Water depth at upstream end of the redd (nearest 0.1 ft) using a top setting rod

- Mean water column velocity (feet per second to nearest 0.05 ft/sec) measured using a Swoffer Model 2100 or Marsh McBirney FlowMate 2000 current meter

- Substrate size (dominant, sub-dominant, and percent dominant) characterized in accordance with the size classifications described in WDFW (2008).

Juvenile surveys will be completed via methods best suited for given conditions. This may include snorkeling in clear water habitats, electrofishing, seining, minnow trapping, etc. Details for collection of micro-habitat data for juvenile fish will be developed based on sampling methods applied.

The existing HSC curve sets developed during the 1980s will be compared with more contemporary curve sets developed for similar river systems. In addition, the HSC data collected in 2012 will be compared with existing curve sets to see if patterns of use are similar. Several different methods will be evaluated for updating the 1980s HSC curve sets including, Enveloping, Habitat Guilds, bootstrapping, roundtable/expert opinion, and statistical approaches as noted by Abmadi-Nedushan et al. (2006).

For the purpose of facilitating discussions with licensing participants, a preliminary approach for selecting/developing habitat suitability criteria (micro, meso, and macro criteria) will be prepared and presented in a Technical Memorandum. This TM will be provided to the Working Group for review and comment.

Table 1. Summary of the proposed species and life stages, macro-habitat types, potential sampling techniques, and sampling timing for use during 2012 HSC curve validation surveys.

Species	Life Stage	River Reach	Macro-Habitat Areas[1]	Sample Sites[1]	Possible Sampling Technique	Sample Timing[1]
Chinook	Juvenile	Middle River	Slough, side channel, tributary mouths	Slough 21, 8A, and 6A	Snorkel, electrofishing, seining	June, July, August, September
	Spawning	Middle River	Tributary, mainstem	Indian R., 4th of July Cr., Lane Cr.	Pedestrian survey, side scan sonar, Didson	July, August
Sockeye	Juvenile	Middle River	Slough, side channel, tributary mouths	Slough 20, 9, 8, 6A	Snorkel, electrofishing, seining	June, July, August, September
	Spawning	Middle River	Slough, and side channels	Slough 11, 8A,	Pedestrian survey, side scan sonar, Didson	August, September, October
Coho	Juvenile	Middle River	Slough, side channel, tributary mouths	Slough 6A, Lane Cr., Birch & Sunshine Cr.	Snorkel, electrofishing, seining	June, July, August, September
	Spawning	Middle River	Tributary mouths	Indian R., 4th of July Cr., Slough 8A	Pedestrian survey	August, September
Chum	Juvenile	Middle River	Slough, side channel, tributary mouths	Slough 21, 9, and 6A	Snorkel, electrofishing, seining	June, July, August,
	Spawning	Middle River	Slough, side channel, mainstem	Slough 21, 11, and 8A	Pedestrian survey, side scan sonar, Didson	August, September
Pink	Juvenile	Middle River	Slough, side channel, tributary mouths	None specified	Snorkel, electrofishing, seining	June, July
	Spawning	Middle River	Slough, side channel, tributary mouths	Slough 21, 15, and 11	Pedestrian survey	July, August

Sub-task 8: Review and Selection of Habitat Modeling Methods/Components

Defining average low, mid, and high flow conditions of the river will assist in selection of target flow conditions for SWIFS sampling and defining the habitat modeling flow range. Existing information will be used to develop 20, 50, and 80 percent exceedance flow statistics to define the lowest and highest flows that will be used for habitat modeling.

As part of the review and synthesis of instream flow data collected as part of the 1980s study, a subset of transects will be selected and the entire process used to develop the habitat/flow relationships (e.g., transect selection, field data collection techniques, data entry, QA/QC, and hydraulic and habitat modeling) reviewed. Evaluation of potential Project impacts on both physical and biological processes in the Susitna River will require the use of several different assessment tools or models including, but not limited to, Physical Habitat Simulation Modeling, RJHAB, Varial Zone Modeling, River Flow Routing Modeling, Forward-looking Infrared Imaging, Surface Area Mapping, Water Quality Modeling, and Wetted Perimeter Modeling (Table 2). These will be presented to and discussed with the Working Group for the applicability to the SWIFS. The various indices of Project effects on macro and meso habitat will be summarized and tabulated to allow ready comparison of the effects of operational scenarios to natural/baseline conditions.

Table 2. Assessment of physical and biological processes and potential habitat modeling techniques*.

Physical & Biological Processes	Habitat Types			
	Mainstem	Side Channel	Slough	Tributary Mouths
Spawning	PHAB/VZM	PHAB	PHAB/HabMap	PHAB/RFR
Incubation	RFR/VZM	PHAB	PHAB/HabMap	PHAB/RFR
Juvenile Rearing	PHAB/RFR	PHAB	PHAB/HabMap	PHAB/RFR
Adult Holding	RFR	RFR	NA??	NA??
Macroinvertebrates	VZM/WP	VZM/WP	PHAB/HabMap/ WP	NA??
Standing/Trapping	VZM	VZM	VZM/WP	VZM/WP
Upwelling/Downwelling	FLIR	HabMap/FLIR	HabMap/FLIR	HabMap/FLIR
Temperature	WQ	WQ	WQ	WQ
Ice Formation	IceProcesses/WQ/ RFR	IceProcesses/WQ/ RFR	HabMap/Open leads	NA

PHAB Modeling; VZM-Varial Zone Modeling; RFR-River Flow Routing Modeling; FLIR- Forward-looking Infrared Imaging; HabMap-Surface Area Mapping; WQ-Water Quality Modeling; WP-Wetted Perimeter Modeling
* A detailed description of each of the models listed will be provided in a separate document.

This sub-task will result in development of a Technical Memorandum that includes:

- Recommendations for the flow range to be modeled in the 2013-2014 Instream Flow Study;
- Suggested modeling approaches to be considered/applied to the SWIFS, noting applicability to specific habitat types;
- A suggested approach for incorporating turbidity and upwelling into the analysis;
- A suggested approach for comparing pre-Project habitat with post-Project habitat.
- Recommendations for the 2013-2014 SWIFS regarding integration of habitat modeling including how various habitat modeling methods might be used most effectively to represent the habitat (empirical mapping of habitat over a range of flows, 1-D hydraulics and habitat modeling, 2-D hydrodynamics and habitat modeling) and how the various physical and biological habitat process can be integrated and used to analyze existing and post-Project habitat.
- Recommended approach for incorporating hydrology (period of record, water year types) and habitat time series analysis into the 2013-2014 SWIFS; and
- Recommended approach for temporal habitat modeling (e.g., varial zone analysis; effective habitat analysis) to address load following operations.

The TM will be provided and presented to the Working Group for review and discussion.

Sub-task 9: Temperature Modeling

To ensure continuity between studies, the F-S5 Task Leader (S. Beck) will participate in the development of the 2013-2014 Water Temperature Modeling Study Plan. Assumed topics would include determination of potential Project impacts on water temperature, review of existing information on water temperature conditions in the Susitna River, review of water quality criteria for various species and life stages, and development of monitoring protocol. It is assumed that the F-S5 Task Leader will participate in both face-to-face meetings and conference calls with AEA and licensing participants to assist with development of the final Water Temperature Modeling Study Plan.

Sub-task 10: 2013-2014 Instream Flow Study Plan Development

A formal 2013-2014 SWIFS plan will be developed through consultation with AEA, FERC and the licensing participants that is based on results from Sub-tasks 1-9 above.

NEXUS BETWEEN PROJECT AND RESOURCE TO BE STUDIED AND HOW THE RESULTS WILL BE USED

Project construction and operation will modify the flow, temperature, and sediment/turbidity regimes of the Susitna River downstream of the proposed Watana Dam. These modified regimes will affect the amount and distribution (temporal and spatial) of aquatic habitat and may affect fish access to side sloughs and tributary streams. The 2013-2014 Instream Flow Study will quantify the response of aquatic habitats to Project induced change to baseline stream flow, stream temperature, turbidity, and other parameters, as appropriate. Results of the 2013-2014 Instream Flow Study will be used to evaluate potential Project impacts and develop potential Protection, Mitigation and Enhancement measures (PM&Es).

The 2012 instream flow efforts will be coordinated with other 2012 studies to identify areas of mutual interest and shared analysis. Specifically these include: fish distribution and abundance studies; fish habitat utilization studies; water temperature studies; geomorphology studies; and riparian studies.

PRODUCTS

Study products to be delivered in 2012, include:

- Draft Technical Memoranda including those pertaining to:
    - Key Instream Flow Documents and Contents
    - Target Species/Life stages, Periodicity, and Observed Habitat Utilization
    - Important Physical Habitat Processes, River Stratification, and Study Sites
    - Habitat Suitability Criteria
    - Habitat Modeling
    - Preliminary Study Site Selection
    - Others

- Relational database - A geospatially-referenced relational database of historic data used in the current analysis and data collected during 2012 field season, if applicable, will be prepared. This database will form the basis for additional data collection in 2013-2014. All new field data must be associated with location information collected using a Global Positioning System (GPS) receiver in unprojected geographic coordinates (latitude/longitude) and the WGS84 datum. Naming conventions of files and data fields, spatial resolution, and metadata descriptions must meet the ADNR standards established for the Susitna-Watana Hydroelectric Project.

- Data -All original data collected in the field in 2012 will be QC'ed and delivered to AEA. The data will be entered into the relational database described above, QC'ed and delivered to AEA.

- Final 2012 Technical Memo - technical memo summarizing all of the 2012 results will be prepared and presented to resource agency personnel and other licensing participants,

along with spatial data products. All map and spatial data products will be delivered in the two-dimensional Alaska Albers Conical Equal Area projection, and North American Datum of 1983 (NAD 83) horizontal datum consistent with ADNR standards.

SCHEDULE

It is anticipated that the 2012 Instream Flow Planning Study would be completed in accordance with the following schedule. However, the schedule is subject to refinement and revision based on further discussion with the Working Group, review of the 1980s data, and coordination efforts with other resource specialists.

- Draft Technical Memorandum – June 29, 2012
- Original QC'd Data - November 9, 2012
- QC'd Geospatially-referenced relational database – November 9, 2012
- Final Technical Memorandum on 2012 Activity – November 9, 2012.

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