

## **5. PRELIMINARY ISSUES AND STUDIES LIST**

### **5.1. Development of Preliminary Issues and Studies**

Based on review of existing information, data gap analyses, and preliminary discussions with agencies and other stakeholders (“licensing participants” or “participants”), AEA has identified a number of issues for the proposed Project licensing. The issues for each resource area, and the corresponding study needs, are listed and described below. The identified study needs represent preliminary information regarding those studies that AEA proposes to include in its Proposed Study Plan (PSP), to be filed in June 2012 in accordance with requirements of FERC’s Integrated Licensing Process (ILP). The PSP will present a detailed scope, objectives, and methodologies for each proposed study. AEA intends to hold resource workgroup meetings during the formal study planning phase in 2012 to consult with licensing participants on development of the study designs for inclusion in the PSP and subsequently the Revised Study Plan (RSP).

Resource issues and proposed studies to address those issues are summarized in Table 5.1-1. More detailed descriptions of the licensing issues and associated study needs, by resource area, are provided in Section 5.2. Also listed below under resource area subheadings are AEA’s early study and information development activities planned for 2012, which will provide additional information for use during formal study planning.

**Table 5.1-1.** Summary of identified resource issues and corresponding studies, Susitna-Watana Hydroelectric Project licensing.

| Identified Resource Issue(s) [see Section 5.2 for issue descriptions] | Licensing Study/Information Need  | Status – 2012 Early Information Development Activity   |
|---|---|--|
| Water Resources: WR1 and WR3  | <p><u>Reservoir and Flow Routing Model Development:</u><br/>                     A HEC ResSim model to evaluate reservoir operations under various constraints and operating scenarios, as well as downstream routing effects is being developed. The HEC ResSim model is being proposed for this project due to its ability to model both aspects, reservoir operations and downstream routing simultaneously. The model will provide hourly flows and water surface elevations at selected transect locations where stream profiles and other information is known. The flow routing model is needed to serve as input to other water quality and fisheries resources modeling efforts.</p> | WR-S1: Locate and update 1981 hydrographic river transect information for the Middle Susitna River reaches for use in HECResSim (Reservoir Simulation Model) modeling. Include additional transects for lower river reaches.   |
| Water Resources: WR2  | <p><u>Water Resources River Ice Study:</u><br/>                     The overall study objective is to determine Project effects on downstream river ice formation process. Specific objectives are to (1) document the timing and process of ice cover formation, (2) identify the relationship between river ice processes and channel morphology, vegetation and aquatic habitats, and (3) forecast expected changes in river ice formation and processes as a result of Project construction and operation.</p>  | WR-S2: Document the formation and break up of river ice downstream of the proposed Watana Dam site. Document relationship between river ice process and river morphology, riparian habitat and aquatic habitats. Identify reaches most likely to experience changes in ice processes due to Project construction and operation.                            |
| Water Quality: WQ1 - WQ4  | <p><u>Water Quality Impacts Study:</u><br/>                     Study objectives: (1) verify baseline water quality conditions with select water quality measurements, (2) assess potential effects of Project construction and operations on temperature, turbidity, total dissolved/suspended solids, dissolved oxygen, pH, metals, and chemical/nutrient characteristics within the proposed Watana Reservoir and the mainstem river downstream of the proposed Watana Dam site (RM 184), and (3) evaluate potential effects of Project operations on total dissolved gas concentrations downstream of the proposed dam.</p>   | WQ-S1: Review of existing temperature data and models.   |
| Geomorphology: G1 - G10<br>Geology/Soils: GS1 and GS2                 | <p><u>Geomorphology Study:</u><br/>                     The study objective is to assess the potential change in Lower, Middle, and Upper Susitna River morphology, including mainstem, side channels, sloughs, and tributary mouths as a result of Project construction and operation.</p>   | G-S1: Determine bedload and suspended sediment load by size fraction at Tsusena Creek, Gold Creek, and Sunshine Gage stations to improve sediment rating curves and total bed material load calculation. G-S2: Geomorphic assessment of the Middle River reach using aerial photography to quantify how channel types change with flow and assess relative |

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|---|--|--|
|   |  | stability of channel features.<br>G-S3: Assessment of project effects on lower river channel morphology.   |
| Upper River Fish and Aquatic Resources: F1 - F3<br>Middle River Fish and Aquatic Resources: F4 - F8<br>Lower River Fish and Aquatic Resources: F9 - F10 | <p><u>Fish Abundance and Distribution Study:</u><br/>                     Study objectives: (1) characterize resident and anadromous fish species composition, spatial and temporal distribution, and relative abundance by subbasin and channel type and (2) develop habitat fish use information for impact assessment and use in the Instream Flow Study.</p> <p><u>Upper River Fish Study:</u><br/>                     Study objectives: (1) characterize resident and anadromous fish species composition, spatial and temporal distribution, and relative abundance and (2) characterize the habitat within the reservoir inundation zone.</p> <p><u>Productivity Study:</u><br/>                     Study objectives: (1) document benthic algae and macroinvertebrate taxonomic composition (to family level) and abundance in representative habitats in the Susitna River, (2) compare (using existing literature) the benthic algae and macroinvertebrate taxonomic composition and abundance to river systems having turbidity regimes (and flow/temperature regimes, if possible) similar to the turbidity estimated during Project operation, (3) estimate the effects of altered flow, temperature, and turbidity regimes on primary and secondary production/abundance, (4) identify factors currently limiting resident fish and juvenile salmonid growth (food availability, turbidity and/or water temperature) and evaluate the effects of changes in water temperature, turbidity, and food availability on resident fish and juvenile salmonid growth and habitat.</p> <p><u>Instream Flow Study:</u><br/>                     The objective of the study is to provide habitat-flow relationships necessary to quantify potential effects of Project operations and alternative flow scenarios on aquatic and riparian habitat.</p> | F-S1: Synthesis of existing fish data.<br>F-S2: Susitna River salmon run apportionment.<br>F-S3: Middle River habitat utilization study.<br><br>F-S4: Chinook salmon presence above Devils Canyon<br>F-S5: 2012 Instream Flow Planning Study |

| Identified Resource Issue(s) [see Section 5.2 for issue descriptions] | Licensing Study/Information Need  | Status – 2012 Early Information Development Activity  |
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|   | <p><u>Potential impacts to the Endangered Cook Inlet beluga whale:</u><br/>Information is needed to understand any connection, if any between potential Project effects and the listed beluga whale. Information about the beluga whale prey will be needed to evaluate potential indirect effects, if any to this species.</p>   | <p>F-S6: Cook Inlet beluga whale anadromous prey study analysis.</p>  |
| <p>Wildife Resources: W1 - W6</p>                                     | <p><u>Big Game Study:</u><br/>Study objectives for moose: (1) complete population estimates for the Upper and Middle Susitna River basins and road and transmission corridors, (2) use spatial analysis of seasonal range use and movements based on telemetry data to provide information on habitat use, movements, and extent of winter range through the Project area, and (3) measure forage quality and browse intensity in the impoundment zone, access routes, and transmission corridors to quantify habitats that would be lost or altered, estimate timing of use and degree of dependency of resident and migratory populations, and compare habitat quality to other adjacent regions.</p> <p>Study objectives for caribou: (1) complete population estimates for the Project area including the Nelchina and Delta herds, especially estimates of sub-herd numbers and distribution in areas north of the proposed impoundment area, (2) evaluate current and historic Nelchina and Delta herds, movements, traditional migration routes across the proposed impoundment area, and sensitive seasonal distributions such as calving ranges, and (3) use spatial analysis of seasonal range use and movements based on current telemetry data from GPS/satellite collared caribou to provide information on current habitat use and movements throughout the Project area.</p> <p>Study objectives for Dall's sheep: (1) complete population estimate and delineate seasonal ranges in mountain regions next to the Project area, including road and transmission corridors and (2) assess current condition and use of mineral licks on lower Jay Creek.</p> <p>Study objectives for brown and black bears: (1) complete population estimates in the proposed Project area, (2) evaluate berry production in the impoundment zone and access corridors, (3) evaluate use of salmon spawning streams downstream from the proposed dam site</p> | <p>W-S1: Wildlife habitat use and movement (corresponds to big game study). Compile existing population data and extrapolate to Project areas for moose, caribou, bears, Dall’s sheep, and wolves. Analyze other available ADF&amp;G datasets for related to habitat use.</p> |

| Identified Resource Issue(s) [see Section 5.2 for issue descriptions] | Licensing Study/Information Need  | Status – 2012 Early Information Development Activity  |
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|   | <p>including use of Prairie Creek, (4) identify denning areas.</p> <p>Study objectives for wolves: (1) complete population estimates, determine number of packs and individuals using the Project area, including road and transmission corridors, (2) use spatial analysis of telemetry data to map pack territories and movements, and (3) identify locations of dens, rendezvous sites, hunting areas, and other essential areas for each pack.</p> <p><u>Furbearer Study:</u><br/>Study objectives: (1) evaluate existing data on distribution, habitat use, and movements of wolverine, beaver, river otter, mink, muskrat, and other furbearers, (2) complete current estimate of active beaver colonies in the middle and lower river, (3) complete spring surveys to evaluate overwinter survival of beaver, and (4) evaluate potential marten home range and dispersal movements between old forest stands.</p> <p><u>Small Game Mammal and Upland Gamebird Study:</u><br/>Study objectives for snowshoe hare, ptarmigan, and grouse: (1) evaluate existing data on distribution, habitat use, and movements and (2) evaluate seasonal habitat use, potential habitat fragmentation effects, and dispersal capabilities.</p> <p><u>Harvest Study for Big Game, Furbearers, Small Game Mammals and Upland Gamebirds:</u><br/>Study objectives for moose, caribou, Dall's sheep, bears, wolves, and furbearers: (1) evaluate and compile existing past and current data on harvest effort, harvest locations, hunter access, and hunter mode of travel and (2) compare current harvest locations to current patterns of seasonal habitat use and movements.</p> <p>Study objectives for small game mammals and upland gamebirds include: (1) evaluate and compile existing past and current data on harvest effort, harvest locations, hunter access, and hunter mode of travel and (2) compare current harvest locations to current patterns of small game mammals and upland gamebird abundance, seasonal habitat use, and dispersal capabilities.</p> | <p>W-S2: Past and current big game and furbearer harvest study. Compile existing harvest and hunter effort within finest available harvest units; compare past and current distribution of reported harvest and effort, compare harvest locations to seasonal movements and recommend additional data collection.</p> |

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|   | <p><u>Eagle and Raptor Study:</u><br/>                     Study objectives for bald and golden eagles: (1) evaluate existing data on distribution, established nest sites and pair territory locations, and foraging habitats, (2) complete current surveys to locate active nests and alternative nest sites within habitats affected by the impoundment, access road corridor, and transmission line corridors, (3) complete current surveys to document fall and winter communal roost sites, and (4) evaluate seasonal habitat use.</p> <p>Study objectives for cliff nesting raptors: (1) evaluate existing data on nest site locations, identify potentially suitable cliff nesting habitat locations and (2) complete current nest surveys at identified suitable cliff habitats to document use throughout the Project area.</p> <p>Study objectives for other raptors and owls: (1) evaluate existing data on nest site locations, identify potentially suitable nesting habitats and (2) complete current nest surveys in potentially suitable nesting habitats during late-winter early spring for owls and during early spring for other raptors throughout habitat potentially affected by the Project.</p> <p><u>Waterbirds, Seabirds, and Waterfowl Study:</u><br/>                     Study objectives: (1) evaluate existing data on nesting, brood-rearing, and migration staging distributions for waterbirds and waterfowl, (2) complete current surveys for nesting, brood-rearing, and migration staging habitats to determine abundance of waterbirds and waterfowl throughout the Project area, and (3) evaluate seasonal habitat use and movement patterns.</p> <p><u>Landbird and Shorebird Study:</u><br/>                     Study objectives: (1) evaluate existing data on nesting and migration staging habitats for landbirds and shorebirds, (2) complete current surveys for nesting and migration staging habitats to determine distribution and abundance of landbirds and shorebirds throughout the Project area, and (3) evaluate seasonal habitat use and migration routes.</p> | <p>W-S3: Eagle nests and raptor nest study. Compile existing nest site, tree and cliff habitat data, determine current spatial distribution of potentially suitable habitats and complete aerial and ground-based surveys.</p> |

| Identified Resource Issue(s) [see Section 5.2 for issue descriptions] | Licensing Study/Information Need  | Status – 2012 Early Information Development Activity  |
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|   | <p><u>Non-Game Species of Conservation Concern Study:</u><br/>                     Study objectives for little brown bat: (1) evaluate existing data on distribution, habitat use, and movements, (2) evaluate geologic and topographic data to identify areas potentially containing Karst topography with cave features within the Project area, and (3) complete current distribution and habitat use surveys for bat species in the inundation zone, and the Middle Susitna River area.</p> <p>Study objectives for Wood Frog: (1) evaluate existing data on distribution, habitat use, and movements and (2) complete current distribution surveys for wood frogs throughout the Project area.</p> <p>Study objectives for small mammals: (1) evaluate existing data on distribution, habitat use, and movements and (2) complete distribution and abundance surveys within the inundation zone, and along road and transmission corridors.</p> <p>Study objectives for birds: (1) compile list of migratory bird species of concern and identify occurrence data and distribution of suitable habitats within the Project area based on existing data on distribution, habitat use, and movements and (2) complete current population and habitat use estimates for birds of concern throughout the Project area.</p> |   |
| <p>Botanical Resources: B1 - B5</p>                                   | <p><u>Vegetation Mapping Study:</u><br/>                     Study objectives: (1) determine the appropriate mapped scales, areal extents, and the Alaska Vegetation Classification level for vegetation mapping, (2) develop vegetation maps at suitable scales, and (3) provide habitat acres and distribution to support the development of related studies.</p> <p><u>Wetland-Riparian Study:</u><br/>                     Study objectives: (1) determine the appropriate scales and areal extents for wetland delineations in consultation with the USACE and compile available existing wetland mapping, (2) conduct field surveys to collect site-specific wetland data, (3) develop a wetland functional assessment, (4) determine natural fire-spread patterns in the proposed reservoir reach of the Susitna River, and (5) evaluate the relationship of wetland and riparian vegetation to the hydrologic regime.</p>   | <p>B-S1: Vegetation and wildlife habitat mapping. Compare current and historical vegetation and land cover mapping, determine appropriate map scales, areal extents and classification level, complete preliminary mapping from recent aerial images, complete initial field verification of preliminary mapping and identify habitat/plant community associations for rare and sensitive plants.</p> <p>B-S2: Riparian study. Identify riparian field sites and data from 1980s studies for potential resampling, review process and succession models for predicting downstream effects, complete preliminary mapping of riparian habitats from recent aerial images including wildlife habitat elements, and complete initial field verification of preliminary mapping.</p> |

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|   | <p><u>Rare Plant Study:</u><br/>Study objectives: (1) identify the locations of rare plant populations in the Project area and (2) identify potential habitat enhancement locations.</p> <p><u>Noxious Weed Study:</u><br/>Study objectives: (1) identify locations of populations of target invasive weed species in the Project area and (2) identify potential treatment locations.</p>   | <p>B-S3: Wetland mapping. Compile current and historical wetland mapping, determine appropriate map scales, areal extents for wetland delineation, complete delineations on current photography incorporating data from vegetation mapping study, identify riparian and wetland delineation field sites and data from the 1980s studies for potential re-sampling, and select sampling locations and complete initial field surveys.</p> |
| <p>Aesthetic Resources: A1</p>  | <p><u>Aesthetic Resources Study:</u><br/>Study objectives: (1) assess significance of impacts of borrow and spoil areas, transmission lines, access roads, construction camps, and dams on scenic resources and (2) assess potential effects on scenic resources due to Project operation and maintenance activities.</p>  | <p>A-S1: Inventory BLM VRM designations.</p> <p>A-S2: Identify initial key viewing areas and key viewpoints.</p>   |
| <p>Recreation and Land Use Resources: R1 - R6 and L1 - L2</p>         | <p><u>Recreation Resources and Land Use Study:</u><br/>Potential study objectives: (1) assess potential Project-related impacts on fishing, including the availability of fish, access, and quality of experience, (2) evaluate potential Project-related impacts on recreational hunting and trapping, including the availability of resources, access, and quality of experience, (3) assess potential Project-related impacts on boating and pack rafting downstream of Devils Canyon, including access to the water and possible impediments to navigation, (4) evaluate potential Project-related impacts on non-consumptive activities (e.g., bird watching and hiking), including availability of resources, access to the resources, and quality of the experience, (5) assess potential Project-related impacts of construction worker recreational activities on fish and wildlife resources in the Susitna River watershed, (6) evaluate potential Project-related impacts due to increases in recreational use resulting from improved access, creation of the reservoir, altered stream flow, and the need to accommodate and manage recreation use, (7) assess potential changes/effects to recreationist and local resident access patterns from potential Project-related changes in freeze-up conditions in the middle reach of the Susitna River, (8) evaluate the feasibility and desirability of restrictions on recreation to</p> | <p>R-S1: Identify proposed recreation developments.<br/>R-S2: Informally survey recreation providers.<br/>R-S3: Collect existing recreation demand and supply data.<br/>L-S1: Title and site control research.<br/>L-S2: GIS base map updates.</p>   |



| Identified Resource Issue(s) [see Section 5.2 for issue descriptions] | Licensing Study/Information Need   | Status – 2012 Early Information Development Activity   |
|---|--|--|
|   | reduce impacts on fish and wildlife resources in the Susitna River watershed, and (9) formulation of a recreation plan.  |  |
| Cultural Resources Issues: C1 - C4                                    | <u>Cultural Resources Study:</u><br>Study objectives: (1) identification and significance of the potential effects on cultural, historical, and archaeological sites and (2) formulation of a cultural resources mitigation plan.  | C-S1: Pre-field data assessment and information gathering and compilation.   |
| Subsistence Resources Issues: S1                                      | <u>Subsistence Resources Studies:</u><br>Study objectives: (1) assess potential Project-related effects on subsistence activities, (2) evaluate potential Project-related effects on the population of local animal species, including potential changes in wildlife migration patterns (addressed via Wildlife Resources studies), and (3) assess potential Project-related effects on human access to the Project vicinity (addressed via Recreation Resource studies).  | S-S1: Collect and analyze existing subsistence information. Collect existing harvest data, resource use, subsistence land use maps, place names and traditional environmental knowledge. |
| Socioeconomic and Transportation Issues: So1 - So8                    | <u>Socioeconomic Resources Study:</u><br>Study objectives: (1) assess potential Project-related impacts to lifestyles in area communities, (2) evaluate potential Project-related changes to commercial opportunities related to fishing, hunting, trapping, etc., (3) assess potential Project-related changes in employment in area communities, (4) evaluate potential Project-related increases in demand on resources offered by the Mat-Su Borough and communities to provide public services and facilities for the Project and Project employees, (5) assess potential Project-related secondary development impacts on undeveloped ANCSA Corporation lands, (6) evaluate potential Project-related impacts resulting from residency and movement of Project construction personnel, (7) assess potential Project-related displacement and influences on residences and businesses, and (8) evaluate potential Project-related changes in economic conditions in the region.<br><br><u>Transportation Study:</u><br>The objective of the transportation study will be to assess the potential impacts to transportation systems resulting from the construction and operation of the proposed Project. | No specific socioeconomic study is being scoped, however data collection and information gathering will continue in order to inform the study plans developed in 2012.                   |

## **5.2. Preliminary Issues and Information Needs**

Preliminary Issues were identified from reviewing the 1980s licensing efforts, data gap reports and agency consultations as areas of potential inquiry regarding effects from the construction, presence of facilities, and operation and maintenance of the Susitna-Watana Hydroelectric Project. This listing identifies the high-level preliminary issue topics that will continue to be developed and refined through the ILP and preparation of the study plan for the Project. Some topics may drop out and other topics may be added. Each issue is given a alpha-numeric designation for reference and tracking. The key to the alpha designation is as follows:

**GS- GEOLOGY AND SOILS (INCLUDED IN SECTION 5.2.3)**

**WR – WATER RESOURCES (SECTION 5.2.1)**

**WQ – WATER QUALITY (SECTION 5.2.2)**

**G – GEOMORPHOLOGY (SECTION 5.2.3)**

**F – FISHERIES AND AQUATIC RESOURCES (SECTION 5.2.4)**

**W – WILDLIFE RESOURCES (SECTION 5.2.5)**

**B – BOTANICAL RESOURCES (SECTION 5.2.6)**

**A – AESTHETICS (SECTION 5.2.7)**

**R – RECREATION (SECTION 5.2.8)**

**L – LAND USE (SECTION 5.2.8)**

**C – CULTURAL RESOURCES (SECTION 5.2.9)**

**S – SUBSISTENCE RESOURCES (SECTION 5.2.10)**

**SO – SOCIOECONOMIC AND TRANSPORTATION RESOURCES (SECTION 5.2.11)**

Immediately after identifying and listing preliminary issues, this section provides summaries of AEA proposed studies that may be needed to evaluate the preliminary issues. In developing these Study Plan summaries, AEA has considered the preliminary issues, the data gap reports, and the adequacy of existing, relevant and reasonably available information to address these issues. Additionally, AEA has considered the seven criteria for study requests listed in 18 CFR § 5.9, as discussed in Section 2.5, which all licensing participants should address in making any study requests. The proposed studies should be considered preliminary and subject to modification during FERC's Scoping and subsequent Study Plan development.

After the study descriptions, a list of planned 2012 studies and information development efforts is provided. More up-to-date information on the 2012 studies is provided on the Susitna-Watana

Project website (<http://www.susitna-watanahydro.org>). The specific 2012 studies follow the naming convention listed above for the issues with an additional “” to designate “study.”

The preliminary issues arise from the Project’s construction, presence of facilities and/or operation and maintenance activities and have a Project nexus. The existing information from the 1980s, or any applicable work that has been undertaken in the Project area, will be used to the extent possible in conducting the studies and resolving issues. It is anticipated that some of these issues can be resolved without performing new studies. As appropriate, the existing information will be used for baseline conditions and/or built upon and supplemented with new information to address the preliminary issues.

### **5.2.1. Water Resources Issues**

**WR1:** Project operations will affect flow timing and magnitude compared to current conditions in Susitna River reaches below the proposed dam, which in turn can affect fish and riparian habitats and fish movement.

**WR2:** Potential effects of Project operations on reservoir reach and downstream ice processes. Changes in ice processes may affect river morphology and water quality, which can affect fish and riparian habitats.

**WR3:** Changes in timing and magnitude of flows from Project operations on the interconnection and overtopping into side channel and side sloughs may affect fish habitat and productivity.

#### *5.2.1.1. Project Operations HEC ResSim Model*

##### Study Rationale and Objectives

Project operations will alter the flows and flow regime downstream of the dam and reservoir fluctuations will affect the natural resources in the reservoir area. An operations model that can predict reservoir levels and downstream hourly flow and water surface elevations at places of interest will be essential to other environmental analyses to determine effects on resources in the area. Changes in timing and magnitude of flows can change the interconnection and overtopping of side channel and side sloughs and flow routing models can provide input into further fisheries and stream morphology investigations to understand how these changes could affect aquatic habitats.

##### Study Area

The study area includes the Susitna River downstream to the mouth, from the upstream end of the proposed Watana Reservoir.

##### Study Components

The USACE Hydrologic Engineering Center (HEC) has developed a series of programs for hydrologic and hydraulic modeling including the HEC ResSim (Reservoir System Simulation) model. HEC ResSim is able to model reservoir operations under various constraints and

operating scenarios, as well as downstream routing effects. The HEC ResSim model is being proposed for this Project due to its ability to model both aspects, reservoir operations and downstream routing, of the Susitna-Watana Dam project simultaneously.

The HEC ResSim model setup of the watershed will include major inflows to the Susitna River where time-series flow data is available including the Chulitna, Talkeetna, and potentially the Yentna Rivers, as well as cumulative local inflows. The model setup will also include control points at the Watana Dam site and Gold Creek, and comparison points with historic data at the Sunshine and Susitna Station USGS Gaging Stations. Reservoir and dam characteristics from the 1985 FERC application will be the initial basis of the physical and operating parameters in the model, and updated, when applicable, to reflect the current configuration. Downstream routing will be performed based on the Muskingum-Cunge channel flow routing method and will use 8-point cross-sections initially based on survey data collected in 1980 and 1981 and summarized in the Hydrographic Surveys Closeout Report, Final Draft (R&M Consultants 1981). The 1980s cross-section data will be updated as a part of the current studies. Location and elevation cross-section data were collected in the 1980s at 68 locations on the Susitna River between Talkeetna River and just upstream of Portage Creek near Devils Canyon. Data for 23 additional cross-sections was collected between Devil Creek and Deadman Creek, which is just downstream of the Watana Dam site. Additional cross sections will be needed in the Lower River as no complete transects were obtained in the 1980s and there is interest in understanding the likely changes in flows and water surface elevations in the Lower River reaches.

#### 5.2.1.2. *Water Resources River Ice Study*

##### Study Rationale and Objectives

Water released for winter generation is expected to alter the natural formation and breakup of river ice by:

- Preventing or delaying in-channel (frazil and aufeis) and ice cover formation for several miles downstream of the reservoir.
- Increasing the elevation at which the ice cover forms downstream of this open reach.
- Preventing the formation of a stable ice cover on the reservoir.

The overall study objective is to determine Project effects on downstream river ice formation process. The specific objectives are to:

- Document the timing and process of ice cover formation.
- Identify the relationship between river ice processes and channel morphology, vegetation and aquatic habitats.
- Forecast expected changes in river ice formation and processes as a result of Project construction and operation.

##### Study Area

The study area includes the Susitna River downstream to the mouth, from the upstream end of the proposed Watana Reservoir.

## Study Components

At a minimum, the study will include the following study components:

- The 1980s river ice studies will be thoroughly reviewed, and where possible, compiled in geo-mapping format for comparison with present day observations. If compilation of 1980s study results are available to guide study site selection, observations of river ice formation and breakup would commence in 2012-13 and continue through 2014-15. Otherwise, site specific measurement and observation would not commence until winter 2013-14.
- Document existing ice cover formation between River Mile (RM) 0 and 250 using repetitive aerial observations and videography.
- Measurement of ice thickness and surface elevation would be made between RM 80 and 150 and RM 180 and 200.
- The presence or absence of frazil ice and aufeis ice as well as the timing and process of ice cover formation on aquatic habitats between RM 98 and 150 will be documented. Particular attention will be given to the relationship that exists between river ice and vegetation, geomorphology and aquatic habitats within the reach. Some aspects are vegetation succession, wood recruitment, sediment transport, channel migration, upwelling, and fish survival.
- Information will be compiled regarding river ice and existing hydroelectric projects in arctic and sub-arctic climates outside Alaska.

Assessment of the effect of the ice process change on geomorphology, vegetation and aquatic habitat would occur within those respective studies.

### *5.2.1.3. 2012 Water Resources Study Components*

**WR-S1:** Locate and update 1981 hydrographic river transect information for Middle Susitna River reaches for use in HECResSim (Reservoir Simulation Model) modeling. Identify new cross section locations and obtain relevant data at representative locations in the Lower River reach.

**WR-S2:** Document the breakup and formation of river ice downstream of the proposed Watana Dam site. The progression of ice breakup and formation will be documented using repetitive aerial observations. Ice thickness and ice surface elevation measurements will be made.

### **5.2.2. Water Quality Issues**

**WQ1:** Potential effects of Project construction activities, such as accidental spills and releases of petroleum products or other materials, disturbance of vegetation and soil cover, increased stormwater runoff, and, increased suspended sediment/turbidity or nutrient levels within the reservoir reach and downstream of the dam.

**WQ2:** Potential effects of reservoir filling, Project operations, including reservoir surface elevation fluctuations, on temperature, turbidity, total dissolved/suspended solids, dissolved oxygen, pH, metals, and chemical/nutrient characteristics within the reservoir.

**WQ3:** Potential effect of Project operations on temperature, turbidity, total dissolved/suspended solids, dissolved oxygen, pH, metals, and chemical/nutrient characteristics of the mainstem river downstream from the proposed Watana Dam site (RM 184).

**WQ4:** Potential effects of the proposed spillway operations on total dissolved gas concentrations in the Susitna River downstream of the Project.

#### 5.2.2.1. *Water Quality Impacts Study*

##### Study Rationale and Objectives

Project operations are going to impact water quality. Water quality studies will help quantify those impacts. This study has the following objectives:

- Verify baseline water quality conditions with select water quality measurements.
- Assess potential effects of Project construction and operations on temperature, turbidity, total dissolved/suspended solids, dissolved oxygen, pH, metals, and chemical/nutrient characteristics within the proposed Watana Reservoir and the mainstem river downstream from the proposed Watana Dam site (RM 184).
- Evaluate potential effects of Project operations on total dissolved gas concentrations downstream of the proposed Watana Dam site.

##### Study Area

The study area includes the Watana Reservoir and the Susitna River downstream of the reservoir. Study areas will likely vary and be defined during the course of the study plan development to address specific study components.

##### Study Components

The study will include the following study components:

- Review and summarize existing water quality information: All available previous water quantity and modeling data will be reviewed and summarized and used to the extent possible to inform any additional water quality and modeling work.
- Baseline water quality monitoring: The Susitna River and its tributaries will be monitored to determine baseline water quality conditions. Measurement of temperature, turbidity, total dissolved/suspended solids, dissolved oxygen, pH, metals, and chemical/nutrient will be collected. Monitoring stations will be established and sampling will be performed for comparison within and between sites over time.
- Evaluate and select appropriate reservoir and riverine water quality models. Ensure that the selected models have the capability to incorporate ice processes.

- Use the temperature models to simulate water temperature during the portions of the year that may be of most concern to aquatic species and ice processes. Modeling development steps include:
  - Collect/develop model inputs as necessary such as channel and reservoir geometry data, solar shading data (topographic and riparian), meteorological data (air temperature, wind speed, relative humidity, solar radiation), hydrology data, and boundary condition flow and water temperature data for the modeled river reaches and reservoirs.
  - Calibrate and validate the hydrodynamics and heat budget portions of the water temperature model(s) with empirical water temperature (river reaches and reservoirs) and meteorological data (e.g., use data collected in 2005-2008). Calibrate water travel time either with data collected in this study or data collected in another study (Instream Flow).
- Characterize modeled water temperatures (i.e., seasonal, daily, within-day temperatures) for existing, Project, and alternative flow conditions. For Project and alternative flow conditions, model a range of flow releases.
- Evaluate and select appropriate reservoir turbidity modeling approach based on empirical/literature data from other systems and numerical modeling, as appropriate. Any reservoir turbidity modeling approach will be based on a significant empirical data foundation. As appropriate, the study will use data from similar glacial river/reservoir systems and validation of the modeling approach.
- The reservoir turbidity modeling will be used in combination with mass flow/turbidity modeling in the Susitna River (downstream) to characterize turbidity for Project and alternative flow regimes. Modeling will be coordinated with the Instream Flow Study to ensure that all important habitat types are included in the modeling (main channel, side channel, side slough, upland slough, tributary mouths) along the length of the river.
- Stream temperature and meteorological monitoring will be used to establish baseline conditions and support reservoir and stream temperature modeling of potential Project effects.
- Stream turbidity monitoring within the Susitna River will be used to establish baseline conditions and used to assess potential downstream Project effects.
- Stream heavy metals concentrations (copper and aluminum) have been reported in the Susitna River during prior sampling efforts. The potential source of these elements will be assessed using geology and soils analysis. In addition, a review of previously collected data will be made to determine the form of metal reported from previous sampling (dissolved vs. total) and its potential bioavailability to aquatic organisms.

#### *5.2.2.2. 2012 Water Quality Study Components*

In addition to the above proposed studies, the following studies or study components will be started in early 2012 in advance of formal Study Plan development for the Project. AEA is currently working with the resource agencies to determine the full scope of this work. The resulting studies or study components will be included in the Proposed Study Plan when it is filed with FERC.

**WQ-S1:** Review of existing temperature data and models. Obtain and evaluate water and meteorological temperature data, including 1980s data that was used to calibrate the SNTEMP and DYRESM temperature models that were used.

### **5.2.3. Geomorphology/Geology/Soils Issues**

#### Reservoir Geomorphology Issues

**G1:** Potential longevity of Watana Reservoir as a result of sediment entrapment based on present day particle sizes in transport.

**G2:** Potential change in morphology at the upper end of the proposed reservoir resulting from sediment entrapment. Changes in the river morphology at the upper end of the reservoir may affect fish migration and habitat.

**G3:** Potential effects of Project operations on mass wasting, shoreline erosion, tributary mouth migration, and stability within the reservoir inundation zone. These changes may affect fish and wildlife or cultural resources.

**G4:** Potential temporary effects of soil erosion and sedimentation from Project construction activities, including construction and use of access roads and borrow areas, in the Susitna River.

#### Middle River Geomorphology Issues (Watana Dam Site (River Mile [RM 184]) downstream to Three Rivers Confluence [RM 98])

**G5:** Potential effects of reduced sediment load and changes to sediment transport as a result of Project operations within the Middle River. Streambed coarsening due to reduced sediment transport may alter river morphology, riparian conditions, and distribution and abundance of mainstem, side channels, and side sloughs that affect fish habitat.

**G6:** Potential effect of Project operations on the stability of tributary mouths and access to the tributaries within the Middle River. Potential tributary mouth morphological changes may affect fish access to tributaries.

**G7:** Potential effects of Project construction and operation on the recruitment and deposition of large wood within the Middle River. Changes in large wood abundance may affect aquatic habitat.

**G8:** Potential effects of Project and infrastructure construction (dam, access roads, borrow areas, transmission facilities) on sediment recruitment to water bodies within the Project vicinity.

#### Lower River Geomorphology Issues (Three Rivers Confluence [RM 98] downstream to Cook Inlet [RM 0])

**G9:** Potential effects of reduced sediment load and changes to sediment transport as a result of Project operations within the Lower River.



**G10:** Potential effects of Project construction and operation on the recruitment and deposition of large wood to the Lower River reach. Changes in large wood abundance may affect aquatic habitat.

### Geology and Soils Issues

**GS-1:** Potential increases in erosion resulting from construction and operation of transmission lines, roads, an airstrip, and construction camp.

**GS-2:** Potential seismic effects on the proposed dam and other facilities.

#### 5.2.3.1. *Geomorphology Study*

##### Study Rationale and Objectives

Project operations will influence the sediment supply and sediment transport capacity of the river due to changes in the high flow regime and entrapment of sediment in Watana Reservoir. This could have potential effects on fluvial processes and channel morphology. Project operations may influence water temperatures and the formation of ice and ice break-up that could alter river flood stage and scour processes, potentially changing river channel morphology. Within the Watana Reservoir inundation zone changes in river flow and stage, and changes in sediment transport processes, could alter channel stability upstream of the reservoir, cause changes in the morphology of tributaries entering the reservoir, and could induce erosion along the reservoir shoreline.

It is important to predict the type and magnitude of geomorphologic changes that may occur in the Susitna River due to the proposed Project. Existing data on the sediment supply and sediment transport characteristics of the river is both spatially and temporally limited to a few USGS stations.

The study objective is to assess the potential change in lower, middle and upper Susitna River morphology, including mainstem, side channels, sloughs, and tributary mouths.

##### Study Area

The geomorphology study would consider the reservoir inundation zone and the remaining segments of the Middle River, and the Lower River reaches.

##### Study Components

The overall study approach is to review existing and collect new data in order to:

- Identify channel stability and changes in channel morphology today in comparison to recent historic data using aerial photography, available channel geometry data, or other geo-referenced data sources.
- Characterize slope stability and soil conditions along the reservoir inundation zone.

- Collect channel geometry and gradient data for tributaries entering the Watana Reservoir inundation zone.
- Verify 1980s study of trap efficiency of Watana Reservoir. In combination with data collected for sediment load and particle sizes entering reservoir, and sediment transport modeling, calculate sediment accumulation rate.
- Quantify bed and suspended sediment load, timing of sediment delivery, sediment sizes, and sediment transport rates in longitudinal profile along the river.
  - Prepare sediment rating curves for existing USGS station data.
  - Collect new sediment transport and particle size data for stratified study reaches lacking data.
- Collect cross-sectional and longitudinal profile channel geometry data for representative river reaches to be used in hydraulic and sediment transport modeling.

This data would be used in combination with geomorphic principles and criteria/thresholds defining probable channel forms, and with sediment transport and hydraulic modeling methodologies to predict the potential for alteration of channel morphology.

#### *5.2.3.2. 2012 Geomorphic Study Components*

In addition to the above proposed geomorphic studies, the following studies or study components will be started in early 2012 in advance of formal Study Plan development for the Project. AEA is currently working with the resource agencies to determine the full scope of this work. The resulting studies or study components will be included in the Proposed Study Plan when it is filed with FERC.

**G-S1:** Determine bedload and suspended sediment load by size fraction at Tsusena Creek, Gold Creek, and Sunshine Gage stations.

**G-S2:** Geomorphic assessment of the Middle River reach using aerial photography.

**G-S3:** Assessment of Project effects on Lower River channel morphology.

#### **5.2.4. Fish and Aquatic Resource Issues**

##### Upper River Fish and Aquatic Issues (Upstream of the Watana Dam Site [RM 184])

**F1:** Effect of change from riverine to reservoir lacustrine habitats resulting from Project development on aquatic habitats, fish distribution, composition, and abundance, including primary and secondary productivity.

**F2:** Potential effect of fluctuating reservoir surface elevations on fish access and movement between the reservoir and its tributaries and habitats.

**F3:** Potential effect of Watana Dam on fish movement.

Middle River Fish and Aquatic Issues (Watana Dam Site [RM 184] downstream to Three Rivers Confluence [RM 98])

**F4:** Effect of Project operations on flow regimes, sediment transport, temperature, and water quality that result in changes to seasonal availability and quality of aquatic habitats, including primary and secondary productivity. The effect of Project-induced changes include streamflow, stream ice processes, and channel morphology (streambed coarsening) on anadromous fish spawning and incubation habitat availability and suitability in the mainstem and side channels and sloughs in the Middle River above and below Devils Canyon.

**F5:** Potential effect of Project flow regime on anadromous fish migration above Devils Canyon. Devils Canyon is a velocity barrier to most fish movement and changes in flows can result in changes in the potential fish movement through this area (approximately RM 150).

**F6:** Potential influence of the proposed Project flow regime and the associated response of tributary mouths on fish movement between the mainstem and tributaries within the Middle River reach.

**F7:** Influence of Project-induced changes to mainstem water surface elevations July through September on adult salmon access to upland sloughs, side sloughs, and side channels.

**F8:** Potential effect of Project-induced changes to stream temperatures, particularly in winter, changing the distribution of fish communities, particularly invasive northern pike.

Lower River Fish and Aquatic Issues (Three Rivers Confluence [RM 98] downstream to Cook Inlet [RM 0])

**F9:** The degree to which Project operations affect flow regimes, sediment transport, temperature, water quality that result in changes to seasonal availability and quality of aquatic habitats, including primary and secondary productivity.

**F10:** Potential impacts to the Endangered Cook Inlet beluga whale.

*5.2.4.1. Fish Abundance and Distribution Study*

Study Rationale and Objective

The intent of the fish population studies is to address Project-induced macro-habitat changes and subsequent changes to habitat quality and fish abundance and distribution. This study has the following objectives:

- Characterize resident and anadromous fish species composition, spatial and temporal distribution, and relative abundance.
- Develop habitat fish utilization information for use in the impact assessments and the Instream Flow Study.

### Study Area

The study area includes the Susitna River corridor and its tributary mouths from the proposed Watana Dam site downstream. Study areas will likely vary and be defined during the course of Study Plan development to address specific study components.

### Study Components

The study will include the following study components:

- Compile and summarize existing information on fish population composition, spatial and temporal distribution, and abundance.
- Develop a sampling approach to obtain habitat utilization (including turbidity/temperature) information in channel types (main channel, side channels, side sloughs, upland sloughs, tributary mouths, and tributaries) in selected study reaches.
- Evaluate fish movement through Devils Canyon.
- Assess access to tributary mouths based on geomorphologic studies.
- Combine results from the Water Temperature and Turbidity Study with the current fish distribution and water temperature criteria data for various species/lifestages of native and introduced species to estimate fish distributions within the Project area.
- Data reporting for Susitna River fish populations will include:
  - Spatial and temporal distribution maps of resident and anadromous fish species and lifestages for existing conditions.
  - Periodicity charts for each species/lifestage by season and location within the study area.
  - Spatial and temporal abundance estimates for resident and anadromous fish (adults and juvenile rearing and outmigration).
  - Summary of channel type and mesohabitat utilization of fishes.

#### *5.2.4.2. Upper River Fish Study*

### Study Rationale and Objective

The intent of the reservoir fish habitat study is to address the change from riverine habitats to reservoir habitats and the impact of Project operations on reservoir habitat quality, tributary access, and fish distribution. This study has the following objectives:

- Characterize resident and anadromous fish species composition, spatial and temporal distribution, and relative abundance.
- Characterize the habitat within the inundation zone.

### Study Area

The study area includes the area of inundation of the proposed Watana Reservoir. Study areas will likely vary and be defined during the course of Study Plan development to address specific study components.

## Study Components

The study will include the following study components:

- Compile and summarize existing information on fish population composition, spatial and temporal distribution, and abundance and characterize the existing habitat.
- Characterize the expected water surface elevation patterns and approximate pool volumes of the proposed Watana Reservoir using Project operations modeling.
- Assess potential fish passage barriers at river and stream inlets to Watana Reservoir. Summarize expected water quality information (water chemistry, temperature, turbidity) with respect to thermocline location, epilimnion and hypolimnion water temperatures and dissolved oxygen concentrations for proposed Watana Reservoir using Project operations modeling and data from the water temperature/water quality modeling studies.
- Characterize the expected fish species assemblage and estimate the trophic state (e.g., oligotrophic) of proposed Watana Reservoir.

### *5.2.4.3. Productivity Study*

#### Study Rationale and Objectives

The intent of the Productivity Study is to characterize the macroinvertebrate community. Project operations are going to impact the habitat in the river and have subsequent impacts on macroinvertebrate communities. This study has the following objectives:

- Document benthic algae and macroinvertebrate taxonomic composition (to family level) and abundance in representative habitats in the Susitna River.
- Compare (using existing literature) the benthic algae and macroinvertebrate taxonomic composition and abundance to river systems having turbidity regimes (and flow/temperature regimes, if possible) similar to the turbidity estimated during Project operation.
- Estimate the effects of altered flow, temperature, and turbidity regimes on primary and secondary production/abundance.
- Identify factors currently limiting resident fish and juvenile salmonid growth (food availability, turbidity and/or water temperature) and evaluate the effects of changes in water temperature, turbidity, and food availability on resident fish and juvenile salmonid growth and habitat.

#### Study Area

The study area includes the Susitna River downstream of the proposed Watana Dam. Study areas will likely vary and be defined during the course of Study Plan development to address specific study components.

## Study Components

The study will include the following study components:

- Review and summarize historical algal and macroinvertebrate communities, and fish growth/production information in the study area.
- Document the algal and benthic macroinvertebrate communities and abundance (including different macrohabitat types).
- Document the algae/benthic macroinvertebrate community in other river systems with turbidity regimes similar to that which will occur with the Project (rivers must have applicable temperature and flow regimes and substrates).
- Evaluate changes to juvenile growth and abundance from potential Project-induced changes to temperature, turbidity and flow, and their impacts on food availability.

### *5.2.4.4. Instream Flow Study*

#### Study Rationale and Objectives

The intent of the Instream Flow Study is to evaluate effects of Project operations on habitat quality and availability.

The overall study objective is to characterize aquatic and riparian habitat as a function of flow using site-specific data, ecological principles, and modeling methodologies as needed. The information developed from this study, in combination with other resource studies (e.g., water temperature, fish abundance and distribution, geomorphology, and riparian), will provide a basis for streamflow-related resource management decisions and impact analyses.

The specific objective of the study is to provide habitat versus flow relationships necessary to quantify the potential effects of the Project and other alternative flow scenarios on aquatic and riparian habitat.

#### Study Area

The study area includes aquatic habitats and riparian habitat (related to river flow) in the Susitna River downstream of the proposed Watana Dam. Study areas will likely vary and be defined during the course of Study Plan development to address specific study components.

#### Study Components

The study will include the following study components:

- Use Aquatic Resources Working Group to refine and develop Study Plan for Instream Flow Modeling.
- Compile, evaluate and validate 1980s instream flow studies.
- Stratify the study area into study reaches.

- Estimate relative abundance of mesohabitat types (e.g., pool, run, riffle) within representative channel types (main channel, side slough, upland slough, tributary mouths), in selected river reaches.
- Select target species/lifestages.
- Development of macro, meso and/or microhabitat suitability criteria for selected species life stage for use in developing habitat versus flow relationships.
- Quantify the habitat versus flow relationships for selected species.
- Use the habitat versus flow relationships to develop a time series analysis of aquatic habitat under existing and Project conditions.
- Identify the time periods, flow conditions, and life stages when habitat may be a limiting factor for selected fish species for the existing and with Project conditions.

#### **5.2.4.5. 2012 Fish and Aquatic Study Components**

In addition to the above proposed fishery studies, the following studies or study components will be started in early 2012 in advance of formal Study Plan development for the Project. AEA is currently working with the resource agencies to determine the full scope of this work. The resulting studies or study components will be included in the Proposed Study Plan when it is filed with FERC.

**F-S1:** Synthesis of Existing Fish Population Data.

**F-S2:** Susitna River Salmon Run Apportionment Study.

**F-S3:** Middle River Habitat Utilization Study.

**F-S4:** Chinook Salmon and Presence Above Devils Canyon.

**F-S5:** 2012 Instream Flow Planning Study.

**F-S6:** Cook Inlet Beluga Whale Anadromous Prey Analysis

#### **5.2.5. Wildlife Resource Issues**

**W1:** Potential loss and alteration of wildlife habitats, including key habitat features such as den sites and mineral licks, from Project construction and operation.

**W2:** Potential physical and behavioral blockage and alteration of movements due to reservoir water and ice conditions; access and transmission corridors; new patterns of human activities.

**W3:** Potential changes in wildlife mortality rates due to Project-related fluctuating water and ice conditions in the reservoir and downstream river reaches.

**W4:** Potential impact of changes in predator and prey abundance and distribution related to increased human activities and habitat changes resulting from Project development.

**W5:** Potential impacts to wildlife from changes in hunting, vehicular use, noise, and other disturbances due to increased human presence resulting from Project development.

**W6:** Potential impacts to special status wildlife species.

#### 5.2.5.1. *Big Game Study*

##### Study Rationale and Objective

The overall study objective is to build on existing information and develop current information on abundance, distribution, movements, and habitat use for moose, caribou, Dall's sheep, black bears, brown bears, and wolves to accurately evaluate potential Project-related effects on big game resources in the upper and middle Susitna River basins. The information developed from this study, in combination with other resource studies (e.g., vegetation mapping, wetland mapping, wildlife-habitat relationships, salmon spawning distributions, big game harvest locations, distribution of sensitive wildlife habitats), will provide a basis for impact assessments, development of mitigation, and will inform harvest and population management decisions. Many wildlife studies conducted for the APA Susitna Hydroelectric Project focused on big game mammals because of their ecological importance and because of management concerns for human use, both consumptive (subsistence and sport hunting) and non-consumptive (wildlife viewing).

The specific objectives of the study include:

##### Moose

- Complete current population estimates for moose for Upper and Middle Susitna River basins and road and transmission corridors.
- Use spatial analysis of seasonal range use and movements based on telemetry data to provide information on moose habitat use, movements, and extent of winter range through the Project area.
- Measure moose forage quality and browse intensity in the impoundment zone, access routes, and transmission corridors to quantify habitats that would be lost or altered, estimate timing of use and degree of dependency of resident and migratory populations, compare habitat quality to other adjacent regions, and develop mitigation.

##### Caribou

- Complete current population estimates for caribou in the Project area including caribou from Nelchina and Delta caribou herds, especially estimates of sub-herd numbers and distribution in areas north of the impoundment area.
- Evaluate current and historic Nelchina and Delta caribou herd identification, movements, traditional migration routes across the proposed impoundment area, and sensitive seasonal distributions such as calving ranges.



- Use spatial analysis of seasonal range use and movements based on current telemetry data from GPS/satellite collared caribou to provide information on current caribou habitat use and movements throughout the Project area.

### Dall's Sheep

- Complete current population estimate and delineate seasonal ranges for Dall's sheep in mountain regions next to the Project area, including road and transmission corridors.
- Assess current condition and use of mineral licks on the lower Jay Creek.

### Brown and Black Bears

- Complete current population estimates for bears in the Project area.
- Evaluate berry production in the impoundment zone and access corridors.
- Evaluate use of salmon spawning streams downstream from the proposed dam location including the use of Prairie Creek.
- Identify denning areas.

### Wolves

- Complete current population estimates for wolves, determine number of packs and individuals using the Project area, including road and transmission corridors.
- Use spatial analysis of telemetry data to map pack territories and movements.
- Identify locations of dens, rendezvous sites, hunting areas, and other essential areas for each pack.

### Study Area

The study area includes all areas that will be directly or indirectly affected by Project construction and operations; including facility sites, access roads, transmission lines laydown/storage areas, the inundation zone for the reservoir, and the downstream Susitna River.

### Study Components

The study will include the following study components:

- Identify, compile, and evaluate existing population data.
- Spatial analyses of existing telemetry data to determine seasonal habitat use and movements.
- As appropriate, aerial and ground surveys may be used to estimate populations in the upper and middle Susitna River basins, and road and transmission corridors.
- As appropriate, ground-based surveys may be used to evaluate moose forage quality and browse intensity in the impoundment zone, access routes, and transmission corridors.
- As appropriate, ground-based surveys may be used to evaluate bear use of salmon spawning streams in the middle Susitna River Basin.
- Ground-based surveys to evaluate significant habitat features such as current use of the Jay Creek mineral licks.

- Data reporting will include:
  - Spatial and temporal distribution maps for big game mammals with emphasis on delineation and temporal use of sensitive habitats and consistently used movement corridors.
  - Detailed mapping of moose foraging habitats including quantity and quality information for impact assessment and development of mitigation.
  - Accurate population estimates for big game mammals using the Project area.

#### 5.2.5.2. *Furbearer Study*

##### Study Rationale and Objectives

The overall study objective is to develop current information on abundance, distribution, habitat use and movements of terrestrial (wolverine, marten, lynx, red fox, and coyote) and aquatic (beaver, muskrat, river otter, and mink) furbearing mammals to evaluate potential Project-related effects on habitat loss and alteration; blockage or alteration of movements; changes in mortality; and changes in human harvest and disturbance. The information developed from this study, in combination with other resource studies (e.g., vegetation mapping, wetland mapping, wildlife-habitat relationships, fish distributions, furbearer harvest locations, distribution of sensitive wildlife habitats), will provide a basis for impact assessments. Many wildlife studies conducted for the original SHP focused on furbearing mammals because of their ecological importance and management concerns for human use, both consumptive (subsistence and sport hunting) and non-consumptive (wildlife viewing).

The specific objectives of the study may include:

- Evaluate existing data on distribution, habitat use, and movements of wolverine, beaver, river otters, mink, muskrat, and other furbearers.
- Complete current estimate of active beaver colonies in the middle and lower river.
- Complete spring surveys to evaluate overwinter survival of beavers.
- Evaluate potential marten home range and dispersal movements between old forest stands.

##### Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations; including facility sites, access roads, laydown/storage areas, the inundation zone for the reservoir, and the downstream Susitna River.

##### Study Components

The study will include the following study components:

- Identification and compilation of existing terrestrial and aquatic furbearer population size, seasonal distribution, suitable habitats, and movement data.

- Spatial analyses of existing data to determine location of sensitive habitats such as beaver lodges and cash sites; and river otter, red fox and coyote den sites.
- Winter track surveys to estimate wolverine and other furbearer population size in the upper and middle Susitna River basins, including road and transmission corridors.
- Aerial and ground-based surveys to document distribution and activity of beaver colonies and overwinter survival.
- Data reporting will include:
  - Spatial and temporal distribution maps for furbearers with emphasis on delineation of seasonal ranges and suitable habitat.
  - Detailed mapping of beaver lodges; river otter, red fox, and coyote den sites.
  - Accurate population estimates for furbearers using the Project area.

### 5.2.5.3. *Small Game Mammal and Upland Gamebird Study*

#### Study Rationale and Objectives

The overall study objective is to develop current information on abundance, distribution, habitat use, and movements of snowshoe hare, ptarmigan and grouse to evaluate potential Project-related effects on habitat loss and alteration; blocked movements, changes in mortality; and changes in human harvest. The information developed from this study, in combination with other resource studies (e.g., vegetation mapping, wetland mapping, wildlife-habitat relationships, predator distributions, and harvest locations), will provide a basis for impact assessments. Currently there is little information on potential effects of increased human access on these small game resources. The area has limited human access and use and may provide refugia and source populations of snowshoe hare, ptarmigan and grouse for neighboring regions with higher human use and harvest levels.

The specific objectives for snowshoe hare, ptarmigan, and grouse include:

- Evaluate existing data on distribution, habitat use, and movements.
- Evaluate seasonal habitat use, potential habitat fragmentation effects, and dispersal capabilities.

#### Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations; including facility sites, access roads, laydown/storage areas, the inundation zone for the reservoir, and the downstream Susitna River.

#### Study Components

The study will include the following study components:

- Identification and compilation of existing population, distribution, habitat, and movement data.
- Spatial analyses of existing data to determine distribution of suitable habitats.

- Winter track surveys to estimate snowshoe hare populations throughout the Project area.
- Aerial and ground-based surveys to document abundance, distribution, and productivity of small game and upland gamebirds.
- Telemetry samples to document seasonal habitat use, seasonal movement patterns, and dispersal capabilities.
- Data reporting will include:
  - Spatial and temporal distribution maps with emphasis on delineation of suitable and used habitats.
  - Detailed mapping of seasonal and dispersal movements with evaluation of habitats crossed.
  - Accurate population estimates for the Project area and adjacent harvested areas.

#### 5.2.5.4. *Harvest Study for Big Game, Furbearers, Small Game Mammals and Upland Gamebirds*

##### Study Rationale and Objectives

The overall study objective is to compile and evaluate past and current human use and harvest locations and levels within the Project area for big game mammals—especially moose and caribou, furbearers, snowshoe hare, ptarmigan and grouse to evaluate potential Project-related effects on changes in access and related changes in human harvest. The information developed from this study, in combination with other resource studies (e.g., big game use and movements in the Project area; furbearer, small game mammal and upland gamebird use of the Project area; waterfowl use of the Project area; vegetation and wetland mapping; wildlife-habitat relationships; and predator distributions), will provide a basis for impact assessments, and development of mitigation. Currently there is little information on potential effects of increased human access on these game resources, although it has been noted that human access has increased since the studies completed for the APA Susitna Hydroelectric Project in the 1980s. The current Project area has limited human access and may provide refugia and source populations for neighboring regions with higher human use and harvest levels.

The specific objectives for moose, caribou, Dall's sheep, bears, wolves, and furbearers include:

- Evaluate and compile existing past and current data on harvest effort, harvest locations, hunter access, and hunter mode of travel.
- Compare current harvest locations to current patterns of seasonal habitat use and movements.

The specific objectives for small game mammals and upland gamebirds include:

- Evaluate and compile existing past and current data on harvest effort, harvest locations, hunter access, and hunter mode of travel.
- Compare current harvest locations to current patterns of small game mammals and upland gamebird abundance, seasonal habitat use, and dispersal capabilities.

### Study Area

The study area includes ADF&G, Game Management Units (GMU) 13A, 13B, 13E and any additional areas that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas and the inundation zone for the reservoir.

### Study Components

The study will include the following study components:

- Identification and compilation of existing harvest and hunter effort within appropriate harvest units.
- Development of additional data collection and harvest monitoring for hunters and trappers currently using the Project area.
- Spatial analyses of existing data to determine and compare past and current distribution of hunter and trapper reported harvests and reported effort.
- Comparison of current harvest patterns to current abundance and seasonal movements of big game, furbearers, small game mammals and upland gamebirds.
- Data reporting will include:
  - Spatial and temporal distribution maps of hunter/trapper harvest and effort by game species within minimum reporting units (Uniform Coding Units or subunits).
  - Current harvest monitoring reports including location, mode of transportation, effort expended, and game species harvested within GMUs affected by the Project and surrounding units for comparison.

#### *5.2.5.5. Eagle and Raptor Study*

### Study Rationale and Objectives

The overall study objective is to develop current information on distribution, abundance, and habitat use including active nest locations for bald and golden eagles, peregrine falcons, and stick nesting raptors to evaluate potential Project-related effects on habitat loss and alteration; changes in mortality; and changes in human disturbance. The information developed from this study, in combination with other resource studies (e.g., vegetation mapping, wetland mapping, wildlife-habitat relationships, fish distribution studies), will provide a basis for impact assessments and development of mitigation including seasonal avoidance of active nest sites for birds of management or conservation concern.

The specific objectives of the study include:

#### Bald and Golden Eagles

- Evaluate existing data on distribution, established nest sites and pair territory locations, and foraging habitats.
- Complete current surveys to locate active nests and alternative nest sites within habitats affected by the impoundment, access road corridor, and transmission line corridors.
- Complete current surveys to document fall and winter communal roost sites.
- Evaluate seasonal habitat use.

#### Cliff Nesting Raptors

- Evaluate existing data on nest site locations, identify potentially suitable cliff nesting habitat locations.
- Complete current nest surveys at identified suitable cliff habitats to document use throughout the Project area.

#### Other Raptors and Owls

- Evaluate existing data on nest site locations, identify potentially suitable nesting habitats.
- Complete current nest surveys in potentially suitable nesting habitats during late-winter early spring for owls and during early spring for other raptors throughout habitat potentially affected by the Project.

#### Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations; including facility sites, access roads, laydown/storage areas, the inundation zone for the reservoir, and the downstream Susitna River.

#### Study Components

The study will include the following study components:

- Identification and compilation of existing historical nest site locations, and locations of suitable tree and cliff nesting habitats.
- Spatial analyses of existing data to determine distribution of suitable habitats.
- Late winter aerial and ground-based surveys for owls.
- Early spring (prior to leaf out) aerial and riverine-based surveys to document active tree and cliff nest sites.
- Late-spring and summer surveys to verify and monitor nest activity, and search for additional nests.
- Data reporting will include:
  - Compilation of past eagle and other raptor nest locations with survey extents to compare to current survey data.

- Early reporting of current nest locations and activity for eagles with coordinates and appropriate buffer zones to protect active eagle nests from disturbance during field studies.
- Spatial summary and mapping of suitable forest, riparian, and cliff habitats to evaluate extent of suitable nesting habitats within the Project area.

#### 5.2.5.6. *Waterbirds, Seabirds, and Waterfowl Study*

##### Study Rationale and Objectives

The overall study objective is to develop current information on nesting, brood-rearing, and migration staging habitat use by loons, grebes, gulls, terns, geese, swans, and ducks. The information developed from this study, in combination with other resource studies (e.g., vegetation mapping, wetland mapping, wildlife-habitat relationships, fish distribution studies), will provide a basis for impact assessments.

The specific objectives of the study include:

- Evaluate existing data on nesting, brood-rearing, and migration staging distributions for waterbirds and waterfowl.
- Complete current surveys for nesting, brood-rearing, and migration staging habitats to determine abundance of waterbirds and waterfowl throughout the Project area.
- Evaluate seasonal habitat use and movement patterns.

##### Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations; including facility sites, access roads, laydown/storage areas, the inundation zone for the reservoir, and the downstream Susitna River.

##### Study Components

The study will include the following study components:

- Identification and compilation of existing historical nesting, brood-rearing and migration staging locations.
- Spatial analyses of existing data to determine distribution of high use habitats.
- Aerial spring surveys to determine distribution and abundance of nesting waterbirds and waterfowl.
- Ground-based surveys for nesting harlequin ducks and brood-rearing harlequin ducks and mergansers along the upper and middle Susitna River and major tributaries.
- Aerial summer surveys to determine distribution, abundance, and habitat use for brood-rearing waterbirds, seabirds, and waterfowl.
- Aerial fall surveys to determine distribution, abundance, and habitat use for migration staging by waterbirds and waterfowl.
- Data reporting will include:

- Compilation and delineation of past waterbird and waterfowl nesting habitats, brood-rearing areas, and migration staging locations with survey extents to compare to current survey data.
- Early reporting of current nest locations and activity for harlequin ducks in riparian habitats subject to field studies with coordinates and appropriate buffer zones to protect active nests from disturbance during field studies.
- Spatial summary and mapping of suitable aquatic and wetland habitats to evaluate extent of suitable nesting, brood-rearing, and migration staging habitats within the Project area.

#### 5.2.5.7. *Landbird and Shorebird Study*

##### Study Rationale and Objectives

The overall study objective is to develop current information on nesting distribution, abundance, and current use of wetland and upland habitats by landbirds and shorebirds. The information developed from this study, in combination with other resource studies (e.g., vegetation mapping, wetland mapping, bird-habitat relationships), will provide a basis for impact assessments.

The specific objectives of the study include:

- Evaluate existing data on nesting and migration staging habitats for landbirds and shorebirds.
- Complete current surveys for nesting and migration staging habitats to determine distribution and abundance of landbirds and shorebirds throughout the Project area.
- Evaluate seasonal habitat use and migration routes.

##### Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations; including facility sites, access roads, laydown/storage areas, the inundation zone for the reservoir, and the downstream Susitna River.

##### Study Components

The study will include the following study components:

- Identification and compilation of existing historical nesting habitat association, and migration staging areas.
- Spatial analyses of existing data to delineate habitats used by a high diversity of birds.
- Ground-based surveys for breeding landbirds and shorebirds throughout the Project area.
- Data reporting will include:
  - Compilation and delineation of high density and diversity bird habitats.
  - Delineation of potential migration routes and staging habitats.



### 5.2.5.8. *Non-Game Species of Conservation Concern Study*

#### Study Rationale and Objectives

The objective of this study is to develop current information on distribution, abundance, and habitat use in the Project area for non-game animals that have been identified as Covered Species in Alaska's Comprehensive Wildlife Conservation Plan and/or as species of concern by various groups as defined in the FERC/USFWS MOU on migratory birds. Preliminary reviews have identified little brown bats, wood frogs, and certain birds as species of concern that occur within the Project area. The information developed from this study, in combination with other resource studies (e.g., vegetation mapping, wetland mapping, wildlife-habitat relationships), will provide a basis for impact assessments and development of mitigation.

The specific objectives of the study include:

#### Little Brown Bat

- Evaluate existing data on distribution, habitat use, and movements.
- Evaluate geologic and topographic data to identify areas potentially containing Karst topography with cave features within the Project area.
- Complete current distribution and habitat use surveys for bat species in the inundation zone.

#### Wood Frog

- Evaluate existing data on distribution, habitat use, and movements.
- Complete current distribution surveys for wood frogs throughout the Project area.

#### Small Mammals

- Evaluate existing data on distribution, habitat use, and movements.
- Complete distribution and abundance surveys within the inundation zone, and along road and transmission corridors.

#### Birds

- Compile listing of migratory bird species of concern and identify occurrence data and distribution of suitable habitats within the Project area based on existing data on distribution, habitat use, and movements.
- Complete current population and habitat use estimates for birds of concern throughout the Project area.

#### Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations; including facility sites, access roads, laydown/storage areas, the inundation zone for the reservoir, and the downstream Susitna River.

## Study Components

The study will include the following study components:

- Identification and compilation of existing population, distribution, habitat, and movement data.
- Spatial analyses of existing data to determine distribution of suitable habitats potentially affected by the Project.
- Acoustic surveys to identify areas used by bats in the Middle and Upper Susitna River areas.
- Auditory surveys for wood frogs in the Project area during the spring breeding season around waterbodies and wetlands in the impoundment zone, in the upper river, in riparian habitats in the middle river, and along road and transmission corridors.
- Trapping surveys for small mammals, including the Alaska tiny shrew, within the impoundment zone, facility sites, road and transmission corridors.
- Various surveys for raptors, owls, waterbirds, seabirds, waterfowl, shorebirds, and landbirds as applicable with species specific surveys if standard methods are insufficient to determine presence in the Project area (such as harlequin duck, or American dipper surveys).
- Data reporting will include:
  - Early reporting of current nest locations and activity for owls and other raptors, loons, swans, and harlequin duck nests with coordinates and appropriate buffer zones to protect nest from disturbance during field studies.
  - Spatial delineations of habitats used by bats, wood frogs, Alaska tiny shrew and bird species of concern.

### *5.2.5.9. 2012 Wildlife Resource Study Components*

Some of the components of the proposed studies discussed above will be initiated in 2012 in order to help inform the formal study plans. AEA is currently working with the resource agencies to determine the full scope of this work. The resulting studies or study components will be included in the Proposed Study Plan when it is filed with FERC.

**W-S1:** Wildlife Habitat Use and Movement (corresponds to Big Game Study).

**W-S2:** Past and Current Big Game and Furbearer Harvest Study.

**W-S3:** Eagle Nests and Raptor Nest Study.

### **5.2.6. Botanical Resource Issues**

**B1:** Losses of vegetation and wetland communities and productivity from reservoir inundation and other Project facilities development (direct effects).

**B2:** Changes to vegetation and wetland communities along access roads, transmission corridors, and reservoir edges from changes in solar radiation, temperature moderation, erosion and dust deposition, reservoir fluctuation, pathogen dispersal and abundance.

**B3:** Potential introduction of invasive plants due to Project construction.

**B4:** Potential changes in wetlands, wetland functions, riparian vegetation, and riparian succession patterns related to altered hydrologic regimes below the dam.

**B5:** Potential changes in rare plant populations related to the development of the reservoir, access and transmission facilities, and construction and operation activities including erosion and dust deposition.

#### 5.2.6.1. *Vegetation Mapping Study*

##### Study Rationale and Objectives

The overall study objective is to develop vegetation and habitat GIS cover data both using existing information and developing Project-specific aerial image interpretation. The information developed from this study, in combination with other resource studies (e.g., wetlands/riparian study, rare plant study, invasive plant study, and various wildlife habitat studies), will provide a basis for vegetation/habitat management decisions, impact analyses, and mitigation development.

The specific objectives of the study include:

- Determine the appropriate mapped scales, areal extents, and the Alaska Vegetation Classification level for vegetation mapping.
- Develop vegetation maps at suitable scales.
- Provide habitat acres and distribution to support the development of related studies.

##### Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas, and the inundation zone for the reservoir. The study area also includes all downstream areas that will be included in riparian vegetation and wildlife habitat studies.

##### Study Components

The study will include the following study components:

- Identification of available current and historical vegetation and land cover mapping data.
- Determining appropriate mapped scales, areal extents, and the Alaska Vegetation Classification level for vegetation mapping.
- Preliminary vegetation mapping from recent aerial images.
- Field verification of mapped vegetation.

- Identify locations for ground-based botanical, rare plant, invasive plant, and moose browse inventory data collection.
- Reporting of study results, including reporting that is coordinated with other pertinent studies.

#### 5.2.6.2. *Wetland-Riparian Study*

##### Study Rationale and Objective

The overall study objective is to characterize wetland and riparian habitat, develop a wetland functional assessment, and identify potential changes related to an altered hydrologic regime and from disturbance related to Project construction and operations. The information developed from this study, in combination with other resource studies (e.g., aquatic habitat, vegetation mapping, hydrology, geomorphology, and ice processes studies), will provide a basis for wetland and riparian management decisions, impact analyses, and mitigation development.

The specific objectives of the study include:

- Determine the appropriate scales and areal extents for wetland delineations in consultation with USACE and compile available existing wetland mapping.
- Conduct field surveys to collect site-specific wetland data.
- Develop a wetland functional assessment.
- Determine natural fire spread patterns in the reservoir reach of the Susitna River.
- Evaluate the relationship of wetland and riparian vegetation to the hydrologic regime.

##### Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas, and the inundation zone for the reservoir. The study area for riparian vegetation, but not for wetland delineation, also includes representative reaches of the Susitna River downstream of the dam site.

##### Study Components

The study will include the following study components:

- Determine appropriate scales and areal extents for wetland delineations in consultation with USACE.
- Compile available wetland mapping at various scales for development of wetland delineations based on current aerial photography.
- Incorporate data from the Vegetation Mapping Study and available data on natural fire patterns along the reservoir and the Susitna River.
- Identify riparian and wetland delineation field sites and data from the 1980s studies for potential resampling.
- Conduct field surveys for wetland delineations, wetland functional assessments and riparian vegetation conditions.

- Report study results, including results that are coordinated with other pertinent studies (hydrologic, ice processes, geomorphology etc.).

#### 5.2.6.3. *Rare Plant Study*

##### Study Rationale and Objectives

The overall study objective is to identify the location of rare plant populations in the Project area. The information developed from this study, in combination with other resource studies (e.g., vegetation mapping and wetland studies), will provide a basis for habitat management decisions, impact analyses, and mitigation measures.

The specific objectives of the study include:

- Identify the locations of rare plant populations in the Project area.
- Identify potential habitat enhancement locations.

##### Study Area

The study area includes all areas that can safely be accessed that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas, and the inundation zone for the Watana Reservoir.

##### Study Components

The study will include the following study components:

- Identification of target species.
- Identification of the study area and locations for field surveys.
- Conducting field surveys for the target species.
- Reporting of study results, including reporting that is coordinated with other pertinent studies.

#### 5.2.6.4. *Noxious Weed Study*

##### Study Rationale and Objective

The overall study objective is to identify the location of target invasive plant populations in the Project area. The information developed from this study, in combination with other resource studies (e.g., vegetation mapping and rare plant studies), will provide a basis for habitat management decisions, impact analyses, and mitigation measures.

The specific objectives of the study include:

- Identify the locations of populations of target invasive weed species in the Project area.
- Identify potential treatment locations.

## Study Area

The study area includes all areas that can safely be accessed that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas, and the inundation zone for the Watana Reservoir.

## Study Components

The study will include the following study components:

- Identification of target invasive plant species.
- Identification of the study area and locations for field surveys.
- Conducting field surveys for the target invasive plant species.
- Reporting of study results, including reporting that is coordinated with other pertinent studies.

### *5.2.6.5. 2012 Botanical Resources Study Components*

In addition to the above proposed botanical studies, the following studies or study components will be started in early 2012 in advance of formal Study Plan development for the Project. AEA is currently working with the resource agencies to determine the full scope of this work. The resulting studies or study components will be included in the Proposed Study Plan when it is filed with FERC.

**B-S1:** Vegetation Mapping and Wildlife Habitat Mapping Study.

**B-S2:** Riparian Study.

**B-S3:** Wetland Mapping.

### **5.2.7. Aesthetic Resource Issues**

**A1:** Potential effects on visual resources due to Project development and operation.

#### *5.2.7.1. Aesthetic Resources Study*

## Study Rationale and Objectives

APA's 1985 Susitna Settlement Plan identified visual resource study questions and topical issues associated with hydroelectric project development. These questions and issue areas provide additional insight into information needs that will be useful to understanding the larger visual resources issue as described above along with identifying the significance of potential new noise sources resulting from construction and operation of the Project. The main Project facilities (dam, powerhouse, reservoir, camp, etc.) are located in a remote area a way from developed areas, however, the terminus portions of the Project access road and transmission facilities along with railroad siding facilities would be close to sparsely developed areas. Many of the lands

within the reservoir area and potentially along access and transmission routes are on BLM lands. The BLM manages visual resources of its lands through its Visual Resource Management (VRM) system. The construction and operation of the Project will affect the scenic landscape within these settings and noise will be generated from the transportation of materials and construction personnel in the area. To understand the nature and magnitude of these changes, the following broad objectives have been defined for the visual resources studies, corresponding to many of the 1985 study efforts.

The specific objectives of the study include:

- Understanding the significance of impacts of borrow and spoil areas, transmission lines, access roads, construction camps, and dams on scenic resources.
- Identify potential effects on scenic resources due to project operation and maintenance activities.

### Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas, and the inundation zone for the reservoir. Additionally, the transportation corridors that will be used for construction will be within the study area for evaluations of potential increases in noise.

### Study Components

The visual resource study process is outlined in APA's 1985 Susitna Settlement Plan and 1985 Susitna Hydroelectric Project FERC License Application. That process was based on the U.S. Forest Service's Visual Resource Management System (USFS 1974) and refined through field reconnaissance and professional judgment. Information generated from new visual resource studies can be incorporated into the BLM's VRM, as the BLM holds land in the Project area, not the Forest Service. Many aspects of that process are similar to the BLM's VRM system and those components including identifying:

- Landscape character types and notable natural features within the Project area will be identified and evaluated based on a high, medium, and low basis for their aesthetic value (a relative measure of scenic quality and visual sensitivity) and their visual absorption capability (a relative ability of a landscape to absorb physical change).
- The aesthetic value and visual absorption capability ratings for each landscape character type are then combined to create composite ratings grouped into categories and used to determine the degree of visual impact and potential for mitigation.

The visual resource studies will entail identifying existing landscape character, scenic integrity levels, scenic attractiveness, visual priority routes and use areas along with key view points. Landscape visibility maps and visual absorption capability classes would be created from the studies. These items will be refined through field reconnaissance and professional judgment, and used to determine the degree of visual impact and potential for mitigation of Susitna-Watana Hydroelectric Project features.

Several resource management plans may be useful and are likely relevant to visual resources in the Susitna-Watana Hydroelectric Project vicinity. These plans will be obtained and evaluated for potential use in the analysis including:

- 1985 Susitna Hydroelectric Project Settlement Plan.
- 1985 Susitna Hydroelectric Project FERC License Application.
- 2010 Susitna Matanuska Area Plan.
- ADNR Nelchina Public Use Area documents (various).
- 2009-2014 Alaska State Comprehensive Outdoor Recreation Plan.
- Recreation and Tourism in South-Central Alaska: Patterns and Prospects.
- ADF&G documents (various).
- BLM East Alaska Resource Management Plan and Environmental Impact Statement.
- 2006 Denali State Park Management Plan.
- Denali National Park documents (various).
- Cook Inlet Regional Corporation documents (various).

#### *5.2.7.2. 2012 Aesthetic Resources Study Components*

Some of the components of the proposed studies discussed above will be initiated in 2012 in order to help inform the formal study plans. AEA is currently working with the resource agencies to determine the full scope of this work. The resulting studies or study components will be included in the Proposed Study Plan when it is filed with FERC.

**A-S1:** Inventory BLM VRM designations

**A-S2:** Identify initial key viewing areas and key viewpoints

#### **5.2.8. Recreation and Land Use Resource Issues**

**R1:** Potential flow-related effects to river access and navigation within and downstream of reservoir.

**R2:** Potential changes in the timing and extent of winter use of the river corridor due to Project-related changes in ice cover.

**R3:** Potential effects on fishing opportunities due to the Project.

**R4:** Potential effects on hunting and trapping opportunities due to the Project.

**R5:** Potential effects of recreation use by construction workers on fish and wildlife in the Project vicinity.

**R6:** Potential need to accommodate and manage increased recreation use due to increased access to the Project area.

**L1:** Changes in land use and ownership due to construction and operation of the Project.



**L2:** Consistency of the Project with relevant land use and management plans.

### 5.2.8.1. *Recreation and Land Use Studies*

#### Study Rationale and Objectives

The proposed Project will occupy a combination of BLM, State, ANCSA Corporation and possibly other private lands. Special use and occupancy permits will be needed from the BLM and State for use of these lands, and private lands will need to be acquired for some of the Project facilities. The proposed studies are aimed at providing information needed to guide recreation and land use and occupancy management decisions for the Project. The land use study provides land use information about the Project area that will be incorporated into the FERC license application and potentially right-of-way permits and use and occupancy applications submitted to the BLM and other similar information determined in conjunction with ANCSA Corporations and potentially other private land owners affected by the Project.

APA's 1985 Susitna Settlement Plan identified recreation and land management study questions and potential issues associated with hydroelectric project development. These study questions and issues which tier off of the Project issues identified in Section 5.2.7, are presented below as potential study objectives:

- Assess potential Project-related impacts on fishing, including the availability of fish, access, and quality of experience (R2).
- Evaluate potential Project-related impacts on recreational hunting and trapping, including the availability of resources, access, and quality of experience (R3).
- Assess potential Project-related impacts on boating and pack rafting downstream of Devils Canyon, including access to the water and possible impediments to navigation (R1).
- Evaluate potential Project-related impacts on non-consumptive activities (e.g., bird watching and hiking), including availability of resources, access to the resources, and quality of the experience.
- Assess potential Project-related impacts of construction worker recreational activities on fish and wildlife resources in the Susitna River watershed (R4).
- Evaluate potential Project-related impacts due to increases in recreational use resulting from improved access, creation of the reservoir, altered stream flow, and the need to accommodate and manage recreation use.
- Assess potential changes/effects to recreationist and local resident access patterns from potential Project-related changes in freeze-up conditions in the middle reach of the Susitna River.
- Evaluate the feasibility and desirability of restrictions on recreation to reduce impacts on fish and wildlife resources in the Susitna River watershed.
- Formulation of a recreation plan.

## Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas, and the inundation zone for the reservoir. Additionally, the transportation corridors that will be used for construction will be within the study area for evaluations of potential changes to recreation resources within a broader study area along with other regional recreation resources that could be affected by development of the Project and associated new recreation opportunities.

## Study Components

The recreation resource study process has components identified from a variety of sources including APA's 1985 Susitna Settlement Plan, 1985 Susitna Hydroelectric Project FERC License Application, and AEA's "Socioeconomic, Recreation, Air Quality, and Transportation Data Gap Analysis." The general approach involves review of pertinent recreation literature, discussions regarding recreation-related plans and consultation with state and federal resource agencies and ANCSA Corporations, and completion of informal recreation and resource use surveys to support demand evaluation efforts. Additionally, a field reconnaissance program will be necessary to document, evaluate, plan and verify locations of proposed recreation sites. A six-step approach taken in the 1980s provides the outline to the proposed study as follows:

- Step 1: Determined study objectives and developed a detailed work plan. This activity included review of all relevant agency documents and their objectives and their objectives, and interviews with key agency personnel.
- Step 2: Inventoried existing recreation facilities and plans, and estimated future recreation demand with and without the Project.
- Step 3: Inventoried potential recreation sites within the Project area. This activity involved a review of relevant documents and previous studies, and extensive on-site investigations.
- Step 4: Evaluated recreation opportunities at the potential sites identified in Step 3. The sites were evaluated by defining the qualitative and quantitative aspects of their recreation potential based on information from steps 2 and 3.
- Step 5: Refined the opportunity evaluation and recommended Recreation Plan and alternatives.
- Step 6: Developed an implementation plan, including phasing, demand monitoring, and cost estimate.

The approach taken in the 1980s APA Susitna Hydroelectric Project will be replicated for the currently proposed Project.

As recommended in the Gap Report the following analyses will be updated (as part of Step 2):

- Reasonably foreseeable future recreation facilities. Private recreation facilities information.
- Recreation use, satisfaction, and attitude survey.
- Alaska Railroad passengers and whistle-stop use.
- Lodge owner survey.

- Air taxi survey.
- Guide survey.
- Survey of boaters and pack rafters exiting at Susitna Landing; Talkeetna Boat Launch and Airstrip; and Willow Creek.
- Current and future recreation commercial recreation use of Project area.
- Projected demand for recreation opportunities in the Project area.

The land use study will identify current land uses and land ownership information for all Project areas. These include open space, rural and urban residential uses, commercial and industrial uses, agriculture including irrigated farmland and transportation and utility use lands affected by the Project. Recent aerial photography, title searches, and GIS data showing land status will be used to determine the primary uses and where these land use types are affected. State, Federal and Borough plans will be reviewed and evaluated for any potential conflicts and/or consistencies with Project construction and operation plans, and the results will be quantified in tables.

The land use studies for the Project will include the following:

- Identification of all relevant comprehensive plans and land management plans, and a discussion of the Project's consistency or lack of consistency with each plan.
- If not consistent, justification for accepting the lack of consistency.
- Depiction of uses of land and resources adjacent to the project using maps, air photos, or drawings that clearly delineate the project boundary and boundaries of public lands.
- Documentation of consultation with agencies having land management or planning/zoning authority in the area.

The studies will rely on recreational information, comprehensive plans, and land management plans described above, as well as other items revealed during the FERC licensing process.

Also, in cooperation with the ANCSA Corporations, resource agencies, the MSB, and other interested entities, AEA will develop appropriate land use and management plans for the Project. A comprehensive land use management plan, if needed, could help AEA, and other land owners, and FERC to be able to identify reasonable balance between developmental and recreational interests, and wildlife and fisheries resource values.

Several resource management plans may be useful and are likely relevant to visual resources in the Project vicinity. These plans will be obtained and evaluated for potential use in the analysis including:

- 1985 Susitna Hydroelectric Project Settlement Plan.
- 1985 Susitna Hydroelectric Project FERC License Application.
- Susitna-Matanuska Area Plan Public Review Draft.
- MSB Comprehensive Development Plan: 2005 Update.
- ADNR Nelchina Public Use Area documents (various).
- 2009-2014 Alaska State Comprehensive Outdoor Recreation Plan.
- Recreation and Tourism in South-Central Alaska: Patterns and Prospects.

- BLM East Alaska Resource Management Plan and Environmental Impact Statement.
- 2006 Denali State Park Management Plan.
- Cook Inlet Regional Corporation documents (various).
- South Denali Visitor Center Steering Committee.
- Denali National Park and Preserve Final Backcountry Management Plan: General Management Plan Amendment and Environmental Impact Statement.
- Denali National Park and Preserve Final South Denali Implementation Plan and Environmental Impact Statement.
- Consolidated General Management Plan for Denali National Park and Preserve.
- Susitna Area Plan.

#### 5.2.8.2. 2012 Recreation and Land Use Study Components

Some of the components of the proposed studies discussed above will be initiated in 2012 in order to help inform the formal study plans. AEA is currently working with the resource agencies to determine the full scope of this work. The resulting studies or study components will be included in the Proposed Study Plan when it is filed with FERC.

**R-S1:** Identify proposed recreation developments.

**R-S2:** Informal survey of recreation providers and user groups.

**R-S3:** Collect existing recreation demand and supply data.

**L-S1:** Title and site control research.

**L-S2:** GIS base map updates.

#### 5.2.9. Cultural Resource Issues

**C1:** Potential effects on cultural resource sites including those determined eligible for listing on the National Register of Historic Places (NRHP), including impacts due to inundation of historic properties from reservoir water levels.

**C2:** Potential effects of construction, operation, and maintenance activities and increased human use on traditional/tribal spiritual areas and other traditional uses (Traditional Cultural Properties) within the Area of Project Effect (APE).

**C3:** Inadvertent disturbance or vandalism to historic properties from increased access for recreational activities.

**C4:** Aesthetic changes to surrounding historic landscape may affect the historic and cultural significance of a property.

### 5.2.9.1. Cultural Resources Studies

#### Study Rationale and Objectives

The proposed Project will impact a variety of lands and landscape features within the area. Cultural resources in the area may be affected and several sets of analyses are needed to identify the appropriate changes and mitigation, if any through a formal process under Section 106 of the National Historic Preservation Act (NHPA). The proposed studies are aimed at providing information needed to evaluate the effect of cultural resources from Project development and operations. Cultural resource study objectives for proposed Project include:

- The identification and significance of loss of affected cultural, historical and archaeological sites.
- Formulation of a cultural resources mitigation plan.

#### Study Area

The study area will be what is defined by the APE. This will include all areas that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas, and the inundation zone for the reservoir. This will also include any surrounding historic landscape or area of indirect affects.

#### Study Components

The cultural resources study investigations will identify and revisit appropriate previously and newly recorded historic properties within the APE, update the current location and condition of each site, update or create site forms for each site, develop a prioritized list of sites and evaluate whether they are eligible for the NRHP, and evaluate the Project's effects on historic properties within the proposed FERC project boundary.

The cultural resources study components will be determined in consultation with the SHPO, BLM, FERC, Alaska Native groups and other interested participants. Prior to developing this PAD, a report summarizing data gaps was developed and these gaps provide a starting point for laying out the components of a cultural resources study program. The data gaps identified for cultural resources can help serve as the basis of the studies anticipated and include the following components:

- Mapping-related Activities:
  - Synthesis of existing locational data for known sites.
  - Map site locations and environmental variables.
  - Field verification of existing site locational data.
  - Identify previous survey coverage.
  - Add existing and baseline place names.
  - Identify and map prehistoric resource locations (settlement patterns, historic land use).
- Synthesis and Analysis Activities:

- Develop historic contexts and Project significance standards (to evaluate potential eligibility to NRHP).
- Develop site locational predictive modeling.
- Update cultural chronology using radiocarbon and tephra sampling data.
- Update and retrieve legacy records and artifact collections.
- Perform oral history interviews with 1978-85 field research principals.
- Inventory 1978-85 records.
- Identify and update information related to Traditional Cultural Properties.
- Summarize Paleontological records and develop site location model.
- Develop plan for unanticipated discoveries.
- Prepare Historic Properties Management Plan.

### Relevant Cultural Resource Plans

Existing cultural resource management plans that are relevant to the proposed Project include:

- The Alaska Office of History and Archaeology's (operated under the Alaska Department of Natural Resources' Division of Parks and Outdoor Recreation) Cultural Resource Management Plan for the Denali Highway Lands.
- Mat-Su Borough Ordinance 87-007.
- Mat-Su Borough Historic Preservation Plan.
- Alaska's Historic Preservation Plan.

Additionally, cultural and historic preservation plans, resolutions and programs may exist in the record of various Native organizations.

In the Project licensing process, further research and consultation will be conducted to identify existing cultural resource plans that are relevant to the Project. Project design, construction and operation will be conducted in compliance with those plans identified.

#### *5.2.9.2. 2012 Cultural Resources Studies*

**C-S1:** Pre-Field Data Assessment and Information Gathering and Compilation.

### **5.2.10. Subsistence Resource Issues**

**S1:** Potential changes in subsistence fishing and hunting opportunities due to Project-related effects on fish and wildlife populations.

#### *5.2.10.1. Subsistence Resources Studies*

### Study Rationale and Objectives

The proposed Project will impact a variety of lands and landscape features within the area. Access to and quality of subsistence resources in the area may be affected. The proposed studies are aimed at providing information needed to evaluate the effect on subsistence resources from

Project development and operations. Potential study objectives may include: Assess potential Project-related effects on subsistence activities.

- Evaluate potential Project-related effects the population of local animal species, including potential changes in change wildlife migration patterns (addressed via Wildlife Resources studies).
- Assess potential Project-related effects on human access to the Project vicinity (addressed via Recreation Resource studies).

Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas, and the inundation zone for the reservoir. Additionally, the transportation corridors that will be used for construction will be within the study area for evaluations of potential changes to access to subsistence resources within a broader study area.

Study Components

Prior to developing this PAD, a report summarizing data gaps was developed. The data gaps identified for subsistence resources provides a listing of the specific information needs that will be moved into study plans and are listed in Table 5.2-1.

**Table 5.2-1. Summary of Subsistence Data Gaps**

| <b>Data Gap</b>   | <b>Specific Information Needed</b>   |
|---|--|
| Current subsistence information                         | Current, quantitative information on subsistence resources in the Project area   |
| Subsistence harvesters                                  | Information on subsistence harvesters who may currently be using the Project area for subsistence  |
| Subsistence use area maps                               | Current subsistence use area maps for each community, or for all species harvested in each community<br>Subsistence harvest or subsistence use area map information for communities, dispersed households and lodges along the road system and the Alaska Railroad |
| Subsistence summary tabular data                        | Access to subsistence summary tabular data from ADF&G  |
| ANILCA Section 810 analysis                             | Data adequate to prepare an ANILCA Section 810 analysis of impacts of the Project on subsistence where federal lands may be withdrawn, reserved, leased or otherwise permitted for use, occupancy or disposition   |
| Traditional Environmental Knowledge (TEK) documentation | TEK documentation specific to Project area   |
| Place names   | Research on place names in proposed Project area, using an integrated approach including archaeology, oral history and library research  |

As stated earlier in this section, current data is needed with regards to the use of the Project area for subsistence resources. Low use levels were previously reported in the area that will be directly impacted by the Project, but updated information will be needed to determine existing use levels.

Existing plans and programs regarding subsistence resources that are relevant to the proposed Project include:

- U.S. Fish and Wildlife Service's Federal Subsistence Management Program.
- Minto Flats State Game Refuge Management Plan.
- East Alaska Resource Management Plan.
- Alaska Department of Fish & Game's Wildlife Action Plan.
- Alaska Department of Natural Resources' (ADNR's) Susitna Area Plan.
- ADNR's Southeast Susitna Area Plan for State Lands.
- ADNR's Susitna Matanuska Area Plan.
- ADNR's Susitna Forestry Guidelines.
- Mat-Su Borough Forest Management Plan.
- Conservation Plan for the Cook Inlet Beluga Whale.

In the Project licensing process, additional research will be conducted to identify existing subsistence resource plans that are relevant to the Project. Project design, construction and operation will be conducted in compliance with those plans identified.

#### *5.2.10.2. 2012 Subsistence Resources Studies*

S-S1: Collect and analyze existing subsistence information. Collect existing harvest data, resource use, subsistence land use maps, place names and traditional environmental knowledge.

#### **5.2.11. Socioeconomic and Transportation Issues**

**So1:** Effects of Project construction activities on regional and local economic conditions.

**So2:** Effects of Project power output on regional and local economic conditions.

**So3:** Potential effects on economic conditions from changes in recreation use due to the Project.

**So4:** Potential effects to lifestyles in area communities related to increases in transportation and other construction-related activities due to the Project.

**So5:** Changes in direct and indirect commercial opportunities related to recreation, including fishing, hunting, and trapping, and commercial non-consumptive uses due to the Project.

**So6:** Potential for increased demand on services provided by Mat-Su Borough and communities related to Project construction and operation (e.g. health and human services, law enforcement, emergency services, education, etc).



**So7:** Secondary development impacts on undeveloped lands.

**So8:** Potential for air quality impacts during construction.

### *5.2.11.1. Socioeconomic Resources Study*

#### Study Rationale and Objectives

The proposed Project will lead changes in socioeconomic conditions in the greater Railbelt area and local communities. The proposed studies are aimed at providing information needed to evaluate the effect of changes resulting from Project development and operations.

Socioeconomic issues are broken out into general social and economic study questions and those related to the transportation systems of Alaska.

Socioeconomic issues and study questions arose when the APA Susitna Project was previously proposed in the 1980s. Many of these remain relevant to the currently proposed Project. Potential study objectives include:

- Identify potential Project-related impacts to lifestyles in area communities (So4).
- Understand potential Project-related changes to commercial opportunities related to fishing, hunting, trapping, etc. (So5).
- Identify potential Project-related changes in employment in area communities (So6).
- Estimate potential Project-related increases in demand on resources offered by the Mat-Su Borough and communities to provide public services and facilities for the Project and Project employees (So7).
- Assess potential Project-related secondary development impacts on undeveloped ANCSA Corporation lands (So8).
- Identify potential Project-related impacts resulting from residency and movement of Project construction personnel.
- Estimate potential Project-related changes in economic conditions in the region.

The degree of socioeconomic impact resulting from proposed Project construction and operation on nearby communities, as well as on local and regional economies, will be assessed.

#### Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas, and the inundation zone for the reservoir. Additionally, the transportation corridors and community bases that will be used for construction will be within the study area for evaluations along with development of the Project and its associated new recreation opportunities.

#### Study Components

The Socioeconomic study components have been identified from a variety of sources including APA's 1985 Susitna Settlement Plan, 1985 Susitna Hydroelectric Project FERC License

Application, and AEA’s “Socioeconomic, Recreation, Air Quality, and Transportation Data Gap Analysis.”

Many of the Project’s potential adverse impacts are related to the potential change in the size and location of the population. Once this has been quantified, a more detailed assessment of the socioeconomic impacts of the Project will be done. A preliminary summary of potential areas of study and inquiry specific to socioeconomic resources is provided in Table 5.2-2.

**Table 5.2-2. Potential Socioeconomic Issues Related to the Proposed Project**

| Impact Issue Category   | Issue  |
|---|--|
| Related to social environment during construction and operation         | Potential for increases in population  |
|   | Potential impacts in quality of life for existing residents (due to increased noise, traffic, development, etc.)   |
|   | Potential increase in demand for community facilities (education, public safety, etc.)   |
|   | Potential impacts on ability to fund increase in community facility demand or degradation of service quality   |
|   | Potential for increased demand for housing   |
|   | Potential impacts to community cohesion  |
|   | Availability of an additional source of electricity in case of emergency   |
|   | Potential conversion of land to industrial or transportation related purposes  |
|   | Potential impact on subsistence resources availability   |
|   | Impacts to aesthetics for residents  |
|   | Potential displacement of existing residents   |
|   | Potential for new development along access roads or the Denali Highway   |
|   | Potential for localized impacts on local particulate matter levels in the Project area due to earthmoving, aggregate mixing and construction vehicle travel on unpaved roads |
|   | Potential improvements to air quality in the Railbelt due to a lower use of fossil fuels by existing utility plants  |
| Significance of ambient air quality impacts during Project construction |  |
| Related to economy during construction and operation                    | Potential increases in income  |
|   | Potential reduction in unemployment  |
|   | Potential for lower cost energy  |
|   | Potential for increased business opportunities during construction and   |

| Impact Issue Category | Issue   |
|-----------------------|---|
|                       | operation of the Project                                    |
|                       | Potential changes in tourism and tourism related employment |
|                       | Potential for increased property tax revenue                |

Prior to developing this PAD, a report summarizing data gaps was developed. These data gaps help serve as the foundation for developing study plans and information needs for the licensing of the Project. The data gaps specific to socioeconomics are shown below on the Table 5.2-3.

**Table 5.2-3. Summary of Socioeconomic Data Gaps**

| Data Gap   | Specific Information Needed   |
|--|---|
| <b>Local Government Structure</b>  |   |
| Update local government baseline to include Denali Borough                     | <ul style="list-style-type: none"> <li>• Anderson</li> <li>• Clear</li> <li>• Cantwell</li> <li>• Healy</li> <li>• Smaller settlements (Ferry, McKinley Village, Carlo Creek, etc.)</li> </ul>                                      |
| Update baseline to incorporate MSB Community Councils                          | Identify baseline conditions and impacts for a community council level where appropriate  |
| <b>Population</b>  |   |
| Update baseline population and demographic information                         | <ul style="list-style-type: none"> <li>• Population</li> <li>• Number of households</li> <li>• Household characteristics</li> <li>• Age characteristics</li> <li>• Race/ethnicity</li> <li>• Gender</li> <li>• Education</li> </ul> |
| Project future population and demographic information                          | <ul style="list-style-type: none"> <li>• Anticipated population change with and without the Project</li> <li>• Community-level forecasts</li> </ul>   |
| Develop a construction-related population change estimate                      | Demographic information during construction period  |
| Identify minority and low-income population for environmental justice analysis | Identification of minority and low-income communities   |
| <b>Income</b>  |   |
| Update baseline income information   | <ul style="list-style-type: none"> <li>• Median household income</li> <li>• Per capita income</li> <li>• Population below poverty level</li> </ul>  |

| Data Gap   | Specific Information Needed   |
|--|---|
| <b>Housing</b>   |   |
| Update baseline housing conditions                           | <ul style="list-style-type: none"> <li>• Existing housing stock</li> <li>• Forecasted housing stock</li> <li>• Availability</li> <li>• Vacancy rates</li> <li>• Housing tenure</li> <li>• Affordability</li> <li>• Tenure</li> <li>• Residential properties near dam site, impoundment area, access corridors and transmission corridors</li> </ul> |
| Update vacancy rates   | Expected vacancy rates  |
| <b>Public Services and Facilities</b>                        |   |
| To be determined as Project is refined                       |   |
| <b>Water and Wastewater</b>                                  |   |
| Update baseline water and wastewater demand                  | <ul style="list-style-type: none"> <li>• Existing water/wastewater demand</li> <li>• Forecasted water/wastewater demand</li> </ul>  |
| Update baseline water and wastewater system capacity         | <ul style="list-style-type: none"> <li>• Planned capacity of systems</li> <li>• Number of people who can be accommodated by systems</li> </ul>  |
| Locate well locations  | Utility conflict report to determine location of wells in areas directly impacted by Project  |
| Locate private systems                                       | Identify private systems impacted by Project  |
| Update baseline and projected wastewater demand and capacity | <ul style="list-style-type: none"> <li>• Area served by system</li> <li>• Future capacity of system</li> </ul>  |
| <b>Solid Waste</b>   |   |
| Update landfill capacity information                         | <ul style="list-style-type: none"> <li>• Verify projected capacities of landfills in each borough</li> <li>• Information about replacement landfill in Denali Borough</li> </ul>  |
| <b>Police</b>  |   |
| Update baseline police coverage                              | <ul style="list-style-type: none"> <li>• Existing staffing levels</li> <li>• Projected staffing levels</li> <li>• Detachment location and coverage areas</li> <li>• Level of service standards</li> </ul>   |
| Update baseline information to include Wildlife Troopers     | <ul style="list-style-type: none"> <li>• Location of detachments</li> <li>• Existing/baseline staffing of detachments</li> <li>• Projected staffing needs</li> </ul>  |

| <b>Data Gap</b>  | <b>Specific Information Needed</b>   |
|--|--|
| <b>Fire</b>  |  |
| Update baseline fire protection in the MSB   | <ul style="list-style-type: none"> <li>• Service area boundaries</li> <li>• Station location and resources</li> <li>• Planned improvements (focus on stations/Fire Service Areas near Project area)</li> </ul> |
| Update baseline information to include Denali Borough Volunteer Fire Departments (VFD) | <ul style="list-style-type: none"> <li>• Coverage of each VPD</li> <li>• Station locations</li> <li>• Target response times</li> <li>• Anticipated date of exceeding capacity</li> </ul>                       |
| <b>Health Care</b>   |  |
| Update baseline health care information  | <ul style="list-style-type: none"> <li>• Existing health care facilities</li> <li>• Facility capacities</li> </ul>   |
| <b>Education</b>   |  |
| Update school capacity, baseline and future enrollment                                 | <ul style="list-style-type: none"> <li>• Projected school enrollment for baseline year</li> <li>• Projected school enrollment for Project design year</li> <li>• School capacity</li> </ul>                    |
| <b>Electricity</b>   |  |
| Update electric power information  | <ul style="list-style-type: none"> <li>• Current electrical power information</li> </ul>   |
| <b>Air Quality</b>   |  |
| Update Project emissions for construction permitting                                   | <ul style="list-style-type: none"> <li>• Construction equipment needs</li> <li>• Construction activity levels</li> </ul>   |
| Summarize baseline fossil-fuel generation emissions                                    | <ul style="list-style-type: none"> <li>• Estimates of criteria air pollutants for each plant</li> <li>• Breakdowns of electric generation by type</li> </ul>   |
| Add regional air quality data  | <ul style="list-style-type: none"> <li>• Summarize data for nearest regional monitors</li> <li>• Compare measured data against current National Ambient Air Quality Standards (NAAQS)</li> </ul>               |

Local and regional land use plans relevant to socioeconomic resources include:

- MSB Comprehensive Development Plan
- Denali Borough Comprehensive Plan
- Talkeetna Comprehensive Plan
- Chase Comprehensive Plan
- MSB Draft Public Facilities Plan

In the Project licensing process, additional socioeconomic resource plans may be identified that are relevant to the Project.

No specific 2012 study activities are planned, however information gathering activities will continue to inform the basis of planning for 2013 studies.

### 5.2.11.2 Transportation Study

#### Study Rationale and Objectives

The proposed Project will lead changes in transportation conditions in the greater Railbelt area and local communities. The proposed studies are aimed at providing information needed to evaluate the effect of changes resulting from Project development and operations. Potential transportation issues related to the Project are summarized in Table 5.2-4. The objective of the transportation study will be to assess the potential impacts to transportation systems resulting from the construction and operation of the proposed Project. A more detailed evaluation on impacts to the transportation system will be conducted during the licensing effort.

**Table 5.2-4. Transportation Issues Related to the Proposed Project**

| Impact Issue Category                                      | Issue   |
|--|---|
| Related to Project roads during construction and operation | Potential changes in existing transportation network  |
|  | Potential changes in access   |
|  | Potential increases in traffic volumes  |
|  | Potential increases in transportation related noise   |
|  | Potential impacts from the paving of the Denali Highway   |
|  | Potential increased in accidents due to conflicts between construction vehicles and other traffic         |
|  | Possible improvements to the transportation system needed to support construction activities              |
|  | Potential impacts to other resources due to the footprint of Project access roads and transmission lines. |
|  | Potential conversion of land to transportation related uses   |
|  | Potential for increased maintenance needs on non-Project owned roads                                      |
| Related to aviation during construction and operation      | Potential changes in air traffic patterns   |
|  | Potential for increased noise due to increase air traffic   |
|  | Potential for airport land being unavailable for non-Project related use                                  |
|  | Potential for take-off and landing delays for other airport users   |
|  | Potential for Project needs to conflict with existing airport users                                       |
|  | Potential impacts to other resources due to the footprint of aviation related Project components          |
|  | Potential for increased air traffic in the Project area   |

|   |   |
|---|---|
| Related to rail during construction and operation | Potential for increase in traffic delays at-grade crossings   |
|   | Potential for increased vehicle/train accidents due to increased volumes of rail traffic at at-grade crossings  |
|   | Potential conversion of land to transportation related uses   |
|   | Potential for increased noise due to increases in rail traffic  |
|   | Potential impacts to other resources due to the footprint of rail related Project components  |
| Related to other construction needs               | Possible improvements to the elements of the transportation system needed to support construction activities and limited access to those facilities while they are being improved |
|   | Potential conflicts with existing shippers/freight traffic depending on how construction materials are sent to Alaska   |
|   | Geographic location of impacts could occur throughout Railbelt depending on how construction materials are sent to Alaska   |

Study Area

The study area includes all areas that will be directly altered or disturbed by Project construction and operations, including facility sites, access roads, laydown/storage areas, and the inundation zone for the reservoir. Additionally, the transportation corridors and community bases that will be used for construction will be within the study area for evaluations along with development of the Project and its associated new recreation opportunities.

Study Components

Prior to developing this PAD, a report summarizing data gaps was developed. These data gaps help serve as the foundation for developing study plans and information needs for the licensing of the Project. The data gaps identified for transportation provides a listing of the specific information needs are shown below on the Table 5.2-5.

**Table 5.2-5. Summary of Transportation Data Gaps**

| <b>Data Gap</b>                          | <b>Specific Information Needed</b>  |
|--|---|
| <b>Roads</b>                             |   |
| Identify future road network             | <ul style="list-style-type: none"> <li>• Location of road</li> <li>• Roadway characteristics</li> </ul>   |
| Identify existing and future local roads | <ul style="list-style-type: none"> <li>• Location of road</li> <li>• Traffic volume</li> </ul>  |
| Identify RS 2477 trails                  | <ul style="list-style-type: none"> <li>• Location of existing RS 2477 corridors</li> <li>• Location of potential RS 2477 corridors</li> <li>• Status of corridor</li> </ul> |

|   |  |
|---|--|
| Identify existing bridges/structures                    | <ul style="list-style-type: none"> <li>• Location of bridges/structures</li> <li>• Vehicle restrictions (height, weight, width, etc.)</li> </ul>   |
| Update baseline and future traffic volumes and capacity | <ul style="list-style-type: none"> <li>• Current traffic volumes</li> <li>• Roadway configuration (number of lanes, traffic signals, etc.)</li> <li>• Turning movements</li> <li>• Anticipated growth in Project area</li> </ul>         |
| <b>Rail</b>   |  |
| Identify baseline and future capacity of ARRC system    | <ul style="list-style-type: none"> <li>• Track usage and capacity</li> <li>• Number of rail cars/trains that would move each day</li> <li>• Time of year construction would occur</li> <li>• Origin of construction materials</li> </ul> |
| <b>Aviation</b>   |  |
| Identify and locate private aviation facilities         | <ul style="list-style-type: none"> <li>• Construction equipment needs</li> <li>• Construction activity levels</li> </ul>   |
| Identify and assess airport capacity                    | <ul style="list-style-type: none"> <li>• Baseline and projected takeoffs and landings</li> <li>• Availability of unleashed land for construction staging</li> </ul>  |

Local and regional plans relevant to transportation resources include:

- Interior Alaska Transportation Plan.
- MSB Long Range Transportation Plan (LRTP).
- Palmer Airport Master Plan (AMP).
- Wasilla AMP.
- MSB Regional Aviation System Plan (RASP).

In the Project licensing process, additional transportation plans may be identified that are relevant to the Project.

No specific 2012 study activities are planned however information gathering activities will continue to inform the basis of planning for 2013 studies.

### 5.3 Relevant Plans

Section 10(a)(2)(A) of the Federal Power Act requires FERC to consider the extent to which a project is consistent with Federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the Project. Under 18 CFR 4.38, in developing its license application, AEA must identify relevant comprehensive plans and explain how and why the Project would or would not comply with such plans. The most current listing of the Commission’s List of Comprehensive Plans is from June 2011. AEA intends to evaluate the



Project with respect to the following plans identified by FERC in the June 2011 listing, along with other relevant plans described in Section 4 and 5 of this document.

Alaska Department of Fish and Game. Susitna Flats State Game Refuge, March 1988. Juneau, Alaska.

Alaska Department of Fish and Game. 1989. Northwest area plan for state lands. Fairbanks, Alaska. February 1989. 168 pp.

Alaska Department of Fish and Game. Matanuska-Susitna Borough. 1985. Susitna Basin area plan. Juneau, Alaska. June 1985. 440 pp.

Alaska Department of Fish and Game. Matanuska-Susitna Borough. 1991. Susitna Basin recreation rivers management plan. Anchorage, Alaska. August 1991. 181 pp.

Alaska Department of Fish and Game. 1998. Catalog of waters important for spawning, rearing or migration of anadromous fishes. November 1998. Juneau, Alaska. Six volumes.

Alaska Department of Fish and Game. 1998. Atlas to the catalog of waters important for spawning, rearing or migration of anadromous fishes. November 1998. Juneau, Alaska. Six volumes.

Alaska Department of Natural Resources. 1986. Matanuska Valley moose range management plan. Anchorage, Alaska. October 1986. 256 pp.

Alaska Department of Natural Resources. Alaska's Outdoor Legacy: Statewide Comprehensive Outdoor Recreation Plan (SCORP): 2009-2014. Anchorage, Alaska.

Bureau of Land Management. 1981. South central Alaska water resources study: Anticipating water and related land resource needs. Anchorage, Alaska. October 1, 1981. 97 pp.

U.S. Fish and Wildlife Service. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.