

Susitna-Watana Hydroelectric Project Document

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1.1. Characterization of Aquatic Habitats in the Susitna River with potential to be affected by the Susitna-Watana Project

1.2. Requester of Proposed Study

AEA anticipates resource agencies will request this study.

1.3. Responses to Study Request Criteria (18 CFR 5.9(b))

The following sections provide the necessary context and justification for the proposed study.

1.3.1. Describe the goals and objectives of each study proposal and the information to be obtained.

Construction and operation of the Susitna-Watana Hydroelectric Project has the potential to alter aquatic habitats in the mainstem channel at tributary confluences as well as at the inlets and outlets to side channels, sloughs, and various off-channel habitat features both in the area of the inundation upstream from the Watana Dam site and downstream in the potential zone of project hydrologic influence. The overarching goal of this study is to characterize habitats that will be altered and/or lost or gained from filling of the reservoir, hydropower operations, and associated changes in flow, water surface elevation, sediment regimes, and temperatures. The study area encompasses the entire Susitna River from the confluence with the Oshetna River to the area of tidal influence around RM 28. The objectives of this study are as follows:

1. Characterize the upper mainstem Susitna River and tributary habitat within the proposed inundation zone.
2. Characterize middle and lower river channel margin and off-channel habitats using the Susitna-Watana Project habitat classification system and standard US Forest Service (USFS) protocols, with modifications to accommodate site-specific habitats.
3. Characterize the tributary and lake habitat upstream from Watana Dam site to the Oshetna River that is currently accessible to fish from the Susitna River or that would become accessible due to inundation of existing fish passage barriers after the reservoir is filled.

1.3.2. If applicable, explain the relevant resource management goals of the agencies and/or Alaska Native entities with jurisdiction over the resource to be studied.

Aquatic resources including fish and their habitats are generally protected by a variety of state and federal mandates. In addition, various land management agencies, local jurisdictions, and non-governmental interest groups have specific goals related to their land management responsibilities or special interests. These goals are expressed in various statutes, plans, and directives:

- Alaska Statute 41.14.170 provides the authority for state regulations to protect the spawning, rearing, or migration of anadromous fish. Alaska Statute 41.14.840 regulates the construction of fishways and dams. State regulations relating to fish resources are generally administered by ADF&G. ADF&G is responsible for the management, protection, maintenance, and improvement of Alaska's fish and game resources in the interest of the economy and general well-being of the state (AS 16.05.020). ADF&G monitors fish populations and manages subsistence, sport and commercial uses of fish through regulations set by the Board of Fisheries (AS 16.05.221). ADF&G's authority for protection of fish resources and habitat is further established through the Anadromous

Fish Act (AS 16.05.871 – 901) and the Fishway Act (AS 16.05.841). In addition to the state statutes, the following resource management plans and directives provide guidance and direction for protection of fish resources and aquatic habitats on lands within or adjacent to the Project area:

- The Federal Subsistence Board, which comprises representatives of the US Fish and Wildlife Service, National Park Service, Bureau of Land Management, Bureau of Indian Affairs, and US Forest Service, oversees the Federal Subsistence Management Program (57 FR 22940; 36 CFR Parts 242.1–28; 50 CFR Parts 100.1–28), with responsibility for managing subsistence resources on Federal public lands for rural residents.
- Magnuson-Stevens Fishery Conservation and Management Act (PL 104-267) provides federal protection for Essential Fish Habitat (EFH) defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” NOAA’s National Marine Fishery Service (NOAA Fisheries) is responsible for designating EFH. In the case of anadromous fish streams (principally salmon), NOAA Fisheries has designated the water bodies identified in the Catalogue of waters important for spawning, rearing, or migration of anadromous fishes – Southcentral Region prepared by ADF&G (Johnson and Klein 2009) as the definition of EFH within freshwater habitats.
- Aquatic Resources Implementation Plan for Alaska’s Comprehensive Wildlife Conservation Strategy, September 2006. Prepared by ADF&G, Division of Sport Fish.
- Our Wealth Maintained: A Strategy for Conserving Alaska’s Diverse Wildlife and Fish Resources. Prepared by ADF&G, Juneau, Alaska. xviii+824 pp.

Management and land use plans relevant to Aquatic Resources Study Components:

- The role of state land use plans, generally administered by Alaska Department of Natural Resources (ADNR), was established by state statute (AS 38.04.005). The Susitna-Matanuska Area Plan (SMAP) and The Southeast Susitna Area Plan (SSAP) direct how ADNR will manage general state uplands and shorelands within the planning boundaries.
- The Susitna Basin Recreation Rivers Management Plan describes how ADNR will manage state land and water along six rivers including: the Little Susitna River, Deshka River, Talkeetna River, Lake Creek, Talachulitna River, and Alexander Creek. The plan documents how these six rivers will be managed over the long term including providing management intent for each river segment, new regulations for recreation and commercial use, and guidelines for leases and permits on state land.
- The Susitna Flats Game Refuge Management Plan provides ADF&G guidance to manage the refuge to protect fish and wildlife populations, including salmon spawning and rearing habitats.

1.3.3. If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Fisheries resources are owned by the State of Alaska, and the Project could potentially affect these public interest resources.

1.3.4. Describe existing information concerning the subject of the study proposal, and the need for additional information.

Existing information includes recent and historic aerial photography of the study area. The Aquatic Resources Data Gap Analysis (AEA 2011a) and PAD (AEA 2011b) summarized existing information and identified data gaps for aquatic habitats in the Upper Susitna River Reach. The licensing effort of the 1980s APA Project generated a substantial body of literature, some of which will be summarized and used to support the 2013–2014 data collection efforts. The adult salmon habitat use studies conducted by ADF&G during the 1980s are summarized by Woodward-Clyde Consultants and Entrix, Inc. (1985). Results of ADF&Gs studies in the Upper Susitna River Reach, including habitat characterization (Schmidt et al. 1984; ADF&G 1983; ADF&G 1984) are summarized in Exhibit E of the 1985 License Application (Harza-Ebasco 1985).

In recent years, ADF&G has conducted sampling in the Upper Susitna River sub basin as part of their Alaska Freshwater Fish Inventory (AFFI) program. In 2003, the ADF&G conducted a reconnaissance inventory in 19 reaches upstream of Devils Canyon. Existing fish, habitat, and aquatic resource information appears insufficient to address the following issues that were identified in the PAD (AEA 2011):

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 associated habitats.

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 stream flow, 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.

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.

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.

1.3.5. Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

Construction and operation of the Project [as described in the Pre-application Document \(PAD, AEA 2011\)](#) likely will affect flow, water depth and surface water elevation in the mainstem channel, at tributary confluences, inlets and outlets to side channels, sloughs, and confluences with off-channel habitat features both in the area of the inundation upstream from the Watana Dam site and downstream in the potential zone of project hydrologic influence. Understanding existing conditions of habitat will provide baseline information needed for predicting the likely extent and nature of potential changes that will occur due to Project operational effects on flow, water surface elevations, and sediment regimes.

1.3.6. Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The characterization of habitats will be complemented by the Instream Flow Study (ISF) and various fish population studies. All remote imagery and the majority of field sampling associated with this study are intended to occur in 2013. In 2014, potential effects to habitats resulting from Project operations will be modeled and additional field work for habitat characterization and validation will be conducted as necessary. All habitat data collected in this study will be consistent with the Susitna-Watana Project habitat classification system and standard protocols outlined in the US Forest Service "*Fish and Aquatic Stream Habitat Survey Handbook*" (USFS 2001). Information gathered from this study will be provided to the ISF team for modeling of potential changes; hence this study requires close coordination with the ISF team.

Habitat methods developed and refined in 2012 will be employed in 2013 to complete mapping of habitats. Methods for survey upstream and downstream of the proposed dam site, will include remote videography/photography and ground-based surveys to characterize aquatic habitat, extending coverage beyond that completed in the 2012 habitat mapping effort. Habitat units will be mapped to the mesohabitat level.

Due to the complex nature of the channel network in the middle and lower river remote imagery will be used to delineate habitat units and stratify units by mainstem habitat type (e.g., main channel, side-channel, off channel, tributary mouths). Subsequently a representative random sample of habitat units will be selected for further characterization during field surveys. Habitat data will be collected to represent typical channel margin and off-channel habitat features, and may be extrapolated to similar channel margin and off-channel habitat features identified by remote habitat mapping.

Habitat parameters to be measured for this study include at a minimum:

- Habitat unit type (See Susitna-Watana Project classification system for types)
- Habitat unit length
- Average wetted width (3 measurements per unit)
- Percent substrate composition
- Length of undercut bank
- Dominant riparian vegetation type
- Cover

For the upper Susitna River, the focus will be on expanding habitat characterization beyond that accomplished in 2012. Thus, any tributary, lake, or mainstem habitats that should be characterized and/or sampled upstream of the proposed Watana Dam will be identified. Tributary habitat up to 3,000' elevation or to fish migration barriers if the barriers are lower than 3,000' elevation will be mapped and typed.

Habitat data will also be collected from the locations of spawning salmon in the middle river mainstem consistent with habitat suitability criteria needs for instream flow modeling. Data will include measurements of redd area, water depth, water velocity, turbidity, substrate size and composition, surface and intergravel water temperature, and vertical hydraulic gradient. This

study component requires coordination with Salmon Escapement Study team to locate individual holding and spawning salmon in clear and turbid water of the middle and upper river.

Deliverable work products will include the following.

1. **Draft Study Plan.**
2. **Final Study Plan.** The study plan for 2013–14 will be finalized in consultation with resource agencies and other licensing participants.
3. **Summary of Interim Results.** Interim reports will be prepared and presented to the Technical Work Group to provide study progress. Reports will include up-to-date compilation and analysis of the data and ArcGIS spatial data products.
4. **Data.** All original data collected in the field in 2013 and 2014 will be entered into the relational database described below, QA/QC'd, and delivered to AEA.
5. **Geospatially-Referenced Relational Database.** All data generated during this study will be incorporated into the Susitna Fish Program geospatially-referenced relational database to be created in 2012; this database will form the basis for additional data collection in 2013–2014. All new field data will be associated with location information collected using a GPS receiver in unprojected geographic coordinates (latitude/longitude) and the WGS84 datum. Naming conventions of files and data fields, spatial resolution, and metadata descriptions will meet the ADNR standards established for the Susitna-Watana Hydroelectric Project.
6. **ArcGIS spatial products.** The geospatial products will include geodatabases and maps indicating survey area, habitat types used by spawning fish, habitat data, and locations of significant features such as barriers and springs. Naming conventions of files, data fields, and metadata descriptions will meet the ADNR standards established for the Susitna-Watana Hydroelectric Project. All map and spatial data products will be delivered in the two-dimensional Alaska Albers Conical Equal Area projection and North American Datum of 1983 (NAD 83) horizontal datum consistent with ADNR standards.
7. **Technical Memorandum.** A technical memorandum summarizing the study results will be prepared and presented to the resource agencies and other licensing participants, along with spatial data products.
8. **Interim and Final Reports.** An interim report will be prepared after the 2013 study effort, and a final report at the conclusion of the study that will document the methods, field effort, results, conclusions, and recommendations from this study.

1.3.7. Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The schedule, staffing, and costs will be detailed as the 2013–2014 Study Plan develops. The total estimated cost for habitat characterization study efforts is \$2,000,000.

1.3.8. Literature Cited

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