

# Susitna-Watana Hydroelectric Project Document ARLIS Uniform Cover Page

<b>Title:</b> Cook Inlet beluga whale and prey study	<b>SuWa 137</b>
<b>Author(s) – Personal:</b>	
<b>Author(s) – Corporate:</b> Alaska Energy Authority	
<b>AEA-identified category, if specified:</b> Aquatic and fish resources study requests	
<b>AEA-identified series, if specified:</b>	
<b>Series (ARLIS-assigned report number):</b> Susitna-Watana Hydroelectric Project document number 137	<b>Existing numbers on document:</b>
<b>Published by:</b> [Anchorage] : Susitna-Watana Hydroelectric Project, [2012]	<b>Date published:</b> 5/15/12
<b>Published for:</b>	<b>Date or date range of report:</b>
<b>Volume and/or Part numbers:</b>	<b>Final or Draft status, as indicated:</b>
<b>Document type:</b>	<b>Pagination:</b> 9 p.
<b>Related work(s):</b>	<b>Pages added/changed by ARLIS:</b>
<b>Notes:</b>	

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### 1.1. Cook Inlet Beluga Whale and Prey Study

#### 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))

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

The goal of this study is to provide relevant information on Cook Inlet Beluga Whales (CIBWs) and prey species ecology in the Susitna River and delta with respect to potential changes in the lower river habitat that may result due to construction and operation of the Susitna-Watana Hydroelectric Project (Project). Prey species information for eulachon will be gathered as a part of this study while information for salmon will be coordinated with other fish studies ongoing and proposed for the lower river. This information will be used by the Federal Energy Regulatory Commission (FERC) during National Environmental Policy Act (NEPA) documentation and the Project licensing process; for the National Marine Fisheries Service (NMFS) Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) consultations; and for the development of avoidance, minimization, and mitigation measures [if necessary](#).

There are seven objectives identified for this study.

- 1) Summarize existing information on life history, run timing, abundance, distribution, and habitat of beluga whale prey species in the Susitna River and in other Cook Inlet tributaries used by beluga whales.
- 2) Summarize existing information on the temporal and spatial distribution of beluga whales in Cook Inlet, the Susitna River delta, and the Susitna River relative to the availability of eulachon, Chinook, sockeye, chum, and coho salmon.
- 3) [Provide a factual basis to](#) initiate consultation with the NMFS for Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) permitting and requirements for the Susitna Watana study program.
- 4) Document the current presence and the upstream extent of Cook Inlet beluga whales within the Susitna River delta.
- 5) Describe the current densities of adult eulachon and their spawning habitat in the lower Susitna River.
- 6) Evaluate the relationship between potential hydropower-related changes in the lower river and in-river movements of beluga whales.
- 7) Evaluate the relationship between potential hydropower-related changes in the lower river and eulachon spawning habitat.

##### 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.

The NMFS is required to promote the conservation of all marine mammal species, particularly if they are designated as depleted under the MMPA or listed as threatened or endangered under the ESA. CIBWs are protected both as a depleted stock under the MMPA and as endangered under the ESA. Traditionally, CIBW were a subsistence resource for Alaska Natives, however, the subsistence harvest was limited in 1999 due to sharp declines in CIBW abundance

throughout the 1990's. The CIBW population has been below the harvestable level of 350 since 2009 (Allen and Angliss 2012).

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

Fisheries and marine mammal resources are owned by the State of Alaska, and the Project could potentially affect these public interest resources by affecting flows or habitat in the Susitna River and delta.

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

The majority of information regarding the current CIBW population abundance and distribution comes from annual, aerial surveys conducted by the NMFS-NMML (National Marine Mammal Laboratory) during June and August (NMFS 2008, 2012). Additionally, aerial surveys for beluga whales were completed in 1982 and 1983 as part of the original licensing effort (Harza-Ebasco 1985). These surveys all recognize the summer aggregations of belugas in the Susitna River delta (NMFS 2008). Additionally, satellite tags were applied to 15 whales from 1999-2002 which further confirmed the use of the delta by CIBWs (Hobbs et al. 2005, 2008). Finally, land-based and boat-based surveys directed at movement and residency patterns have been conducted in the Susitna Flats and adjacent areas (Funk et al. 2005; Prevel-Ramos et al. 2006, Markowitz and McGuire 2007, Markowitz et al. 2007, Nemeth et al. 2007). These studies have provided a photo-identification catalog for CIBW. Photographs of marked individuals have been used to characterize distribution and habitat use by individuals and groups of whales (McGuire et al. 2008, McGuire and Kaplan 2009, McGuire et al. 2009, 2011a,b).

Whale movement and habitat use studies using satellite telemetry and hydrodynamic modeling indicate that beluga distributions are controlled not only by water temperature and ice coverage, but also by the seasonal flow patterns of various rivers. This suggests that availability of salmon and other fish (i.e. eulachon) in river mouths influence beluga movements (Ezer 2011). Beluga whales use the Susitna River delta throughout the majority of the open water season (late-April through September) (NMFS 2008). The spring timing is coincident with the spawning migrations of eulachon and Pacific salmon into the river. Availability of prey species was one of the primary constituent elements used to designate critical habitat in 2011. Critical habitat for CIBW includes the Susitna River delta and extends upriver approximately 8.5 NM from mean lower low water (MLLW).

Preliminary data from studies of eulachon in the 1980s indicate that their spawning requirements are broad and that most spawning occurs below RM 28, but some spawning activity can be found as far upstream as RM 50 (HDR Alaska, Inc. 2011). Eulachon may be commercially harvested in the salt waters of the Upper Cook Inlet between the Chuit and Little Susitna Rivers from May 1 to June 30 using a hand operated dip net; the harvest is not allowed to exceed 100 tons (ADF&G 2012). Harvest rates over the period 2006 to 2010 averaged 55 tons (Shields 2010). However, recent data on eulachon densities and distribution in the Susitna River delta is sparse.

ADF&G has conducted ongoing salmon escapement studies in the Susitna River drainage basin including: helicopter and foot surveys to index counts of Chinook salmon; coho salmon escapement surveys; and coho and chum salmon telemetry studies. The Susitna River Salmon Run Apportionment Study describes additional capture and tagging efforts on the Susitna River

that will augment ADF&Gs telemetry studies of chum and coho salmon and will also mark Chinook and pink salmon.

**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.**

Cook Inlet beluga whales could be impacted by potential Project-induced changes to the abundance, productivity, and run timing of important Susitna River prey species: eulachon, and Chinook, sockeye, chum, and coho salmon. These Project-related effects could occur due to changes in discharge if the changes prevented, impaired or delayed beluga whale access to delta or river habitats that support known prey species, including eulachon and salmon. In addition, potential effects of flow that, in turn, affect abundance, densities, and/or run timing of these prey species also have the potential to affect CIBW. The CIBW Distinct Population Segment is protected by the NMFS as both a depleted stock under the MMPA, and as an endangered species under the ESA. In addition, large portions of upper Cook Inlet, including the Susitna River delta, have been designated as critical habitat for the CIBW. Eulachon and adult Chinook, sockeye, chum and coho salmon are identified as primary constituent elements of CIBW critical habitat in Cook Inlet.

This study addresses the following issue identified in the PAD (AEA 2011):

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

Studies will be conducted to evaluate the impacts of Project-related changes to sediment transport and delivery, stream temperature, water quality, stream flow, and ice processes on salmon habitat, productivity, abundance and run timing. This study will synthesize the available information on eulachon to understand how the Project may affect the species in the Susitna River. The temporal and spatial distribution of beluga whales within the Susitna River will be used to inform the assessment area of 2013–2014 studies.

**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.**

***Objective 1: Summarize existing information on life history, run timing, abundance, distribution, and habitat of beluga whale prey species in the Susitna River and in other Cook Inlet tributaries used by beluga whales.***

This task will involve identifying, compiling and reviewing existing literature to prepare a white paper describing the life history and habitat requirements of eulachon in glacial river systems. Available data on the Upper Cook Inlet eulachon, Chinook, chum, coho, and sockeye salmon fisheries and Susitna River eulachon, Chinook, chum, coho, and sockeye salmon escapement, life history and distribution (below RM 50) will be synthesized to identify key habitat requirements (e.g. stream temperatures, stream flows) for critical periods including spawning (late April through June) and outmigration (June through August). Finally, we will identify any remaining data gaps and evaluate the potential for Project impacts on eulachon and salmon habitat to determine future study needs.

***Objective 2: Summarize existing information on the temporal and spatial distribution of beluga whales in Cook Inlet, the Susitna River delta, and the Susitna River relative to the availability of eulachon, Chinook, sockeye, chum, and coho salmon.***

This task involves compiling existing temporal and spatial distribution data for Cook Inlet beluga whales in and around the Susitna River and Susitna River delta, especially during spawning periods of Susitna River eulachon, Chinook, sockeye, chum and coho salmon. Data will be requested from the Port of Anchorage, Joint Base Elmendorf Richardson, Cook Inlet Region Incorporated, and the NMFS. However, these entities may not be able to provide data and/or may not be able to meet the desired project schedule. 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. Naming conventions of files and data fields, spatial resolution, and metadata descriptions will comply with the ADNR standards established for the Susitna-Watana Hydroelectric Project. This information will be used to identify potential Project-induced impacts to CIBWs and critical habitat and to identify critical data gaps to determine future study needs..

***Objective 3: Initiate consultation with the NMFS for Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) permitting and requirements for the Susitna Watana study program.***

In association with the NMFS, determine MMPA and ESA permit needs for the environmental studies program. Permits are required for all studies conducted within CIBW-designated critical habitat (up to RM 9), all studies that may have flights to transport personnel and/or equipment over open water (up to RM 9) and for CIBW surveys throughout Type 1 critical habitat planned for spring 2013. The schedule and scope of the permits may be altered during agency consultation. Additionally, we will develop a “No Impact” protocol to be implemented by all projects with 2012 field studies since the project does not have MMPA or ESA permits for 2012.

***Objective 4: Document the current presence and upstream extent of Cook Inlet beluga whales in the Susitna River delta.***

We will examine a combination of methods to monitor the presence, timing, and upstream extent of CIBW in the Susitna River. CIBWs swim into tributaries of upper Cook Inlet, including the Susitna River and adjacent Little Susitna River to feed on presumably adult and juvenile salmon and eulachon. Historic records indicate that beluga whales have been observed in the eastern channel of the Susitna River as far as 30-40 miles upriver, but are most commonly found within the first 5 miles (Funk et al. 2005). Potential monitoring methods will include a combination of systematic and opportunistic surveys. For example, visual observations from boats by the fisheries crews based in field camps at Flathorn and at the confluence of the Yentna River, dedicated CIBW aerial surveys, and land-based remote camera systems. The timing and methods used for monitoring will be examined during the completion of the 2012 Study Plan (i.e., data synthesis for CIBWs and prey species). We will also investigate the anticipated timing of Project effects on critical habitat.

***Objective 5: Describe the current densities of adult eulachon and their spawning habitat in the lower Susitna River.***

Because eulachon are considered broadcast spawners, they may be migrating, holding and spawning at depths that pose challenges for fish collection. Additionally, we are interested in a sampling protocol for eulachon that will pose the least amount of physical disturbance to potential spawning habitat. Consequently, our primary approach to collecting estimates of eulachon density will be by mobile (boat) surveys with a combination side- and down-looking split-beam sonar, which has been successfully used to characterize the seasonal distribution and density of forage fish in the Susitna River delta (Nemeth et al. 2007). Sonar transects will be established throughout the lower river. Sampling locations will be spread throughout the lower river and will include areas that have previously been documented as eulachon spawning habitat and/or areas with similar physical characteristics to these known spawning locations as well as areas where spawning has not previously been documented. Transects will be located to ensure collection of data across representative channel and/or habitat types (e.g. mainstem riffles, side channel glides). This is the preferred method for density estimation as it will require minimal handling and disruption to spawning eulachon, and will be able to cover large areas on a relatively frequent basis.

As there will be other fish species staging in the lower Susitna River at the time of the eulachon spawning migration (e.g., salmon smolts), it will be necessary to obtain species verification for sonar-derived fish densities. Thus, a fish capture survey will be conducted in one location along each sonar transect. Sampling for eulachon will be conducted using a variety of methods including seining, gill netting, trawling, and/or boat electrofishing. Total catch by species, area sampled, and measurement of effort (e.g. set times for nets, power, time, and distance for electrofishing) will be recorded for each sampling location. If multiple species are collected, size measurements will be obtained to help differentiate acoustic targets.

During sonar and fish sampling the crew will make observations of any marine mammals present, particularly CIBW. All CIBW observations will be documented and locations marked with a GPS waypoint. This information will be incorporated into the data collection effort for Objective 1.

***Objective 6: Evaluate the relationship between potential hydropower-related changes in the lower river and in-river movements of beluga whales.***

Data collected during Objectives 2 and 4 (past and present distribution and movements of CIBW in the Susitna River delta) will be combined with data from In-stream Flow, Ice Processes and Geomorphology studies to evaluate the potential effects of the project. The method(s) used to evaluate the significance of potential impacts to CIBW will be dependent upon the nature and degree of the changes in flow and channel morphology which may affect in-river movements of CIBWs.

***Objective 7: Evaluate the relationship between potential hydropower-related changes in the lower river and eulachon spawning habitat.***

The initial step in addressing this objective is to characterize eulachon spawning habitats in the lower Susitna River (Objective 1). Historical data on eulachon spawning habitat (e.g., 1980s data) will be synthesized through the completion of the 2012 Study Plan. In 2013-14, habitat data will be collected concurrent with fish sampling for species verification and will be supplemented with dedicated habitat surveys, as appropriate. Spawning habitats will be delineated to the finest scale possible, i.e. channel location and mesohabitat type, with upstream and downstream borders marked by GPS waypoints. Several habitat parameters will be collected for all delineated habitats including average water depth, average wetted width,

water temperature, velocity, tide elevation, and substrate composition. These habitat data will be used as inputs to any flow-habitat models that may need to be developed to evaluate potential changes in eulachon spawning habitat as a function of any Project-related changes in flow and surface water elevation.

**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 exact schedule, staff assignments, and costs will be detailed as the 2013–2014 Study Plan develops. The level of effort and cost can change significantly based on the final study plans. For instance, aerial surveys for CIBW distribution in the Susitna River delta will require 2-4 individuals for observation and data analysis. Depending on the area covered during each survey, the type of data collected (i.e. visual observation versus photographic data) and subsequent data analyses, systematic surveys can cost between \$5,000 and \$20,000 per survey. Surveys could occur on a weekly or monthly basis year-round resulting in a cost of \$200,000 to \$1,000,000 per year depending on survey design. There is similar uncertainty in estimating costs for eulachon studies. Ideally, multiple survey crews of four people would sample for 8 hours each day (4 hours before and after high tide). The timing of surveys should coincide with documented eulachon runs in May and June. If similar effort to the studies completed in the 1980's is expected (i.e. 4 surveys per week), then costs could be in excess of \$150,000 per year for labor costs plus the cost for data analyses. Costs for equipment will also be drastically different depending on methods that will be permitted (i.e. boat electroshocking, side-scan sonar systems, and/or netting equipment). Lower levels of effort will reduce the cost proportionally with effort.

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