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Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Cook Inlet Beluga Whale Study
Study Plan Section 9.17

Final Study Plan

Alaska Energy Authority

SUSITNA-WATANA HYDRO
Clean, reliable energy for the next 100 years.

July 2013

9.17. Cook Inlet Beluga Whale Study

On December 14, 2012, Alaska Energy Authority (AEA) filed with the Federal Energy Regulatory Commission (FERC or Commission) its Revised Study Plan (RSP), which included 58 individual study plans (AEA 2012). Section 9.17 of the RSP described the Cook Inlet Beluga Whale Study. This section focuses on the methods for locating, describing, and assessing Cook Inlet Beluga Whales (*Delphinapterus leucas*; CIBW) within the Susitna River delta which may be affected as a result of Project construction and operation. RSP 9.12 provided goals, objectives, and proposed methods for data collection regarding CIBW.

On February 1, 2013, FERC staff issued its study plan determination (February 1 SPD) for 44 of the 58 studies, approving 31 studies as filed and 13 with modifications. RSP Section 9.17 was one of the 31studies approved with no modifications. As such, in finalizing and issuing Final Study Plan Section 9.17, AEA has made no modifications to this study from its Revised Study Plan.

9.17.1 General Description of the Proposed Study

The goals of this study are threefold: (1) to provide current, fine scale information on Cook Inlet Beluga Whale (*Delphinapterus leucas*; CIBW) distribution and movements within the Susitna River delta, (2) to correlate these data with information on the ecology and habitat parameters of CIBW prey species, including eulachon and Pacific salmon, and (3) to record incidental observations of all marine mammals sighted during beluga whale studies. Information is needed regarding CIBWs and their prey in the Susitna River and delta to facilitate future analysis of the potential effects that may result from the construction and operation of the Project. CIBW prey species information (i.e., eulachon and salmon) will be coordinated with fish studies both currently ongoing and those proposed for the lower river (see Fish Distribution and Abundance in the Upper River [Section 9.5], Fish Distribution and Abundance in the Middle and Lower River [Section 9.6], Salmon Escapement [Section 9.7], Characterization and Mapping of Aquatic Habitats [Section 9.9], and Eulachon Run Timing, Distribution, and Spawning [Section 9.16]). Collectively, this information will be used by FERC in its National Environmental Policy Act (NEPA) and licensing processes, for the NMFS Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) reviews, and for the development of potential protection, mitigation, and enhancement (PM&E) measures.

Three specific objectives have been identified for this study:

1. Document CIBWs and other marine mammals in the Susitna River delta, focusing on CIBW distribution and upstream extent.

2. Document CIBW group size, group composition, and behavior within the Susitna River delta.

3. Develop a model to describe the relationships between river flows, water surface elevation, and CIBW foraging habitats in the Susitna River.

9.17.2 Existing Information and Need for Additional Information

Cook Inlet beluga whales reside in Cook Inlet year-round, which makes them geographically and genetically isolated from other beluga whale stocks in Alaska (Allen and Angliss 2012). Given

their limited geographic range, changes in environmental conditions, including temperature and prey distributions among others, have the potential to influence CIBW distribution within the Inlet. Since the early 1990s, a variety of studies have been conducted to assess CIBW spatial and temporal distribution. Beginning in 1993, aerial surveys have been conducted annually by NMFS-National Marine Mammal Laboratory. These surveys have been flown annually in June and August with the focus of survey effort concentrated along northern, coastal waters of the Inlet (within 1.5 kilometers [0.9 miles] from shore) and a reduced survey effort in the middle and southern portions of the Inlet (NMFS 2008; Hobbs et al. 2011). Historic aerial surveys for beluga whales also were completed in 1982 and 1983 (Harza-Ebasco 1985). In addition to aerial surveys, land- and boat-based surveys have been conducted to investigate CIBW movement and residency patterns in the Susitna Flats State Game Refuge and adjacent areas. These latter efforts have been focused on characterizing distribution and habitat use by individuals and groups of whales (Funk et al. 2005; Prevel-Ramos et al. 2006; Markowitz and McGuire 2007; Markowitz et al. 2007; Nemeth et al. 2007; McGuire et al. 2008; McGuire and Kaplan 2009; McGuire et al. 2009, 2011a, b).

From 1999 to 2003, researchers applied satellite tags to 14 CIBW individuals to examine year-round movements (Goetz et al. 2012). The tagged whales were documented moving in Upper Cook Inlet even when ice was present. The whales present were documented in dispersed groups and they spent more time in offshore waters, south of the Susitna River delta (Rugh 2000). In a separate study, Hobbs et al. (2005) reported that CIBWs dive deeper in the winter than during summer which suggests that shallow, ice-covered mudflats are not the primary winter foraging grounds. These data indicate a reduced likelihood of beluga whale presence in the Susitna delta habitats during winter.

Passive acoustic monitoring (PAM) has been used to monitor whales in Cook Inlet (ADF&G 2010). Results of this study showed varied CIBW residency patterns throughout the year which may be difficult to interpret due to challenges with this technology. The ability to detect marine mammals acoustically depends on several factors including the type of equipment, proximity of the animal to the recording device, vocal behavior of the animal, and environmental factors such as high flow noise, which may mask marine mammal calls (e.g., river discharge and tidal fluctuations). Therefore, the absence of an acoustic detection does not necessarily indicate the absence of whales. These false negatives impose a high level of uncertainty on acoustic-based distribution studies.

Although these studies have documented large aggregations of CIBWs in Upper Cook Inlet in late summer and fall (Funk et al. 2005; NMFS 2008; Allen and Angliss 2012), they did not document information on the spatial and temporal use of the Susitna River delta. This finer-scale information on CIBW distribution and movement patterns within the Susitna River delta is needed to understand the potential for Project-related effects on CIBWs.

Minimal site-specific data is available on use of Susitna River delta habitats. The Susitna Flats portion of upper Cook Inlet appears to be important calving grounds for CIBWs (Huntington 2000). The use of Susitna delta mudflats by CIBWs has been documented (McGuire et al. 2009, 2011a, b; Hobbs et al. 2011). Given these data on the distribution of CIBWs within and around the Susitna River delta, additional information is needed to describe specifically how and when the CIBWs use Susitna River habitats.

The existing information on CIBWs listed above is incomplete and depicts only a partial picture of CIBW habitat needs. However, additional information is available regarding habitat that has been deemed essential to the conservation of this species. The CIBW was listed as an endangered species under the ESA in October 2008 (73 FR 62919) and critical habitat for CIBWs was designated in April 2011 (76 FR 20180; Figure 9.17-1). When determining critical habitat, NMFS also identified the following five primary constituent elements (PCEs) essential to the conservation of the CIBWs:

1. Intertidal and subtidal waters of Cook Inlet with depths <30 feet (mean lower low water; MLLW) and within 5 miles of high and medium flow anadromous fish streams.
2. Primary prey species consisting of four species of Pacific salmon (Chinook, sockeye, chum, and coho), Pacific eulachon, Pacific cod, walleye pollock, saffron cod, and yellowfin sole.
3. Waters free of toxins or other agents of a type and amount harmful to CIBWs.
4. Unrestricted passage within or between the critical habitat areas.
5. Waters with in-water noise below levels resulting in the abandonment of critical habitat areas by CIBWs.

Based on these criteria, NMFS identified two specific marine area types in Cook Inlet that contained one or more PCE. Type 1 critical habitat encompasses 1,909 square kilometers (738 square miles) of Cook Inlet northeast of a line from the mouth of Threemile Creek to Point Possession. Type 1 critical habitat has the highest concentrations of beluga whales from spring through fall. Type 2 critical habitat consists of 5,891 square kilometers (2,275 square miles) of known fall and winter use areas. It is located south of Type 1, and includes nearshore areas along the west side of the Inlet and Kachemak Bay on the east side of the lower inlet. Type 1 critical habitat extends into the Susitna River approximately 8.6 nautical miles from MLLW. Because the critical habitat designations include the lower Susitna River it is important to understand the potential for the Project to affect the habitat of the CIBW.

Seasonal movement patterns of CIBWs, as well as site fidelity, appear to be closely linked to prey availability. Whale movement patterns coincide with seasonal salmon and eulachon concentrations (Moore et al. 2000). CIBWs have been documented upriver in Cook Inlet tributaries during spring, summer, and fall. Historic records also indicate that CIBWs have been seen in the eastern channel of the Susitna River as far as 30 to 40 miles upriver, yet are most commonly found within the first 5 miles of the Susitna River delta (Funk et al. 2005). It is thought that these excursions into tributaries are associated with foraging on prey species. Because these whales are following prey species into river habitats, any Project-related impacts to prey species abundance, run timing, and/or density have the potential to have indirect impacts on CIBWs (PCE 2). It is, therefore, important to collect baseline information on CIBW prey species that will facilitate future analysis of potential Project impacts.

In addition to CIBWs, three other marine mammals have been documented in Cook Inlet. Harbor seals (*Phoca vitulina*), harbor porpoise (*Phocoena phocoena*), and killer whales (*Orcinus orca*) may use Susitna River delta habitat. Harbor seals are distributed throughout Cook Inlet with higher concentrations in lower Cook Inlet compared to the upper inlet. However, sightings of harbor seals in the upper inlet have been increasing over the past few years. The most recent aerial survey documented approximately 1,750 harbor seals in the Susitna River delta (Shelden et al. 2011). Harbor seals in Alaska are not classified as strategic or depleted stocks under the MMPA and are not listed as threatened or endangered under the ESA (Allen and Angliss 2012).

The most recent population estimate for the Cook Inlet/Shelikof Strait harbor seal stock is 22,900 (Allen and Angliss 2012). Harbor porpoise have been documented throughout Cook Inlet (Shelden et al. 2011; ADF&G 2009, 2010). Harbor porpoise in Cook Inlet belong to the Gulf of Alaska stock, which is not classified as a strategic or depleted stock under the MMPA and is not listed as a threatened or endangered species under the ESA (Allen and Angliss 2012). The most recent abundance estimate is 31,046 for Gulf of Alaska harbor porpoise. While unlikely, resident killer whales have also been acoustically detected in upper Cook Inlet (ADF&G 2010). The presence of these other species in upper Cook Inlet indicates the need to further consider the potential for them to utilize Susitna River delta habitats.

9.17.3 Study Area and Timing

The study area encompasses the Susitna River delta upstream to the upper extent of CIBW distribution. Since the upper extent of the distribution is unknown, surveys will extend up to RM 50, 10 to 20 miles upstream of existing whale sightings (Figure 9.17-1). Surveys will be conducted during the open-water season (April through October). Due to logistics and safety concerns, as well as lower concentrations of belugas in the Susitna River during winter months (as documented through satellite tags), winter surveys (November through March) will not be conducted.

9.17.4 Study Methods

9.17.4.1 Document CIBW and Other Marine Mammal Presence within the Susitna River Delta

Aerial surveys conducted by NMFS occur only in June and August; therefore, the distribution of CIBWs throughout the open-water season is not well-documented. Fine-scale information on CIBW seasonal distribution, particularly during times coinciding with spawning and migrations of prey species, is needed to evaluate potential Project-related impacts to CIBWs, critical habitat, and prey availability. To address this current lack of information, this study proposes to conduct aerial surveys for CIBWs in the Susitna River delta (Figure 9.17-1) during the open-water season. The survey schedule will consist of 15 to 20 surveys conducted annually from ice-out to freeze-up depending on weather conditions, aircraft availability, and timing so as not to interfere with NMFS aerial surveys. The specific survey schedule is presented in Section 9.17.6.

The survey schedule allows for increased survey effort during the spawning season of prey species (May and June) and during times when beluga calves may be present (July and August) and will be adjusted, as necessary, to avoid potential interference with the NMFS surveys in June and August. Each survey will be scheduled for four flight hours to ensure adequate coverage of the Susitna River delta up to RM 50 and will allow for additional time to circle around areas where CIBWs are encountered. Flights will be scheduled around low and high tides. Surveying during low tide is most effective for documenting group sizes because animals congregate in areas due to lower water levels. Surveying during high tide will be advantageous for determining the upstream extent of belugas in the Susitna River. If possible, both low and high tides will be surveyed on the same day (i.e., two hours for each tide). Flights will be conducted at 1,000 feet to avoid disturbance to marine mammals and, by extension, avoid the need for a marine mammal take permit.

The aerial survey team will consist of one pilot and two experienced marine mammal observers (MMOs), one of which will serve as the data recorder. Survey protocol will follow Hobbs et al. (2011) and will generally include the following steps. The MMOs will scan the water visually to locate CIBWs via unaided eyes. Data will be recorded on a hand-held global positioning system (GPS) (i.e., Archer) that will be programmed with a custom data acquisition program. For each sighting, the time and position will be captured through the GPS-enabled data program. The MMOs will enter the angle of the sighting, which will be obtained from an inclinometer to obtain the degrees relative to the survey aircraft. Data for marine mammals will include location, group size, group composition (i.e., adults, juveniles, and cow-calf pairs), and overall group behavior. Environmental data will be updated every 30 minutes. Effort data recorded will include environmental conditions that can affect the observers' ability to sight animals (e.g., high sea state, glare, and sun position).

While all marine mammal sightings will be documented during the aerial surveys, more detailed methods will be used when a group of CIBWs is encountered. Each observer will independently count the number of animals in each group, and multiple passes (up to five) may be performed to get the most accurate count of each CIBW group. All counts from both observers will be combined and the median will be used to achieve the most accurate group size and reduce the effect of outliers within counts (Hobbs et al. 2011). Video and still cameras will be available to document encounters, when possible, but will not be used for group counts. Additionally, the team will immediately report to NMFS any observations of stranded or distressed marine mammals.

9.17.4.2   Document CIBW Group Size, Group Composition and Behavior in the Susitna River

While aerial surveys are appropriate to document the spatial distribution of CIBWs in the Susitna River delta, these surveys only represent one point in time during each month to evaluate CIBW presence. To increase the ability to detect CIBW presence in the Susitna River over a more continuous timeframe and to document group composition and individual behavior (i.e., foraging), a combination of remote live-feed video camera systems and high-resolution still cameras will be utilized. Live-feed video cameras will provide real-time data over longer time periods (i.e., weeks to months). Remote camera systems (video and still) allow for data collection without disturbing study animals and will provide behavior and life history details that may not be obtained through aerial surveys, such as the presence of calves. This technology was successfully used in the Little Susitna River for CIBWs in 2011 by the Alaska Sea Life Center. In addition to documenting CIBWs, this technology was also successful at identifying harbor seals within the river.

9.17.4.2.1 Camera Stations

Two stations with live-feed video camera arrays will be established at the mouth of the Susitna River. Each station will include an array of two video cameras, for a total of four video cameras. One video camera will be used to provide a wide-angle coverage maximizing the field of view, while the other video camera will be capable of focusing in on groups or individual animals, providing more detailed behavioral data. The video camera system will utilize remotely-operated camera technology (SeeMore Wildlife Systems, Homer, AK), which will allow observers to remotely manipulate the cameras (e.g., pan, zoom, capture still images, wipe lens,

etc.) in real-time via a microwave link. The camera systems will be mounted to 9-meter steel towers embedded in the ground. Batteries, electronics, and the recharging system to run the cameras will be located in hard cases mounted at the base of the steel towers and the live images from the cameras will be transmitted via microwave signal to a receiver.

In addition to the video camera arrays, up to four still camera stations, with one camera per station, will be located along the river within a reach that extends from the mouth upstream to RM 10. The still camera stations will be located along the river at approximately evenly spaced intervals to collect incidental observations of marine mammals. The specific location of the both still and video cameras will be determined during a field reconnaissance planned for Q1 2013 and will be dependent upon on field-of-view, permits and co-location with instruments from other studies (i.e., Ice Processes [Section 7.6] and Instream Flow [Section 8.5]).

9.17.4.2.2 Monitoring Live-feed Cameras

Camera observers will be used to remotely monitor the live-feed video cameras. Monitoring will be conducted over a continuous 8-hour period for five out of every seven days from May through September. The entire 8-hour video period will occur during daylight hours but start and end times will vary in order to focus on high tides. The five days monitored each week will be randomly selected and will include both weekend and weekdays. During each monitoring period, camera observers will remotely scan the study area with one of the two video cameras every 20 minutes. For each scan, the observers will focus the camera at the farthest south or north position and slowly move the camera focal point across the study area. Camera movement will be in timed increments, not continuous. With each movement of the camera the observers will pause the camera long enough to determine if whales are present before moving the camera to the next increment. Scans will last between 10 and 15 minutes, but may be longer if beluga whales are present to allow for accurate data collection. During intervals between scans, the cameras will be focused on a single location and checked frequently for opportunistic sightings. The focus of the cameras between scans will be the area with the greatest possibility of having an opportunistic sighting, determined by distance from the camera and visibility due to tidal stage.

9.17.4.2.3 Data Collection

Two camera observers will be assigned to each video camera station for each 8-hour monitoring period. Upon sighting a group of whales, one observer will conducted focal group sampling, while the second observer will continue to scan the study area for the presence of other groups of whales. The use of two video cameras allows for independent tracking and division of labor among camera observers; thus, one camera can be used for focal group sampling while the other is viewing the study area.

To obtain the precise location of CIBW activity, the study area will be divided into segments using a numbered grid covering the camera's field-of-view. When beluga whales are present, observers will record the group location by grid number, the number of animals in the group, group composition (life stage, gender), and behaviors of individuals. Once a group enters the field-of-camera-view, the camera observer will begin focal group sampling and will keep the camera focused on that group for as long as is possible given the time of observation within the monitoring period, the presence of other CIBW groups or other marine mammals, and environmental conditions. The goal of focal group sampling is to extract the most information possible from the group without compromising data from additional groups.

9.17.4.2.4 Behavior Logs

Camera observers will record beluga behavior using three activity codes to indicate primary, secondary and tertiary group activities. The primary activity is defined as that which best describes the activity of the group as a whole (e.g., traveling). The secondary and tertiary activities are defined as behaviors of individuals within the group such as tail slapping and/or eye spying. If observers are able to obtain close-up video of whales with distinctive markings, still photos of these events will be collected for potential use in photo-identification. Presence and behavior of any other marine mammals or humans (including vessel traffic), will also be recorded and all video footage will be digitally archived with AEA.

9.17.4.2.5 Group Counts

Each whale sighting will be assigned two identification numbers: a "day group" number that reflects the actual order of when a specific group was detected that day and an "archive group" that defines the group and thus, remains constant for all sightings during the study period. For example, a group sighted on four successive camera scans in one day will be assigned "day group" numbers of 1, 2, 3, and 4, and if it is the first unique group of that day the "archive group" number would be 1. If a single group of whales splits into distinct segments, letters will be used to denote archival subgroups of the same parent group (e.g. 1a, 1b, etc.). The only time that an archival group number will change is if two known groups merge into one. In such an instance, e.g., Group 1 joins Group 2, the combined group will be given the archive group number of the group that joined, in this case, Group 2. This method of documentation allows for detailed tracking of animal groups, movements, and interactions without inflating animal numbers.

For reporting purposes, beluga whale sightings will be in reference to archive groups in order to accurately reflect the total number of groups and individuals observed. Sightings also will be in reference to behavior, composition, and/or location data recorded within the confines of a single scan (day group) in order to reflect dynamic changes within the study area by a single group.

Data will be available in a real-time format and can be accessed during the study as needed. In addition post-processed data will be presented in monthly reports that reflect monitoring effort and beluga whale activity (presence, group size, location, composition) as well as environmental conditions. While not the focus of this study, if photographs are high quality enough to be used for photo-identification purposes, AEA will collaborate with LGL to include this information in the CIBW catalogue.

9.17.4.3 Develop a model to describe the relationships between river flows, water surface elevation, and CIBW foraging habitats in the Susitna River delta.

Satellite tagging of CIBWs and hydrodynamic statistical modeling of CIBW distribution from aerial surveys and tagging data indicate that seasonal CIBW distributions are correlated with water temperature, ice coverage, and the seasonal flow patterns of various rivers (Goetz et al. 2012). Additional data suggests that availability of salmon and other prey fish, such as eulachon, in river mouths can influence CIBW movements (Ezer 2011). CIBWs are known to be present in the Susitna River delta from late April through September (NMFS 2008) and this timing is coincident with the spawning migrations of eulachon and then Pacific salmon into the river.

To help understand the relationship between Susitna River hydrology and CIBW foraging habitats, AEA develop a river discharge versus water surface elevation (WSE) model. As a first step in model development, AEA will develop a predictive relationship between freshwater discharge, the tide, and WSE based on current conditions that can be applied to future with-Project conditions. The WSE model will evaluate the influence of river discharge on water surface elevation under four operational scenarios. The four scenarios represent the existing condition, a maximum load-following, an intermediate load-following, and a base-load scenario. The three with-Project scenarios will provide bookends and an intermediate assessment of potential Project effects.

If it is determined that Project-induced flow changes may alter WSE within the CIBW foraging distribution, the model can then be used to assess how changes in WSE in the delta may affect CIBW foraging habitats. Specific details of model development follow.

9.17.4.3.1 Model Background

Because the intertidal and tidal areas less than 30 feet deep (MLLW) at river mouths is one of the critical habitat PCEs for CIBW, AEA's modeling effort will focus on these areas. The degree of Project effects on WSE is likely insignificant or discountable compared to the high tidal flux in the Susitna River delta. However, to assess the likelihood and degree of a potential effect on the PCE, AEA will analyze the relationship between alternative instream flows under several Project operational scenarios and water levels in the Susitna estuary. Water level (or depth) is a key component for evaluating whether the proposed Project affects CIBW habitat within the Susitna estuary.

The model AEA will apply is a spreadsheet based WSE model that has been successfully developed and applied in an instream flow study of the Skagit River estuary in Northwest Washington State (DE&S 1999). The Skagit River estuary is the second largest saltwater estuary in Washington and is similar to the Susitna River estuary in its size, channel complexity, and its annual discharge range of >5,000 cfs to <60,000 cfs.

The WSE Model was selected as it meets the need of the following analytical objectives.

- The model must be predictive of water levels over the range of possible instream flow alternatives under current and future Project operations.

- The model must be predictive of water levels under Project operations accounting for the temporal and spatial complexities and interaction of tide and discharge in the Susitna estuary.

- The analysis must be based on empirical, site-specific data.

9.17.4.3.2 Model Development

The WSE model will compute the effects of river discharge on water levels in selected estuarine channels under both tidal and non-tidal periods. In this analysis, the periods when estuary hydrodynamics are a function of river discharge (and prior-tide drainage) only and the periods when estuary hydrodynamics are a function of both discharge and tide are referred to as non-tidal and tidal, respectively. The analysis will delineate zones (longitudinally up the river beginning in the intertidal zone) that are primarily controlled by tidal influence from zones primarily controlled by river discharge. The method will predict the effects of instream flow alternatives

in these zones on the magnitude, duration, and frequency of inundation (depth) of estuarine channels under both tidal and non-tidal periods. The analysis will involve the development of two separate water surface elevation simulation regressions. The non-tidal period is analyzed using a multiple regression equation between channel WSE and the combination of discharge and tidal drainage potential. The tidal period is analyzed with a multiple regression between channel WSE and the combination of discharge and tide level in Cook Inlet in the vicinity of the Susitna estuary. Both regressions predict WSE in the estuary as a function of discharge for selected estuary study channel(s).

Three data sets (tide level, site WSE, and channel profiles) will be referenced to the common datum plane of mean lower low water (MLLW). The required data sets are listed below:

1. 1)   Time-indexed WSE at selected estuary channels over a wide range of river discharges and tide levels.

2. 2)   Time-indexed river discharge entering the estuary.

3. 3)   Time-indexed tide level in Cook Inlet near the Susitna estuary.

4. 4)   Cross-sectional channel profile at each estuary channel study site.

5. 5)   Reference of WSE, tide, cross-section, and physical habitat features to the datum plane of MLLW.

Wind speed and direction, barometric pressure, and ambient air temperature will be continuously recorded at a station located on the southern tip of Big Island on the Susitna Flats. Simultaneous measurements of barometric pressure will be subtracted from each pressure transducer water level recording at the estuary channel study sites to obtain actual WSE. Wind data will be used to identify and remove periods of tide "pile-up" from the database.

9.17.4.3.3 Use of Model Results

The output of the WSE model will be water surface elevations that correspond to varying river discharge values and varying tidal conditions. These results will be displayed in graphical and tabular format and can be used to evaluate any future with- or without-Project hydrologic condition. This analysis, combined with ongoing flow, sediment, and water quality modeling will characterize the daily and seasonal variability of intertidal waters in the Susitna delta. These data will then be correlated to seasonal and Project-induced changes in discharge from the Susitna River.

Model results also will be available for use by other studies to evaluate any potential Project effects on changes to CIBW habitat, access by CIBW to the habitat, and potential changes for prey species' habitat in the estuary. Several other studies will provide data that can support such an evaluation including:

- Salmon Escapement Study (Section 9.7).

- Eulachon Run Timing, Distribution and Spawning in the Susitna River Study (Section 9.16).

- Baseline Water Quality Study and Water Quality Modeling Study (Sections 5.5 and 5.6, respectively).

- Geomorphology Study (Section 6.5).

- Fish and Aquatics Instream Flow Study (Section 8.5).

- Ice Processes Study (Section 7.6).

9.17.5 Consistency with Generally Accepted Scientific Practices

The study methods presented are consistent with methods commonly followed in investigations of marine mammal distribution (Hobbs et al. 2011). Aerial surveys are commonly used for documenting marine mammal distribution and have been employed by NMFS for CIBW abundance surveys since 1993 (Hobbs et al. 2011). Aerial surveys were also used to document CIBWs in the study area during the original licensing effort (Harza-Ebasco 1985). The proposed method for live-feed remote video cameras has been successfully used to document CIBWs and other marine mammal movements and behaviors in large river systems in Alaska (Easly-Appleyard et al. 2012). High-resolution still cameras are also used by NMFS to document CIBW group counts and group composition (Hobbs et al. 2011, 2012). The WSE model has been used successfully in the Skagit River, Washington, to evaluate tidal influence on spring Chinook salmon habitat in the estuary (DE&S 1999).

9.17.6 Schedule

The anticipated field schedule for 2013 and 2014 will run from late April (or ice-out) through the end of October (or freeze-up) (see Table 9.17-1). Each year, 15 to 20 aerial surveys will be conducted:

- Two in mid-late April (or after ice-out)

- Three in May

- Three in June (in addition to the NMFS survey)

- Three in July

- Three in August (in addition to the NMFS survey)

- Two in September

- Two in October (or until freeze-up)

This schedule for aerial surveys will allow for increased survey effort during the spawning season of CIBW prey species (May and June) as well as during times when calves may be present (July and August). The survey schedule may be adjusted, as needed, based on weather conditions and aircraft availability, and to avoid potential interference with NMFS surveys in June and August.

Remote cameras will be installed in late April and will operate until the end of October. Data analyses will be completed by the middle of November of each year.

Field efforts for the WSE model will begin in late April 2013 and will operate for four to six months to ensure that a full range of tidal cycles and river discharges are measured. Data analysis will be conducted following the field season. Modeling efforts may continue into 2014.

Quality Assurance (QA)/Quality Control (QC) reviews of the data analyses will be completed by the end of November each year.

Reporting will be completed in February 2014 (Initial Study Report) and February 2015 (Updated Study Report), one and two years, respectively, from FERCs Study Plan Determination. Progress on the study will be presented at the Technical Workgroup meetings to be held quarterly in 2013 and 2014.

9.17.7 Relationship with Other Studies

The Cook Inlet Beluga Whale Study will interrelate with at least seven of AEA's other Project studies (Figure 9.17-2). The flow of information into the CIBW Study is anticipated to occur over the two-year study period through an iterative process.

Information from the following studies will be synthesized with the beluga whale study results to provide an ecologically based description of beluga whale distribution and habitats. The Salmon Escapement Study (Section 9.7) and Eulachon Run Timing, Distribution and Spawning in the Susitna River Study (Section 9.16) will provide information on the distribution of beluga whale prey species in the Lower River while the Baseline Water Quality Study (Section 5.5), Water Quality Modeling Study (Section 5.6), Geomorphology studies (Sections 6.5 and 6.6), Ice Processes Study (Section 7.6), and the Fish and Aquatics Instream Flow Study (Section 8.5) will provide information on physical and chemical processes that may influence distributions of CIBWs and their prey species. In addition, information from these studies will be used for the environmental analysis that will be prepared in support of AEA's FERC License Application. Additional formal data sharing will occur among studies after completion of QA/QC procedures with the delivery of the Initial Study Report (February 2014) and Updated Study Report (February 2015).

9.17.8 Level of Effort and Cost

Fieldwork will occur daily from late April through September. Aerial survey teams will consist of three people (one pilot and two MMOs) and up to four observers will be utilized for remote-camera monitoring and data analysis (depending on the number of cameras installed). Each aerial survey is scheduled for 4 hours for a total of 72 flight hours each year. Approximate yearly cost for aerial surveys is $300,000 and approximate cost for remote-camera equipment and operations is $300,000 per year. The Water Surface Elevation field effort and model will cost approximately $250,000 with the majority of funding being utilized in 2013.

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9.17.10   Tables

Table 9.17-1. Schedule for implementation of the beluga study.

Activity	2012				2013				2014				2015
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q
Permit Applications			——	——	-----								
2013 Aerial Surveys						——	——	-----					
2013 Camera Surveys						——	——	-----					
2013 WSE Modeling Effort							——	-----					
Initial Study Report								--—— Δ					
2014 Aerial Surveys										——	——	-----	
2014 Camera Surveys										——	——	-----	
2014 WSE Modeling Effort (if needed)									-----				
Updated Study Report											——	——	▲

Legend:

—— Planned Activity

----- Follow-up activity (as needed)

Δ   Initial Study Report (ILP due date 2-3-2014)

▲   Updated Study Report (ILP due date 2-2-2015)

9.17.11 Figures
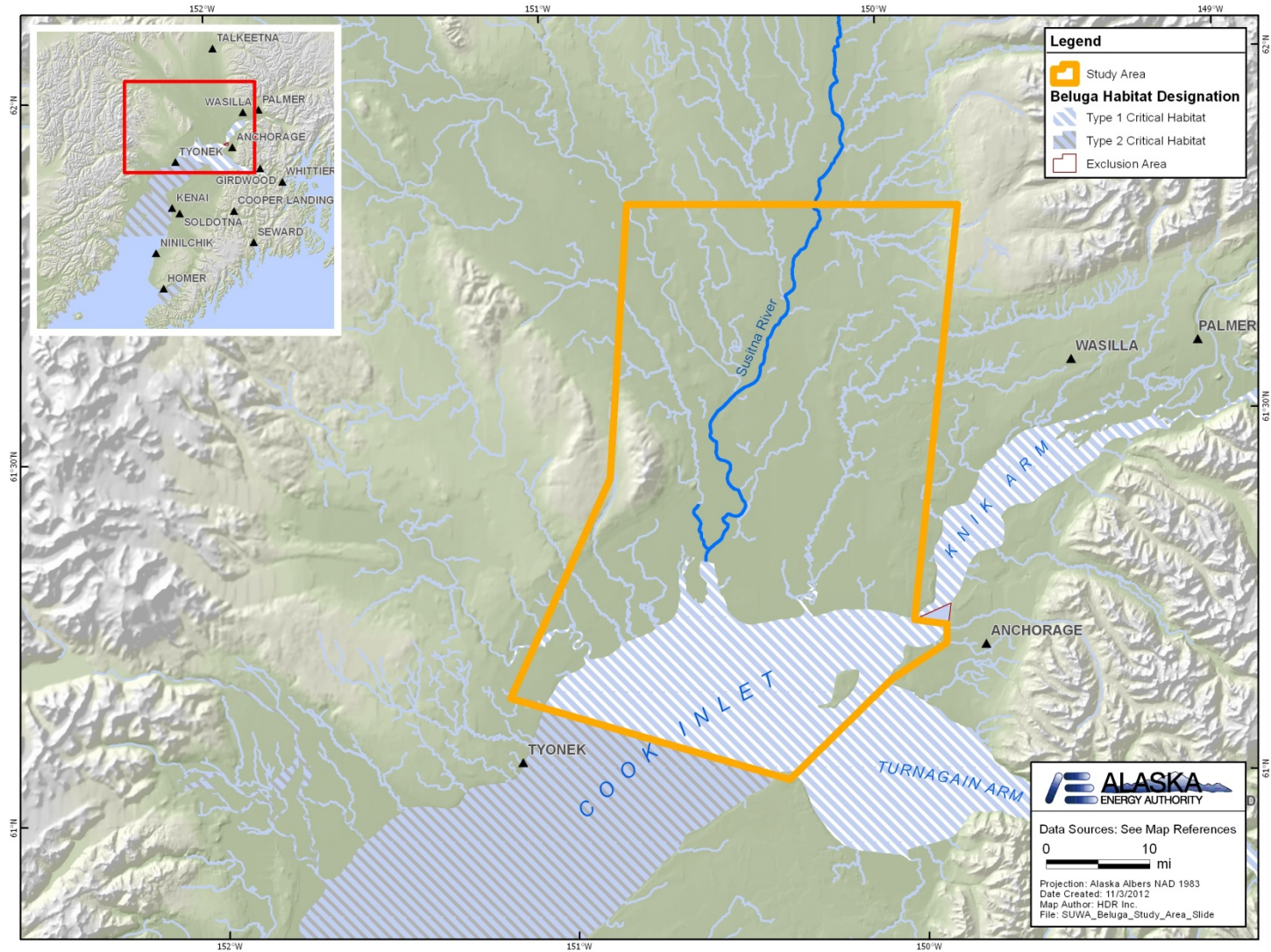

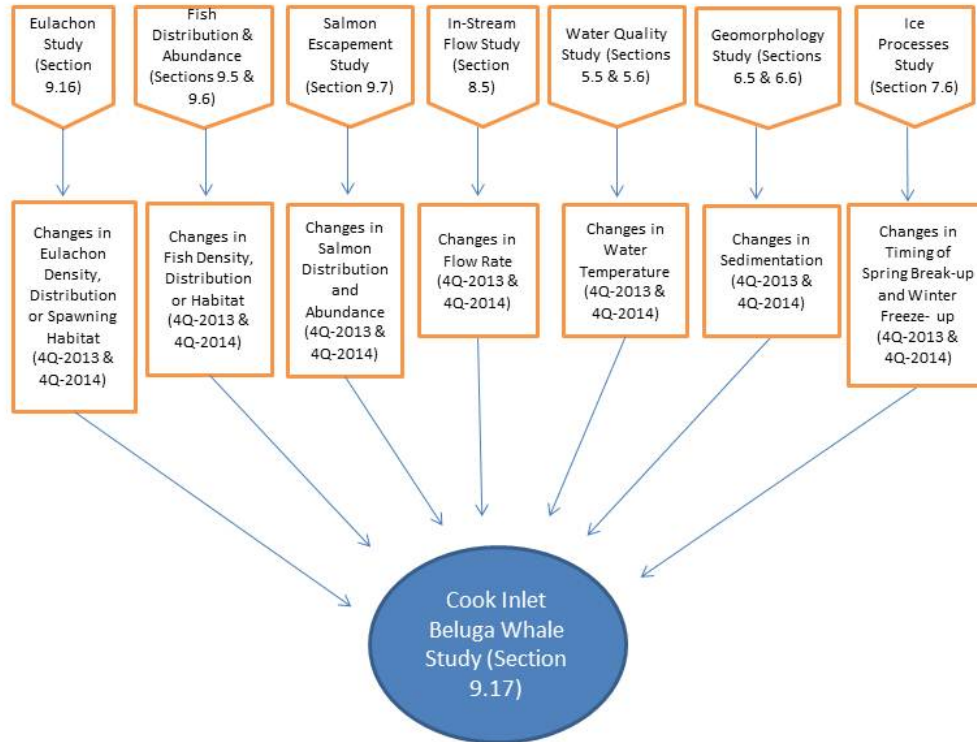**Figure 9.17-1. Study area for Cook Inlet Beluga Whale Study.**

Figure 9.17-2. Cook Inlet Beluga Whale Study interdependencies.