# Susitna-Watana Hydroelectric Project Document
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SUSITNA-WATANA HYDRO

# Susitna-Watana Hydroelectric Project
# (FERC No. 14241)

# Vegetation and Wildlife Habitat Mappping Study Plan - 2012

Alaska Energy Authority

SUSITNA-WATANA HYDRO

*Clean, reliable energy for the next 100 years.*

May 2012

# VEGETATION AND WILDLIFE HABITAT MAPPING STUDY PLAN—2012

## INTRODUCTION

The Alaska Energy Authority (AEA) is preparing a License Application that will be submitted to the Federal Energy Regulatory Commission (FERC) for the Susitna-Watana Hydroelectric Project (Project) using the Integrated Licensing Process (ILP). The Project is located on the Susitna River in the south-central region of Alaska. The Susitna River drains the Talkeetna Mountains and portions of the Alaska Range (Clearwater Mountains) and flows for approximately 300 miles before emptying into upper Cook Inlet. The Project's dam site would be located at River Mile (RM) 184, and a reservoir would be created upstream of the dam. One or two power transmission lines and an access road also would be constructed. The results of the Vegetation and Wildlife Habitat Mapping Study will provide baseline information needed to support the FERC's National Environmental Policy Act (NEPA) analysis for the Project license.

Construction and operation of the Project as described in the Pre-application Document (PAD; AEA 2011) will affect vegetation and wildlife habitats both upstream and downstream of the proposed dam site, and along the proposed access and transmission line routes. This study plan outlines the objectives and methods for characterizing the existing vegetation and wildlife habitats in the Project area. This study efforts in 2012 will be the first year of a multi-year study, which will include field data collection activities and mapping in 2012, 2013, and 2014.

Thematic maps of vegetation and wildlife habitats are important tools that can be used to define baseline conditions and help predict impacts to both botanical and wildlife resources from proposed energy projects like the proposed Project. For botanical and wildlife resources, the goal is to identify and map vegetation and wildlife habitats in the project area to quantify potential impacts from project construction, long-term changes from project operations, and to plan mitigation and post-construction monitoring measures. The mapping of vegetation and wildlife habitats is a critical study component for the Project because the wildlife habitats delineated in this effort will be used to quantitatively assess the impacts of habitat loss and alteration for all bird and mammal species evaluated during the FERC licensing process. These assessments of habitat loss often are the primary basis for evaluating impacts to wildlife species, and especially for the more uncommon species of birds and mammals, for which there typically are few observations to determine specific areas of use in the Project area. Moreover, these uncommon wildlife species often are of most concern to management agencies specifically because they are uncommon (naturally or because of population declines), and hence are more susceptible to population-level impacts from proposed developments.

## STUDY OBJECTIVES

The overall (multi-year) objectives of the Vegetation and Wildlife Habitat Mapping Study are to:

- Identify and map vegetation and wildlife habitat types in the Project area using the vegetation map prepared for the original Susitna Hydroelectric Project (SHP) by Kreig and Associates (1987) as a starting point, and updating to reflect current conditions as indicated on recent aerial imagery for the Project area;
- Quantify the potential direct, indirect, and cumulative impacts to vegetation and wildlife habitats from Project construction as well as maintenance and operations activities;

- Develop potential protection, mitigation and enhancement (PME) measures to address Project-related impacts to vegetation and wildlife habitats; and
- Develop and implement the 2013–2014 Vegetation and Wildlife Habitat Mapping Study Plan.

The interim study objective for 2012 is to begin work on a current vegetation map for the Project area using the 1987 vegetation mapping (Kreig and Associates 1987) and re-working, as needed, based upon the field verification (ground-truth) data to be collected in summer 2012. The mapping work in 2012 will be limited to those areas for which there is current high-resolution aerial imagery.

## STUDY AREA

The study area for the mapping of vegetation and wildlife habitats will be formally defined in consultation with management agency personnel over the course of developing the 2013–2014 study plan, but a working study area for the 2012 season includes a 5-mile buffer surrounding the areas would be directly altered or disturbed by Project construction and operations (Figure 1). These affected areas include the proposed reservoir impoundment zone, areas for infrastructure of the dam and powerhouse and supporting facilities, the proposed access route and transmission-line corridors, and materials sites.

The alteration of successional vegetation and wildlife habitats downstream of the dam (due to changes in hydrologic flow and ice processes in the Susitna River) will be specifically addressed in the Riparian Study. In that study, we will collaborate with other researchers conducting several different studies of riverine physical processes, most notably instream flow and ice processes, to map and predict the changes in riparian vegetation and wildlife habitats from construction of the proposed dam (see Riparian Study Plan—2012).

## EXISTING INFORMATION

Several different groups of researchers contributed to vegetation mapping for the Alaska Power Authority's SHP in the 1980s (AEA 2011). In all cases, maps were based on field data and vegetation types were delineated by aerial photo interpretation; vegetation boundaries were hand-drawn on mylar or acetate over aerial photos and topographic maps. The University of Alaska Agricultural Experiment Station (UAAES) mapped vegetation types to the Level III of the first version of the Alaska Vegetation Classification (AVC; Viereck and Dyrness 1980) during 1980–1982, based on field work conducted in 1980 (McKendrick et al. 1982).

The UAAES mapping covered a narrow corridor confined to the Susitna floodplain upstream from Talkeetna, expanded outward to the basin level at Devils Canyon, and continued upstream from there (AEA 2011). Map scales were 1:24,000 for the areas that would have been impacted directly and 1:250,000 for the remainder of the basin. In addition, the area extending 16 km (10 mi) in all directions from the upper Susitna River between Gold Creek and the mouth of the Maclaren River was mapped at a scale of 1:63,360. A 1:24,000-scale map of "apparent wetlands" also was produced, as well as two other 1:63,360-scale maps for the proposed SHP northern (Healy to Fairbanks) and SHP southern (Willow to Cook Inlet) transmission-line corridors. Both of these transmission corridors are outside of the current Project area. The 1:63,360-scale map area includes the SHP central transmission-line corridor which ran along both sides of the Susitna River between the originally proposed Watana Dam site to Gold Creek.

The mapping completed by Kreig and Associates (1987) covered parts of the upper and middle Susitna basin, from near the mouth of the Oshetna River (upstream of the Watana Dam site) to just downstream of the Devils Canyon Dam site. That mapping effort focused on habitats important for moose forage. Mapping was performed at the 1:63,360 scale and incorporated previous mapping results (McKendrick et al. 1982). Existing ground data and photography provided by Alaska Department of Fish & Game (ADF&G), Bureau of Land Management, and the U.S. Forest Service, as well as newly obtained ground

and aerial data was also included. Vegetation types with high forage values (mainly shrub and forest types) were mapped to AVC Level IV (vegetation combined community-scale classification). Each map polygon was assigned values for understory cover of willows, dwarf birch, and alder, and a limited ground-truthing survey was conducted. A relational database of attributes for every polygon was developed and exported in digital format to floppy disk, and those data were provided to ADF&G.

Current, high-resolution orthophoto imagery is available for some portions of the mapping study area, but not all. To support field studies in 2012, AEA plans to purchase additional moderate-resolution imagery, which will cover the entire mapping study area. New high-resolution aerial photography or satellite imagery for the Project area is expected to be acquired in summer 2012; that imagery (needed to support fine-scale, on-screen mapping work) likely will be available in late 2012.

## METHODS

We propose an integrated approach to the mapping of vegetation and wildlife habitats based on methods developed for Ecological Land Surveys (ELS) studies conducted in tundra, boreal forest, and coastal regions in Alaska (see Jorgenson et. al. 2002 for an example study in south-central Alaska). This integrated mapping approach involves mapping terrain units such as vegetation type, physiography, surface form, and disturbance type, and then combining them into units with ecological importance (in this case wildlife habitats). The integrated terrain unit (ITU) mapping methods are flexible and well suited to the use of existing GIS data layers for terrain units (when available).

The method of combining various ITUs allows for the preparation of a number of thematic maps depending on the specific needs of the proposed project. For the SWHP, a vegetation map at Level IV of the Alaska Vegetation Classification (Viereck et al. 1992), and a wildlife habitat map based on the best combination of ITUs will be produced to yield a habitat map that accurately reflects use by wildlife. A concerted effort will be made to incorporate data from existing vegetation maps prepared for the original SHP (McKendrick et. Al. 1982, but especially Kreig and Associates 1987).

## TASK 1: COMPILE AND REVIEW EXISTING INFORMATION TO DEVELOP MAPPING MATERIALS

All historical and current geographic project layers will be managed using an *ArcGIS* geodatabase managed by GIS specialists at ABR. Much of the required data have already been compiled by ABR in the terrestrial gap-analysis studies conducted for the Project in 2011, including existing high-quality aerial photography, National Wetland Inventory (NWI) mapping, existing (1987) vegetation mapping, and rare or invasive plant species documented in broad regions encompassing the Project area. The existing vegetation data-layer produced by Kreig and Associates in 1987 has been obtained and updated to current *ArcGIS 10* format for viewing and editing with other Project data layers. Additional, fine-scale, recent imagery will be needed to complete the mapping in this multi-year study, and it is expected that imagery will be available in late 2012.

## TASK 2: COMPLETE PRELIMINARY MAPPING

The existing vegetation map data (Kreig and Associates 1987) will be assessed for accuracy within the mapping study areas for which there is recent, high-resolution digital imagery, and map polygons will be updated to reflect Level III or IV vegetation types as defined by Viereck et al. (1992). The assignment of Level III (largely reflecting vegetation structure) or Level IV (vegetation structure plus dominant species) vegetation types will depend on how accurate the 1987 mapping is when compared to recent imagery. The accuracy assessment will focus on the extent of registration errors, match-line errors between adjoining mapping blocks, and on accuracy of map polygon vegetation codes in comparison to recent imagery. As much as possible, the 1987 vegetation mapping will be used initially during the 2012 field

studies as a planning tool to develop a list of target vegetation types to document during the field work (see below). The 1987 mapping, if not highly accurate at the Level IV of Viereck et al. (1992), may be modified (aggregated) into broader-scale vegetation types (Level III). These broad-scale vegetation map polygons would then serve as the basis from which finer-scale map polygons would be developed.

When modifying the 1987 vegetation map layer, we will use a minimum mapping size of 1.0 acre for vegetated areas and 0.25 acres for waterbodies. Each vegetation map polygon will be updated and coded with Level III or IV vegetation types (Viereck et al. 1992), as well as preliminary physiography, surface form, and disturbance types.

## TASK 3: COMPLETE GROUND VERIFICATION

Ground-verification plots to be surveyed during summer 2012 will be selected to cover the range of mapped types identified during the preliminary mapping (above). If the 1987 vegetation mapping proves to be accurate only at the Level III of Viereck et al. (1992), we will select ground-verification plots based first upon the Level III map polygons and then will select finer-scale photosignatures to sample within the Level III polygons, so as to acquire the field data necessary to map vegetation to the Level IV of Viereck et al. (1992).

Since fine-scale imagery for the entire mapping study area will not be available for either the preliminary mapping phase or the 2012 field season, we will focus the field sampling in the footprint areas that are currently covered by 1-ft pixel resolution imagery (obtained by the Mat-Su LiDAR mapping project and publicly on AlaskaMapped.org). Areas not covered by preliminary mapping or high-quality digital imagery also will be sampled during summer 2012, but on a more limited basis. In such areas, we will focus the plot sampling on large, easily identifiable landcover types (these surrounding areas will be more heavily sampled in 2013 and 2014).

To maximize efficiency in data collection, at each ground-verification plot we will collect data necessary for vegetation and wildlife habitat mapping as well as wetlands mapping. Wetlands data collection efforts will be consistent with U.S. Army Corps of Engineers (USACE) requirements for wetland delineations (USACE 1987, USACE 2007; see Wetlands Mapping Study Plan—2012). Data will be recorded digitally in the field using a standardized data entry form designed to link directly to a standardized relational database. At each ground-verification sampling location, visual cover estimates will be made for all vascular plant species present. Site characteristics to be recorded will include: plant community structure (for vascular and nonvascular plants), physiography, surface form, site disturbances, and plant phenological observations. During field visits, the locations of all incidental observations of rare plants, invasive plants, wildlife species, or significant wildlife habitat features (e.g., raptor nests) will be documented and communicated to the Botanical and Wildlife Resources Program leads. A small soil pit will be dug to evaluate soil characteristics. The USACE wetlands determination methodology requires a standard 10-m radius plot size in which visual cover estimates are made for individual plant species, and this plot size is suitable as well for the vegetation and wildlife habitat sampling.

## TASK 4: POST-FIELD MAPPING AND DERIVATION OF WILDLIFE HABITAT TYPES

After the field season, we will begin revising the preliminary mapping so that it accurately reflects the field-verified occurrences of Level IV vegetation types, physiography, surface form, and disturbance types. This on-screen mapping in GIS will be an on-going process that likely will not be completed for the full mapping study area until 2014. Once substantial progress has been made on the ITU mapping for 2012, however, we will prepare a preliminary set of wildlife habitat types for a review by ABR wildlife biologists working on the Project. To derive wildlife habitat types, the ITU attributes assigned to each polygon (vegetation, physiography, surface form, and disturbance type) will be combined to produce a large number of basic habitat types. These basic habitats then will be aggregated into a smaller set of derived habitat types that share similar characteristics considered important to the wildlife species that

occur in the Project area, such as the expected levels of available (plant) food sources and cover for escape and/or shelter. These factors can be directly related to the quantity and quality of vegetation, soils, hydrology, microtopography, and/or microclimates present. After incorporation of recommendations from ABR wildlife biologists and any necessary alterations to the development of wildlife habitats, a number of summary statistics will be generated using standard *ArcGIS* geoprocessing techniques. The summary statistics will include total acreages of vegetation and wildlife habitats within the study area and comparisons with the 1987 vegetation map prepared by Kreig and Associates (1987). This information will be included in the Technical Memorandum describing the results of the 2012 mapping study (see below).

## REPORTING

The primary deliverables to be prepared in 2012 include (1) this study plan describing the work to be performed in 2012, (2) the Proposed and Revised Study Plans for work in 2013–2014, (3) copies of field data and GIS map products, and (4) a Technical Memorandum describing the progress and results of the 2012 Vegetation and Wildlife Habitat Mapping Study (see Products below).

In the Technical Memorandum, we will summarize the results of the 2012 Vegetation and Wildlife Habitat Mapping Study. The report will include descriptions of the vegetation and habitat types identified; a summary table (acreages) of the vegetation and habitat types represented in the 2012 mapping effort; field plot photos including site, ground, and soil photographs; and recommendations for the 2013 field survey effort.

A digital copy of the preliminary vegetation and habitat mapping will be provided as a separate deliverable in *ArcGIS* format, and will include supporting metadata documentation.

## LOGISTICAL SUPPORT AND HEALTH AND SAFETY

The field survey will be coordinated with the Wetlands Mapping Study using the following schedule, transportation, and personnel:

- Two (2-person) field crews will perform each field survey;
- Two 12-day field surveys (24 days total, including travel time) will be conducted starting approximately 15 June 2012 and ending 15 August 2012; and
- Field logistics will require a 4-passenger helicopter with approximately 4 hours of flight time required each day.

A Health, Safety, and Environmental Plan will be prepared prior to the field effort that will include:

- Project Safety Risk Assessment and Plan: This consists of a matrix that describes specific potential hazard/risk categories; the methods to be used to minimize risks; and responses to hazards.
- Field Communication Plan: This plan identifies the field personnel, the physical location of the field party, and contact information (telephone, fax, email, satellite phone, cell phone, or radio).
- Emergency Contact form and Emergency Medical form: All field personnel complete (or update) these forms prior to beginning field work.

All field personnel will have, at a minimum, CPR and Basic First Aid training prior to commencing fieldwork. Discussions regarding safety concerns raised by field personnel will be documented on a Safety Concerns or Minor Safety Incident Report. Should a minor safety incident occur, an ABR Safety Concerns or Minor Safety Incident Report will be filled out by the staff member(s) involved in the

incident and reviewed by the Field Project Leader (FPL) and Project Manager (PM). After returning from the field, all forms will be submitted to the ABR Safety Group for review and a copy will be stored in the project's safety folder. A post-field safety review will be conducted to review all safety concerns or minor incidents, identify any problems areas where safety training or planning can be improved, and those resolutions will be communicated to the PI/FPL and the staff involved in the incident.

A major safety incident (defined as an accident that required removal of the staff member from the field, hospitalization, or other responses that would initiate an OSHA or Workman's Compensation report) will be reported immediately to their PM/FPL and Tom DeLong, ABR's Office/Contracts Manager. A detailed report on the safety incident, the response, and any actions required will be prepared by the PM and submitted to the ABR Safety Group for review. As with the minor incident reports, this report will be reviewed during the post-field audit and any appropriate changes in planning, training, or response will be undertaken and documented with a follow-up addendum to the original report.

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

Project construction, facilities, and operation and maintenance will affect vegetation and wildlife habitats both upstream and downstream of the proposed dam, as well as along access and transmission line routes. Project effects will include direct, indirect, and cumulative effects to vegetation and wildlife habitats. Through this study, ABR biologists will characterize and quantify the direct loss of vegetation and wildlife habitat types within the Project footprint, and evaluate potential direct and indirect effects of Project maintenance and operations on vegetation and wildlife habitat types. As noted above, this is a multi-year study that will begin in 2012, and upon completion of the mapping for the full study area, PME measures will be developed in an effort to minimize adverse Project-induced impacts. The PME measures will be developed after careful consideration of the vegetation and habitat types expected to be affected.

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

- Losses of vegetation and wetland communities and productivity from reservoir inundation and the development of other Project facilities (direct effects).
- Changes to vegetation and wetland communities along access roads, transmission corridors, and reservoir edges due to alteration of solar radiation, temperature moderation, erosion and dust deposition, reservoir fluctuation, pathogen dispersal and abundance.
- Potential introduction of invasive plants due to Project construction.
- 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.

The results of this study will provide a quantification of the number of acres and distribution of vegetation and habitat types to provide a basis for vegetation and wildlife habitat impact analyses and development of PME measures. The wildlife habitat types mapped in this study also will provide the basis for an evaluation of habitat use by wildlife in the Project area, which then will be used to evaluate impacts to wildlife habitats for the specific bird and mammal species of concern in the Project area. Additionally, the results of this study will be used to help facilitate the Rare Plant Study and Invasive Plant Study (e.g., vegetation and habitat types where rare or invasive plants are likely to be found will be identified to help to focus future field efforts). As noted above, the alteration of successional vegetation and wildlife habitats in riparian areas downstream of the proposed dam (due to changes in hydrologic flow and ice processes in the Susitna River) will be addressed in the Riparian Study (see Riparian Study Plan—2012).

## PRODUCTS

Study products to be delivered in 2012 will include:

**Development of final 2012 Vegetation and Wildlife Habitat Mapping Study Plan.** The study plan for work in 2012 will be finalized through consultation with AEA, the Botanical Resources Program Lead, the Wildlife Resources Program Lead, resource management agencies, and other licensing participants. The Study Project Manager for the Vegetation and Wildlife Habitat Mapping Study will participate in the Technical Work Group meetings as the technical lead for this study and will prepare materials and revise the study plan accordingly.

**2013–2014 Vegetation and Wildlife Habitat Mapping Study Plan.** The 2013–2014 study plan will be developed with input received during the Technical Work Group Meetings through the formal FERC ILP study plan process. The Study Project Manager for the Vegetation and Wildlife Habitat Mapping Study will participate in the Technical Working Group meetings and assist the Botanical Resources Program Lead in developing the draft and final Proposed Study Plans and draft and final Revised Study Plans.

**Draft Technical Memorandum**. A draft technical memorandum will be prepared in mid-summer 2012 summarizing the progress of the 2012 field studies and mapping work.

**Geospatially-referenced ground-verification data**. A geospatially-referenced relational database of historic data and data collected during the 2012 field season, including representative photographs of vegetation and habitat types will be prepared. This database will form the basis for additional data collection efforts in 2013 and 2014. Naming conventions of files and data fields, spatial resolution, map projections, and metadata descriptions will meet the data standards to be established for the Project.

**Vegetation and habitat maps in ArcGIS software**. Draft vegetation and habitat maps will be developed and delivered according to the schedule indicated below. The vegetation and habitat maps will continue to be developed during 2013 and 2014 so as to cover the full mapping study area. Naming conventions of files and data fields, spatial resolution, map projections, and metadata descriptions will meet the data standards to be established for the Project.

**Final Technical Memorandum**. A final technical memorandum summarizing all of the 2012 study results will be prepared in winter 2012. In the memorandum, the status of the study will be assessed and any technical problems that have occurred will be identified, thereby allowing for refinement of the study methods in 2013–2014.

## SCHEDULE

This is a multi-year study. The following schedule is for the 2012 scope of work. The schedule for the 2013–2014 work will be developed during the 2013–2014 study planning process.

- Final 2012 Vegetation and Wildlife Habitat Mapping Study Plan — May 15, 2012
- Draft 2013–2014 Vegetation and Wildlife Habitat Mapping Proposed Study Plan — May 18, 2012
- Final 2013–2014 Vegetation and Wildlife Habitat Mapping Proposed Study Plan — June 30, 2012
- Draft Technical Memorandum – July 31, 2012
- Draft 2013–2014 Vegetation and Wildlife Habitat Mapping Revised Study Plan — September 15, 2012
- Final 2013–2014 Vegetation and Wildlife Habitat Mapping Revised Study Plan — October 31, 2012
- Geospatially-referenced relational database of field data — November 30, 2012

- Draft vegetation and wildlife habitat maps in ArcGIS software — November 30, 2012
- Final Technical Memorandum — November 30, 2012
- Draft 2013–2014 Vegetation and Wildlife Habitat Mapping Study Plan (based on FERC approval) — December 2012

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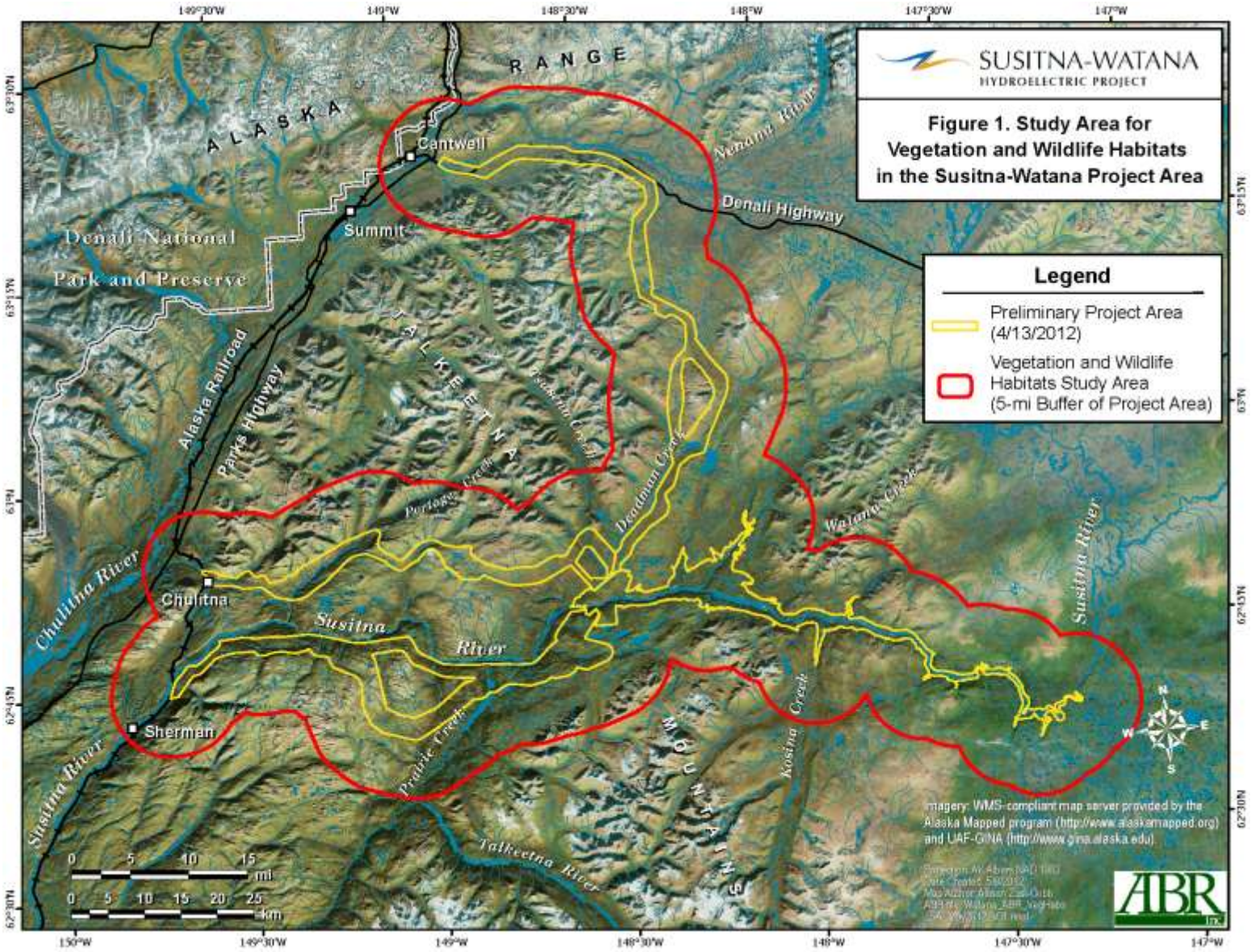
SUSITNA-WATANA
HYDROELECTRIC PROJECT
Figure 1. Study Area for Vegetation and Wildlife Habitats in the Susitna-Watana Project Area
Legend
Preliminary Project Area (4/13/2012)
Vegetation and Wildlife Habitats Study Area (5-mi Buffer of Project Area)
ALASKA RANGE
Denali National Park and Preserve
Cantwell
Summit
Denali Highway
Nenana River
Alaska Railroad
Parks Highway
Talkeetna Mountains
Deadman Creek
Watana Creek
Susitna River
Chulitna River
Chulitna
Sherman
Prairie Creek
Kosina Creek
Talkeetna River
imagery: WMS-compliant map server provided by the Alaska Mapped program (http://www.alaskamapped.org) and UAF-GINA (http://www.gina.alaska.edu)
ABR
0 5 10 15 mi
0 5 10 15 20 25 km