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SUSITNA-WATANA HYDRO

Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Wetlands Mapping - 2012

Alaska Energy Authority

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

May 2012

WETLANDS 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 Wetlands 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 Susitna-Watana Hydroelectric Project as described in the Pre-application Document (PAD; AEA 2011) would affect wetlands both upstream and downstream from the proposed dam site, and along access and transmission line routes. However, fill in wetlands would only occur upstream of the dam site and along the access and transmission line routes, hence the mapping of wetlands is being proposed only for those areas. The downstream effects of the proposed Project on riparian habitats in the Susitna River will be addressed in the Riparian Study (see Riparian Study Plan—2012). This study plan outlines the objectives and methods for characterizing the existing wetlands in the Project area. The 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.

STUDY OBJECTIVES

The overall (multi-year) objectives of the Wetlands Mapping Study are to:

- Identify and map wetlands in the Project area based upon recent aerial imagery;
- Quantify the potential direct, indirect, and cumulative impacts to wetlands and wetland functions from Project construction, operations, and maintenance activities;
- Develop potential protection, mitigation, and enhancement (PME) measures to address Project-related impacts to wetlands and wetland functions; and
- Develop and implement the 2013–2014 Wetlands Mapping Study Plan.

A complete assessment of the Project area wetlands and wetland functions will be completed as the Project area is refined (e.g., preferred alternative access and transmission corridors). The interim study objective for 2012 is to begin work on a wetland map for the Project area using existing and recent aerial imagery and field verification (ground-truth) data to be collected in summer 2012.

STUDY AREA

The study area for the mapping of wetlands will be formally defined in consultation with management agency personnel over the course of developing the 2013–2014 study plan. A working study area for the 2012 season, however, includes all areas that could be directly altered or disturbed by Project construction and operations (reservoir impoundment zone, dam and powerhouse and supporting facilities, access route

and transmission-line corridors, and materials sites) and a 2-mile buffer surrounding these areas (Figure 1).

The alteration of wetland habitats downstream of the dam (due to changes in hydrologic flow and ice processes in the Susitna River) will be addressed in the Riparian Study. In that study, we are not proposing to map wetlands separately, primarily because fill of wetlands would not occur downstream from the proposed dam and therefore wetlands mapping information would not be needed for the Project's Section 404 wetlands permit application. In the Riparian Study, we will be mapping successional vegetation and wildlife habitats (which include wetlands), and 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 habitats from construction of the proposed dam (see Riparian Study Plan—2012).

EXISTING INFORMATION

Wetlands were mapped for the Alaska Power Authority's (APA) Susitna Hydroelectric Project (SHP) in the 1980s through a cooperative agreement between U.S. Fish and Wildlife Service (USFWS) and the APA to produce a preliminary wetland map for the SHP area at a scale of 1:63,360. These data, described in USFWS (1984), are now a part of the National Wetlands Inventory (NWI) database; however, they are currently unavailable to the public in digital format. The NWI maps of the SHP area were based on the vegetation mapping completed by McKendrick et al. (1982), with some additional modification using stereoscopic photo-interpretation. The original Alaska Vegetation Classification (AVC) (Viereck and Dyrness 1980) vegetation classes were cross-referenced and converted into wetland classes using the classification scheme of Cowardin et al. (1979). Mapping was not finalized by the original report publication date (USFWS 1984), but a preliminary table of wetland classes and acreages expected to be affected by SHP components was developed from that report (see AEA 2011). NWI data for the current Project area has recently been digitized, but to date, the data has not been released by the USFWS for public use. Complete digital NWI data for the current Project area is expected to be available by middle or late 2012.

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

In general, the wetlands mapping for the Project area will follow the protocols for preparing wetland maps that have been developed by the USFWS NWI program (National Wetlands Inventory Center 1995, Dahl et al. 2009), but the classification of wetlands will incorporate elements of three different wetland classification systems: NWI, hydrogeomorphic (HGM) classes, and a regional classification developed for the Cook Inlet basin (see below). Wetland types will be defined based on a number of landscape, geomorphic, hydrological, and biological variables and will be classified as fine-scale wetland ecosystems (wetland ecotypes).

In addition to the wetlands mapping needed for a Section 404 wetland permit application, a wetland functional assessment for the mapped wetland ecotypes will be prepared. The specific set of wetland functions and the data elements needed to evaluate those wetland functions have not yet been determined, but will be defined in consultation with management agencies over the next several weeks. These discussions are on-going and are expected to be completed before the 2012 field season starts. The set of

wetland functions to be assessed will be tailored to those expected to be of most importance in remote regions of Alaska in which landscape disturbances are few. The wetland functional assessment will be based on based on hydrogeomorphic (HGM) principles. Although draft HGM guidebooks have been prepared for the Cook Inlet Basin (Hall et al. 2003) and Interior Alaska (Alaska Department of Environmental Conservation and USACE 1999), the models are confined to a small set of HGM classes and are regionally specific; thus, they are unlikely to be applicable to the Susitna Basin, which lies in the transition zone between Interior Alaska and Cook Inlet and includes montane environments. As a result, we will use the rapid assessment procedure developed by Magee and Hollands (1998) as the basis for assessing wetland functions, but the procedure (and parameters measured) will be modified as needed to evaluate wetland functions unique to the project area.

At a minimum, the 2012 study will include the following study components:

- Compile available digital wetland mapping layers to help facilitate the development of wetland delineations based on current aerial imagery.
- Incorporate data from the Vegetation and Wildlife Habitat Mapping Study and available data on natural fire patterns along the reservoir reach of the Susitna River.
- If possible, identify wetland delineation field sites and data from the 1980s studies for potential resampling.
- Preselect field sampling locations and conduct field wetland delineation and functional assessment surveys.
- Conduct initial mapping of wetland types in the areas sampled during field surveys in summer 2012.
- Report on the progress and initial results of the study in the Technical Memorandum (see Products below).

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

A number of wetland and vegetation mapping resources for the project area were identified as part of the preparation of the PAD (AEA 2011). Of particular value is the availability of digital NWI wetlands mapping for the study area. Although this mapping is more than 20 years old, it still will be a useful resource for planning the 2012 field effort. Other data sources that will be used (where available) include soil surveys, digital elevation data, the National Hydrography Dataset (USGS 1999), and any map products that may have been produced for other studies in the region. These data will be compiled and reviewed and, where possible, included as a map layer in *ArcGIS* to assist the current mapping effort.

Available, high-resolution aerial imagery for the mapping study area will be acquired and evaluated for quality and geodetic control. As noted above, for those portions of the study area that are not covered by the high-resolution aerial imagery, moderate-scale imagery will be purchased to support the field effort in summer 2012. New high-resolution aerial photography or satellite imagery for the Project area is expected to be acquired in summer 2012, which then will be used to map wetlands in those areas not covered by existing high-resolution imagery.

TASK 2: COMPLETE PRELIMINARY MAPPING

Prior to the 2012 field season, we will initiate preliminary mapping of wetland and upland boundaries using *ArcGIS 10.0*. On-screen digitizing will be conducted in those areas where NWI mapping is lacking

and suitable aerial imagery is available. The magnitude and scale of the mapping effort will depend on the quality of the imagery and the extent of NWI mapping. The goal of this preliminary mapping is to map a reasonable set of characteristic wetland ecotypes that occur in the mapping study area so as to guide the field wetland-determination and ground-verification surveys (see below).

Classification and mapping of the Project area will follow the protocols for preparing wetland maps that have been developed by the USFWS National Wetland Inventory (NWI) program (National Wetlands Inventory Center 1995, Dahl et al. 2009). These protocols describe requirements for boundary delineation, polygon size, classification, and NWI annotation. The minimum mapping polygon size for most upland and wetland habitats will be 0.5 acres, with smaller polygons (0.1 acre) delineated for water bodies and other wetlands of ecological importance. Wetland and upland boundaries will be delineated based on color signature, plant canopy, and surface relief, along with hydrological indicators such as drainage patterns and surface water connections. As noted above, the classification of wetlands will incorporate elements of three different wetland classification systems: NWI, hydrogeomorphic (HGM) classes, and a regional classification for the Cook Inlet basin (see below). Wetlands also will be classified into Viereck Level IV vegetation types (where possible) using The Alaska Vegetation Classification (Viereck et al. 1992), which includes canopy classes for shrub, dwarf tree, and tree lifeforms.

TASK 3: COMPLETE FIELD WETLAND DETERMINATIONS AND VERIFICATIONS

The wetland field surveys will be organized to collect data from as many wetland ecotypes as possible in a way that maximizes safety and efficiency. The preliminary mapping effort described above will be used to preselect sampling transects and wetland-determination plots, although additional plots may be established in the field when additional field data are needed for a given area or a particular wetland ecotype. Field plots will be sampled along transects that will be located within major physiographic types, including riverine, lacustrine, lowland, and upland areas. If possible, plots for which vegetation data were collected in the 1980s will be resampled (these data will be valuable for assessing the extent to which landscape characteristics have changed in the intervening 25 years).

Wetland determinations will be made using the standard three-parameter approach described in the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environment Laboratory) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0)* (USACE 2007). Field surveys will be conducted between 15 June and 15 September, which is well within the median dates of the onset of vegetation green-up in spring and vegetation senescence in fall, which are summarized in the 2007 Regional Supplement for the Project area. To be classified as a wetland, a site must be dominated by hydrophytic plants, have hydric soils, and show evidence of a wetland hydrologic regime. At each wetland determination plot, percent areal cover of plant species within each stratum (herb, shrub, and tree) will be visually estimated, generally within a 10-m (30-ft) radius of relatively homogeneous vegetation as specified in the 1987 Manual. The size and dimensions of the plots may be modified, however, depending on the site characteristics of the plant community (e.g., narrower plots in riparian fringe habitats). Additional documentation at each plot will include observations of wildlife use (stick nests, dens) and other site characteristics that reflect habitat quality and wetland function. Additional vegetation structure information for both vascular and nonvascular plants will be recorded to assist in evaluating use of the wetland ecotypes birds and mammals.

In addition to wetland determination plots, we will establish ground-verification plots for improving the accuracy of the overall mapping effort. At these plots, the dominant plant species will be recorded, and wetland ecotype and Viereck Level IV vegetation classes (Viereck et al. 1992) will be assigned. These verification assessments will be performed in areas where the wetland or upland status has been well documented in determination plots elsewhere, and will be used to improve map accuracy by increasing the number of documented wetland ecotypes tagged to particular aerial photosignatures.

A mobile *Trimble® Nomad™* series GIS unit will be used to record the wetlands data (using the *WetForm* database), record GPS location (as back-up to handheld GPS receivers), and provide field access to aerial imagery and the preliminary mapping performed prior to the field survey. *WetForm* is a proprietary relational database used to enter wetlands site data in the field, and it facilitates the preparation of electronic copies of the USACE 2007 Regional Supplement dataform for each wetland determination plot.

TASK 4: POST-FIELD MAPPING OF WETLANDS

After the field season, we will revise the preliminary wetlands map to reflect the site characteristics of wetland ecotypes verified in the field. 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.

As noted above, wetland ecotypes will be defined based on a number of landscape, geomorphic, hydrological, and biological variables. For each map polygon delineating a wetland ecotype, attribute codes will be recorded in GIS so as to categorize the mapped wetlands according to three wetland classification systems: the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979), HGM class (Smith et al. 1995), and the wetland classification system developed by the Kenai Watershed Council specifically for lowlands in the Cook Inlet region (http://cookinletwetlands.info/). The latter system, developed by Mike Gracz, improves on the Cowardin system by incorporating region-specific landscape, geomorphic, and wetland function features into the classification. In the mapping of wetlands for the Project, wetland ecotypes will be defined specifically for the Susitna basin using methods consistent with the Cook Inlet lowlands wetland classification system. Wetlands also will be classified into Viereck Level IV vegetation types (where possible) using *The Alaska Vegetation Classification* (Viereck et al. 1992), which includes canopy classes for shrub, dwarf tree, and tree lifeforms.

Once substantial progress has been made on the wetlands mapping for 2012, we will prepare a preliminary wetlands map for the Technical Memorandum, in which the results of the 2012 mapping study will be described (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 Wetlands Mapping Study (see Products below).

In the Technical Memorandum, we will summarize the results of the 2012 Wetlands Mapping Study. The report will include descriptions of the wetland ecotypes identified; a summary table (acreages) of the wetland ecotypes and upland areas represented in the 2012 wetlands mapping effort; a description of the

vegetation, hydrology, and soils of the preliminary wetland functional groups identified; the model to be used for the functional assessment; and recommendations for the 2013 field survey effort. The report also will include field wetland dataforms, and field plot photos including site, ground, and soil photographs.

A digital copy of the preliminary wetlands 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 Vegetation and Wildlife Habitat 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 may affect wetlands upstream from the dam site, and along access and transmission line routes. The construction and operation of the Susitna-Watana Hydroelectric Project is expected to affect wetland resources in the following ways:

- Direct wetland loss from fill placement for constructing roads, power plants, and other Project infrastructure;
- Conversion of palustrine wetland systems to a lacustrine system by damming the Susitna River to create a reservoir;
- Loss of wetland function, including changes in wetland canopy structure, soil biological productivity, water storage, and flood control; and
- Indirect impacts from erosion, dust, permafrost degradation, landslides, and off-road vehicle use.

A thorough understanding of how Project activities are expected to affect wetland resources in the study area will be critical for developing best management practices, rehabilitation options for promoting recovery of wetlands exposed to short term impacts, and compensatory mitigation for permanent wetland losses. Upon completion of the Wetlands Mapping Study for the Project (expected in 2014), protection, mitigation, and enhancement (PME) measures will be developed in consultation with the USACE through the FERC ILP process to address the adverse Project-induced impacts on wetlands identified in the PAD (AEA 2011). As noted above, in areas downstream of the proposed dam the alteration of successional riparian vegetation and wildlife habitats (which include wetlands) 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 Wetlands Mapping Study Plan. The study plan for work in 2012 will be finalized through consultation with AEA, the Botanical Resources Program Lead, the USACE and other resource agencies and licensing participants. USACE must approve the proposed wetland classification functional assessment methods prior to initiation of field data collection. The Study Project Manager for the Wetlands Mapping Study will participate in the Technical Working Group meetings as the technical lead for this study and will prepare materials and revise the study plan accordingly.

2013–2014 Wetlands Mapping Study Plan. The 2013–2014 study plan will be developed with input received during the Technical Working Group Meetings through the formal FERC ILP study plan process. The Study Project Manager for the Wetlands Mapping Study will participate in the Technical Working Group 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 Memoranda. 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 2012 field season, including representative photographs of wetland ecotypes 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.

Wetland map in ArcGIS software. The preliminary wetland map will be developed and delivered according to the schedule indicated below. The wetland map will continue to be developed during the 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 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 components will be developed with the AEA during the 2013–2014 study planning process.

- Final 2012 Wetlands Mapping Study Plan — May 18, 2012
- Draft 2013–2014 Wetlands Mapping Proposed Study Plan — May 28, 2012
- Final 2013–2014 Wetlands Mapping Proposed Study Plan — June 30, 2012
- Draft Technical Memorandum — July 31, 2012
- Draft 2013–2014 Wetlands Mapping Revised Study Plan — September 15, 2012
- Final 2013–2014 Wetlands Mapping Revised Study Plan — October 31, 2012
- Geospatially-referenced relational database of field data — November 30, 2012
- Draft wetlands map in *ArcGIS* software — November 30, 2012
- Final Technical Memorandum — November 30, 2012
- Draft 2013–2014 Wetlands Mapping Study Plan (based on FERC approval) – December 2012

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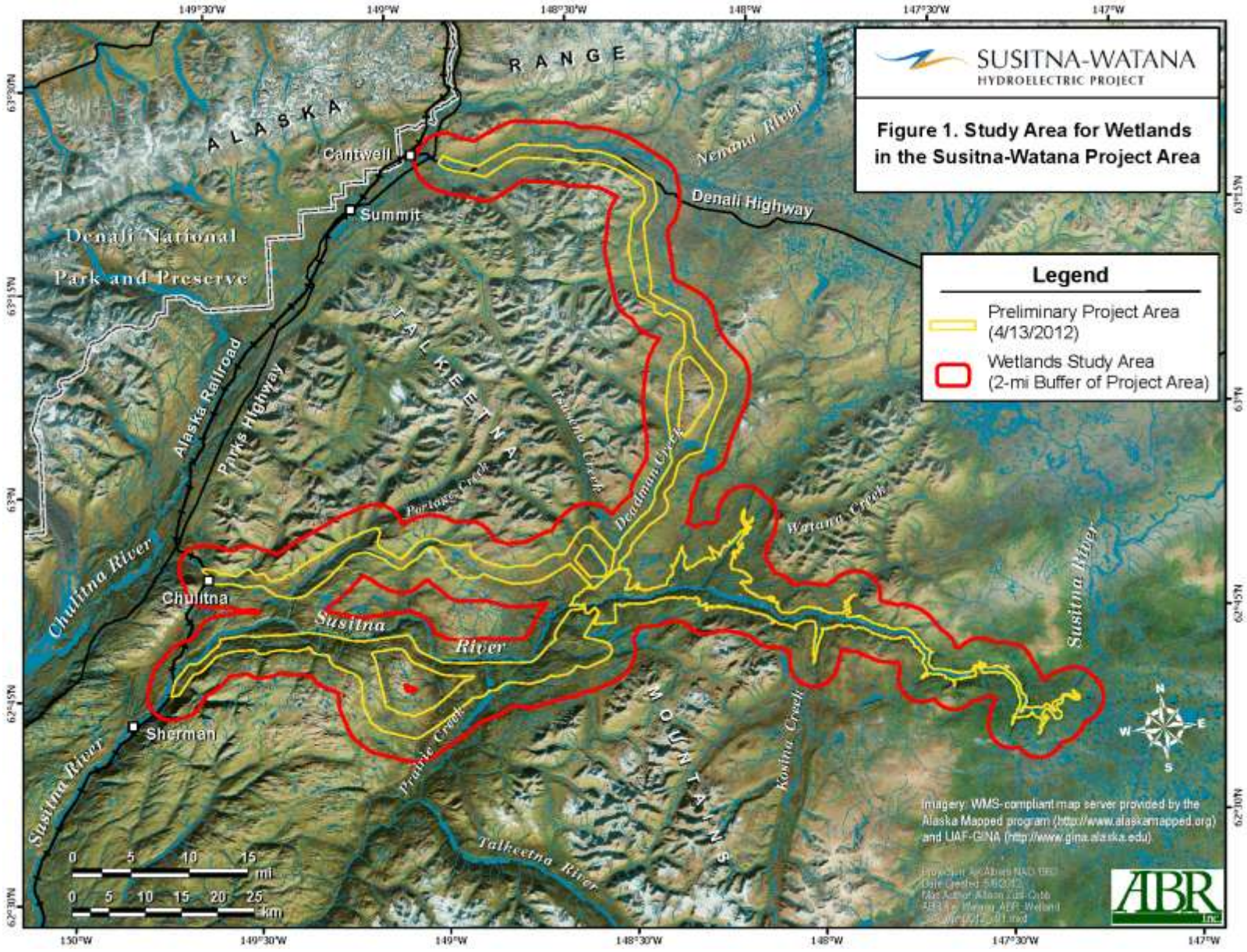
SUSITNA-WATANA
HYDROELECTRIC PROJECT
Figure 1. Study Area for Wetlands in the Susitna-Watana Project Area
Legend
Preliminary Project Area (4/13/2012)
Wetlands Study Area (2-mi Buffer of Project Area)
ALASKA RANGE
Cantwell
Summit
Denali National Park and Preserve
Denali Highway
Nenana River
Alaska Railroad
Parks Highway
TALKEETNA MOUNTAINS
Tsusena Creek
Deadman Creek
Portage Creek
Watana Creek
Susitna River
Chulitna River
Chulitna
Susitna River
Sherman
Prairie Creek
Kosina Creek
Talkeetna River
0 5 10 15 mi
0 5 10 15 20 25 km
Imagery: WMS-compliant map server provided by the Alaska Mapped program (http://www.alaskamapped.org) and UAF-GINA (http://www.gina.alaska.edu)
ABR Inc