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

Riparian Study Plan - 2012

Alaska Energy Authority



SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

May 2012

RIPARIAN 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 Riparian Study will provide baseline information needed to support 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), would alter the natural flow regime of the Susitna River. This study plan outlines the objectives and methods for mapping and characterizing existing vegetation and wildlife habitats in riparian areas downstream from the proposed dam and will serve as the baseline from which predictive models will be developed to assess likely changes in riparian ecosystems downstream of the proposed dam. A thorough understanding of how the proposed Project activities would affect hydrologic processes and riparian ecosystems downstream of the dam will be critical for developing best management practices, assessing potential impacts to wildlife, and preparing adequate FERC documentation of Project effects.

STUDY OBJECTIVES

The goal of the Riparian Study is to characterize and map the local-scale riparian ecosystems (riparian ecotypes) and wildlife habitat types in the Project study area, and assess the extent to which the proposed Project will affect riparian processes and function. The overall (multi-year) objectives of the Riparian Study are to:

- Identify and map riparian ecotypes and wildlife habitats downstream from the Watana Dam site;
- Characterize the physical and ecological processes downstream from the Watana Dam site that are likely to affect riparian areas;
- Quantify the potential impacts to riparian areas due to Project construction and operations, including potential changes to riparian ecotypes and wildlife habitats, riparian processes, and vegetation successional pathways;
- Predict potential changes in riparian ecotypes and wildlife habitats that would result from alterations in instream flow, ice processes, and riverine geomorphology;
- Develop potential protection, mitigation, and enhancement (PME) measures to address Project-related impacts to riparian areas, riparian processes, and vegetation successional pathways; and
- Develop and implement the 2013–2014 Riparian Study Plan.

The interim study objectives for 2012 are to conduct field ground-verification surveys and begin work on a current map of riparian ecotypes and wildlife habitats in riparian areas downstream of the proposed dam.

STUDY AREA

The Riparian Study area will overlap with the vegetation, wildlife habitat, and wetlands mapping study areas near the proposed dam site, but the main focus for the Riparian Study will be on riparian areas along the Susitna River and its tributaries below the dam site, which are expected to be altered by changes in stream flow, ice processes, and riverine geomorphology from construction and operation of the proposed dam.

The study area for the mapping of riparian ecotypes and wildlife habitats in the riparian study will be formally defined in consultation with management agency personnel over the course of developing the 2013–2014 study plan, but we expect the study area will include those riparian areas downstream of the proposed dam site to a point at which the effects of altered flow regimes expected in the Susitna River would not be measurable or would be overridden by the effects of tidal fluctuations from Cook Inlet. This downstream location will be determined following analysis of the results of the 2012 instream flow studies. In 2012, the riparian study will focus on those downstream areas in which altered flow regimes are most likely to occur, including from the proposed dam site downstream to the town of Willow (Figure 1). Eventually (in 2013 and 2014) the width of the study area for the mapping of successional vegetation in the riparian study will cover all riverine areas in the active floodplain of the Susitna River out to the estimated limits of 100-year flood events (plus a buffer area of at least 800 meters, pending input from management agency personnel). The estimated limits of 100-year flood events will be determined in analyses of data from the 2012 instream flow studies. In 2012, the riparian study area will extend laterally from approximately the edge of flowing waters in the Susitna River to 200 meters into adjacent upland terrain .

EXISTING INFORMATION

A number of riparian and vegetation mapping resources for the Project area were identified as part of the preparation of the PAD (AEA 2011), which was prepared, in part, to identify data gaps and prioritize the environmental study efforts for the Project. Of primary importance to the Riparian Study are the previous vegetation mapping and vegetation successional dynamics studies by McKendrick et al. (1982), Collins and Helm (1997), and Helm and Collins (1997). These previous studies will serve as a baseline for developing a sampling scheme and providing a conceptual framework upon which to build our vegetation succession classification and predictive models for assessing the downstream effects of the proposed Project on riparian habitats.

Current, high-resolution orthophoto imagery, which will be used for the on-screen mapping work, is available for most of the Riparian Study area. Moderate-resolution imagery (to support the field studies in 2012) will fill the remaining gaps in the study area. Additional high-resolution aerial photography or satellite imagery for the Project area is expected to be acquired in summer 2012; that imagery likely will be available in late 2012.

METHODS

We propose an integrated approach to the mapping of riparian ecotypes and wildlife habitats based on methods developed for Ecological Land Surveys (ELS) studies conducted in tundra, boreal forest, and coastal regions in Alaska over the past 15 years (see Jorgenson et. al. 2002 for an example study in south-central Alaska). This integrated mapping approach involves mapping terrain units such as vegetation, geomorphology, and surface-form type, and then combining them into units with ecological importance (in this case riparian ecotypes and wildlife habitats, see below). 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 an individual study. For the Riparian Study, a riparian ecotype map and a wildlife habitat map, each based on the best combinations of ITUs, will be prepared. The mapping of wildlife habitats in the Riparian Study will be conducted in coordination with the researchers conducting the Vegetation and Wildlife Habitat Mapping Study to derive a single set of wildlife habitats that apply project-wide.

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

Data sources that may be used for the mapping of riparian ecotypes and wildlife habitats include vegetation mapping and vegetation succession studies conducted in the Susitna River drainage by McKendrick et al. (1982), Collins and Helm (1997), Helm and Collins (1997); soil surveys; digital elevation data; the National Hydrography Dataset (USGS 1999); and other map products that may have been produced for the area as part of other studies. These data will be compiled and reviewed and, if possible, included as a map layer in *ArcGIS* to assist the mapping effort.

The available, high- and moderate-resolution aerial imagery for the project 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 high-resolution aerial imagery (needed for mapping), moderate-scale imagery will be used to support the field sampling efforts in summer 2012.

TASK 2: COMPLETE PRELIMINARY MAPPING

If time permits, prior to the 2012 field season, we will initiate the mapping of preliminary local-scale riparian ecosystems (riparian ecotypes) using the current aerial imagery available for the study area. As noted above, we propose to map riparian ecotypes using an ITU approach. We propose a minimum mapping size of 1 acre for terrestrial polygons and 0.25 acres for waterbodies. ITU map polygons will be attributed with geomorphology (e.g., Braided Active Overbank Deposit); surface form (e.g., Mid-channel Bar); vegetation class (e.g., Low Willow Scrub), and successional stage (e.g., young poplar, old poplar). Riparian vegetation in this study will be mapped to the Level IV of the *Alaska Vegetation Classification* (Vioreck, et al. 1992) with adjustments, as needed, for early successional riparian stages following Helm and Collins (1997). The ITU parameters can be displayed individually to produce distinct geomorphology, surface form, and successional vegetation maps. The ITU codes will be aggregated into preliminary riparian ecotypes based on the combination of the four ITUs noted above that best represents the local-scale riparian habitats in the areas mapped.

TASK 3: COMPLETE GROUND VERIFICATION

We plan to use the preliminary mapping of riparian ecotypes to design a stratified random sampling scheme to preselect potential study sites within riparian habitats, including at least one representative site for each riparian habitat type. If this is not possible (because of time constraints for example), we will preselect study sites based on aerial imagery signatures. In the selection of study sites, we also will coordinate with researchers conducting the instream flow, ice processes, and riverine geomorphology studies to try to co-locate study sites, as much as possible, so that the measured riparian habitat parameters can be related to existing conditions for instream flow, ice processes, and geomorphology on a site-by-site basis. These coordinated baseline data will help in the later stages of the Riparian Study, in which predictions of changes in riparian habitats due to construction and use the proposed dam will be made. We will complete the 2012 ground verification in two phases. In Phase 1, we will work with the Instream Flow Study Project Manager to conduct a helicopter-assisted reconnaissance of the Susitna River from Talkeetna to Willow during mid-June. The goal of the reconnaissance survey is to determine the feasibility of re-locating field sites originally established by McKendrick et al. (1982) and Collins and

Helm (1997) for potential re-sampling, and to identify new study sites for additional sampling. Based on the results of the reconnaissance survey, we will adjust our sampling scheme and prepare for the second phase of field sampling.

Phase 2 of the field sampling will occur in late June–early July and will include sampling of preselected study sites in conjunction with the data collection efforts for the Instream Flow Study. Data will be recorded digitally in the field using a standardized data entry form designed to link directly to a relational database (*Microsoft Access*). We will sample riparian habitats using two types of transects: verification transects and intensive transects. Verification transects are designed for rapid map verification and description of ecosystem components. Circular plots of 10 m radii will be sampled along verification transects, at which mapped variables (e.g., vegetation, successional stage, geomorphology, surface form) will be categorized into classes only; detailed field measurements will not be made. Along intensive transects, circular study plots will be a minimum of 500 m² in forested areas and 50 m² in non-forest areas. On intensive transects, we will collect detailed data on vegetation structure, successional dynamics, plant phenology, site variables, soils, hydrology, and specific wildlife habitat characteristics or sign. The shape of the study plots on both verification and intensive transects may vary depending on the shape of the vegetation stand being sampled. We will follow field methods provided by McKendrick et al. (1982), Collins and Helm (1997), and Helm and Collins (1997). Data attributes collected in the field on intensive transects will include:

- Geo-referenced plot locations (<3-m accuracy);
- Vegetation cover by species in each of 7 height categories (0.0–0.1 m, 0.4–1 m, 1–2 m, 2–4 m, 4–8 m, 8–16 m, and >16 m) based on transect point counts;
- Ages (cross section cuttings or cores) and height of dominant woody plants;
- Density by size class (<4 cm, <0.4 m, 0.4–2 m, 2–4 m, and >4 m DBH); and size-class groupings (<4 m and >4 cm DBH; and >4 m and <4 cm DBH); or other size class or vegetation structure classes necessary for browse evaluations;
- Crown dominance for each woody species;
- Phenological attributes for selected plant species;
- Site variables, including physiography, geomorphic unit, surface form, elevation, aspect, and slope;
- Shallow soil pits for drainage and soil moisture; soil hydrologic variables, including depth of water above or below ground surface, depth to saturated soil, pH, and electrical conductivity (EC); and soil depositional profiles;
- Vegetation structure and plant community composition to identify vegetation types; and
- Wildlife sign such as browse marks, nests, dens, droppings, singing birds, carcasses, tracks, burrows.

TASK 4: POST-FIELD MAPPING AND ANALYSIS

After the field season, we will begin revising the preliminary ITU mapping so that it accurately reflects the field ground-verification data collected in summer 2012. This on-screen mapping in GIS will be an on-going process that may 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 riparian ecotypes and wildlife habitat types. Riparian ecotypes will be derived as described above under Task 2: Complete Preliminary Mapping, and wildlife habitat types will be derived as described in the Vegetation and Wildlife Habitat Mapping Study Plan—2012. The riparian wildlife habitats will be

reviewed by ABR wildlife biologists working on the Project and any revisions necessary will be made before preparing the Technical Memorandum for 2012 (see Reporting below).

After the ITU mapping has been updated, a number of summary statistics will be generated using standard *ArcGIS* geoprocessing techniques, including total acreages of ITU components, riparian ecotypes and wildlife habitats within the study area. This information will be included in the Technical Memorandum describing the results of the 2012 mapping study (see Reporting 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 Riparian Study (see Products below).

In the Technical Memorandum, we will summarize the results of the 2012 Riparian Study. The report will include descriptions of the riparian ecotypes and wildlife habitat types identified; a summary table (acreages) of the riparian ecotypes and wildlife 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 ecotype 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 performed using the following schedule, transportation, and personnel:

- Phase 1: one field crew of 2-3 scientists will comprise the field work, and will include 6 days of field reconnaissance surveys from 20–25 June, 2012.
- Phase 2: two field crews comprised of 2 scientists each will perform the field survey over a 9-day period from 26 June–4 July 2012.
- Both phases of field work will require one R-44 Raven 2 helicopter with approximately 6 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 problem 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 operations will affect riparian habitats downstream from the proposed Watana Dam site. Project effects will include direct, indirect, and cumulative effects to riparian habitats. Through this study, ABR biologists will characterize and quantify riparian habitats and successional vegetation stages downstream from the dam site, and will evaluate potential direct, indirect, and cumulative effects of Project operations on riparian habitats. This is a multi-year study that will begin in 2012 and will continue in 2013 and 2014. Upon a complete assessment of the Project area, mitigation alternatives will be developed from the data to address adverse Project-induced impacts.

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 changes in wetlands, wetland functions, riparian vegetation, and riparian succession patterns related to altered hydrologic regimes below the dam.

The results of this study will provide an analysis of the number of acres and distribution of riparian habitat types to provide a basis for riparian habitat impact analysis and development of mitigation measures. Wildlife use and riparian habitat functions are related to the types and successional stages of riparian vegetation communities; therefore results of this study will be necessary to evaluate baseline and future wildlife use in the Project area. 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., riparian habitat types where rare or invasive plants are likely to be found will be identified to help to focus future field efforts).

PRODUCTS

Study products to be delivered in 2012 will include:

Development of final 2012 Riparian 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 Riparian 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 Riparian 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 Riparian 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 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 the 2012 field season, including representative photographs of riparian habitats 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.

Riparian ecotype and wildlife habitat maps in ArcGIS software. Draft riparian ecotype and wildlife habitat maps will be developed and delivered according to the schedule indicated below. The ecotype 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 2012 Technical Memorandum. A final technical memorandum summarizing all of the 2012 study results will be prepared in winter 2012. Summary results and evaluation of the 2012 data may lead to development of additional data collection or evaluation techniques in subsequent years. 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

The following schedule is for the 2012 scope of work. The schedule for the 2013–2014 work will be developed in consultation with AEA during the 2013–2014 study planning process.

- Final 2012 Riparian Study Plan — 20 May 2012
- Draft 2013–2014 Riparian Proposed Study Plan — May 23, 2012
- Final 2013–2014 Riparian Proposed Study Plan — June 30, 2012
- Draft Technical Memorandum — July 31, 2012
- Draft 2013–2014 Riparian Revised Study Plan — September 15, 2012
- Final 2013–2014 Riparian Revised Study Plan — October 31, 2012
- Geospatially-referenced relational database of field data — November 30, 2012
- Draft (to date) riparian ecotype and wildlife habitat maps in *ArcGIS* software — November 30, 2012
- Final Technical Memorandum — November 30, 2012
- Draft 2013–2014 Riparian Study Plan (based on FERC approval) — December 2012

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