

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

**Invasive Plant Study
Study Plan Section 11.9**

Final Study Plan

Alaska Energy Authority



July 2013

11.9. Invasive Plant 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 11.9 of the RSP described the Invasive Plant Study. This field-based study focuses on identifying disturbed habitats in and near the Project area that could serve as sources of invasive vascular plant species. Field surveys will then be conducted in those disturbed areas to locate populations of invasive species that have some potential to spread into, or farther into, the Project area associated with development activities. An ecological risk assessment will be conducted for the invasive species identified to evaluate the risk of the continued spread of those species because of Project development activities. RSP 11.9 provided goals, objectives, and proposed methods for data collection regarding invasive plants.

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 11.9 was one of the 31 studies approved with no modifications. As such, in finalizing and issuing Final Study Plan Section 11.9, AEA has made no modifications to this study from its Revised Study Plan.

11.9.1. General Description of the Proposed Study

The Invasive Plant Study is a field-based investigation in which AEA will identify disturbed habitats in and near the Project area that could serve as sources of invasive vascular plant species. Field surveys will then be conducted in those disturbed areas to locate populations of invasive species that have some potential to spread into, or farther into, the Project area associated with development activities. An ecological risk assessment will be conducted for the invasive species identified to evaluate the risk of the continued spread of those species because of Project development activities.

Study Goals and Objectives

The overall goals of the Invasive Plant Study are to determine the current prevalence of invasive vascular plants in the Project area and nearby disturbed areas and to assess the risk of the continued spread of invasive species as a result of Project development.

The specific objectives of the Invasive Plant Study are to:

- Identify the locations at which invasive plant species have already become established in the Project area and in nearby disturbed areas;
- Estimate population sizes for invasive species and map their current distributions; and
- Determine whether any of the species present could pose a substantial ecological threat.

The Invasive Plant Study is planned as a two-year study (2013–2014) that will be formally initiated in 2013. However, invasive species found during the field surveys in 2012 for the Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin (Section 11.5), the Riparian Vegetation Study Downstream of the Proposed Susitna-Watana Dam (Section 11.6), and the Wetland Mapping Study in the Upper and Middle Susitna Basin (see Section 11.7) were documented, and those records of invasive species will be used in planning the field

surveys for invasive species in 2013 and 2014. Results from the first year of work in 2013 will be used to update this study plan, if needed, which could include fine-tuning the field survey methods and survey areas for invasive species, based on the results from the first year of work in 2013 and on AEA's recommendations for the Initial Study Report (ISR), as well as ISR comments received by FERC staff, resource agencies, and other interested licensing participants.

11.9.2. Existing Information and Need for Additional Information

No surveys of invasive vascular plants were conducted as part of the APA Project in the 1980s, primarily because the risk of invasive species was not considered a major concern at the time (AEA 2011). Resource management agencies have since become increasingly concerned, however, about the potential for invasive plant species to become established in Alaska as a result of construction activities associated with new development projects. As a result, the U.S. Forest Service, National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, Department of Natural Resources Plant Material Center, and Alaska Natural Heritage Program (AKNHP) work in cooperation to support the Alaska Committee for Noxious and Invasive Plants Management (CNIPM) and the Strategic Plan for Noxious and Invasive Plants Management in Alaska (Hebert 2001). An outcome of the strategic plan was the development of the Alaska Exotic Plant Information Clearinghouse (AKEPIC) database. This geospatial database is used to store invasive species occurrence and location information recorded in field surveys conducted throughout Alaska. The CNIPM provides updates regularly to the AKEPIC database as new surveys are conducted; the database is maintained by the AKNHP and can be accessed online (<http://aknhp.uaa.alaska.edu/maps/akepic/>).

Based on a search of collection localities in the AKEPIC database (AEA 2011), which included data from invasive plant surveys conducted along road systems in and near the Susitna basin and other regional plant surveys, 22 invasive plant species were found to occur in areas relatively near the proposed Project (Table 11.9-1). These 22 species have some potential to establish in the Project area (e.g., if seeds or reproductive shoots were brought in on construction equipment). Areas particularly vulnerable to the establishment of invasive plants include quarry sites, road edges, work pads, and gravel river bars (which are naturally disturbed by flooding and ice scouring). A species of particular concern is *Melilotus alba* (white sweetclover), which establishes readily and often forms monotypic stands along roadsides, trails, and river bars. The ability of this species to colonize linear features on the landscape is especially problematic because such features can act as corridors for dispersal and speed its establishment in new areas. *M. alba* already has been documented colonizing riparian areas along several of Alaska's glacially fed rivers, and low to moderate densities may promote the establishment of other exotic species, while high densities can negatively affect the establishment of both native and non-native species (Conn et al. 2011).

Field surveys for invasive vascular plants will be needed to document the specific locations of invasive species in and near the Project area in order to assess the likelihood that Project development will further aid the spread of invasive species.

11.9.3. Study Area

Since invasive vascular plant species are generally confined to disturbed areas and the Project area is mostly undeveloped, the field surveys for this study will be focused initially on those

areas that can act as potential pathways for invasive species to enter and establish in the Project area. Sections of the Parks and Denali highways that are relatively close to the alternative alignments for the access road and transmission lines, primitive roads or trails that currently provide access into the Project area, and other disturbed areas (see Section 11.9.4) will be surveyed. The specific locations and lengths of the highway segments to be surveyed will be defined during preparation for the field survey work in 2013, and will be based on the locations of the three possible alternative access corridors and their proximity to existing roadways. The primitive roads and trails and other disturbed areas to be surveyed will be identified from high-resolution aerial photography and remote-sensed imagery for the Project area. Some of this imagery exists now and additional imagery for those areas that are currently not covered will be acquired during summer 2013. Primitive roads and trails and other disturbed areas that occur within a 4-mile buffer surrounding the proposed Project infrastructure areas and that could be directly altered or disturbed by construction and operations activities (see Section 11.5, Figure 11.5-1) will be identified. As engineering design for the Project proceeds and final alternatives are developed, potential gravel material sources will be identified and any existing gravel mine sites being considered for support of Project construction and operations also will be surveyed to assess the extent to which invasive plant species are present. Surveys for invasive plants downstream of the proposed dam in riparian habitats currently are not being planned. Disturbance from construction and operations activities associated with the Project will not occur in downstream areas; hence development of the Project will not result in an increase in potential disturbance vectors for the spread of invasives in downstream riparian areas.

11.9.4. Study Methods

11.9.4.1. Field Surveys

Prior to the field surveys in and near the Project area in 2013, recent aerial photography and remote-sensed imagery will be reviewed (see Section 11.9.3) to identify potential “hot spots” for invasive species. These include off-road vehicle trails, gravel roads, quarry sites, and other disturbances that may harbor invasives or are at risk for invasive plant colonization in association with the construction and operation of the proposed Project. The current records in the AKEPIC database will also be reviewed to determine what species have been recorded in the vicinity of the Project area. The areas where invasives have been recorded will be surveyed again to determine if the invasive species are still present and to assess whether the populations (in cases in which population estimates area available) are contracting, expanding, or are relatively unchanged since previous surveys.

Surveys for invasive vascular plants will be conducted in 2013 and 2014 following guidelines in the AKEPIC User Manual (AKNHP 2008). Suspected invasive species will be collected and the locations of populations recorded with a hand-held GPS receiver. Non-native species that are not considered invasive also will be noted. If possible, population estimates will be made by visually enumerating or estimating the number of plants in the area. If population estimates are not possible, the degree of infestation at each location will be ranked qualitatively as low (1–10 percent cover of assessment area), medium (10–40 percent cover), or high (>40 percent cover). The distribution and size of areas where invasive species are present are likely be highly variable, therefore use of a standard assessment area size (e.g., a 10-meter [33-foot] radius plot) will not be appropriate for evaluating the degree of infestation. Thus, the geographic limits of an infested area will be used to define the assessment area boundaries (these areas may be as small

as 0.01 acre or as large as 2 acres). Species will be identified using Hultén (1968) and Identification of Non-native Plants in Alaska (AKNHP 2010). Collected specimens of selected species will be submitted to the University of Alaska Herbarium for confirmation of identifications. All field data will be made available for entry into the AKEPIC database. As engineering design and construction plans for the Project are further developed, the invasive plant work conducted in 2014 likely will be focused more on sources of invasive species closer to the Project area, such as gravel material sites, which could be used during construction activities and could result in the inadvertent transport of invasive species.

11.9.4.2. *Ecological Risk Assessment*

To assess the ecological risk of the invasive plant species found in and near the Project area to expand their distributions farther into the Project area, the U.S. Department of Agriculture (USDA) invasiveness rankings developed for selected species in Alaska (Carlson et al. 2008) will be used. The overall invasiveness scores for each species are based on sub-scores for ecological impact, biological characteristics (e.g., life history, potential for spread, allelopathy), distribution, and feasibility of control. The higher the overall score (ranging from 1–100), the greater the risk that a species will have negative ecological effects and the lower the likelihood it can be controlled effectively. The invasiveness scores for each invasive species found during the field surveys will be considered along with the number and size of the population(s) found, their proximity to proposed Project infrastructure and construction areas, and the species' dispersal mechanism(s) to rank the local ecological risk of spread and further infestation from development of the Project. In addition, to the extent possible, the potential impact of invasives on ecologically important native plant species will be identified. The data gathered in this study (i.e., local ecological risk rankings for each species) will be used to develop PM&E measures for inclusion in the License Application such as part of an invasive species management plan to address the risks of the introduction, spread, and establishment of invasive species in the Project area.

11.9.4.3. *Reporting and Data Deliverables*

The reports and data deliverables for this study include:

- **Electronic copies of field data.** A geospatially-referenced relational database of relevant records from the AKEPIC database and data collected during the 2013 and 2014 field seasons, including representative photographs of infested areas, will be prepared. 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.
- **Invasive species maps in ArcGIS and PDF formats.** The preliminary and final maps of the locations of invasive species populations will be developed and delivered according to the schedule indicated below. 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.
- **Initial Study Report and Updated Study Report.** The Invasive Plant Study results will be presented in the Initial and Updated study reports according to the schedule indicated below. The reports will include descriptions of the invasive species populations found including estimated population sizes or degree of infestation, site characteristics, and the local ecological risk rankings for each species. The Initial Study Report will include any

AEA recommendations for the 2014 field survey effort. Both reports also will include copies of field dataforms and field plot photographs.

11.9.5. Consistency with Generally Accepted Scientific Practice

The Invasive Plant Study will be conducted following the protocols described for invasive plant surveys in Alaska in the AKEPIC User Manual (AKNHP 2008). These methods are the current standards for field surveys of invasive plants in Alaska. The AKEPIC database of invasive plant records, which is maintained by the AKNHP, will be used as the primary source of current records of invasive species in and near the Project area. The AKEPIC database was developed by the CNIPM, which is a working group of six state and federal agencies organized specifically to address the ecological threat of invasive plant species in Alaska.

11.9.6. Schedule

See Table 11.9-2 for schedule information for the Invasive Plant Study. In 2014 and 2015, licensing participants will have opportunities to review and comment on the study reports (Initial Study Report in early 2014 and Updated Study Report in early 2015). Updates on the study progress will be provided during Technical Workgroup meetings, which will be held quarterly in 2013 and 2014.

11.9.7. Relationship with Other Studies

The Invasive Plant Study will be completed with data inputs (see Figure 11.9-1) with data from three other Project studies: the vegetation and wildlife habitat mapping, riparian vegetation, and wetland mapping studies (Sections 11.5, 11.6, and 11.7). Disturbed sites within the Project area to be surveyed for invasive plant species will be identified from aerial imagery and from the mapping of vegetation, wildlife habitats, and wetlands. In addition, any observations or collections of invasive plants recorded during the vegetation and wildlife habitat mapping, riparian vegetation, and wetland mapping studies will be used to help locate populations of invasive plant species and streamline the field survey efforts.

The data collected during the Invasive Plant Study (locations, estimated population sizes, and ecological risk rankings for the invasive plant populations found) will be used directly in the FERC License Application in 2015 to assess the impacts the proposed Project could have on native plant species/communities through the spread of invasive species in the Project area. The invasive plant data also could be used to identify potential PM&E measures to address invasive species, as appropriate.

11.9.8. Level of Effort and Cost

The Invasive Plant Study is planned to be conducted over two years (2013–2014). Field sampling will be conducted each year during the growing season by a crew of two observers. The level of effort in 2013 is expected to be greater (10 days) than in 2014 (6 days). The goal in 2013 will be to survey the prominent disturbed habitats in and near the Project area, and work in 2014 likely will be focused on gravel material sites and other disturbed sites that may have been missed in the 2013 sampling. The Invasive Plant Study will be coordinated with the other botanical studies being performed for the Project to help facilitate the field surveys for invasive plants and minimize costs. The field crews for the vegetation and wildlife habitat mapping,

riparian, and wetland mapping studies will document the locations of any invasive species encountered during their field surveys in 2012 and 2013, and this information will be used to help prioritize the field surveys for the Invasive Plant Study. The projected cost for this study in 2013 is on the order of \$100,000. For 2014, the approximate cost is \$50,000.

11.9.9. Literature Cited

- AEA (Alaska Energy Authority). 2011. Pre-Application Document: Susitna-Watana Hydroelectric Project FERC Project No. 14241. December 2011. Prepared for the Federal Energy Regulatory Commission by the Alaska Energy Authority, Anchorage, Alaska.
- AKNHP (Alaska Natural Heritage Program). 2008. AKEPIC Database User Manual. University of Alaska Anchorage. 25 pp.
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- Graziano, G. 2011. Strategic plan for invasive weed and agricultural pest management and prevention in Alaska. Alaska Department of Natural Resources, Division of Agriculture, Alaska Plant Materials Center, Palmer. 36 pp.
- Hebert, M. 2001. Strategic plan for noxious and invasive plants management in Alaska. Cooperative Extension Service, University of Alaska Fairbanks. 20 pp.
- Hultén, E. 1968. Flora of Alaska and neighboring territories. Stanford University Press. Stanford, CA.

11.9.10. Tables

Table 11.9-1. Invasive vascular plant species recorded on road-system surveys in and near the Susitna basin and in other plant surveys in the region of the proposed Project.

Scientific Name	Common Name	Invasiveness Rank ¹
<i>Phalaris arundinacea</i>	Reed canarygrass	83
<i>Melilotus alba</i>	White sweetclover	81
<i>Cirsium arvense</i>	Canada thistle	76
<i>Prunus padus</i>	European bird cherry	74
<i>Sonchus arvensis</i>	Perennial sowthistle	73
<i>Vicia cracca</i>	Bird vetch	73
<i>Hordeum jubatum</i>	Foxtail barley	63
<i>Bromus inermis ssp. inermis</i>	Smooth brome	62
<i>Trifolium repens</i>	White clover	59
<i>Taraxacum officinale ssp. officinale</i>	Common dandelion	58
<i>Trifolium hybridum</i>	Alsike clover	57
<i>Crepis tectorum</i>	Narrowleaf hawkbeard	54
<i>Poa pratensis</i>	Kentucky bluegrass	52
<i>Poa annua</i>	Annual bluegrass	46
<i>Polygonum aviculare</i>	Prostrate knotweed	45
<i>Plantago major</i>	Common plantain	44
<i>Capsella bursa-pastoris</i>	Shepherd's purse	40
<i>Poa compressa</i>	Flat-stem bluegrass	39
<i>Chenopodium album</i>	Lambsquarters	37
<i>Cerastium glomeratum</i>	Sticky chickweed	36
<i>Matricaria discoidea</i>	Pineapple weed	32
<i>Brassica napus</i>	Rapeseed mustard rutabaga	NR

Notes:

- Assigned according to the Invasiveness Ranking System for Non-native Plants of Alaska (Carlson et al. 2008). Species are ranked on a scale of 0 to 100, with 100 being an extremely invasive species; NR = not ranked.

Table 11.9-2. Schedule for implementation of the Invasive Plant Study.

Activity	2013				2014				2015
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q
Review of AKEPIC data and field survey site selection		—							
Field survey		—	—						
Data analysis			—	—					
Initial Study Report				—	Δ				
Delivery of preliminary field data and invasive species maps				—					
Review of 2013 data and field survey site selection						—			
Field survey						—	—		
Data analysis							—	—	
Updated Study Report								—	▲
Delivery of final field data and invasive species maps							—		

Legend:

- Planned Activity
- Δ Initial Study Report
- ▲ Updated Study Report

11.9.11. Figures

STUDY INTERDEPENDENCIES FOR INVASIVE PLANT STUDY

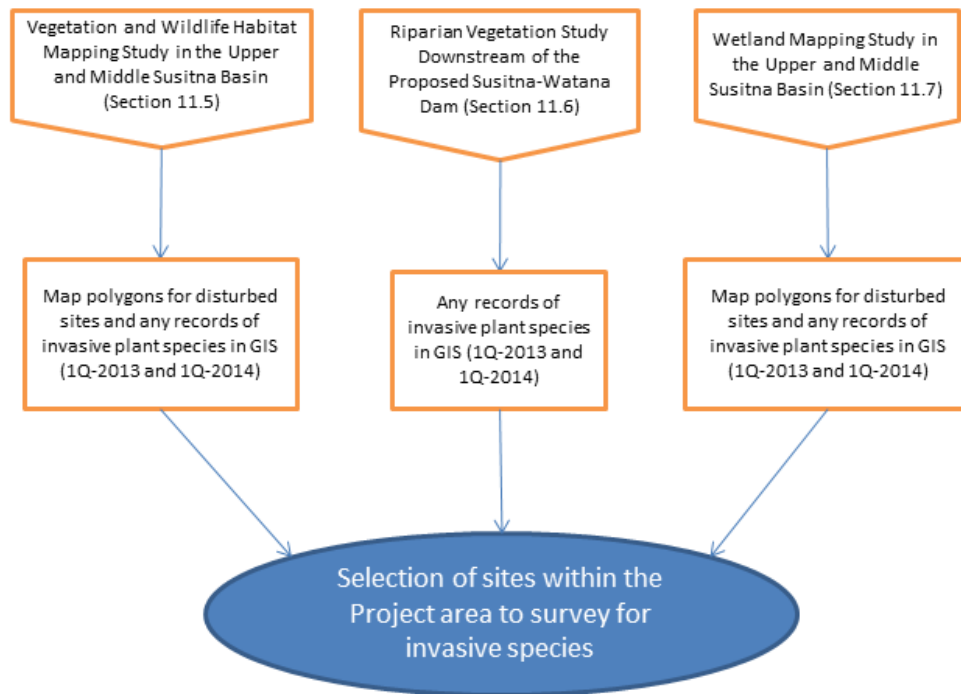


Figure 11.9-1. Study interdependencies for the Invasive Plant Study.