

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

**Characterization and Mapping of Aquatic Habitats**  
**Study Plan Section 9.9**

**Part D: Supplemental Information to**  
**June 2014 Initial Study Report**

Prepared for

Alaska Energy Authority



**SUSITNA-WATANA HYDRO**

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

Prepared by

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## 1. INTRODUCTION

Section 1 (Part A) of the June 2014 ISR for this Characterization and Mapping of Aquatic Habitats Study (Study Plan 9.9) details the development of this study from the Revised Study Plan (RSP) in 2012, through the end of the 2013 study season. Section 7 of the ISR (Part C), filed in June 2014, sets forth AEA's plan and schedule, at that time, for completing this study and meeting the objectives of the RSP.

As detailed in Section 2.2 of the ISR Part D Overview, various circumstances have required AEA to extend the original timeframe for completing the Commission-approved Study Plan. However, AEA has completed Study 9.9 since the filing of the ISR in June 2014. As detailed below, AEA's recent activities for Study 9.9 have consisted of the following:

- Ground-truthing surveys in mainstem habitats of the Upper River and Middle River including 100 percent coverage of mesohabitat mapping within Focus Areas.
- Ground surveys of selected Upper and Middle River tributaries.
- Collection of habitat information for the 12 lakes identified within the potential reservoir inundation zone.
- On September 17, 2014, AEA filed the 2013 and 2014 Aquatic Habitat Mapping Field Season Completion Progress Technical Memorandum.
- On October 15, 2014, AEA held an ISR meeting for the Characterization and Mapping of Aquatic Habitats.
- On November 14, 2014, AEA filed errata to Initial Study Report Part A - Appendix A, Remote Line Mapping, 2012. This map book replaced the version published on June 3, 2014 with the Study 9.9 Initial Study Report.
- Preparation of a Study Completion Report presenting cumulative methods and results for all study activities. This report included an updated map book integrating all study results that supersedes the version filed in the November 2014 errata.

The primary purpose of this Part D Supplemental Information to the ISR is to report on the implementation of the Study Plan from the filing of the ISR in June 2014, through the end of calendar year 2014. In light of this additional implementation, AEA has now completed Study 9.9 in a manner that meets the objectives of the Commission-approved Study Plan.

## 2. BACKGROUND

### 2.1. Purpose of Study

The Characterization and Mapping of Aquatic Habitats Study focuses on describing the aquatic habitats of the Susitna River using a specific hierarchical and nested classification system based

on historic and current data. The study objectives were established in the Study Plan (RSP Section 9.9.2) and are described below.

### **Upper River Habitats:**

1. Characterize and map Upper River tributary and lake habitats for the purpose of evaluating the potential loss or gain in available fluvial and lacustrine habitat that may result from dam construction and inundation by the reservoir.
2. Characterize and map Upper River tributary and lake habitats for the purposes of informing other studies including Fish Distribution and Abundance in the Upper Susitna River (Study 9.5) and River Productivity (Study 9.8).
3. Characterize and map the Upper River mainstem (understood hereafter to encompass both main channel and off-channel habitats) upstream from the Watana dam site to the confluence with the Oshetna River:
  - i. To provide baseline data for the purpose of evaluating the potential loss or gain in accessible available fluvial and lacustrine habitat that may result from dam construction and inundation by the reservoir.
  - ii. To inform other studies including Fish Distribution and Abundance in the Upper Susitna River (Study 9.5), River Productivity (Study 9.8), and Future Watana Reservoir Fish Community and Risk of Entrainment (Study 9.10).

### **Middle River Habitats:**

1. Characterize and map the Middle River mainstem from the Chulitna River confluence to the proposed Watana Dam site, including tributaries within the zone of hydrologic influence (ZHI) and the Focus Areas:
  - i. To provide baseline data for the purpose of evaluating the potential loss or gain in accessible available fluvial habitat that may result from flow regulation below the proposed Watana Dam.
  - ii. To inform other studies including Fish Distribution and Abundance in the Middle and Lower Susitna River (Study 9.6), River Productivity (Study 9.8), and Instream Flow (Study 8.5).

### **Lower River Habitats:**

1. Characterize and map the Lower River mainstem from the upper extent of tidal influence upstream to the Three Rivers Confluence:
  - i. To provide baseline data for the purpose of evaluating the potential loss or gain in available fluvial habitat that may result from flow regulation below the proposed Watana Dam.

- ii. To inform other studies including Fish Distribution and Abundance in the Middle and Lower Susitna River ( Study 9.6), River Productivity (Study 9.8), and Instream Flow (Study 8.5).

## 2.2. Study Components

The components of this study consist of the following:

- Remote line mapping consisted of data from aerial imagery supplemented with information from videography to generate a geospatial database.
- Ground truthing surveys were conducted in a subset of mesohabitat and macrohabitat segments in 2013 and will continue in 2014.
- Focus areas will be 100 percent ground-surveyed to the level of mesohabitat to provide detailed information for the Instream Flow Study (Study 8.5) needs.
- Mesohabitat characterization in a random subset of habitat units using a modified USFS stream survey protocol (USFS 2001) will allow comparisons among habitat types along the river continuum.

## 3. STATUS, HIGHLIGHTED RESULTS, AND ACHIEVEMENTS

The following tasks were completed in 2013 and reported in Part A of the ISR for Study 9.9:

- Remote line mapping consisted of data from aerial imagery supplemented with information from videography to generate a geospatial database.
- Ground truthing surveys were conducted in a subset of mesohabitat and macrohabitat segments in 2013.
- Focus Area surveys were conducted in a subset of mesohabitat and macrohabitat segments in 2013.
- Mesohabitat characterization in a random subset of habitat units in tributaries using a modified USFS stream survey was initiated.

The study team has completed the following activities for Study 9.9 since the June 2014 filing of the ISR:

- Remote line mapping in the geospatial database was updated with the results of ground-truthing surveys (SCR Appendix A).
- Ground truthing surveys of mainstem and tributary habitats were completed in accordance with the Study Plan (SCR Section 4).
- All Focus Area habitats were ground-surveyed in accordance with the Study Plan (SCR Section 4).

- Mesohabitat characterization of a random subset of habitat units in tributaries using a modified USFS stream survey was completed (SCR Sections 4.2.1 and 4.3.1).
- Upper River lakes within the inundation zone were surveyed in accordance with the Study Plan (SCR Section 4.2.3).

#### 4. SUMMARY OF STUDY 9.9 DOCUMENTS

Since filing of the RSP in 2012, AEA and FERC have prepared several documents pertaining to this study. To aid review by FERC staff and licensing participants, each of these documents is listed below. Each of these documents is accessible on AEA's Project licensing website (<http://www.susitna-watanahydro.org/type/documents/>) by clicking on the entry in the "Link" column in the table. In addition, these documents are available on FERC's eLibrary system (<http://www.ferc.gov/docs-filing/elibrary.asp>), in Docket No. P-14241.

Title	Date Filed	Description	Link
9.9 Characterization and Mapping of Aquatic Habitats Study (Revised Study Plan)	12/14/2012	This document presents the plan for this study, including goals, objectives, the study area, and proposed study methods for characterizing aquatic habitat.	<a href="#">RSP for Study 09.09</a>
Middle Susitna River Segment Remote Line Habitat Mapping Technical Memorandum	1/31/2013	AEA filed a technical memorandum characterizing Middle River habitats using a spatial database developed using aerial imagery and videography. The composition and frequency of mainstem aquatic habitats was summarized to support study site selection for the instream flow and fish distribution studies.	<a href="#">Jan. 2013 TM for Study 09.09</a>
Response to Interim Comments on Characterization and Mapping of Aquatic Habitat Mapping Revised Study Plan (RSP 9.9)	3/1/2013	AEA filed a response to interim comments from NMFS and USFWS on the Revised Study Plan.	<a href="#">March 2013 TM for Study 09.09</a>
Susitna River Fish Distribution and Abundance Implementation Plan: Appendix 2, Initial Results Aerial Video Habitat Mapping of Susitna River Tributaries from the Upper Extent of Devils Canyon to the Oshetna River	3/1/2013	This appendix filed by AEA presents 2012 aerial video data and analyses in support of sampling fish in in select tributaries from the upper extent of Devils Canyon to the Oshetna River.	<a href="#">March 2013 TM for Study 09.09</a>
2012 Technical Memorandum, Synthesis of the 1980s Lower Susitna River Segment Aquatic Habitat Information	3/25/2013	This AEA technical memorandum presents and effort to identify whether potential Project effects on aquatic habitat and tributary access in the Lower River warranted additional study and, if necessary, help in planning those studies.	<a href="#">March 2013 TM for Study 09.09 (File 1)</a> <a href="#">March 2013 TM for Study 09.09 (File 2)</a>

Title	Date Filed	Description	Link
Mapping of Aquatic Macrohabitat Types at Selected Sites in the Middle and Lower Susitna River Segments from 1980s and 2012 Aerials	3/25/2013	The overall purpose of the work presented in this AEA TM was to quantify aquatic macrohabitat types at selected sites in the Middle and Lower Susitna River Segments, compare the resulting areas, and determine the applicability of the 1980s information to current conditions.	<a href="#">March 2013 TM for Study 09.09 (File 1)</a> <a href="#">March 2013 TM for Study 09.09 (File 2)</a> <a href="#">March 2013 TM for Study 09.09 (File 3)</a>
FERC Study Plan Determination for Study 9.9	4/1/2013	This document presents FERC approval of Study 9.9, which approved AEA's Revised Study Plan with recommended adjustments.	<a href="#">FERC SPD for Study 09.09</a>
2012 Habitat Videography Information	4/1/2013	AEA recorded low altitude video of tributaries and mainstem reaches in the Middle and Upper segments of the Susitna River. The videos are provided by AEA for technical use by Project scientists and Licensing Participants and for use by the general public to gain a better understanding of the Susitna River and the Project environment.	<a href="#">April 2013 TM for Study 09.09</a>
2012 Habitat Videography Map Book	4/1/2013	AEA provided this mapbook of both orthophotos and USGS topographic maps of the stream reaches characterized by the videography.	<a href="#">April 2014 TM for Study 09.09</a>
2012 Upper River Susitna River Fish Distribution and Habitat Study – Habitat Report	5/30/2013	AEA filed this report summarizing the results of 2012 habitat surveys including both aerial and ground-based aquatic mesohabitat mapping methodologies.	<a href="#">May 2014 TM for Study 09.09</a>
Characterization and Mapping of Aquatic Habitats Technical Memorandum	7/15/2013	This AEA memo provides a detailed description of the methodology for selecting a representative sample of small primary tributaries and low-order (secondary and tertiary) tributaries within the proposed inundation zone of the Upper River as recommended by FERC's SPD.	<a href="#">July 2014 TM for Study 09.09</a>
Draft Initial Study Report for Study 9.9	2/3/2014	This draft of the ISR summarized the study methods and variances during the 2013 study season, and presented preliminary data collected for Study 9.9. This draft ISR was later republished as Part A of the final ISR.	<a href="#">Draft ISR for Study 09.09 (File 1)</a> <a href="#">Draft ISR for Study 09.09 (File 2)</a> <a href="#">Draft ISR for Study 09.09 (File 3)</a> <a href="#">Draft ISR for Study 09.09 (File 4)</a>

Title	Date Filed	Description	Link
Initial Study Report for Study 9.9	6/3/2014	This document is the Initial Study Report (Parts A, B and C) for Study 9.9. Part A republishes the Draft ISR. Part B identifies supplemental information and errata in Part A. Part C presents study modifications and plans for completing the study.	<a href="#">ISR Part A for Study 09.09 (File 1)</a> <a href="#">ISR Part A for Study 09.09 (File 2)</a> <a href="#">ISR Part A for Study 09.09 (File 3)</a> <a href="#">ISR Part A for Study 09.09 (File 4)</a> <a href="#">ISR Part B for Study 09.09</a> <a href="#">ISR Part C for Study 09.09</a>
2013 and 2014 Aquatic Habitat Mapping Field Season Completion Progress Technical Memorandum.	9/17/2014	This AEA TM summarizes progress in 2013 and 2014 with respect to the study objectives and methods outlined in the RSP, as modified by FERC's SPD.	<a href="#">Sept. 2014 TM for Study 09.09</a>
Errata to Initial Study Report Part A - Appendix A, Remote Line Mapping, 2012	11/14/2014	AEA filed these errata to summarize the changes contained in the associated mapbook filed to correct an error in Appendix A of Part A of the ISR.	<a href="#">Nov. 2014 TM for Study 09.09</a>
Revised Map Book for 2012 Remote Line Mapping	11/14/2014	AEA filed this updated mapbook to correct an error in Appendix A of the ISR Part A	<a href="#">Nov. 2014 TM for Study 09.09</a>
Initial Study Report Meetings, October 15, 2014	11/14/2014	Transcripts and AEA's agenda and PowerPoint presentations for the ISR meeting for Fish and Aquatic Studies	<a href="#">Transcripts from ISR Meeting</a> <a href="#">Materials from ISR Meeting</a>
Study Completion Report for Study 9.9	11/6/2015	AEA filed this report to summarize cumulative study activities including field efforts in 2012, 2013, and 2014.	<a href="#">SCR for Study 09.09 (File 1)</a> <a href="#">SCR for Study 09.09 (File 2)</a> <a href="#">SCR for Study 09.09 (File 3)</a> <a href="#">SCR for Study 09.09 (File 4)</a> <a href="#">SCR for Study 09.09 (File 5)</a>

## 5. NEW STUDY DOCUMENTATION SUPPLEMENTING THE ISR

The following table identifies and describes additional reports and other documents that update, refine, or otherwise supplement certain sections of the ISR pertaining to Study 9.9, during AEA's continued implementation of the Study Plan through calendar year 2014.



ISR Reference	Description
Part A, Appendix A	Errata to Study 9.9 ISR Part A, Appendix A. This section is superseded by this version of Appendix A that corrects for an error that occurred during the PDF process of the Study 9.9 ISR Part A Appendix A and inadvertently missed two shapefile resulting in incomplete maps.
Part A, Appendix A	A revised map book based on 2012 line mapping was prepared that added the mesohabitat lines to the maps with macrohabitat lines that were presented in the Errata to Study 9.9 ISR.
Part A, Section 4	This Section is superseded by SCR Section 4, describing the 2014 study plan implementation.
Part A, Section 5	This section is superseded by SCR Section 5.
Part A, Appendix A	This section is superseded with SCR Appendix A.
Part A, Appendix B	This appendix is superseded by SCR Appendix B.

## 6. VARIANCES

The following variances are reported in the June 2014 ISR Part A:

- Physical access limitations and safety concerns restricted the scope of random sampling (RSP Sections 9.9.5.3.2 and 9.9.5.4) to habitat units (ISR Part A, Sections 4.2.4.1 and 4.3.3.1).
- Special habitat features were expanded from the Study Plan (SPD B-210) to include backwaters, beaver complexes and clearwater plumes (ISR Part A, Sections 4.2.4.2 and 4.3.3.2).
- Ground survey flow conditions were more variable than anticipated (RSP Section 9.9.5.3.2) due to unexpected late summer high flows, this affected a small number of habitat units that were surveyed at flows higher than those under which the reference imagery was obtained (ISR Part A, Sections 4.2.4.3 and 4.3.3.3). Careful preplanning largely limited these habitats to those where habitat calls were least likely to be altered by variation in flow conditions.

The following variances occurred following the filing of the June 2014 ISR:

- Physical access limitations and safety concerns restricted the scope of random sampling (RSP Sections 9.9.5.3.2 and 9.9.5.4) to habitat units (SCR Sections 4.2.4.1 and 4.3.3.1).
- During 2014 surveys, the definition of special habitat features was consistent with the description in the June 2014 ISR of 2013 surveys. Special habitat features were expanded from the Study Plan (FERC SPD, B-210) to include backwaters, beaver complexes and clearwater plumes (SCR Section 4.1.2.3).
- During 2014 surveys, as described in the June 2014 ISR for 2013 surveys, ground survey flow conditions were more variable than anticipated (RSP Section 9.9.5.3.2), this affected a small number of habitat units that were surveyed at flows higher than those under which the reference imagery was obtained (SCR Sections 4.1.2.4, 4.2.4.2 and 4.3.3.2). Careful preplanning largely limited these habitats to those where habitat classifications were least likely to be altered by variation in flow conditions.

## 7. STUDY PLAN MODIFICATIONS

Section 7 of the ISR (Part C) detailed modifications for this study following the 2013 study season. These modifications are generally summarized as follows:

- Special habitat features were to be expanded from the Study Plan (FERC SPD B-210) to include backwaters, beaver complexes and clearwater plumes (ISR Part C, Section 7.1.2).

This modification was implemented in 2014 and is reported as a continued variance in the Study Completion Report (SCR). As detailed in the SCR for this study, AEA plans no modifications of the methods for this study, as this study is now complete.

## 8. STEPS TO COMPLETE THE STUDY

The field work, data collection, data analysis, and reporting for this study successfully met all study objectives in the FERC-approved Study Plan. In light of the results, variances, and modifications described above, AEA has completed this study.