

Susitna-Watana Hydroelectric Project
(FERC No. 14241)

**Study of Fish Passage Barriers in the Middle and
Upper Susitna River and Susitna Tributaries**
Study Plan Section 9.12

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

Prepared for

Alaska Energy Authority



SUSITNA-WATANA HYDRO

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Prepared by

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1. INTRODUCTION

Section 1 (Part A) of the June 2014 ISR for this Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries (Study Plan 9.12) 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 made meaningful progress with this Study 9.12 since the filing of the ISR in June 2014. As detailed below, AEA's recent activities for Study 9.12 have consisted of the following:

- The *Fish Passage Criteria Technical Memorandum* was prepared, presenting a proposed final list of fish species to be included in the fish barrier analysis as well as depth, leaping and velocity passage criteria for selected fish species. This document was filed in November 2014.
- During 2014, additional field surveys included evaluation of potential vertical geologic barriers in six tributaries in the Middle and Upper Susitna River and nine tributary mouth thalweg surveys in Middle Susitna River. All 2014 surveys followed the approach described in the ISR Section 9.12.4.5 (AEA 2014) and in the Fish Passage Barrier Assessment Implementation Plan (HDR 2013) using species and passage criteria described in the November 2014 TM (R2 2014). Additional field data in support of this study was collected at modeling sites (ISR Section 4.3.5 (AEA 2014) by other studies (see ISRs for Study 6.6 Sections 4.1.2.9.2 and 4.2.9.3. and Study 8.5 Section 8.5.4.3 and 8.5.4.6; AEA 2014).
- On October 15, 2014, AEA held an ISR meeting for the Fish and Aquatics Program, which included a presentation and discussion of the 2013 Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries.
- Prepared the *2014 – 2015 Study Implementation Report for the Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries (9.12)*, presenting methods, variances, and data collected for study components that have been completed since filing the June 2014 ISR, and filed in November 2015.

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, this Part D also identifies AEA's plans for completing Study 9.12 in a manner that meets the objectives of the Commission-approved Study Plan.

2. BACKGROUND

2.1. Purpose of Study

The goal of this study is to evaluate the potential effects of Project-induced changes in flow and water surface elevation on free access of fish into, within, and out of suitable habitats in the Upper Susitna River (inundation zone above the Watana Dam site) and the Middle Susitna River (Watana Dam site to the confluence of Chulitna and Talkeetna rivers). The study objectives are established in RSP section 9.12.1:

- Locate and categorize all existing fish passage barriers (e.g., falls, cascade, beaver dam, road or railroad crossings) located in selected tributaries in the Middle and Upper Susitna River (Middle River tributaries to be determined during study refinement).
- Locate using geographic information system (GPS), identify the type (permanent, temporary, seasonal, partial), and characterize the physical nature of any existing fish barriers located within the Project's ZHI.
- Evaluate the potential changes to existing fish barriers (both natural and man-made) located within the Project's ZHI.
- Evaluate the potential creation of fish passage barriers within existing habitats (tributaries, sloughs, side channels, off-channel habitats) related to future flow conditions, water surface elevations, and sediment transport.

2.2. Study Components

This study consists of the following components:

- Locate and categorize existing fish passage barriers in selected tributaries in the Middle and Upper Susitna River;
- Locate and characterize the physical nature of any existing fish barriers located within the Project's ZHI downstream from the proposed dam site;
- Evaluate the potential changes to existing barrier found within the Project's ZHI;
- Evaluate the potential creation of fish passage barriers within existing tributaries, sloughs, side channels, off-channel habitats as part on flow modeling efforts.

3. STATUS, HIGHLIGHTED RESULTS, AND ACHIEVEMENTS

The following tasks were completed in 2013 and reported in Part A of the June 2014 ISR for Study 9.12:

- AEA completed aerial surveys for geologic barriers in all major tributaries in the Upper and Middle River. A total of 72 potential barriers were identified and 38 were confirmed as barriers to fish due to height.

- Within the Middle River, seven tributary mouths were surveyed to document current depth and velocity conditions for fish passage and to collect data for an evaluation of the Project's potential effects.
- Characterization of existing barriers and evaluation of potential changes to barriers under with Project conditions is ongoing and is being coordinated with the Geomorphology Study (Study 6.5), the Ice Processes Study (Study 7.6), and the Flow Routing Study (Study 8.5.4).

The study team has completed the following activities for Study 9.12 since the June 2014 filing of the ISR:

- In 2014, field surveys to identify and categorize barriers in Middle and Upper River tributaries were completed resulting in the evaluation of 42 out of 43 potential barriers and the documentation of 40 permanent barriers and 2 seasonal barriers. No evaluation of the 43rd potential barrier was possible due to a lack of access.
- Thalweg surveys in tributary mouths also were completed in 2014. Depth and velocity measurements were recorded and will be reviewed in light of species/lifestage-specific criteria for evaluation of existing barriers in the next year of study.
- In addition, a list of target species and passage criteria were developed and refined after receiving stakeholder input.

4. SUMMARY OF STUDY 9.12 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
9.12 Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries (Revised Study Plan)	12/14/2012	This document presents the plan for the Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries, including goals, objectives, the study area, and proposed study methods.	RSP for Study 9.12
2012 Upper Susitna River Fish Distribution and Habitat Study Habitat Report	5/30/2013	Section 2 describes the 2012 field surveys for the fish barrier assessment.	May 2013 TM for Study 9.12
FERC's Study Plan Determination for	2/1/2013	This document presents FERC approval of Study 9.12, which approved AEA's Revised	FERC SPD for Study 9.12

Study 9.12		Study Plan with recommended changes.	
Study of Fish Passage Barriers Implementation Plan	6/17/2013	In accordance with the February 1 SPD, recommended modifications are addressed in detail in this implementation plan. Any area not discussed within this implementation plan will remain as detailed in the RSP.	2013 IP for Study 9.12
Draft Initial Study Report for Study 9.12	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 9.12. This draft ISR was later republished as Part A of the final ISR.	Draft ISR for Study 9.12 (File 1) Draft ISR for Study 9.12 (File 2)
Initial Study Report for Study 9.12	6/3/2014	This document is the Initial Study Report (Parts A, B and C) for Study 9.12. 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.	ISR Part A for Study 9.12 (File 1) ISR Part A for Study 9.12 (File 2) ISR Part B for Study 9.12 ISR Part C for Study 9.12
Initial Study Report Meetings, October 15, 2014 (Parts A and B)	11/14/2014	Transcripts and AEA's agenda and PowerPoint presentations for the ISR meeting for Fish and Aquatic Studies	Transcripts from ISR Meeting Materials from ISR Meeting
Fish Passage Criteria Technical Memorandum	11/14/2014	This memorandum describes AEA's proposed target species list and passage criteria, input received by stakeholders and FERC and revisions made.	Nov. 2014 TM for Study 9.12
Fish Passage Feasibility at Watana Dam (9.12) - 2014 Study Implementation Report	11/4/2015	This report presents methods, variances, and data collected for study components that have been completed since filing the June 2014 ISR and summarizes the November 2014 technical memorandum.	2014 SIR for Study 9.12 (File 1) 2014 SIR for Study 9.12 (File 2) 2014 SIR for Study 9.12 (File 3)

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 this Study 9.12, during AEA's continued implementation of the Study Plan since the ISR was filed in June 2014.

ISR Reference	Description
Part A, Section 4.1. Fish Species Identification	This section is supplemented with the November 14, 2014 Passage Criteria Technical Memorandum, to include consultation that occurred during 2014.
Part A, Section 4.2. Passage Criteria for the Identified Fish Species	This section is supplemented with the November 14, 2014 Passage Criteria Technical Memorandum, to include consultation that occurred during 2014.
Part A, Section 4.1. Fish Species Identification	This Section is superseded by 2014 SIR Sections 4.1, describing 2014 study implementation.

ISR Reference	Description
Part A, Section 4.2. Passage Criteria for the Identified Fish Species	This Section is superseded by 2014 SIR B. Sections 4.2., describing 2014 study implementation.
Part A, Section 4.4.2 Beaver Dams	This Section is updated by 2014 SIR B. Sections 4.4.2., describing 2014 study implementation.
Part A, Section 5.2 Beaver Dams	This section is supplemented with additional survey data presented in 2014 SIR, Section 5.3.
Part A, Appendix A	This appendix is supplemented with the data presented in 2014 SIR, Section 5.2.
Part A, Appendix B	This appendix is supplemented with the data presented in 2014 SIR, Section 5.3.

6. VARIANCES

6.1. 2013 Study Season

The following variances are reported in the June 2014 ISR:

- Fish Species Identification was delayed to occur simultaneously with development of Fish Passage Criteria in 2014 (ISR Part A, Section 4.1.1).
- Delay in field surveys of existing barriers on Cook Inlet Regional Working Group (CIRWG) and Alaska Railroad Corporation (ARRC) lands (ISR Part A, Section 4.3.6).
- Change from field measurements of beaver dam attributes to model-based evaluation (IP Section 4.4.5).

6.2. 2014 Study Season

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

- Additional surveys for beaver dams were flown in coordination with the Riparian Vegetation Study 11.6. (2014 Study Implementation Report, Sections 4.4.4 and 5.3).

7. STUDY PLAN MODIFICATIONS

7.1. Modifications Identified in ISR

As detailed in Section 7 of the ISR (Part C) for Study 9.12, AEA identified no modifications of the methods for this study.

7.2. Modifications Identified since the June 2014 ISR

As detailed in the Study Implementation Report, AEA plans no modifications of the methods for this study.

8. STEPS TO COMPLETE THE STUDY

In light of the variances described above, the steps necessary for AEA to complete this study are summarized below. As necessary and appropriate, these steps have been updated from those appearing in Section 7 of the ISR (Part C).

The following five steps will be conducted to meet Objectives 3 and 4 of Study 9.12.

1. Evaluate the physical barrier and geomorphological field data with reservoir operations and anticipated changes in surface water elevation to evaluate potential for elimination and creation of tributary barriers in the Upper River.
2. Within Middle River FAs, utilize the results of 2D modeling and passage criteria to evaluate existing and future potential depth and velocity barriers (associated with sloughs, tributary mouths and beaver dams) for target species and life stages.
3. In the Middle River outside of FAs, characterize existing barriers to selected tributaries using 2013 and 2014 survey data. Utilize results of 1-D models, Study 9.12 tributary mouth survey data, and target species/lifestage specific passage criteria to evaluate potential for creation or elimination of barriers in tributary mouths.
4. Evaluate the potential for alteration of a velocity barrier to Northern Pike between the Middle and Lower River.
5. If potential for barrier creation in Middle River tributaries is evident from Steps 2 and 3, use the Instream Flow model to evaluate potential creation of barriers in Lower River tributary mouths.