

**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**

**Initial Study Report
Part C: Executive Summary and Section 7**

Prepared for

Alaska Energy Authority



SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

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EXECUTIVE SUMMARY

Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries 9.12	
Purpose	Susitna-Watana Hydroelectric Project (Project) construction and operation will affect flow, water depth, surface water elevation, and sediment transport in the mainstem channel, tributary confluences, side channels, and sloughs in both the inundation zone upstream from the proposed dam site and downstream in the zone of Project hydrologic influence. The goal of this study is to evaluate how potential Project-induced changes in flow and sediment transport will affect fish access within and among suitable habitats. Understanding existing barriers, how barrier conditions may change above the dam with inundation, and barrier changes below the dam due to Project operation, will provide information needed for evaluating potential changes in fish access to habitats.
Status	This is an ongoing multi-year study that was initiated in 2012. Following consultation with licensing participants, AEA made a preliminary target species list, including five anadromous salmon species and six resident species. AEA developed vertical barrier criteria after seeking input from licensing participants. Final depth and velocity criteria are being refined with input from licensing participants. In 2012 and 2013, field studies of accessible geologic, depth, and velocity barriers on the Upper and Middle Susitna River were completed. Evaluation of barriers within Focus Areas will use forthcoming model outputs from ice-cover and ice-free 2-D hydrologic and geomorphic modeling. Field characterization of barriers will be completed in 2014. Fish passage criteria will be applied to field- and model-based barrier attributes.
Study Components	Major study components include: <ol style="list-style-type: none"> 1. Locate and categorize all existing fish passage barriers (e.g., falls, cascades, beaver dams, road or railroad crossings) located in selected tributaries in the Middle and Upper Susitna River. 2. Locate and characterize the physical nature of any existing fish barriers located within the Project’s zone of hydrologic influence (ZHI) downstream from the proposed dam site. 3. Evaluate the potential changes to existing fish barriers (both natural and man-made) located within the Project’s ZHI. 4. 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.

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2013 Variances	<p>AEA implemented the methods as described in the Study Plan with the exception of the following variances. The significance of these variances is discussed within the ISR.</p> <ul style="list-style-type: none"> • Delay in field surveys of existing barriers on Cook Inlet Regional Working Group (CIRWG) and Alaska Railroad Corporation (ARRC) lands (ISR Section 4.3.5). • Change from field measurements of beaver dam attributes to model-based evaluation (IP Section 4.4.5).
Steps to Complete the Study	<p>AEA will complete the Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna tributaries in accordance with approved study methods. Finalized passage criteria will be applied to potential barriers in accordance with IP Section 7.1.2. Beaver dams within Focus Areas will be evaluated based on passage criteria and modeling results from ISR Study 6.6. Remaining barriers in tributaries and tributary mouths on CIRWG and ARRC lands will be surveyed in accordance with IP Section 7.4. Upper River tributary mouths in the varial zone of the proposed reservoir, as modeled by ISR Study 6.6, will be evaluated for fish passage in accordance with IP Section 7.1.5. Current and future Middle River depth barriers within Focus Areas will be evaluated during ice-free and ice-cover periods incorporating 2-D model outputs in accordance with IP Sections 7.3.2 and 7.3.3, respectively.</p> <p>AEA expects to complete all remaining data collection during the 2014 study season. Analysis for this study will extend into 2015, which will be reported in the USR.</p>
Highlighted Results and Achievements	<p>In 2012 and 2013, 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.</p> <p>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.</p> <p>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).</p>

7. COMPLETING THE STUDY

7.1. Proposed Methodologies and Modifications

AEA will complete the Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries in accordance with approved study methods. Surveys in the Lower River are discussed Section 7.1.1. Finalized passage criteria will be applied to potential barriers in accordance with Implementation Plan (IP) Section 7.1.2. Beaver dams within Focus Areas will be evaluated based on passage criteria, field surveys of beaver dam dimensions in accordance with IP Section 7.3.1, and modeling results from ISR Study 6.6. Barriers in tributaries and tributary mouths on CIRWG and ARRC lands will be surveyed in accordance with IP Section 7.4. Upper River tributary mouths in the varial zone of the proposed reservoir, as modeled by ISR Study 6.5, will be evaluated for fish passage in accordance with IP Section 7.1.5. Middle River depth barriers within Focus Areas with Project and without Project will be evaluated during ice-free and ice-cover periods incorporating 2-D model outputs in accordance with IP Sections 7.3.2 and 7.3.3, respectively.

7.1.1. Decision Points from Study Plan

As described in IP Section 7.5, AEA proposed a phased approach in which studies of barriers in the Middle River will be used to determine the need and design for barrier studies in the Lower River. Two studies—the Geomorphology Study, RSP 6.5, and the Open Water Flow Routing Study, RSP 8.5—will contribute to determining the need for expanding the barrier studies into the Lower River. Preliminary model results presented at the April 15-17, 2014 IFSTT Riverine Proof of Concept Meeting for FA-128 (Slough 8A) indicate good agreement between modeled and observed flow conditions (e.g. total flow, water surface elevation, and velocity). However, complete model runs comparing baseline conditions and Project scenarios are still in development and at this time AEA cannot fully determine the effect of the Project on barrier conditions in Middle River Focus Areas or tributaries.

If modeling results available in Q4 2014 predict barrier formation in the Middle River, the Lower River will be included in this study through coordination with the Open Water 1-D Fish Habitat Analysis, a component of the Instream Flow Study (8.5). In this case, AEA will evaluate the Instream Flow Study's 2013 field and model results from Trapper Creek (PRM 94.5) and Birch Creek (PRM 92.5) to determine potential Project effects on barrier conditions in the Lower River. If this analysis indicates that the Project will cause impacts on fish passage into Trapper Creek and Birch Creek, additional study sites, Sheep Creek and Caswell Creek planned for field work in 2015, will be added to the Lower River analysis in 2015.

7.1.2. Modifications to Study Plan

No modifications to the Study Plan are needed to complete the study and meet Study Plan objectives.

7.2. Schedule

In general, the schedule for completing the FERC-approved Study Plan is dependent upon several factors, including Project funding levels authorized by the Alaska State Legislature, availability of required data inputs from one individual study to another, unexpected weather delays, the short duration of the summer field season in Alaska, and other events outside the reasonable control of AEA. For these reasons, the Study Plan implementation schedule is subject to change, although at this time AEA expects to complete the FERC-approved Study Plan through the filing of the Updated Study Report (USR) by February 1, 2016, in accordance with the ILP schedule issued by FERC on January 28, 2014

With regard to this specific study, AEA expects to complete all remaining data collection during the 2014 study season, including surveys of vertical barriers in tributaries, beaver dams in Focus Areas, and tributary mouths in the Middle River and Lower River. Analysis for this study will extend into 2015, which will be reported in the USR.

7.3. Conclusion

The Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries has identified possible tributary barriers, completed consultation with licensing participants on target fish species and passage criteria, and coordinated with interrelated modeling studies. With access to CIRWG and ARRC lands, remaining barrier surveys will be completed in 2014. Lastly, outputs from modeling efforts will be used to determine the current extent and the formation of new barriers under Project conditions to fully achieve the approved study objectives.