

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

**The Future Watana Reservoir Fish Community and**  
**Risk of Entrainment Study**  
**Study Plan Section 9.10**

**Initial Study Report**

Prepared for

Alaska Energy Authority



**SUSITNA-WATANA HYDRO**

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

Prepared by

R2 Resource Consultants, Inc.

February 2014 Draft

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## LIST OF ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

<b>Abbreviation</b>	<b>Definition</b>
ADF&G	Alaska Department of Fish and Game
AEA	Alaska Energy Authority
FERC	Federal Energy Regulatory Commission
ILP	Integrated Licensing Process
ISR	Initial Study Report
Project	Susitna-Watana Hydroelectric Project No. 14241
RSP	Revised Study Plan
SPD	Study Plan Determination

**EXECUTIVE SUMMARY**

The Future Watana Reservoir Fish Community and Risk of Entrainment Study 9.10	
Purpose	The purpose of this study is to predict the fish community that will develop in the Project reservoir and identify the effects of the Project on the future reservoir fish community.
Status	This study was rescheduled for implementation during the next study season.
Study Components	Major study components include: <ul style="list-style-type: none"> <li>• Development of scenarios for anticipated daily and seasonal changes in reservoir habitat characteristics, based on the alternative Project operating scenarios developed by Project engineers.</li> <li>• Development of alternative potential fish community structure.</li> <li>• Development of alternative fisheries management scenarios.</li> <li>• A desktop potential fish entrainment analysis.</li> </ul>
2013 Variances	The study was deferred until the next study season rather than 2013 (RSP Section 9.10.10). As noted in the Study Plan, this study is largely a desktop analysis that is to be completed as information from other studies becomes available. These other studies are continuing, and AEA will meet study objectives by completing this study as data is available through the next study season.
Steps to Complete the Study	As explained in the cover letter to this draft ISR, AEA's plan for completing this study will be included in the final ISR filed with FERC on June 3, 2014.
Highlighted Results and Achievements	No results specific to this study have been obtained as of this ISR.

## 1. INTRODUCTION

On December 14, 2012, Alaska Energy Authority (AEA) filed with the Federal Energy Regulatory Commission (FERC or Commission) its Revised Study Plan (RSP) for the Susitna-Watana Hydroelectric Project No. 14241 (Project), which included 58 individual study plans (AEA 2012). Included within the RSP was the Future Watana Reservoir Fish Community and Risk of Entrainment Study, Section 9.10. Study 9.10 focuses on understanding the relationship among Project design, operations, lacustrine habitat, and the potential fish community in the proposed Watana Reservoir.

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 9.10 was one of the 13 approved with modifications. In its February 1 SPD, FERC recommended the following:

*We recommend modifying AEA's proposed evaluation of the potential to establish viable populations of anadromous salmonids upstream of the project, specified in task 4 of section 9.10.4.2, to include evaluation of the production potential for Chinook, sockeye, chum, and coho salmon in reservoir and riverine habitats upstream of the dam.*

In accordance with the February 1 SPD, AEA has adopted the FERC requested modifications.

Following the first study season, FERC's regulations for the Integrated Licensing Process (ILP) require AEA to "prepare and file with the Commission an initial study report describing its overall progress in implementing the study plan and schedule and the data collected, including an explanation of any variance from the study plan and schedule." (18 CFR 5.15(c)(1)) This Initial Study Report (ISR) on Future Watana Reservoir Fish Community and Risk of Entrainment has been prepared in accordance with FERC's ILP regulations and details AEA's status in implementing the study, as set forth in the FERC-approved RSP as modified by FERC's February 1 SPD (collectively referred to herein as the "Study Plan").

## 2. STUDY OBJECTIVES

As described in RSP Section 9.10, the overarching goal of this study is to predict the fish community that will develop in the Project reservoir based on the existing species and the habitat that will be created in the inundation zone, and to characterize the potential loss from entrainment.

Specific objectives include the following:

1. Develop scenarios for anticipated daily and seasonal changes in reservoir habitat characteristics based on predicted reservoir operations, size, temperatures, and water quality and depth profiles.
2. Develop scenarios for future reservoir fish communities based on current fish species composition upstream of the proposed dam site and enhancement potential for select

salmon species incorporating anticipated daily and seasonal changes in reservoir habitat characteristics.

3. Characterize potential management options including recreational, commercial, and subsistence uses of the reservoir fishery.
4. Conduct a qualitative desktop analysis on the potential for entrainment of fish species inhabiting the proposed reservoir upstream of Watana Dam.

### **3. STUDY AREA**

As described in RSP Section 9.10.3, the study area (Figure 3-1) encompasses all portions of the basin to be inundated by the proposed Watana Reservoir up to the maximum reservoir water surface elevation to be determined during finalization of design and operational scenarios.

### **4. METHODS AND VARIANCES IN 2013**

As explained in the Study Plan (RSP Section 9.10), this study is highly interrelated to ongoing operations modeling work, and several other studies in AEA's licensing program provide necessary input information for the initiation of this study. These other studies, which include the Water Quality Modeling Study (Study 5.6), Study of Fish Distribution and Abundance in the Upper Susitna River (Study 9.5), Study of Fish Passage Feasibility at Watana Dam (Study 9.11), and Recreation Resources Study (Study 12.5), are ongoing as of this ISR. As a result, a variance occurred in this study because AEA did not initiate this study in late 2013 as contemplated in the Study Plan (RSP Section 9.10.6). AEA will fulfill study objectives by incorporating results from these other studies during the next study season.

### **5. RESULTS**

While there are no results to report for this specific study, AEA made considerable progress in gathering data from other licensing studies that will be used in completion of this study [as described in ISR Studies Water Quality Modeling (Study 5.6), Fish Distribution and Abundance in the Upper Susitna River (Study 9.5), Fish Passage Feasibility at Watana Dam (Study 9.11) and Recreation Resources (Study 12.5)].

### **6. DISCUSSION**

Implementation of Study 9.10 was rescheduled to begin during the next year of study. Rescheduling of the study is not expected to affect the ability to meet study objectives.

The Future Watana Reservoir Fish Community and Risk of Entrainment Study is interrelated with the Project design and at least five other AEA Project studies, all of which made considerable progress in 2013 in developing data that will be used to complete this study, as identified below:

- Water Quality Modeling (ISR Study 5.6):
  - The Environmental Fluid Dynamics Code modelling approach was selected for modeling reservoir and downstream water quality.
  - The reservoir water quality model has been built and tested using the 1984 historical inflow and a corresponding load following outflow that includes an approximately 45 meter variation in pool level.
  - The model includes 20 vertical layers. Preliminary temperature simulations for ice-free conditions indicated the 20 layer configuration adequately represents vertical stratification.
- Operations Modeling (ISR Study 8.5.4.3.2):
  - A reservoir operations model was developed using HEC-ResSim Version 3.0.
  - The HEC-ResSim model will provide results for simulated reservoir elevation under alternative operational scenarios.
  - A 61-year hydrologic record of monthly inflows to Watana Reservoir was synthesized.
- Fish Distribution and Abundance in the Upper Susitna River (ISR Study 9.5):
  - Over 12,600 fish observed from sampling at over 150 sites. Individuals from nine species were observed: Chinook salmon, Arctic grayling, burbot, Dolly Varden, lake trout, longnose sucker, sculpin, humpback whitefish, and round whitefish.
  - Over 1,300 fish were tagged for biotelemetry studies of fish movement.
  - Juvenile Chinook salmon are rare in the Upper River.
  - Juvenile Chinook salmon were documented in the Black River, Oshetna River, Kosina Creek, and other tributaries.
  - A relatively high abundance of Arctic grayling and Dolly Varden were observed in Watana Creek.
- Fish Passage at Watana Dam (ISR Study 9.11):
  - Biological, physical, and engineering information was compiled.
  - A site visit by the passage technical committee occurred.
- Recreation Resources (ISR Study 12.5):
  - Regional sportfishing harvest information from ADF&G was compiled and reported several sites in the Upper River with a low level of use (fewer than 30 annual responses to user surveys).

AEA expects that the implementation of the above listed studies will inform the implementation of this study during the next year of study.

## 7. COMPLETING THE STUDY

[As explained in the cover letter to this draft ISR, AEA's plan for completing this study will be included in the final ISR filed with FERC on June 3, 2014.]

## **8. LITERATURE CITED**

AEA. (Alaska Energy Authority) 2012. Revised Study Plan: Susitna-Watana Hydroelectric Project, FERC Project No. 14241. December 2012. Prepared for the Federal Energy Regulatory Commission, Washington, D.C.

## **9. FIGURES**



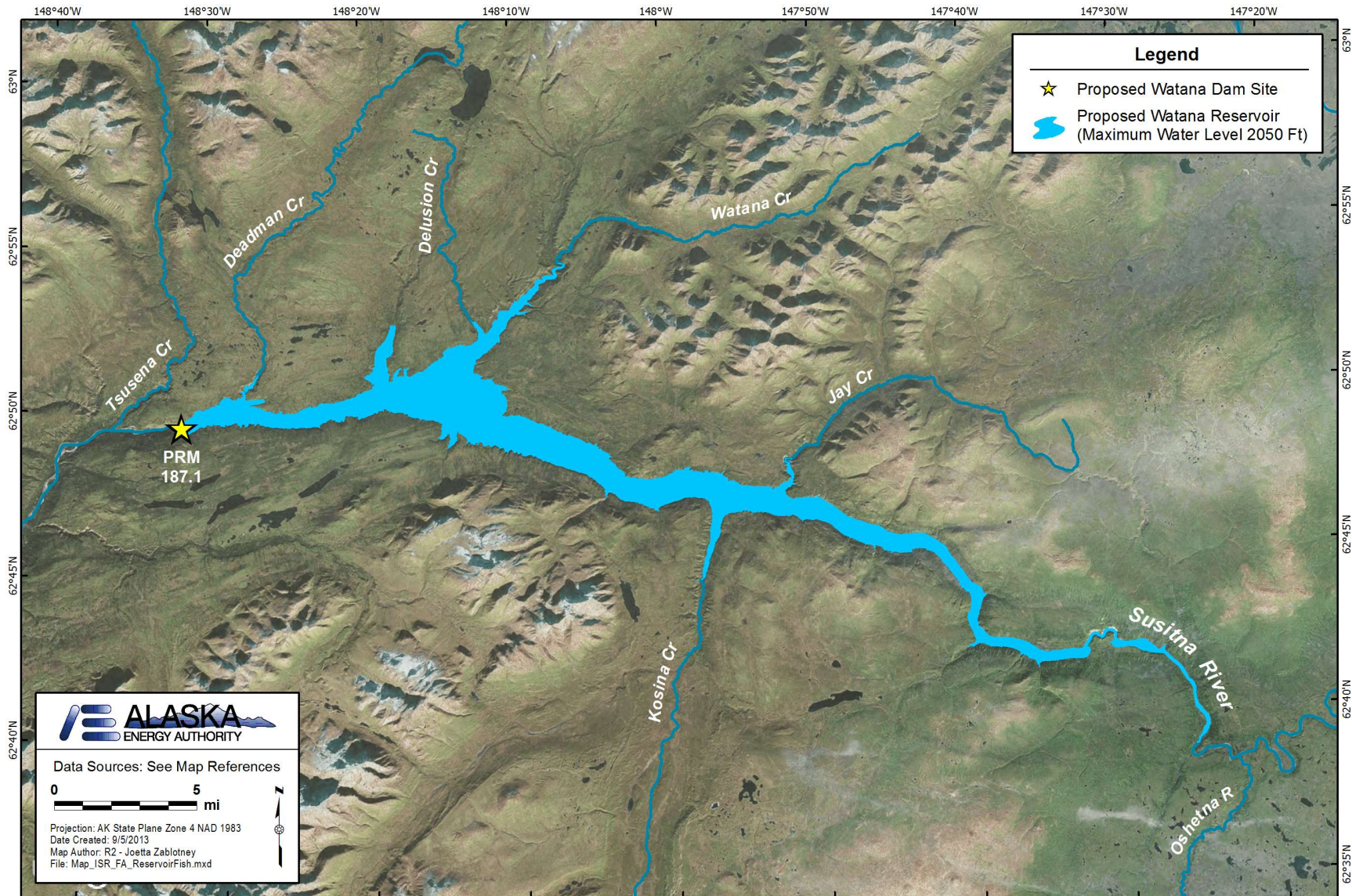


Figure 3-1. Map of study area for Future Watana Reservoir Fish Community and Risk of Entrainment Study.