

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

**Genetic Baseline Study for Selected Fish Species
Study Plan Section 9.14**

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

Prepared for
Alaska Energy Authority



Prepared by
Gene Conservation Laboratory
Commercial Fisheries Division
Alaska Department of Fish and Game

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EXECUTIVE SUMMARY

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Purpose	The purpose of this study is to collect tissue samples suitable for genetic analyses from Susitna River fish species, conduct genetic analysis of Chinook salmon, and establish tissue repositories for all four other salmon species and 20 non-salmon fish species. Chinook salmon tissue will be used to characterize genetic population structure, examine genetic variation for use in mixed-stock analysis, and, if sufficient variation is found, estimate the contribution of Chinook salmon originating upstream of Devils Canyon to select habitats in the Lower River. Salmon and non-salmon tissue repositories will be used for future studies to characterize the genetic legacy and variation of species and populations of interest.
Status	Field collections began in 2012, were expanded in 2013, and will continue in 2014 and 2015, as adequate sample sizes are realized. Chinook salmon analysis began in the fourth quarter of 2013. Collections are on target to meet sampling goals over the study period with two exceptions: 1) odd-year pink salmon were not found spawning in the Chulitna River and were therefore not collected and 2) Chinook salmon from selected tributaries above or near Devils Canyon were not accessible which may impede temporal analyses (Section 4.5).
Study Components	The Study Plan components include: <ul style="list-style-type: none"> • Tissue sample collection for genetic analysis from fish species; • Tissue storage; • Laboratory analysis; • Data retrieval and quality control; and • Genetic baseline development.
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> <p>There were no variances from the collection, storage and analysis methods described in the Study Plan; however, full access to all of the sampling sites was not available in 2013. Access was not available to collect Chinook salmon samples in tributaries flowing through Cook Inlet Regional Working Group (CIRWG) lands above or near Devils Canyon (Cheechako, Devil, Fog, Tsusena and Watana creeks) in 2013. Lack of land access prevented sampling of coho salmon from Portage and Prairie creeks, and reduced sampling effort for sockeye salmon in Prairie Creek (Genetics IP Section 4.2; see ISR Section 4.5).</p>

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Steps to Complete the Study	<p>To complete this study, AEA will continue to implement the methods in the Study Plan.</p> <p>AEA is planning the following activities for 2014:</p> <ul style="list-style-type: none"> • Collect juvenile and adult Chinook salmon from above Devils Canyon. • Collect adult Chinook salmon from upper Cook Inlet tributaries. • Opportunistically collect other salmon and non-salmon species from the Susitna River. • Genotype Chinook salmon for Single nucleotide polymorphism (SNPs) and microsatellite (μSAT). <p>AEA is planning the following activities for 2015:</p> <ul style="list-style-type: none"> • Statistically analyze genetic structure of Chinook salmon. • Examine potential for mixed-stock analysis of Chinook salmon within Susitna River.
Highlighted Results and Achievements	<p>The study made excellent progress towards tissue collections of Susitna River fish species in 2013, with over 4,500 samples collected representing the most species-comprehensive genetic collections from fresh waters in northern Cook Inlet. Preliminary statistical analyses provided insights regarding the potential divergence between Chinook salmon originating from above and below Devils Canyon.</p>

7. COMPLETING THE STUDY

7.1. Proposed Methodologies and Modifications

To complete this study, AEA will implement the methods in the Study Plan. Additional details regarding the field and analytical methods are provided in the 2014 Implementation Plan (IP), which has been developed with input from the USFWS and NMFS (the 2014 IP is incorporated by reference in Part B of this ISR). The full list of Study Plan components for 2014, is as follows:

- Survey flights
- Sample collections
- Sample coordination and delivery among interrelated studies
- Tissue storage
- Laboratory analysis
- Data retrieval and quality control
- Genetic baseline development
- Agency consultation

7.1.1. Decision Points from Study Plan

There were no decision points in the FERC-approved Study Plan to be evaluated for this study following the completion of 2013 work. All refinements to the study based on 2013 results were made within the framework of the 2014 Implementation Plan, which was developed with input from USFWS and NMFS.

7.1.2. Modifications to Study Plan

AEA is not planning any modifications to the approved Study Plan. However, specific details regarding the sampling and analytical methods have been updated in the 2014 Implementation Plan based on the 2013 study season and consultation with NMFS and USFWS.

Specifically, the Study Plan Determination (February 1 SPD) recommended that AEA develop an annual operational plan in consultation with the FWS and NMFS. AEA has adopted this recommendation and has drafted a 2014 Implementation Plan in consultation with the FWS and NMFS. The RSP did not provide for specific sampling methods to collect tissue samples for genetic analysis. However, the 2013 Implementation Plan provided that collection of samples from non-Chinook salmon would be opportunistic between late July and August 4. Between August 4 and late September, three sampling crews would target non-Chinook salmon species based on aerial surveys of potential spawning locations (2013 IP Section 4.2.3). The 2014 Implementation Plan has modified this sampling approach; AEA will only sample non-Chinook salmon species opportunistically during targeted sampling of Chinook salmon in 2014 (see 2014 IP Section 4.2.3). This change in sampling approach will allow AEA to increase the number of tissues samples for non-Chinook salmon in 2014 at a reduced cost and will support AEA's efforts to meet the sample targets outlined in the Study Plan over the course of the study period.

In accordance with the Study Plan, any need for additional sampling in 2015 will be planned in consultation with the FWS and NMFS within the 2015 Implementation Plan framework.

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 by February 1, 2016, in accordance with the ILP schedule issued by FERC on January 28, 2014.

In 2014, AEA plans to complete all remaining data collection for this study. Specifically, AEA is planning the following activities for 2014:

- Collect juvenile and adult Chinook salmon from above Devils Canyon.
- Collect adult Chinook salmon from upper Cook Inlet tributaries.
- Opportunistically collect other salmon and non-salmon species from the Susitna River.
- Genotype Chinook salmon for SNPs and uSats.

With input from USFWS and NMFS, in accordance with the Study Plan, AEA expects to complete all remaining data analysis for this study in 2015. Specifically, AEA is planning the following activities for 2015:

- Continue data collection as necessary to meet the target number of samples if not achieved in 2014
- Develop 2015 Implementation Plan
- Statistically analyze genetic structure of Chinook salmon.
- Examine potential for mixed-stock analysis of Chinook salmon within Susitna River.

7.3. Conclusion

AEA expects that through the combination of 2013 effort (including variances described in Section 4.5.1), proposed future work in 2014 and 2015, and integration with other studies (including modifications proposed to these studies) to fully achieve the approved Study Plan objectives (RSP Section 9.14.1), with the exception of collecting tissue samples from odd-year pink salmon in the Chulitna River (Table 4-5). As discussed in ISR Section 6.5, odd-year pink salmon do not appear to utilize spawning habitats in the Chulitna River. Therefore, AEA is unlikely to meet sampling targets for this sampling stratum. This will not compromise AEA's ability to contribute to the development of a genetic baseline for pink salmon spawning in the Middle and Upper Susitna River drainage in accordance with the Objective 2 of this study.

7.4. Literature Cited

Magnus, D. L., D. Brandenburg, K. F. Crabtree, K. A. Pahlke, and S. A. McPherson. 2006. Juvenile salmon capture and coded wire tagging manual. Alaska Department of Fish and Game, Special Publications No. 06-31, Anchorage.