

# Susitna-Watana Hydroelectric Project Document

## ARLIS Uniform Cover Page

<p><b>Title:</b> Record of consultation, development of 2013 project operational plan, Study 9.14</p>		<h1>SuWa 200</h1>
<p><b>Author(s) – Personal:</b></p>		
<p><b>Author(s) – Corporate:</b> Alaska Energy Authority</p>		
<p><b>AEA-identified category, if specified:</b> Final study plan</p>		
<p><b>AEA-identified series, if specified:</b></p>		
<p><b>Series (ARLIS-assigned report number):</b> Susitna-Watana Hydroelectric Project document number 200</p>	<p><b>Existing numbers on document:</b></p>	
<p><b>Published by:</b> [Anchorage : Alaska Energy Authority, 2013]</p>	<p><b>Date published:</b> [2013]</p>	
<p><b>Published for:</b></p>	<p><b>Date or date range of report:</b></p>	
<p><b>Volume and/or Part numbers:</b> Study plan Section 9.14, Attachment B</p>	<p><b>Final or Draft status, as indicated:</b></p>	
<p><b>Document type:</b></p>	<p><b>Pagination:</b> [11] p.</p>	
<p><b>Related work(s):</b> <i>Attachment B to:</i> Genetic baseline study for selected fish species, Study plan Section 9.14 : Final study plan.</p> <p><i>Comments to:</i> Implementation plan for the genetic baseline study for selected fish species in the Susitna River, Alaska. -- Draft.</p> <p><i>AEA responses to agency comments in this attachment were released as Attachment C called:</i> Response to comments on draft Implementation plan for the genetic baseline study for selected fish species in the Susitna River, Alaska</p>		<p><b>Pages added/changed by ARLIS:</b></p>
<p><b>Notes:</b></p>		

All reports in the Susitna-Watana Hydroelectric Project Document series include an ARLIS-produced cover page and an ARLIS-assigned number for uniformity and citability. All reports are posted online at <http://www.arlis.org/resources/susitna>



## **Attachment B**

---

Record of Consultation, Development of 2013 Project Operational Plan, Study 9.14



March 29, 2013

**To: Sue Walker (NMFS)  
Catherine Berg (USFWS)**

**Subject: Distribution of Draft 2013 Project Operational Plan for Comment, Fish Genetic Baseline Study (RSP 9.14)**

Dear Ms. Walker and Ms. Berg:

On February 1, 2013, the Federal Energy Regulatory Commission (Commission or FERC) issued its Study Plan Determination (SPD) for 44 of the 58 proposed individual studies in the Alaska Energy Authority's (AEA) Revised Study Plan (RSP) for the Susitna-Watana Hydroelectric Project, FERC Project No. 14241 (Project).<sup>1</sup> With regard to the Fish Genetic Baseline Study (RSP 9.14), AEA proposed to develop and circulate to Technical Workgroup (TWG) members by April 30 of 2013 and 2014 detailed annual project operational plans. These operational plans are to establish additional details for field sampling efforts, including specific temporal and spatial sampling locations, to enhance the general locations for target sample collection presented in the RSP.

When approving the Fish Genetic Baseline Study, the Commission recommended that AEA consult with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) and, by March 31, prepare a draft project operational plan for review and comment by the agencies. Following a 15-day review and comment period, AEA will prepare and file the final plan with the Commission by April 30, which will include "documentation of agency consultation, a description of how agency comments are incorporated into the final plans, and an explanation for why any agency comments are not incorporated into the final plans."<sup>2</sup>

The purpose of this letter is to distribute for comment by USFWS and NMFS, as well as other TWG members, the draft 2013 operational plan for the Fish Genetics Baseline Study. Due to the large file size of this document, AEA has uploaded the draft plan to the Project website at the following link:

[http://www.susitna-watanahydro.org/wp-content/uploads/2013/03/SuWaGeneticsSPD\\_Draft\\_OP\\_2013\\_0329-FINAL.pdf](http://www.susitna-watanahydro.org/wp-content/uploads/2013/03/SuWaGeneticsSPD_Draft_OP_2013_0329-FINAL.pdf)

To allow sufficient time for AEA to file the final plan with the Commission by April 30 as directed, AEA requests that all comments be submitted, in writing, by Monday, April 15, 2013. Please submit all comments to:

---

<sup>1</sup> Study Plan Determination for the Susitna-Watana Hydroelectric Project, Project No. 14241-000 (issued Feb. 1, 2013) [hereinafter, "SPD"].

<sup>2</sup> *Id.*, Appendix B, at B-43 to B-44.

Betsy McGregor  
Environmental Manager  
Alaska Energy Authority  
813 West Northern Lights Blvd.  
Anchorage, AK 99503  
E-mail: [bmcgregor@aidea.org](mailto:bmcgregor@aidea.org)

AEA looks forward to receiving comments on the attached draft plan, and to working with NMFS, USFWS, and TWG in implementing the Fish Genetic Baseline Study, as well as all other licensing studies for the proposed Project. If you have questions concerning this submission, please do not hesitate to contact me at (907) 771-3957.

Sincerely,



Betsy McGregor  
Environmental Manager  
Alaska Energy Authority

cc:  
Betsy McCracken, USFWS  
Michael Buntjer, USFWS  
Eric Rothwell, NMFS  
Brian Lance, NMFS  
Marie Steele, ADNR  
Stormy Haught, ADF&G  
Joe Klein, ADF&G  
Klaus Wuttig, ADF&G  
Bill Templin, ADF&G  
Chris Habicht, ADF&G  
Andy Barclay, ADF&G  
Eric Volk, ADF&G  
Matt LaCroix, EPA  
Matt Cutlip, FERC  
Jeff Davis, ARRI  
Dara Glass, CIRI  
Jan Koningsberg  
Wayne Dyok, AEA

**U.S. Fish and Wildlife Service Review of the draft  
“Implementation Plan for the Genetic Baseline Study for Selected Fish Species in the Susitna  
River, Alaska” - Susitna-Watana Hydro Project  
April 12, 2013**

FERC’s February 1, 2013 Study Determination recommended that the study plan be modified to include the following:

- AEA consult with the FWS and NMFS prior to preparing the project operational plans;
- distribute draft project operational plans to the agencies by March 31 of each year of study implementation;
- allow 15 days for the agencies to provide comments on the draft plans;
- file the final plans with the Commission by April 30 of each year of study implementation; and
- include with the final plans, documentation of agency consultation, a description of how agency comments are incorporated into the final plans, and an explanation for why any agency comments are not incorporated into the final plans.
- To the extent feasible, FERC recommend that AEA collect tissue samples over a representative proportion of the entire adult Chinook salmon run.

FERC also recommended that AEA include in the 2013 project operational plan, a schedule for when the 2012 genetics studies would be available, and include provisions for filing those results with the Commission through either the initial study report, or a supplemental report in 2013. The Study Determination also recommended that the report on the 2012 preliminary genetics studies clearly describe the criteria, using current scientific literature, to determine whether there is sufficient genetic uniqueness to estimate the percentage of Chinook originating from Upper and Middle River habitats in areas sampled downstream. Finally, it recommended that the report on the 2012 preliminary genetics studies clearly describe whether the study results indicate that sufficient genetic uniqueness is found to characterize the presence and relative proportion of fish originating from the Upper and Middle River in selected Lower River habitats as described in section 9.14.4.7 of the study plan.

AEA did not consult with FWS or NMFS prior to preparing the 2013 project operational plan, but rather, provided the completed 2013 draft operational plan to the Services for review in March 31, 2013. Omitting the first step in the process, of consultation with FWS prior to developing the operational plan, has not allowed FWS input into the development of the plan. Thus FWS is only able to provide a review of the draft plan. This was completed by Dr. Jeff Olson, Deputy Director of the Conservation Genetics Laboratory, U.S. Fish and Wildlife Service, Region 7.

**General comments on Susitna River genetics operational plan:**

This plan describes the collection of tissue samples from resident and anadromous fish in the Susitna River. The focus of the plan is on estimating the genetic population structure of Chinook salmon by assaying variation at 96 SNP and 12 microsatellite loci. The plan further proposes to perform mixed-stock analysis of juvenile Chinook salmon sampled in lower Susitna River mainstem habitats to estimate habitat use by Chinook salmon originating from the middle and upper portions of the drainage.

We recommend redrafting the proposal to correct grammatical errors and to improve clarity in the following sections: Section 2.1.1, Assessing Chinook salmon population structure (section unclear); Section 4.2, Samples to collect (section unclear, with some background information missing), and Section 4.6.8, Testing among hypotheses (more detail needed). See specific comments, below.

## **Specific comments:**

Page 3, Section 2.1.1, Assessing Chinook salmon population structure: This section could be improved by organizing it into three paragraphs, one for a description of each of the hypotheses of population structure above Devil's Canyon. For Hypothesis 1a, temporal variation in allele frequencies may be seen in small, genetically isolated populations (Waples and Teel 1990).

Page 5, Section 3, Objectives: In the last line of the paragraph introducing the objectives, it reads "... (3) assess the use of Lower and Middle River habitat by juvenile Chinook salmon originating in the Middle and Upper Susitna River." Should this be "Lower River habitat" (delete the word Middle), to follow what is written in Objective 5, "...selected Lower River habitats..."?

Page 5, Section 3 Objectives, Objective #3: There needs to be justification on why samples outside of the Susitna River are being collected for Chinook salmon.

Page 6, Section 4.2, Samples to collect: This section about recommended sample sizes was confusing; some background information and citations seem to be missing (e.g., for the first sentence) or misplaced (e.g., Nei 1978). Sample sizes are partially dependent on the genetic divergence among stocks, the information content of the genetic markers, and adequate estimate of allele frequencies. A more thorough description or better references, for example the recent reports for chum salmon and sockeye salmon MSA, would be useful here.

Page 7, Section 4.2.1, Sample collection target #5 and Page 9, Section 4.2.4, Juvenile Chinook salmon collection above Three Rivers confluence: Why is only the Oshetna River being sampled for juveniles, since adults were collected in Kosina Creek and juveniles have been seen here? We have not checked the Anadromous Waters Catalog, but all tributaries above the Canyon should be sampled for juveniles. Chinook salmon juveniles can migrate quite some distances from their tributary of origin (e.g., Daum and Flannery 2011). There should be some justification on why juvenile samples collected below the falls that are used for "baseline" will likely not comprise a mixture of stocks (please see Specific Comment Page 13, for other suggestions on how these samples could be used.)

Page 9, Section 4.2.6, Other species collections: It sounded like resident species are going to be in bulk collections. Is that a single bulk collection for the entire Susitna River, or a bulk collection for each sampling site (recommend the latter)?

Page 12, Section 4.5, Data Retrieval and Quality Control: Elimination of siblings will only be done for juvenile collections for baseline?

Page 12, Section 4.6.2, H-W Expectation: There may be some deviations from HW expectation by chance. Is it really necessary to delete the collection(s) from further analysis? Should HW testing be conducted after temporal pooling?

Page 13, Section 4.6.8, Testing among hypotheses: This section needs to be expanded. The Evolutionary Criteria of Waples and Gaggiotti (2006) should be described, and related to Hypotheses 1a, 1b, and 2. What are the three levels of the hierarchical analysis? Evaluating the Evolutionary Criteria/Hypotheses through estimating effective population size may not be very powerful if confidence limits are large. Also, unless large sample sizes are achieved, estimating  $N_e$  may not be very successful (Waples 1989, England et al. 2005). It may not be possible to use the temporal method, because the time span in the samples collected may not be large enough. The collections of juveniles may be useful in  $N_e$  estimation, provided they represent a single cohort and

population. It may be possible to determine if juveniles are from one cohort by measuring individual length to determine if sizes fall in a single mode.

Another possible analysis is to use the program MIGRATE to both estimate migration rates and direction and  $N_{\mu}$ . This analysis may also be of interest for the juvenile collections above and below the canyon.

Page 14, Section 4.7.1 Assessing reporting groups (including above Devil's Canyon for MSA): Delete preliminary test using Kosina Creek 2012, N=10. Wait until more samples are collected.

**Review of the draft “Implementation Plan for the Genetic Baseline Study for Selected Fish Species in the Susitna River, Alaska” - Susitna-Watana Hydro Project**

April 12, 2013

FERC’s February 1, 2013 Study Determination recommended that the study plan be modified to include the following:

- AEA consult with the FWS and NMFS prior to preparing the project operational plans;
- distribute draft project operational plans to the agencies by March 31 of each year of study implementation;
- allow 15 days for the agencies to provide comments on the draft plans;
- file the final plans with the Commission by April 30 of each year of study implementation; and
- include with the final plans, documentation of agency consultation, a description of how agency comments are incorporated into the final plans, and an explanation for why any agency comments are not incorporated into the final plans.
- To the extent feasible, FERC recommend that AEA collect tissue samples over a representative proportion of the entire adult Chinook salmon run.

FERC also recommended that AEA include in the 2013 project operational plan, a schedule for when the 2012 genetics studies would be available, and include provisions for filing those results with the Commission through either the initial study report, or a supplemental report in 2013. The Study Determination also recommended that the report on the 2012 preliminary genetics studies clearly describe the criteria, using current scientific literature, to determine whether there is sufficient genetic uniqueness to estimate the percentage of Chinook originating from Upper and Middle River habitats in areas sampled downstream. Finally, it recommended that the report on the 2012 preliminary genetics studies clearly describe whether the study results indicate that sufficient genetic uniqueness is found to characterize the presence and relative proportion of fish originating from the Upper and Middle River in selected Lower River habitats as described in section 9.14.4.7 of the study plan.

AEA did not consult with FWS or NMFS prior to preparing the 2013 project operational plan, but rather, provided the completed 2013 draft operational plan to the Services for review in March 31, 2013. Omitting the first step in the process, of consultation with NMFS prior to developing the operational plan, has not allowed NMFS’ input into the development of the plan. Thus NMFS is only able to provide a review of the draft plan. This was completed by Dr. Jeff Guyon, Director of the Fisheries Genetics Program at NMFS Auke Bay Laboratory, part of the Alaska Fisheries Science Center.

The draft “Implementation Plan for the Genetic Baseline Study for Selected Fish Species in the Susitna River, Alaska” is a proposal by the Alaska Department of Fish and Game (ADF&G) to primarily evaluate the genetic distinction of Susitna River Chinook salmon. This species has been documented to migrate past the proposed dam site at mile 184 and spawn in the upper river, although little is known about this species in the upper river watershed. The proposal also includes plans to (1) collect genetic samples from other salmon species primarily below the proposed dam site to supplement other projects and (2)

to collect non-salmonid genetic samples on an opportunistic basis. The authors then propose to analyze both adult and juvenile Chinook salmon to ascertain whether Chinook salmon spawning upstream of the proposed dam site are part of a self-sustaining, genetically isolated population. Three population hypotheses are outlined in section 2.1.1 and the proposed experiments provide a strategy how to address each of them. Throughout the proposal, the authors do an outstanding job identifying the limitations of the study. The ADF&G genetics laboratory is a preeminent laboratory with extensive experience in the genetic analysis of salmon populations.

Because of the prominence of Chinook salmon in the draft plan, this review is focused primarily on the analysis proposed for that species. While the proposal is very well written, potential suggestions for improving the study are as follows:

1. Section 4.2.1 While the proposed sampling strategy is impressive, adult Chinook salmon are inherently difficult to sample because of their large size and preferred spawning habitat, often in fast deep water. This is clearly recognized in Table 2 as the preferred sample size is identified as 200 for each of the 6 sublocations above Devil's Canyon, yet the expected cumulative total for all 6 aggregated sublocations is identified as only 50. Given anticipated sampling difficulties, it's unclear whether ADF&G will be able to collect the minimum sample set of 50 representative Chinook salmon above Devil's Canyon in just two years, especially above the proposed dam site. Even if successful, 50 appears to be a low number of samples to compare to identify genetic differences in related stocks. The authors should consider other options in case the realized sample numbers are too low to address project objectives.
2. Section 4.7.1 Regarding the proposed preliminary analysis of the 10 samples collected in Kosina Creek in 2012, there is concern regarding the validity of the test. It's possible given the small number of samples that the power of the test may not be strong enough to identify differences if they exist. It's also possible that the small sample set could be biased in some way and therefore suggest differences where they may not exist. Because of this potential for misinterpretation, the authors should consider first performing some type of power analysis with existing populations of known genetic divergence to gauge the validity of comparing 10 samples from a single aggregation. If the test can't statistically be done with 10 samples, it might be best to hold any comparison until the sample sets are strong enough for a statistically reliable test.
3. Regarding the sampling locations upstream of the proposed dam site, the authors should consider including adult and juvenile Chinook salmon sampling upstream of the Oshetna River (location 22 on Figure 2). My understanding is that the Oshetna River is the furthest upstream location that juvenile Chinook salmon were identified in the past, but it's possible those juveniles could have originated from further upstream spawning aggregates and it's not clear whether locations upstream of the Oshetna River have been surveyed for even presence or absence of salmon; no apparent barrier to their migration is noted and habitat appears suitable.

4. Given that previous studies were completed in the past regarding the proposed dam site, it would be helpful to determine whether samples such as scales are available from historical studies. DNA from historical scales might help differentiate between the 3 different hypotheses identified in 2.2.1.
5. Section 4.6 While the proposed tests will be used to differentiate between the three hypotheses, the specific level of divergence used to discriminate fish populations is unclear. This is presumably because the number of available samples will shape the utility of the potential tests and interpretation of the results will be done later in 2014 and 2015 in consultation with other laboratories.
6. Juvenile salmon species can be difficult to distinguish, thus the authors should include species ID for juveniles collected at least upstream of the proposed dam site and possibly below. Such an analysis might provide additional information regarding potential spawning success of all salmon species.

In addition, there are some minor grammatical suggestions:

1. Page 1, first paragraph: Figure 2 is referenced prior to Figure 1.
2. Page 1, second paragraph: should read "... the proposed dam site are part of a ..."
3. Page 2, fourth paragraph: extra semicolon after "salmon"
4. Page 3, first paragraph: need space after "3"
5. Page 4, last paragraph: should read "The 2014 Genetics Implementation..."
6. Page 5, under "Objectives": might consider separating into primary and secondary objectives
7. Page 7, under "Sample collection targets": might consider separating into primary and secondary sampling goals
8. Page 12, second paragraph: "... exclude from the baseline all ..." – are juveniles going to be included in the genetic baseline?
9. Page 32-36, Figures 2-6: helpful to identify the proposed dam site on the maps

AEA Team Member		Other Party	
<b>Name:</b>	<i>Chris Habicht</i>	<b>Name:</b>	<i>Betsy McCracken</i>
<b>Organization:</b>	<i>ADFG Genetics</i>	<b>Organization:</b>	<i>USFWS</i>
<b>Study Area:</b>	<i>Susitna River and Upper Cook Inlet</i>	<b>Phone Number:</b>	<i>907-271-2783</i>
<b>Date:</b>	<i>2012 09 19</i>	<b>Time:</b>	
Meeting held by: <input type="checkbox"/> AEA Team <input checked="" type="checkbox"/> Other Party			

**Others at meeting:** Bill Templin

**Subject:** At the request of Betsy, we met to discuss genetic applications associated with the SuWa hydro project.

**Discussion:** We had a broad discussion regarding genetic applications for understanding population structure and genetic mixed-stock analyses. We also discussed what is known about population structure of Chinook salmon in Upper Cook Inlet, temporal stability of allele frequencies in wild populations, and our experience collecting Chinook salmon adults above Devils Canyon in 2012.

**Action Item:** Betsy asked for the following 4 items by email:

1. An updated Upper Cook Inlet Chinook collection list that includes all 2012 samples that our lab collected.
2. An allele frequency temporal stability paper for sockeye salmon.
3. The Chinook salmon baseline as it stood in May, 2012 – you can see from the updated collection list (above) that there are more collections to add now.
4. The trip report for the 2012 collections of Chinook salmon made by ADFG Gene Conservation Lab in 2012.

AEA Team Member		Other Party	
<b>Name:</b>	<i>Chris Habicht</i>	<b>Name:</b>	<i>Betsy McCracken</i>
<b>Organization:</b>	<i>ADFG Genetics</i>	<b>Organization:</b>	<i>USFWS</i>
<b>Study Area:</b>	<i>Susitna River and Upper Cook Inlet</i>	<b>Phone Number:</b>	<i>907-271-2783</i>
<b>Date:</b>	<i>2012 11 02</i>	<b>Time:</b>	
Meeting held by: <input type="checkbox"/> AEA Team <input checked="" type="checkbox"/> Other Party			

**Others at meeting:** Bill Templin, Andy Barclay

**Subject:** At the request of Betsy, we met to discuss AEA's study plan objectives for the Fish Genetics Proposed Study Plan

**Discussion:** We had a broad discussion regarding AEA's Baseline Fish Genetics Proposed Study Plan, where Betsy asked for clarification on the genetic analyses proposed and advice on what analyses might be useful in addressing the primary questions: 1) answer whether or not the Chinook above Devil's Canyon are genetically distinct, 2) determine the effective Chinook spawning population size above Devil's Canyon, and 3) if these Chinook are genetically distinct above Devil's Canyon, what proportion of the Susitna River spawning population do they contribute? We also discussed genetic structure of other Pacific salmon, basic population genetic theory, and genetic mixed-stock analyses applications.

**Action Item:** Betsy incorporated our responses into a document: "USFWS Comments on AEA's Baseline Fish Genetics Proposed Study Plan (PSP)" that she provided back to us the following day for review.