

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

**Study of Fish Distribution and Abundance in the  
Upper Susitna River  
Study Plan Section 9.5**

**Part D: Supplemental Information to  
June 2014 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

November 2015

## TABLE OF CONTENTS

<b>1. Introduction.....</b>	<b>1</b>
<b>2. Background .....</b>	<b>2</b>
2.1. Purpose of Study .....	2
2.2. Study Components .....	2
<b>3. Status, Highlighted Results, and Achievements.....</b>	<b>3</b>
<b>4. Summary of Study 9.5 Documents .....</b>	<b>4</b>
<b>5. New Study Documentation Supplementing the ISR.....</b>	<b>7</b>
<b>6. Variances .....</b>	<b>7</b>
6.1. 2013 Study Season .....	7
6.2. 2014 – 2015 Study Season .....	8
<b>7. Study Plan Modifications .....</b>	<b>9</b>
7.1. Modifications Identified in ISR.....	9
7.2. Modifications Identified since the June 2014 ISR .....	10
<b>8. Steps to Complete the Study .....</b>	<b>10</b>

## 1. INTRODUCTION

Section 1 (Part A) of the June 2014 ISR for this Study of Fish Distribution and Abundance in Upper Susitna River (Study Plan 9.5) 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 9.5 since the filing of the ISR in June 2014. As detailed below, AEA's recent activities for Study 9.5 have consisted of the following:

- Completion of the second study year of downstream migrant trapping.
- Completion of the second study year of resident fish radio tagging and tracking.
- Evaluation of updated tributary target sample lengths using the Black River as a pilot study per technical memoranda on proposed sampling modifications for 2015 (*Proposed 2015 Modifications to Fish Distribution and Abundance Study Plan Implementation Technical Memorandum*), and a second one presenting an evaluation of modifications implemented in the Black River in 2014 (*Evaluation of 2014 Study Modifications in the Black River Technical Memorandum*).
- Completion of first study year of a hybrid sampling approach in the Upper River mainstem utilizing habitat mapping to implement a GRTS sampling approach for off-channel and side channel habitat site selection as described in the *Proposed 2015 Modifications to Fish Distribution and Abundance Study Plan Implementation Technical Memorandum*).
- Fish Distribution and Abundance sampling at sites that were not sampled or partially sampled in 2013 due to land access restrictions.
- Provided an updated version of the field protocol for gear selection and level of effort applied during sampling in *Appendix 3. Protocol for Site-Specific Gear Type Selection; Version 5*, which supersedes Appendix 3 of the Implementation Plan.
- Provided a written protocol describing methods AEA will implement to improve and evaluate the accuracy of field identification of early life stages of Chinook and Coho salmon in the *Draft Chinook and Coho Salmon Identification Protocol*.
- On October 15, 2014, AEA held an ISR meeting for the Fish and Aquatics Program, which included a presentation and discussion of the 2013 Fish Distribution and Abundance in the Upper Susitna River Study.
- Prepared the *2014 – 2015 Study Implementation Report for the Fish Distribution and Abundance in the Upper River Susitna Study (9.5)*, 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 filing of this ISR Part D. In light of this additional implementation, this Part D also identifies AEA's plans for completing Study 9.5 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 characterize the current distribution, relative abundance, run timing, and life history of resident and non-salmon anadromous fish species as well as freshwater rearing life stages of anadromous salmonids in the Upper Susitna River. Eight specific objectives have been developed for this study and include multiple tasks. Data collected as part of this study will be used to provide a baseline characterization of fish assemblages in the Susitna River, to identify and evaluate potential Project-induced effects on fish assemblages, and inform development of any necessary protection, mitigation, and enhancement measures. This goal will be achieved by completing the following eight objectives.

- Objective 1: Describe the seasonal distribution, relative abundance, and fish habitat associations of juvenile anadromous salmonids, non-salmonid anadromous fishes and resident fishes.
- Objective 2: Describe seasonal movements of juvenile salmonids and selected fish species such as Rainbow Trout, Dolly Varden, Humpback Whitefish, Round Whitefish, Northern Pike, Pacific Lamprey, Arctic Grayling and Burbot within the hydrologic zone of influence upstream of the Project.
- Objective 3: Describe early life history, timing, and movements of anadromous salmonids.
- Objective 4: Characterize the seasonal age class structure, growth, and condition of juvenile anadromous and resident fish by habitat type.
- Objective 5: Determine whether Dolly Varden and Humpback Whitefish residing in the Upper River exhibit anadromous or resident life histories.
- Objective 6: Determine baseline metal concentrations in fish tissues for resident fish species in the mainstem Susitna River (see Studies 5.5 and 5.7).
- Objective 7: Document the seasonal distribution, relative abundance, and habitat associations of invasive species (Northern Pike).
- Objective 8: Collect tissue samples to support the Genetic Baseline Study for Selected Fish Species (Study 9.14).

### **2.2. Study Components**

Major study components include the following:

- Seasonal fish sampling in Upper Susitna River during the 2013 and 2014 open water period to provide data on distributions, abundance, and habitat associations of all fish species encountered and specifically document any Northern Pike observed or collected.
- Strategic sampling of locations targeting the early life history stages of juvenile Pacific salmon between ice-out and the beginning of seasonal surveys.
- Downstream migrant trapping in the Oshetna River, Kosina Creek and in the mainstem Susitna River upstream of the dam site.
- Use of radio-telemetry to describe seasonal movements of selected fish species within the zone of hydrologic influence.
- Use of PIT tagging technology to track movements of freshwater stages of selected fish species, and estimate individual growth rates within the zone of hydrologic influence.
- Collect and analyze otoliths from Dolly Varden and Humpback Whitefish to determine life history strategy these fish exhibit.
- Collect fish tissue samples in target species in support of metals analysis and genetic baseline characterizations.

### 3. STATUS, HIGHLIGHTED RESULTS, AND ACHIEVEMENTS

This multi-year study was initiated in 2012 with preliminary sampling was conducted at prioritized locations where juvenile or adult Chinook Salmon had been previously documented; results of that work are reported in two technical memorandums for this study, the *2012 Upper Susitna River Fish Distribution and Habitat Study: Fish Distribution Report* and the *2012 Upper Susitna River Fish Distribution and Habitat Study: Habitat Report*. The following tasks were completed in 2013 and reported in Part A of the ISR for Study 9.5:

- Seasonal fish sampling in Upper Susitna River during the 2013 open water period to provide data on distributions, abundance, and habitat associations of all fish species encountered and specifically document any Northern Pike observed or collected.
- Strategic sampling of locations targeting the early life history stages of juvenile Pacific salmon between ice-out and the beginning of seasonal surveys.
- Downstream migrant trapping in the Oshetna River and Kosina Creek.
- Use of radio-telemetry to describe seasonal movements of selected fish species within the zone of hydrologic influence.
- Use of PIT tagging technology to track movements of freshwater stages of selected fish species, and estimate individual growth rates within the zone of hydrologic influence.
- Collect otoliths from Dolly Varden and Humpback Whitefish to determine life history strategy these fish exhibit.
- Collect fish tissue samples in target species in support of metals analysis and genetic baseline characterizations

The study team has completed the following activities for Study 9.5 since the June 2014 filing of the ISR.

- Field surveys focused on evaluating a new sampling approach to increase the sampling of rare habitats in the Upper River mainstem and tributaries. This effort was successfully implemented increasing the number of off-channel habitats and tributary mouths surveyed in the Upper River mainstem. In addition more intensive sampling in the Black River increased the replicates of mesohabitat types improving the ability to address fish-habitat associations in Upper River tributaries. The 2014 sampling advanced the knowledge of distributions and habitat use of Chinook Salmon, Dolly Varden and Lake Trout in the Upper Susitna River.
- Downstream migrant traps were operated successfully in three locations within the Upper River. Trap catch demonstrated patterns of movement for fish leaving the Oshetna River and Kosina Creek as well as moving downstream in the mainstem. The 2014 trapping data represent the first documentation of the timing of Chinook Salmon downstream movements in the Upper Susitna River.
- An additional 150 radio tags were implanted in individuals of five fish species in the Upper River and their movements were tracked via aerial surveys and fixed telemetry stations.
- An additional 1,466 PIT tags were implanted in individuals of six fish species in the Upper River.
- Analysis of size distributions of juvenile Chinook Salmon captured in the Upper River in 2014 and the bimodal distribution of lengths indicates the possibility of two year classes of Chinook Salmon rearing in the Upper River.

#### **4. SUMMARY OF STUDY 9.5 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	Description	Link
9.5. Study of Fish Distribution and Abundance in the Upper Susitna River (Revised Study Plan)	12/14/2012	This document presents the plan this study, including goals, objectives, the study area, and proposed study methods for documenting baseline conditions for fish species.	<a href="#">RSP for Study 9.5</a>
Draft Susitna River Fish Distribution and Abundance Implementation Plan	1/31/2013	This draft Implementation Plan document provides additional details regarding AEA's approach presented in the RSP. The detail in the Implementation Plan is sufficient for and intended to guide field crews during the data collection process.	<a href="#">Draft IP for Study 9.5</a>
Final Susitna River Fish Distribution and Abundance Implementation Plan	3/1/2013	This final Implementation Plan document provides additional details regarding AEA's approach presented in the RSP. The detail in the Implementation Plan is sufficient for and intended to guide field crews during the data collection process. This document includes 12 appendices.	<a href="#">Final IP for Study 9.5</a>
Synthesis of Existing Fish Population Data	3/4/2013	This technical memorandum summarizes the available contemporary and historical fish and aquatic studies to support the development and implementation of studies needed to understand the potential effects of the proposed Susitna-Watana Hydroelectric Project. The summary is focused on the studies conducted by the Alaska Department of Fish and Game and Trihey and Associates during the 1980s as part of the Susitna-Hydroelectric Aquatics Studies Program.	<a href="#">March 2013 TM for Study 09.05</a>
FERC Study Plan Determination for Study 9.5	4/1/2013	This document presents FERC approval of Study 9.5, which approved AEA's Revised Study Plan with recommended adjustments to the study as presented in the RSP.	<a href="#">FERC SPD for Study 9.5</a>
2012 Upper Susitna River Fish Distribution and Habitat Study - Habitat Report	5/30/2013	This document provides information contributing to existing aquatic meso-habitat information within the mainstem Susitna River and selected tributaries in the Upper Susitna River watershed above Devils Canyon (approximately RM 150-152) upstream to and including the Oshetna River (RM 233.5).	<a href="#">May 2013 TM for Study 9.5</a>
2012 Upper Susitna River Fish Distribution and Habitat Study: Fish Distribution Report	6/4/2013	This document provides information on fish distribution and aquatic habitats within 27 tributary sub-basins sampled upstream of Devils Canyon. Sampling was conducted in 2012 and prioritized locations where juvenile or adult Chinook Salmon had been previously documented.	<a href="#">June 2013 TM for Study 9.5</a>
Draft Initial Study Report for Study 9.5	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 9.5. This draft ISR was later republished as Part A of the final ISR.	<a href="#">Draft ISR for Study 9.5 (File 1)</a> <a href="#">Draft ISR for Study 9.5 (File 2)</a>

Title	Date	Description	Link
Sampling Considerations for Study 9.5 Fish Distribution and Abundance in the Upper Susitna River	3/20/2014	This technical memorandum presented rationale for AEA's proposed sampling modifications to better describe fish-habitat associations in the Upper Susitna River mainstem and tributaries. These proposed modifications were later included in Section 7 of ISR Part C.	<a href="#">March 2014 TM for Study 9.5</a>
Initial Study Report for Study 9.5	6/3/2014	This document is the Initial Study Report (Parts A, B and C) for Study 9.5. 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.	<a href="#">ISR Part A for Study 9.5 (File 1)</a> <a href="#">ISR Part A for Study 9.5 (File 2)</a> <a href="#">ISR Part B for Study 9.5</a> <a href="#">ISR Part C for Study 9.5</a>
Proposed 2015 Modifications to Fish Distribution and Abundance Study Plan Implementation Technical Memorandum	9/17/2014	This technical memorandum evaluated the implementation of the Upper River mainstem and tributary sampling modifications that were proposed in <i>Sampling Considerations for Study 9.5 Fish Distribution and Abundance in the Upper Susitna River</i> and screw trap locations proposed in Section 7 of the ISR.	<a href="#">Sept. 2014 TM for Study 9.5</a>
Appendix 3. Protocol for Site-Specific Gear Type Selection; Version 5	11/14/2014	This filing provided an updated version of the field protocol for gear selection and level of effort applied during sampling. This version supersedes Appendix 3 of the IP.	<a href="#">Nov. 2014 TM for Study 9.5</a>
Draft Chinook and Coho Salmon Identification Protocol	11/14/2014	This protocol describes methods AEA will implement to improve and evaluate the accuracy of field identification of early life stages of Chinook and Coho salmon.	<a href="#">Nov. 2014 TM for Study 9.5</a>
Initial Study Report Meetings, October 15, 2014	11/14/2014	Transcripts and AEA's agenda and PowerPoint presentations for the ISR meeting for Fish and Aquatic Studies.	<a href="#">Transcripts from ISR Meeting</a> <a href="#">Materials from ISR Meeting</a>
Evaluation of 2014 Study Modifications in the Black River Technical Memorandum	12/17/2014	This technical memorandum evaluated modifications to tributary target sample lengths proposed in <i>Sampling Considerations for Study 9.5 Fish Distribution and Abundance in the Upper Susitna River</i> and Section 7 of the ISR using comparison of sampling in the Black River in 2013 and 2014 as a case study.	<a href="#">Dec. 2014 TM for Study 9.5</a>
Fish Distribution and Abundance in the Upper River, 2014 - 2015 Study Implementation Report	11/6/2015	This report presents methods, variances, and data collected for study components that have been completed since filing the June 2014 ISR.	<a href="#">2014-2015 SIR for Study 9.5</a>



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

ISR Reference	Description
Part A, Section 4, Methods	This Section is supplemented by 9.5 SIR Section 4, describing 2014 study implementation.
Part A, Section 4.12, Fish Sampling Techniques	This Section is supplemented by the updated version of the protocol for gear selection by field crews. This version of <i>Appendix 3. Protocol for Site-Specific Gear Type Selection, Version 5</i> also supersedes Appendix 3 of the Fish Distribution and Abundance Implementation Plan.
Part A, Section 4.12.11, Fish Handling	This Section is supplemented by the <i>Draft Chinook and Coho Salmon Identification Protocol</i> that address additional handling measures.
Part A, Section 5, Results	This section is supplemented by 9.5 SIR Section 5, and Appendix B.
Part C, Section 7.1, Proposed Methodologies and Modifications	This section is supplemented by two technical memoranda: 1) <i>Proposed 2015 Modification to Fish Distribution and Abundance Study Plan Implementation</i> , and 2) <i>Evaluation of 2014 Study Modification in the Black River</i> that present and evaluate modifications to the 9.5 Study Plan based on 2013 and 2014 data

## 6. VARIANCES

### 6.1. 2013 Study Season

In 2013, 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 Study 9.5 ISR Part A sections noted below.

- Addition of an early life history study objective (Objective 3 above; ISR Part A, Section 4.6.2)
- Adjustments to rotary screw trap, PIT array, radio telemetry fixed receiver, and fish distribution and abundance sampling locations (ISR Part A, Section 4.1.6)
- Adjustments to the number of radio telemetry fixed stations (ISR Part A, Section 4.1.6.4)
- Adjustments to the timing of fish distribution and sampling efforts (ISR Part A, Section 4.2.1)
- Adjustments to sample unit lengths (ISR Part A, Section 4.1.6.1.1);
- Adjustments to gear type applications (e.g., numbers of passes, soak times, minnow trap densities; ISR Part A, Section 4.4.4.1)
- Refinements to estimating the detection efficiency of PIT tag interrogation systems (ISR Part A, Section 4.5.4.1)
- Adjustments to the timing of radio-tag implementation and aerial survey methods for tracking resident fish (ISR Part A, Sections 4.5.4.2 and 4.5.4.3)

- Due to ADF&G fish collection permit restrictions on fish handling, only the first 25 individuals of each species were weighed and measured during each check of a rotary screw trap (ISR Part A, Section 4.7.1.1)
- Used size instead of age to evaluate habitat associations of juvenile anadromous and resident fish (ISR Part A, Section 4.7.1)
- Adjustments to the timing of fish tissue sample collection for metals and mercury analysis (ISR Part A, Section 4.9.1)

## 6.2. 2014 – 2015 Study Season

The following variances occurred following the filing of the June 2014 ISR. The significance of these variances is discussed within the Study 9.5 ISR, Part A and the 2014-2015 Study Implementation Report (SIR) sections noted below.

- Addition of an early life history study objective (ISR Part A, Section 4.6.2)
- Adjustments to radio telemetry fixed receiver, and fish distribution and abundance sampling locations (ISR Part A, Section 4.1.6)
- Adjustments to the number of fixed receivers (ISR Part A, Section 4.1.6.4)
- Adjustments to the timing of fish distribution and sampling efforts (ISR Part A, Section 4.2.1)
- Adjustments to mainstem sample unit lengths (ISR Part A, Section 4.1.6.1.1)
- Adjustments to gear type applications (e.g., numbers of passes, soak times, minnow trap densities (ISR Part A, Section 4.4.4.1)
- Refinements to estimating the detection efficiency of PIT tag interrogation systems (ISR Part A, Section 4.5.4.1)
- Adjustments to the timing of radio-tag implementation and aerial survey methods for tracking resident fish (ISR Part A, Sections 4.5.4.2 and 4.5.4.3)
- Due to ADF&G fish collection permit restrictions on fish handling, only the first 25 individuals of each species were weighed and measured during each check of a rotary screw trap (ISR Part A, Section 4.7.1.1).
- Used size instead of age to evaluate habitat associations of juvenile anadromous and resident fish (ISR Part A, Section 4.7.1)
- Increased sample length in select Upper River tributaries (ISR Part C, Section 7.1.2.4; R2 Resource Consultants 2014a) was proposed and implemented in the Black River to better meet the objective of characterizing relative fish abundance by mesohabitat type (2014-2015 SIR, Section 4.4.3).
- The rotary screw trap in Kosina Creek was replaced with fyke netting near the confluence of Kosina Creek to increase catch and operated a rotary screw trap in the mainstem Susitna River location near the proposed dam site (ISR Part C, Section 7.1.2.2; 2014) to better meet the objective of describing seasonal movements (2014-2015 SIR, Section 4.1.4).

- Opportunistic sampling took place in an unnamed lake in the Tsisi Creek drainage to target identification of large salmonids based on an anecdotal report of sockeye salmon spawning (2014- 2015 SIR, Section 4.1.4).
- After reconnaissance of unnamed tributaries 197.7, 204.5, and 206.3 in 2014, it became clear that the proposed GRTS sampling approach in the Implementation Plan (IP Section 5.2; Table 5.2-1) was not appropriate because the gradient and forested conditions precluded helicopter landing and access to sample areas in the middle reaches of each of these streams. Thus, the 2014 sampling efforts used a direct sample approach with two days of sampling effort allotted for each of these tributaries targeting a diversity of the mesohabitat types (2014- 2015 SIR, Section 4.1.4).
- A high flow event in early July damaged the Oshetna River rotary screw trap; consequently the trap was not operated for several days in July while a replacement trap was transported and installed (2014- 2015 SIR, Section 4.2.1).
- One Upper River GRTS panel site, a tributary mouth at PRM 204.5 was inadvertently not sampled during the fall sampling event (2014 - 2015 SIR, Section 4.2.1).
- AEA conducted supplemental PIT-tagging in 2014; however, the distribution of PIT tags was allocated throughout the Upper River Segment in order to increase the number of tags deployed as proposed in ISR Part C, Section 7.1.2.3.3 and discussed in 2014-2015 SIR, Section 4.4.4.
- Radio tagging targets were not met for all species proposed for tagging in the ISR due to those species not being documented in the Upper River or being present in low abundance in the zone of hydrologic influence (2014-2015 SIR, Section 4.4.4).

## 7. STUDY PLAN MODIFICATIONS

### 7.1. Modifications Identified in ISR

As detailed in Section 7 of the ISR, Part C for Study 9.5, AEA plans the following modifications of the methods for this study:

- Sampling directed at salmon early life history (ELH) life stages will take place biweekly (every two weeks) from ice breakup through the end of June (ISR Part C, Section 7.1.2.1.).
- AEA plans to replace the Kosina Creek rotary screw trap with fyke netting near the mouth of Kosina Creek (ISR Part C, Section 7.1.2.2.).
- In 2014, fixed radio receiver station locations will be adjusted to follow the locations specified in the Implementation Plan: Watana Dam site, Watana Creek (PRM 196.9), Kosina Creek (PRM 209.2) and the Oshetna River (PRM 235.1) (ISR Part C, Section 7.1.2.3.1.).
- AEA plans to change the Passive Integrated Transponder [PIT] antenna locations. AEA plans to relocate PIT antennas to either a smaller body of water where the antenna can be designed to have better channel coverage (Tsisi, Goose, or Jay Creeks) or higher up in the Kosina Creek watershed above Tsisi Creek (ISR Part C, Section 7.1.2.3.2.).

- Based on sampling sufficiency estimates and improved information on stream widths, AEA has developed revised distance targets for future sampling Upper River tributary sampling efforts. AEA plans to maintain the spatial configuration of the original GRTS panel sampling and apportion additional sampling length within the existing panels by increasing the number of replicates of mesohabitat units sampled per panel, or add panels when necessary (ISR Part C, Section 7.1.2.4.).
- AEA proposes a hybrid approach using transects for main channel sampling and GRTS based on 2013 remote line mapping for off-channel habitats for future sampling. AEA plans to reduce the number of target mainstem transects from 20 to 10 (ISR Part C, Table 7.1-2, Figure 7.1-3) in order to increase sampling in rare and off-channel habitat types (n=6) using a GRTS approach (ISR Part C, Section 7.1.2.5.).
- AEA plans to continue to use a single-pass sampling approach for both fish distribution and abundance sampling (ISR Part C, Section 7.1.2.6.).
- Future fish handling is proposed to occur as it did in 2013; 25 fish, per species, per life stage, per gear will be weighed, measured for length and PIT tagged if appropriate (ISR Part C, Section 7.1.2.7.).

## 7.2. Modifications Identified since the June 2014 ISR

As detailed in the 2014-2015 Study Implementation Report, AEA has evaluated and continues to propose the following Study Plan modifications:

- Modifications to tributary sampling lengths and distance targets for future sampling, as described in ISR Part C, Section 7.1.2.4, and detailed in the *Proposed 2015 Modifications to Fish Distribution and Abundance Study Plan Implementation Technical Memorandum*.
- Implementation of the hybrid approach to mainstem sampling in the Upper River, as described in the *Proposed 2015 Modifications to Fish Distribution and Abundance Study Plan Implementation Technical Memorandum*.
- Rotary screw trap operation at the mouth of the Oshetna River and the PRM 200 mainstem locations as well as fyke netting in the mouth and clear water plume of Kosina Creek. These modifications are consistent with those developed in the ISR Part C, Section 7.1.2.3.1.
- Implementation of the direct sampling approach to unnamed tributaries 197.7, 204.5, and 206.3, as described in the *Proposed 2015 Modifications to Fish Distribution and Abundance Study Plan Implementation Technical Memorandum* and discussed in the 2014-2015 SIR, Section 4.1.4.

## 8. STEPS TO COMPLETE THE STUDY

In light of the variances and modifications 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 steps will be conducted to meet Objective 1 of Study 9.5:

1. Seasonal sampling for fish distribution and abundance in tributaries will take place during early summer (July), late summer (late August- early September), and fall (late September- Early October) in eight GRTS and five direct sample tributary streams with modified target sample lengths (ISR, Part A, Section 4.1.2.1., Table 4.1-2).
2. Seasonal sampling for fish distribution and abundance in the mainstem Susitna River will take place during early summer (July), late summer (late August- early September), and fall (late September- Early October) along 10 transects and at 6 replicate GRTS samples of rare habitat types.

The following steps will be conducted to meet Objective 2 of Study 9.5:

1. Rotary screw traps will be operated at the mouth of the Oshetna River and the PRM 200 mainstem locations as well as fyke netting in the mouth and clear water plume of Kosina Creek during the open-water period.
2. PIT tagging of target species will continue. PIT antenna arrays will be placed in modified locations with channel configuration that better suit the limitations of the technology.

The following step will be conducted to meet Objective 3 of Study 9.5:

1. Sampling directed at salmon early life history (ELH) life stages will take place biweekly (every two weeks) from ice breakup through the end of June.

The following step will be conducted to meet Objective 4 of Study 9.5:

1. At each sampling location, fish will be measured for length and weight (25 per species/life stage) and categorized into life stages based on length.

The following step will be conducted to meet Objective 5 of Study 9.5:

1. AEA will continue to collect and sacrifice Dolly Varden and Humpback Whitefish of appropriate sizes for evaluation of anadromous life history type.

The following step will be conducted to meet Objective 7 of Study 9.5:

1. AEA will continue to identify fish when sampling and document the seasonal distribution, relative abundance, and habitat associations of invasive species (Northern Pike) if documented.

The following step will be conducted to meet Objective 8 of Study 9.5:

1. AEA will continue to collect samples to support the Genetic Baseline Study for Selected Fish Species (RSP Section 9.14) and to follow the methodology proposed to support fish identification in the *Draft Chinook and Coho Salmon Identification Protocol*.