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

# Study of Fish Distribution and Abundance in the Middle and Lower Susitna River

## Study Plan Section 9.6

# 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.*

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# 1. INTRODUCTION

Section 1 (Part A) of the ISR for this Study of Fish Distribution and Abundance in the Middle and Lower Susitna River (Study Plan 9.6) 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 9.6 since the filing of the ISR in June 2014. As detailed below, AEA's recent activities for Study 9.6 have consisted of the following:

- Completion of the first full study year of Winter Fish Studies, as reported in the 2013-2014 Winter Fish Study Technical Memorandum, filed in September 2014.
- Completion of the second study year of Salmon Early Life History (ELH) sampling.
- Continuation of resident fish radio tagging and tracking.
- Fish distribution and abundance sampling at sites that were not sampled or partially sampled in 2013 due to land access restrictions to fulfill and complete the first study year of data collection.
- 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 Middle and Lower Susitna River Study.
- Updated the Implementation Plan regarding the field protocol for gear selection and level of effort applied during sampling, filed as Appendix 3. Protocol for Site-Specific Gear Type Selection; Version 5 in November 2014.
- Prepared the 2014 – 2015 Study Implementation Report for the Fish Distribution and Abundance in the Middle and Lower Susitna River Study (9.6), 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 end of calendar year 2014. In light of this additional implementation, this Part D also identifies AEA's plans for completing Study 9.6 in a manner that meets the objectives of the Commission-approved Study Plan.

# 2. BACKGROUND

## 2.1. Purpose of Study

The overarching goal of this study is to characterize the current distributions, relative abundances, run timings, and life histories of all resident and non-salmon anadromous species encountered including, but not limited to Dolly Varden, Eulachon, Humpback Whitefish, Round Whitefish, Arctic Grayling, Northern Pike, Burbot, and Arctic Lamprey, as well as freshwater rearing life stages of anadromous salmonids (fry and juveniles) in the Middle and Lower Susitna River. 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. The following seven specific objectives have been developed for this study and include multiple tasks.

1) Describe the seasonal distribution, relative abundance (as determined by CPUE, fish density, and counts) and fish habitat associations of juvenile anadromous salmonids, non-salmonid anadromous fishes and resident fishes.
2) Describe seasonal movements of juvenile salmonids and selected fish species such as Rainbow Trout, Dolly Varden, Humpback Whitefish, Round Whitefish, Northern Pike, Arctic Lamprey, Arctic Grayling, and Burbot, with emphasis on identifying foraging, spawning and overwintering habitats within the mainstem of the Susitna River.
    a. Document the timing of downstream movement and catch using out-migrant traps.
    b. Describe seasonal movements using biotelemetry (passive integrated transponder [PIT] and radio-tags).
3) Describe early life history, timing, and movements of anadromous salmonids.
    a. Describe emergence timing of salmonids.
    b. Determine movement patterns and timing of juvenile salmonids from spawning to rearing habitats.
    c. Determine juvenile salmonid diurnal behavior by season.
    d. Collect baseline data to support the Stranding and Trapping Study.
4) Document winter movements and timing and location of spawning for burbot, humpback whitefish, and round whitefish.
5) Document the seasonal age class structure, growth, and condition of juvenile anadromous and resident fish by habitat type.
6) Document the seasonal distribution, relative abundance, and habitat associations of invasive species (Northern Pike).
7) Collect tissue samples from juvenile salmon and opportunistically from all resident and non-salmon anadromous fish to support the Fish Genetic Baseline Study (Study 9.14).

## 2.2. Study Components

Major study components include the following:

- Seasonal fish sampling in Middle and Lower 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 Indiana River (PRM 142.1) and Montana Creek (PRM 80.1), and in the mainstem Susitna River at Curry Station (PRM 124) and Talkeetna Station (PRM 106.9).
- Winter fish studies to overwintering habitat associations of juvenile anadromous salmonids, non-salmonid anadromous fishes and resident fishes.
- Use of radio-telemetry to describe seasonal movements of selected fish species
- Use of PIT tagging technology to track movements of freshwater stages of selected fish species, and estimate individual growth rates.
- Collect fish tissue samples in target species in support of metals analysis and genetic baseline characterizations.

# 3. STATUS, HIGHLIGHTED RESULTS, AND ACHIEVEMENTS

The following tasks were partially completed in 2013 and reported in Part A of the ISR for Study 9.6:

- Seasonal fish sampling in the Middle and Lower 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 spawning and rearing habitats targeting the early life history stages of juvenile Pacific salmon between ice-out and the beginning of seasonal surveys.
- Downstream migrant trapping in Indiana River (PRM 142.1) and Montana Creek (PRM 80.1), and in the mainstem Susitna River at Curry Station (PRM 124) and Talkeetna Station (PRM 106.9).
- Use of radio-telemetry to describe seasonal movements of selected fish species in the Middle and Lower River.
- Use of PIT tagging technology to track movements of freshwater stages of selected fish species, and estimate individual growth rates in the Middle and Lower River.

- Collect fish tissue samples in target species in support of metals analysis and genetic baseline characterizations.
- Winter fish pilot study to evaluate techniques and develop a sampling approach.

The study team has completed the following activities for Study 9.6 since the June 2014 filing of the ISR:

- Field surveys focused on sampling locations that were inaccessible in 2013. The 2014 sampling advanced our knowledge of distributions and habitat use of juvenile Chinook Salmon, Ninespine Stickleback, Bering Cisco, and Rainbow Trout, in the Middle Susitna River.
- A second study year of salmon early life history (ELH) sampling.
- The first complete season of winter fish studies, reported in the *2013-2014 Winter Fish Study Technical Memorandum*.
- An additional 21 radio tags were implanted in individuals of two fish species in the Middle River above Devils Canyon and their movements were tracked via aerial surveys and fixed telemetry stations.
- An additional 2,004 PIT tags were implanted in individuals of ten fish species in the Middle and Lower River. An additional 236 in-hand recapture events provide information on movement and growth.
- Tissue samples for genetic determination were collected and analyzed for an additional 555 individuals.
- A protocol to estimate and improve the field identification accuracy of juvenile Chinook and Coho salmon was detailed in the *Draft Chinook and Coho Salmon Identification Protocol*.

## 4. SUMMARY OF STUDY 9.6 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 |
|---|---|---|---|
| 9.6. Study of Fish Distribution and Abundance in the Middle and Lower Susitna River (Revised Study Plan) | 12/14/2012 | This document presents the plan for this study, including goals, objectives, the study area, and proposed study methods for documenting baseline conditions for fish species. | RSP for Study 9.6 |
| 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. | Draft IP for Study 9.6 |
| 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. | Final IP for Study 9.6 |
| 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. | Mar. 2013 TM for Study 9.6 |
| FERC Study Plan Determination for Study 9.6 | 4/1/2013 | This document presents FERC approval of Study 9.6, which approved AEA's Revised Study Plan with recommended adjustments. | FERC SPD for Study 9.6 |
| Adjustments to Middle River Focus Areas Technical Memorandum | 5/31/2013 | This TM describes the selection of a tenth Focus Area, FA-113. The addition of a tenth Focus Area following filling of the FDA IP in March 2013 necessitated changes to sample locations in MR-7. | May 2013 TM for Study 9.6 |
| 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. | June 2013 TM for Study 9.6 |

| Title | Date | Description | Link |
|---|---|---|---|
| Draft Initial Study Report for Study 9.6 | 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 9.6. This draft ISR was later republished as Part A of the final ISR. | Draft ISR for Study 9.6 (File 1)<br>Draft ISR for Study 9.6 (File 2)<br>Draft ISR for Study 9.6 (File 3)<br>Draft ISR for Study 9.6 (File 4)<br>Draft ISR for Study 9.6 (File 5) |
| Initial Study Report for Study 9.6 | 6/3/2014 | This document is the Initial Study Report (Parts A, B and C) for Study 9.6. 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. | ISR Part A for Study 9.6 (File 1)<br>ISR Part A for Study 9.6 (File 2)<br>ISR Part A for Study 9.6 (File 3)<br>ISR Part A for Study 9.6 (File 4)<br>ISR Part A for Study 9.6 (File 5)<br>ISR Part B for Study 9.6<br>ISR Part C for Study 9.6 |
| ISR Study 9.6 Appendix C: Winter Sampling Report | 6/3/2014 | This report summarized lessons learned during the 2012-2013 winter pilot studies and developed sampling recommendations, locations and techniques for 2013/2014 Winter Fish Studies. | June 2014 TM for Study 9.6 |
| 2013-2014 Winter Fish Study Technical Memorandum | 9/14/2014 | This technical memorandum provides methods and preliminary results for 2013/2014 Winter Fish Studies. This TM is a supplement to the Initial Study Report. | Sept. 2014 TM for Study 9.6 |
| Initial Study Report Meetings, October 15, 2014 | 11/14/2014 | Transcripts and AEA's agenda and PowerPoint presentations for the ISR meeting concerning Project fish and aquatic studies. | Transcripts from ISR Meeting<br>Materials from ISR Meeting |
| Appendix 3. Protocol for Site-Specific Gear Type Selection; Version 5 | 11/14/2014 | This filing supplied stakeholders with 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. | Nov. 2014 TM for Study 9.6 |
| Draft Chinook and Coho Salmon Identification Protocol | 11/14/2014 | This protocol was developed to improve and gage the accuracy of field identification of early life stages of Chinook and Coho salmon. This protocol is a supplement to the Fish Distribution and Abundance Implementation Plan. | Nov. 2014 TM for Study 9.6 |

| Title | Date | Description | Link |
|---|---|---|---|
| Fish Distribution and Abundance in the Middle and Lower Susitna River (Study 9.6) – 2014 – 2015 Study Implementation Report | 11/5/2015 | 2014 - 2015 Study Implementation Report for Study 9.6. | 2014-2015 SIR for Study 9.6 (File 1)<br>2014-2015 SIR for Study 9.6 (File 2)<br>2014-2015 SIR for Study 9.6 (File 3) |

# 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 9.6, during AEA's continued implementation of the Study Plan through calendar year 2014.

| ISR Reference | Description |
|---|---|
| Part A, Section 4, Methods | This Section is supplemented by 9.6 SIR Section 4, describing 2014 study implementation. |
| Part A, Section 4.4, Objective 1 | This Section is supplemented by the Section 4.4 of the *2013-2014 Winter Fish Study Technical Memorandum* |
| Part A, Section 4.5, Objective 2 | This Section is supplemented by the Section 4.5 of the *2013-2014 Winter Fish Study Technical Memorandum* |
| Part A, Section 4.6, Objective 3 | This Section is supplemented by the Section 4.6 of the *2013-2014 Winter Fish Study Technical Memorandum* |
| Part A, Section 4.7, Objective 4 | This Section is supplemented by the Section 4.7 of the *2013-2014 Winter Fish Study Technical Memorandum* |
| Part A, Section 4.10, Objective 8 | This Section is updated by the Section 4.8 of the *2013-2014 Winter Fish Study Technical Memorandum* |
| Part A, Section 4.11 Winter Sampling Approach | This Section is supplemented by the Section 4 of the *2013-2014 Winter Fish Study Technical Memorandum* |
| Part A, Section 4.12, Fish Sampling Techniques | This Section is supplemented by the Section 4.3 of the *2013-2014 Winter Fish Study Technical Memorandum* and updated version of the protocol for gear selection by field crews, *Appendix 3. Protocol for Site-Specific Gear Type Selection, Version 5.* The updated Appendix 3 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 *Draft Chinook and Coho Salmon Identification Protocol* that address additional handling measures. |
| Part A, Section 5, Results | This section is supplemented by 9.5 SIR Section 5, and Appendix B. |
| Part A, Section 5.1 Objective 1 | This results section is supplemented with Section 5.1 of the *2013-2014 Winter Fish Study Technical Memorandum*. |
| Part A, Section 5.2 Objective 2 | This results section is supplemented with Section 5.2 of the *2013-2014 Winter Fish Study Technical Memorandum*. |
| Part A, Section 5.3 Objective 3 | This results section is supplemented with Section 5.2 of the *2013-2014 Winter Fish Study Technical Memorandum*. |

| ISR Reference | Description |
|---|---|
| Part A, Section 5.5 Objective 5 | This results section is supplemented with Section 5.4 of the *2013-2014 Winter Fish Study Technical Memorandum*. |

# 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 Study 9.6 ISR Part A sections noted below for each variance.

- Adjustments to rotary screw trap, PIT array, radio telemetry fixed receiver, early life history, and fish distribution and abundance sampling locations (ISR Part A, Section 4.1.7)
- Adjustments to the number of fixed receiver locations (ISR Part A, Section 4.1.7.4)
- Adjustments to the timing of early life history and fish distribution and sampling efforts (ISR Part A, Section 4.2.1)
- Adjustments to sample unit lengths (ISR Part A, Section 4.1.4.1)
- Adjustments to gear type applications (e.g., numbers of passes, soak times, minnow trap densities; ISR Part A, Section 4.4.4.2)
- Adjustments to Lower River field habitat classification and site selection (ISR Part A, Section 4.4.4.3)
- Use of single antennae configuration at PIT arrays to maximize channel coverages (ISR Part A, Section 4.5.3.1)
- Refinements to estimating the detection efficiency of PIT tag interrogation systems (ISR Part A, Section 4.5.3.1)
- Adjustments to the timing of radio-tag implementation and aerial survey methods for tracking resident fish (ISR Part A, Sections 4.5.3.2 and 4.5.3.3)
- Addition of early life history sampling objective in the Middle River outside of Focus Areas and the Lower River (ISR Part A, Section 4.6.5)
- 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 4.8.1)
- Used size instead of age to evaluate habitat associations of juvenile anadromous and resident fish (ISR Part A, Section 4.8.1)

## 6.2. 2014 – 2015 Study Season

The following variance occurred following the filing of the June 2014 ISR. The significance of these variances is discussed within the Study 9.6 2014-2015 Study Implementation Report sections noted below for each variance.

- Adjustments to, radio telemetry fixed receiver, early life history, winter fish studies, and fish distribution and abundance sampling locations (2014-2015 SIR, Section 4.1.5)
- Adjustments to the number of fixed receiver locations (2014-2015 SIR, Section 4.1.5.3)
- Adjustments to the timing of fish distribution and abundance sampling efforts (2014-2015 SIR, Section 4.2.1)
- Adjustments to sample unit lengths (2014-2015 SIR, Section 4.3.3)
- Adjustments to gear type applications (e.g., numbers of passes, soak times, minnow trap densities; 2014-2015 SIR, Section 4.3.3)
- Refinements to estimating the detection efficiency of PIT tag interrogation systems (2014-2015 SIR, Section 4.4.2)
- 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 (2014-2015 SIR, Section 4.7.1)
- Used size instead of age to evaluate habitat associations of juvenile anadromous and resident fish (2014-2015 SIR, Section 4.7.1)
- Adjustments to the timing of radio-tag implementation and aerial survey methods for tracking resident fish (2014-2015 SIR, Section 4.4.2)
- Fish were not identified to the species level when large numbers of Chum and Sockeye salmon fry were collected during early life history sampling (2014-2015 SIR, Section 4.5.5)
- In addition to tissue samples collected in support of the Genetic Baseline Study for Selected Fish Species (Study 9.14) genetics samples of Coho Salmon and Chinook salmon were collected in the Middle River for fish identification purposes (2014-2015 SIR, Section 4.9.1)
- Adjustments to the timing of Winter Fish Studies sampling efforts (2014-2015 SIR, Section 4.10.1)

# 7. STUDY PLAN MODIFICATIONS

## 7.1. Modifications Identified in ISR

As detailed in Section 7 of the ISR (Part C) for Study 9.6 report sections noted below, 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 in six Focus Areas and outside of Focus Areas in the Middle River upstream of Impediment 1 (PRM 155.1) and the Lower River (ISR Part C, Section 7.1.2.2)

- AEA plans to continue to sampling with adjustments made to Fish Distribution and Abundance sampling sites, including the addition of FA-113 and main channel habitat placed into a single stratum (ISR Part C, Section 7.1.2.2)

- AEA plans to move the rotary screw trap located on the mainstem Susitna at Curry Station to the mainstem Susitna below Portage Creek between PRM 151.3-152.3 (ISR Part C, Section 7.1.2.3).

- AEA plans to seek an alternative location for the Montana Creek rotary screw trap. AEA plans to move the trap to a suitable location in the mainstem Lower Susitna River in the vicinity of Montana Creek (ISR Part C, Section 7.1.2.3).

- The Indian River and Montana Creek PIT antenna locations were prone to flooding and damage resulting in intermittent operation. AEA plans to relocate these antennas near the modified mainstem screw trap locations or to another location in proximity to a source of PIT tagged fish (ISR Part C, Section 7.1.2.3).

- In 2014, fixed radio receiver station locations will be adjusted to use the Powerline station in place of the Slough 21 station and the Slough 11 and Fog Creek stations will be eliminated. Telemetry efforts during 2014 will include a fixed receiver station at Devils Island (PRM 166.9) (see Section 7 of ISR Study 9.7). In 2015, fixed stations will follow the Study Plan with the exception of the modifications described above (ISR Part C, Section 71.2.4.1).

- AEA plans to continue to PIT tag fish at capture locations until 4,000 tags (1,000 tags x four PIT antennas) have been allocated per target species in the entire Middle/Lower River segments instead of capping the number of fish tagged at 1,000 within five or ten miles of an antenna site (ISR Part C, Section 71.2.4.2).

- AEA plans to continue implementation of Winter Fish Studies as described in ISR appendix C (ISR Part C, Section 7.1.2.5).

- AEA plans to continue with modified sample reach lengths for main channel, side channel, side channel complex, and bar island complex habitat types along transects and in GRTS locations. Sample lengths will be 500 m (0.3 mi) when boat electrofishing and drift gillnetting are feasible and 200 meters for other techniques (ISR Part C, Section 7.1.2.6.1).

- AEA plans to continue to use a single-pass sampling approach for both fish distribution and abundance sampling (ISR Part C, Section 7.1.2.6.2).

- 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 7.1.2.6.3).

## 7.2. Modifications Identified since the June 2014 ISR

As detailed in the 2014-2015 Study Implementation Report sections noted below, AEA has evaluated and continues to recommend the implementation of the following modifications of the methods for this study:

- AEA plans to continue to implement the same study sites used for 2013-2014 winter PIT tag arrays for future efforts (2014-2015 SIR, Section 4.4.2).

- AEA plans to collect additional tissue samples for genetic analysis and increase photo documentation of juvenile Chinook and Coho salmon inform the accuracy and improvement of species identification in the field (2014-2015 SIR, Section 4.9.1).

# 8. STEPS TO COMPLETE THE STUDY

In light of the variances and modifications described above, the steps necessary for AEA 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 9.6:

1. Seasonal sampling for fish distribution and abundance in seven select tributaries upstream of impediment 1 (PRM 155.1) will take place during early summer (July), late summer (late August- early September), and fall (late September- Early October) (See ISR Part A, Section 4.1.2.1.,Table 4.1-2).

2. Seasonal sampling for fish distribution and abundance in the mainstem Middle Susitna River will be repeated during early summer (July), late summer (late August- early September), and fall (late September- Early October) and target 177 GRTS sample locations (See ISR Part A, Section 4.1.2.2.Table 4.1-3).

3. Seasonal sampling for fish distribution and abundance in Lower River will be repeated along 10 transects.

4. Winter fish studies will take place at FA-104 (Whiskers Slough), FA-128 (Slough 8A), and FA-138 (Gold Creek) with monthly sampling events February through April.

The following steps will be conducted to meet Objective 2 of Study 9.6:

1. Rotary screw traps will be operated at the mouth of the Indian River, and in the mainstem downstream of confluence of Portage Creek, at Talkeetna Station, and at a location in the Lower River.

2. PIT tagging of target species will continue. PIT antenna arrays will be placed at four locations including the 2013 sites at Whiskers Slough and Slough 8A. The Indian River and Montana Creek PIT antenna locations relocated to another location in proximity to a source of PIT tagged fish.

3. Radio tagging of targets species will continue. Tag implantation will occur at the surgeons discretion during the summer or fall; the time when they are at an energetic maximum and likely to be most resilient to the stresses associated with handling.

4. Fixed radio receivers will be operated during the open water period at the following locations in Middle and Lower River as described in the Study Plan (IP Section 5.8.2.1): Lane Creek Station (RM 113.0), Gateway (RM 125.5), Fourth of July Creek (RM 131.1), Indian River (RM 138.5), Slough 21 (RM 141.1), Portage Creek (RM 148.8), Cheechako Station (RM 152.4), the Chinook Creek confluence (RM 157.0), Devils Station (RM 164.0).

The following step will be conducted to meet Objective 3 of Study 9.6:

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 in Middle River six Focus areas, the Middle River Upstream of Impediment 1 (PRM 155.1), and the Lower River.

The following steps will be conducted to meet Objective 4 of Study 9.6:

1. Tagging of Burbot and whitefishes will continue during the open water season.

2. Aerial surveys during winter fish studies will take place approximately every 16-20 days

The following steps will be conducted to meet Objective 5 of Study 9.6:

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.

2. PIT tagging will continue and recaptures will provide additional growth information.

The following step will be conducted to meet Objective 6 of Study 9.6:

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 7 of Study 9.6:

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 as detailed in the *Draft Chinook and Coho Salmon Identification Protocol*.