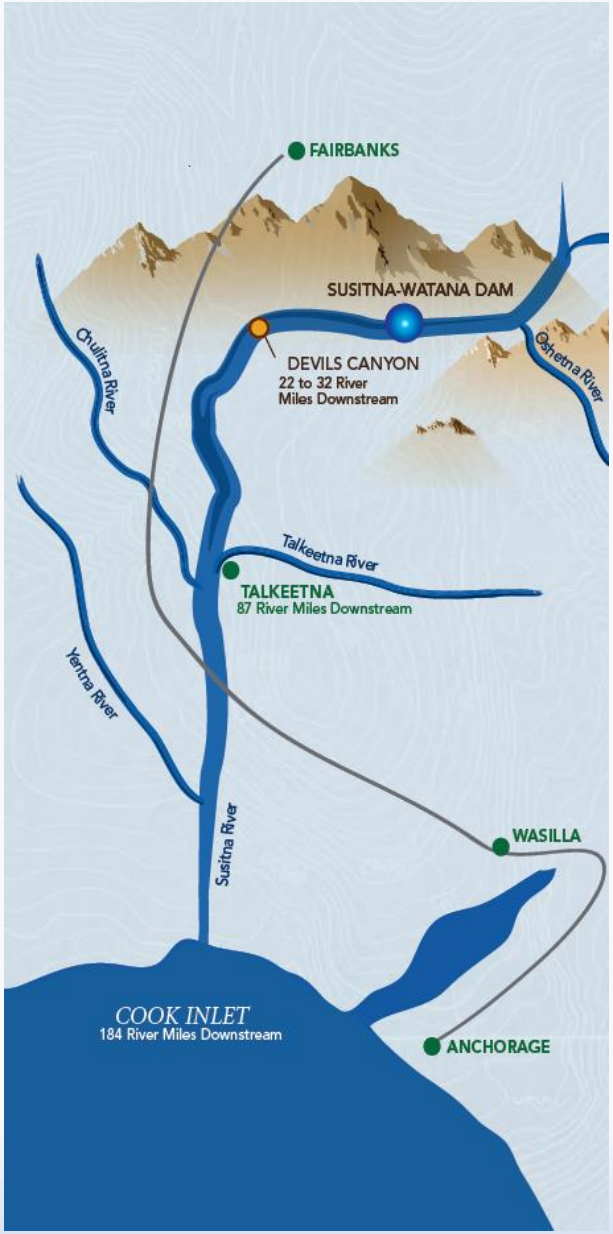


Initial Study Report Meeting

Study 9.14 Genetic Baseline Study for Selected Fish Species

March 22, 2016

Prepared by

Chris Habicht and Andy Barclay

ADF&G

Study 9.14 Status

- ISR Documents (ISR Part D Overview)
  - Initial Study Report Parts A, B and C (June 3, 2014)
    - Final 2014 Implementation Plan for the Genetic Baseline Study for Selected Fish Species in the Susitna River Alaska, 2014 Regional Operational Plan (ISR Part B)
  - Study Implementation Report (Nov 6, 2015)

- Completed:

  - Two years of field collections
  - Screening 48 SNPs for Upper Cook Inlet Chinook Salmon
  - Screening 12uSATs for juvenile Chinook salmon collected in the Middle and Upper Susitna River

- Laboratory, statistical analysis, and reporting are ongoing.

Study 9.14 Objectives

- Develop a repository of genetic samples for target resident fish species captured within the Lower, Middle, and Upper Susitna River drainage
- Contribute to the development of genetic baselines for chum, coho, pink, and sockeye salmon spawning in the Middle and Upper Susitna River drainage
- Characterize the genetic population structure of Chinook salmon from Upper Cook Inlet, with emphasis on spawning aggregates in the Middle and Upper Susitna River
- Examine the genetic variation among Chinook salmon populations from the Susitna River drainage, with emphasis on Middle and Upper River populations, for mixed-stock analyses (MSA)
- If sufficient genetic variation is found for MSA, estimate the annual percent of juvenile Chinook salmon in selected Lower River habitats that originated in the Middle and Upper Susitna River in 2013 and 2014 (Figure 2-1)

Study 9.14 Components

- **Sample Collection** (ISR Part A, Section 4.1; pg 3)
- **Tissue Storage** (ISR Part A, Section 4.2; pg 7)
- **Laboratory Analysis** (ISR Part A, Section 4.3; pg 8)
- **Data Retrieval and Quality Control** (ISR Part A, Section 4.4; pg 8)

Study 9.14 Variances

- In 2013, full access was not available to tributaries flowing through Cook Inlet Regional Working Group (CIRWG) lands above or near Devils Canyon (Cheechako, Devil, Fog, Tsusena and Watana creeks) or in Portage and Prairie creeks.
  (ISR Part A, Section 4.5; ISR Part D, Section 6.1)

- In 2014, Lat./long., fish length and sex data were not recorded and scales were not sampled for the 12 adult Chinook Salmon captured and sampled for genetic tissues in Fog Creek.
  (SIR, Section 4.5; ISR Part D, Section 6.2)

Continued

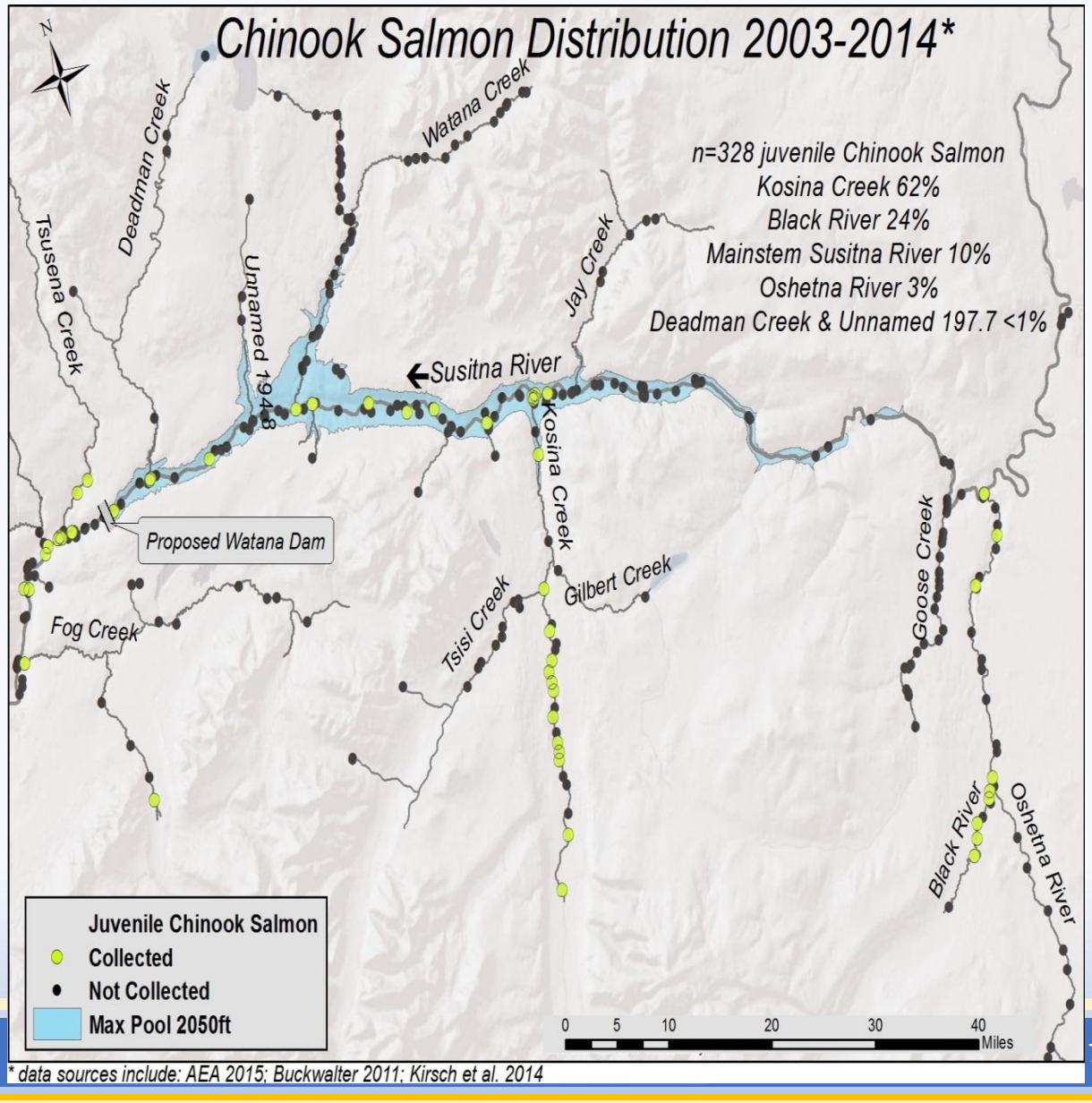
Study 9.14 Variances

- In 2014, replaced sampling caudal fin tissue from Chinook Salmon juveniles collected from tributaries above Devils Canyon , which is lethal to fish, with **buccal swab sampling**. **(ISR Part B, Section 4.2.4.1; ISR Part D, Section 7.1)**

- In 2014, and in consultation with Services, laboratory methods increased markers to include **190 SNP markers and 12 microsatellite markers** to be analyzed for all Chinook Salmon captured in the Middle and Upper River to increase statistical power to test among hypotheses for fish spawning above Devils Canyon. **(ISR Part B, Attachment 1; SIR, Section 4.5; omitted from ISR Part D, Section 6.2)**

Summary of Results

Sampling effort and genetic sampling for juvenile Chinook Salmon above Devils Canyon



Summary of Results – Chinook Salmon (2012-2014)

(SIR Sections 5.1.1., 5.1.3, and 5.1.5)

Adults

Total:

2,450 fish; 41 sites

Within Susitna:

2,347 fish; 37 sites

Within/above DC:

107 fish; 7 sites

Above DC:

18 fish: 4 sites

Juveniles

Within/above DC:

398 fish; 9 sites

Above DC:

226 fish; 5 sites

Lower River:

8 fish; 1 habitat type

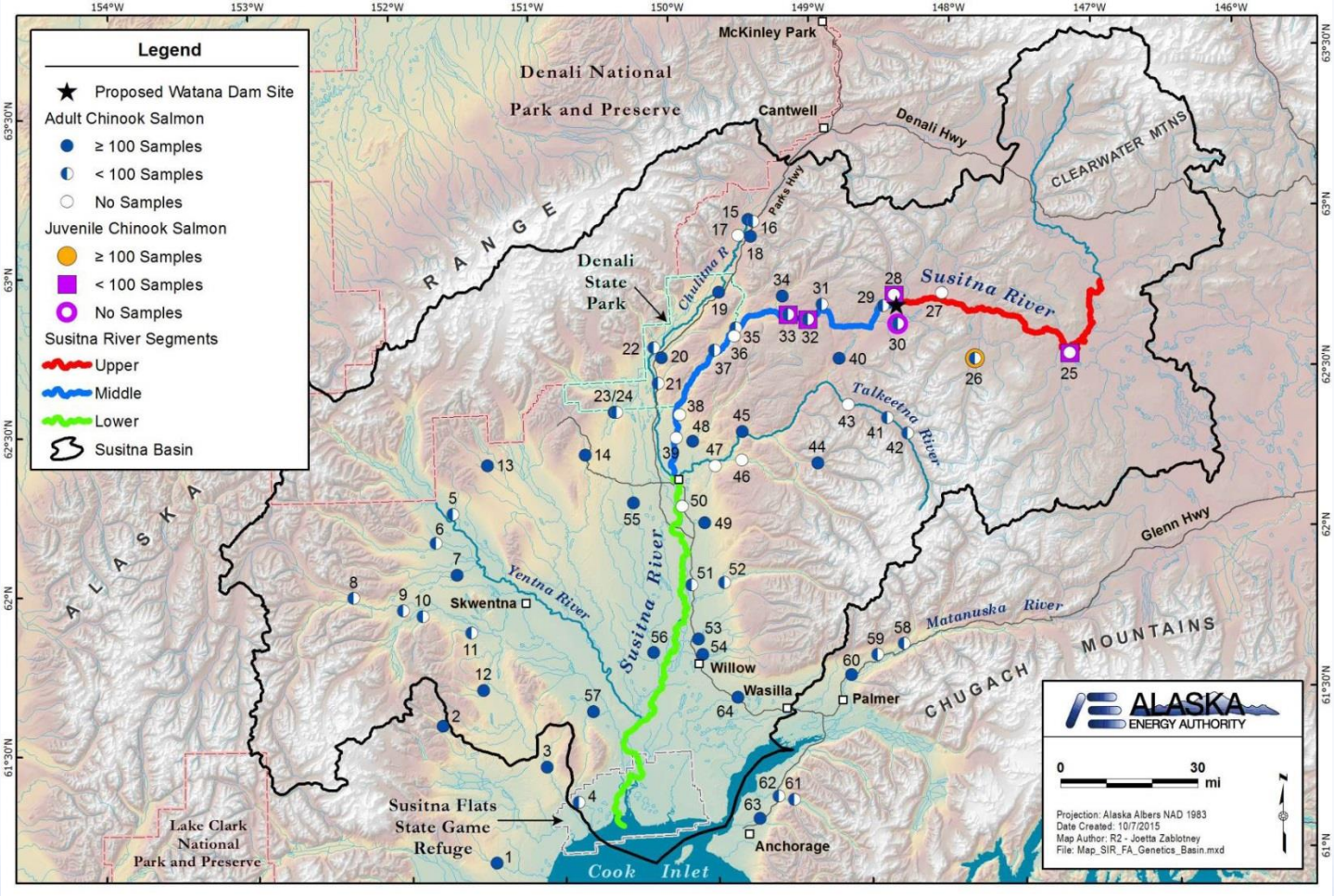
Species identification

Within/above DC:

398 fish; all Chinook

Other projects:

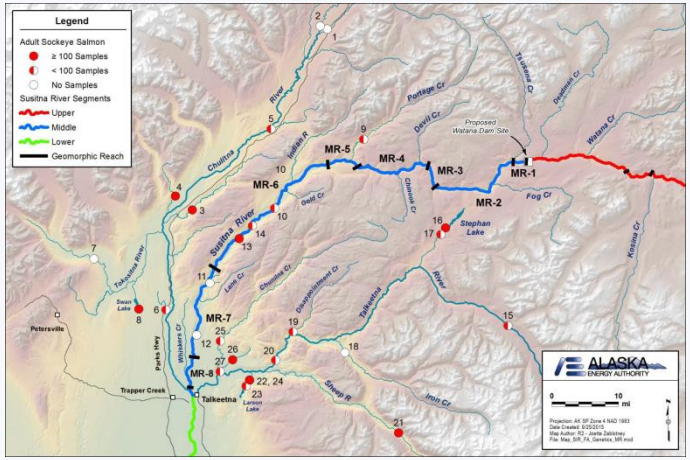
399 fish; (Study 9.6)



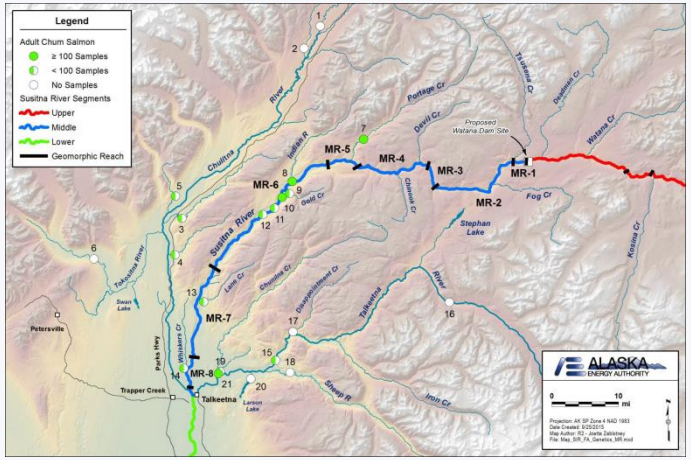
Summary of Results – Other Adult Salmon (2013-2014)

(SIR Section 5.1.2)

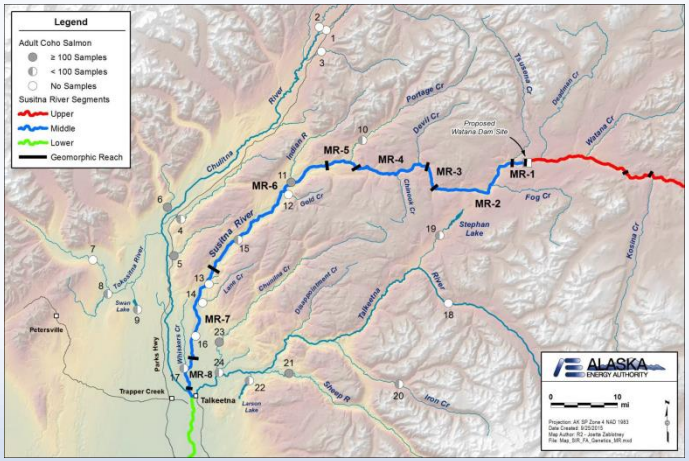
Sockeye Salmon: 376 fish; 15 sites



Chum Salmon: 659 fish; 14 sites

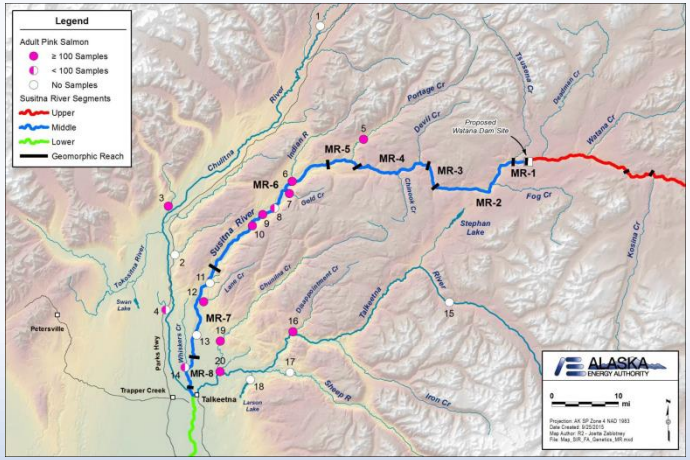


Coho Salmon: 1,101 fish; 15 sites



Pink Salmon odd: 1,049 fish; 12 sites

Pink Salmon even: 116 fish; 1 site



Summary of Results – Other Species

(SIR Section 5.1.4)

- 2,402 total fish
- > 50 fish: 9 species

  Burbot, Dolly Varden, Eulachon, Arctic Grayling, Slimy Sculpin, Three-spine Stickleback, Longnose Sucker, Rainbow Trout, and Round Whitefish
- 1 – 50 fish: 6 species

  Arctic Lamprey, Northern Pike, Nine-spine Stickleback, Lake Trout, Bering Cisco Whitefish, Humpback Whitefish
- 0 fish: 6 species

  Alaska Blackfish, Pacific Lamprey, Coastrange Sculpin, Pacific Staghorn Sculpin, Prickly Sculpin, and Lake Whitefish

Summary of Results

(SIR Sections 5.1.5, 5.3)

Pacific salmon sampling from Study 9.7

- 4,935 adult salmon; 230 non-salmon sampled
- 3,361 tagged Chinook Salmon sampled
- Added 12 adult Chinook Salmon to baseline (spawned within/above DC)

Laboratory Analysis (Chinook Salmon)

- **Upper Cook Inlet adults**
  - Successfully screened for at least 48 SNP markers
- **Within/above DC adults**
  - Successfully screened for 12 uSATs and 188 SNPs
- **Within/above DC juveniles**
  - Low volume/quantity DNA yield
  - Successfully screened for 12 uSATs
  - Unsuccessfully screened for 188 SNPs

Modifications

- No modifications specified in the SIR or ISR Part D, Section 7.2.
- AEA clarifies the following variances are proposed as **study plan modifications**:
  1. Use of non-lethal tissue sampling method (i.e., **buccal swabs** instead of caudal fin) for Chinook Salmon juveniles sampled upstream of Devils Canyon.
     (ISR Part B, Section 4.2.4.1; SIR, Section 4.5; ISR Part D, Section 7.1)
  2. Increase number of markers to include **190 SNP markers and 12 microsatellite markers** to be analyzed for all Chinook Salmon captured in the Middle and Upper River to increase statistical power to test among hypotheses for fish spawning above Devils Canyon.
     (ISR Part B, Attachment 1; SIR, Section 4.5)

Steps to Complete Study

(ISR Part D – Section 8, pg 6)

- Laboratory analysis of Chinook Salmon samples collected within the Susitna Basin.
- Screen and statistically analyze additional SNP and µSAT genetic markers for fish collected in the Middle and Upper Susitna River to satisfy USFWS and NMFS recommendations to better characterize genetic structure of Chinook Salmon and to increase statistical power to test the hypotheses.
- Examine population structure of Chinook Salmon within sampled upper Cook Inlet tributaries.
- Examine potential for mixed-stock analysis of Chinook Salmon within the Susitna River.

AEA clarification of ISR Part D Section 8 – This task is not a step to complete the FERC-approved Study Plan:

- Establish biological basis for species determination by genetic marker.

Licensing Participants Proposed Modifications to Study 9.14?

- Agencies
- CIRWG members and Ahtna
- Public