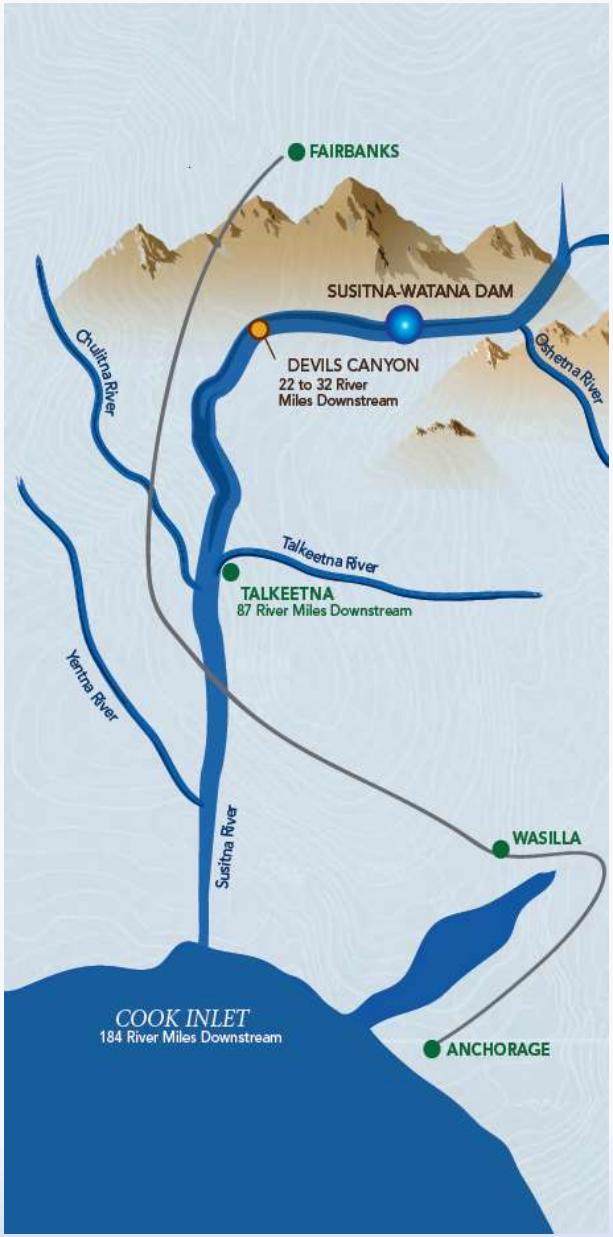


Initial Study Report Meeting

Study 9.12

Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries

October 15, 2014

Prepared by

R2 Resource Consultants, Inc.

Study 9.12 Objectives

- Locate and categorize all existing fish passage barriers located in selected tributaries in the Middle and Upper Susitna River

- Locate, identify the type (permanent, temporary, seasonal, partial), and characterize the physical nature of existing fish barriers within the Project's Zone of Hydrologic Influence (ZHI)

- Evaluate potential changes to existing fish barriers within the Project's ZHI

- Evaluate the potential creation of fish passage barriers within existing habitats (tributaries, sloughs, side channels, off-channel habitats) related to future flow conditions, water surface elevations, and sediment transport

Study 9.12 Components

- Fish Species Identification (ISR Part A, Section 4.1; 4)
- Passage Criteria for Identified Fish Species (ISR Part A, Section 4.2; 6)
- Site Selection (ISR Part A, Section 4.3; 6)
- Field Methods (ISR Part A, Section 4.4; 8)
- Modeling Methods (ISR Part A, Section 4.5; 11)

Study 9.12 Variances

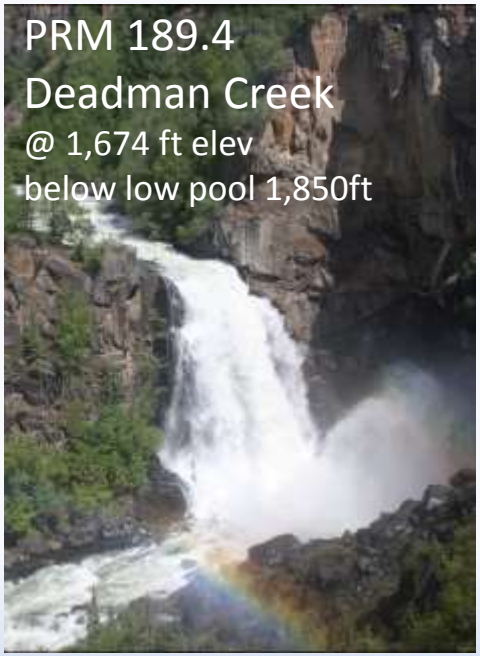
- Delay in field surveys of existing barriers on Cook Inlet Regional Working Group (CIRWG) and Alaska Railroad Corporation (ARRC) lands (ISR Part A, Section 4.3.5)

- Change from field measurements of beaver dam attributes to model-based evaluation (IP Section 4.4.5)

Study 9.12 Summary of Results in ISR (ISR Study 9.12, Part A – Section 5)

Middle and Upper River Vertical Barriers surveyed in 2012

- 72 potential barriers surveyed in 2012
- 38 confirmed as barriers to fish passage due to height, greater than 12 ft
- 3 tributaries with barriers that will be inundated, below max pool elevation 2,050 ft



Study 9.12 Summary of Results in ISR (ISR Study 9.12, Part A – Section 5)

Upper River Vertical Barriers surveyed in 2013

- 4 potential barriers surveyed in 2012; 2 confirmed as barriers to fish passage
- Barriers at Unnamed Tributary 204.3 - ground survey in Oct 2014 to confirm as barrier

Barrier in Unnamed Tributary 189.7

Barrier in Unnamed Tributary 197.7

Barrier A in Unnamed Tributary 204.3

Barrier B in Unnamed Tributary 204.3

Study 9.12 Summary of Results in ISR (ISR Study 9.12, Part A – Section 5)

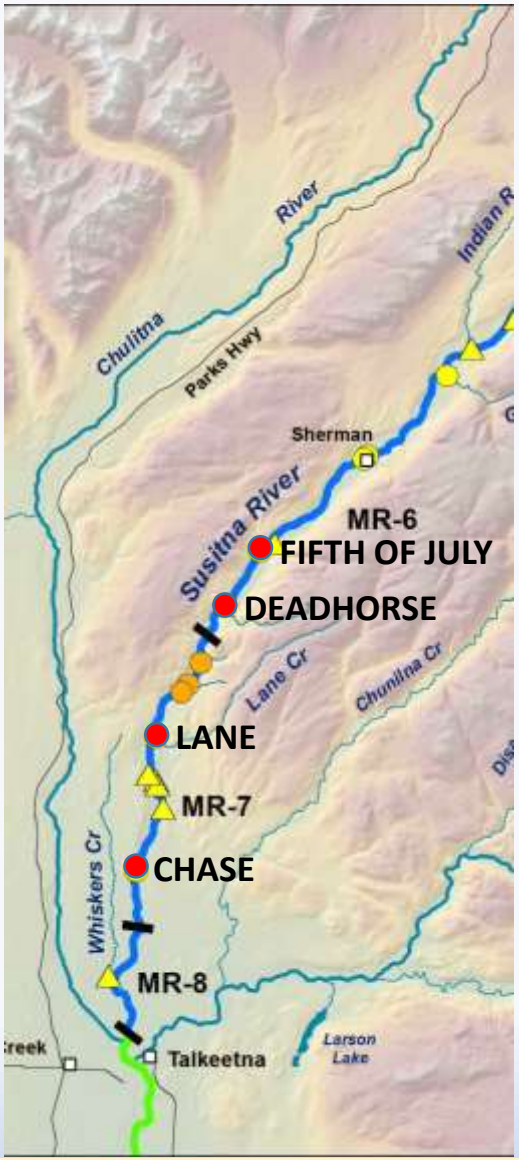
- Within the Middle River in 2013 , seven tributary mouths were surveyed to document current depth and velocity conditions for fish passage and to collect data for an evaluation of the Project's potential effects.

CHASE CREEK PRM 110.5

DEADHORSE CREEK PRM 124.4

LANE CREEK PRM 117.2

FIFTH OF JULY CREEK PRM 127.3



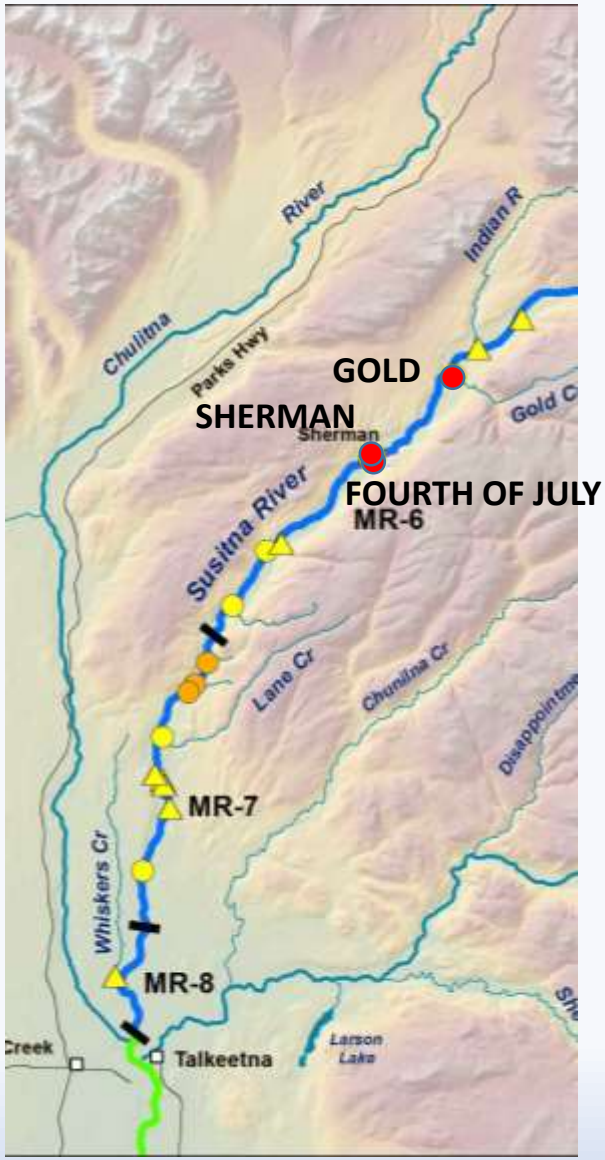
Study 9.12 Summary of Results in ISR (ISR Study 9.12, Part A – Section 5)

- Middle River tributary mouths surveyed (cont.)

FOURTH OF JULY CREEK PRM 134.3

GOLD CREEK PRM 140.1

SHERMAN CREEK PRM 134.1



Study 9.12 Summary of Results in ISR (ISR Study 9.12, Part A – Section 5)

- Characterization of existing barriers and evaluation of potential changes to barriers is ongoing and is being coordinated with the Geomorphology Study (Study 6.5), the Ice Processes Study (Study 7.6), and the Flow Routing Study (Study 8.5.4).

Study 9.12 Summary of Results since ISR

AEA proposed species list, additional species suggested by licensing participants, and preliminary species list following consultation during fisheries technical meeting on March 19, 2014.

AEA Proposed Species List	Additional Species Suggested by Licensing Participants	Final Species List
Chinook salmon	Arctic lamprey	Chinook salmon
Chum salmon	Bering cisco[1]	Chum salmon
Coho salmon	Eulachon[1]	Coho salmon
Pink salmon	Northern pike[1]	Pink salmon
Sockeye salmon	Humpback whitefish	Sockeye salmon
Arctic grayling		Arctic grayling
Burbot		Arctic lamprey
Dolly Varden		Burbot
Rainbow trout		Dolly Varden
		Humpback whitefish
		Rainbow trout
[1] Species not added to final list due to absence from study area		

Study 9.12 Summary of Results since ISR

as presented in March 19, 2014 Fisheries Technical Meeting

(http://www.susitna-watanahydro.org/wp-content/uploads/2014/04/2014-03-19TT_Fish_Notes.pdf)

Upstream ***Velocity*** Criteria

- Refined prolonged and burst speed swimming performance from literature (presented at March Barrier meeting) + criteria for Humpback Whitefish and Arctic Grayling

Leaping and ***Gradient*** Criteria for Adult Upstream Migration

- Final leaping criteria (Chinook, Coho, Chum, Pink, Sockeye Salmon)
- Gradient criteria - FSH 2090.21 - Aquatic Habitat Management Handbook

Depth Criteria for Upstream Adult Migration and Downstream juvenile/resident spp

- Final depth criteria – water depth required to fully submerge the fish species

Final Criteria Application - Interactions of Velocity, Leaping/Gradient , Depth and Distance

- Ongoing development of criteria application for Focus Areas and Tributary Mouths
- Final approach dependent on model outputs from Fluvial Geomorphology Modelling (6.6)

AEA Proposed Modifications to Study 9.12 in ISR (ISR Study 9.12, Part C – Section 7.1.2)

No modifications to the Study Plan are proposed to complete the study and meet Study Plan objectives

Decision Points from Study Plan (ISR Study 9.12, Part C – Section 7.1.1)

- Results from the 1-D Bed Evolution Model to be presented in a forthcoming Technical Memorandum (Q4 2014) will be used to examine the potential for depth barriers under pre-Project and post-Project conditions in main channels, side channels and tributary mouths in the Lower River upstream of PRM 29.9.
- The modeling results will inform the decision point for extending the Fish Passage Barrier Study into the Lower River.

Current Status and Steps to Complete Study 9.12

- Barriers identified from aerial and ground surveys in 2012, 2013 and 2014 will be combined into a comprehensive barrier dataset and GIS layer
- Determine approach for integrating passage criteria for fish species into modelling framework in coordination with IFS 8.5, GEO 6.5 and FGM 6.6
- Complete modelling analysis of current barrier conditions and potential changes related to future flow conditions, water surface elevations, and sediment transport

Steps to Complete Study 9.12 (ISR Study 9.12, Part C – Section 7.1)

- Finalized passage criteria will be applied to potential barriers in accordance with IP Section 7.1.2.
- Beaver dams within Focus Areas will be evaluated based on passage criteria and modeling results from ISR Study 6.6.
- Remaining barriers in tributaries and tributary mouths on CIRWG and ARRC lands will be surveyed in 2014 in accordance with IP Section 7.4.
- Current and future Middle River depth barriers within Focus Areas will be evaluated during ice-free and ice-cover periods incorporating 2-D model outputs in accordance with IP Sections 7.3.2 and 7.3.3, respectively.
- AEA expects to complete all remaining data collection during the 2014 study season. Analysis for this study will extend into 2015, which will be reported in the USR.

Licensing Participants Proposed Modifications to Study 9.12?

- Agencies
- CIRWG members and Ahtna
- Public