Regional Operational Plan ROP.SF.2A.2015.12

Operational Plan: Beaver Dam and Related Pond Inventory on Anadromous Streams within the Susitna River Drainage, 2015

by

Samantha Oslund

February 2016

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

REGIONAL OPERATIONAL PLAN ROP.SF.2A.2015.12

OPERATIONAL PLAN: BEAVER DAM AND RELATED POND INVENTORY ON ANADROMOUS STREAMS WITHIN THE SUSITNA RIVER DRAINAGE, 2015

by

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Signature Page

Project Title:	Beaver Dam and Related Pond Inventory on anadromous streams within the Susitna River drainage, 2015.
Project leader(s):	*Samantha Oslund, Assistant Area Management Biologist* *Sam Ivey, Area Management Biologist*
Division, Region and Area	Sport Fish, Region II, Palmer
Project Nomenclature:	
Period Covered	July 2015
Field Dates:	July 15 – October 4
Plan Type:	Category II

Approval

Title	Name	Signature	Date
Project leader	Samantha Oslund		4/23/15
Research Coordinator	Tim McKinley		7/1/15

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ABSTRACT

Currently within the Matanuska–Susitna basin there is only ad-hoc documentation of beaver structures. This project will provide a beaver dam and pond inventory on at least 22 anadromous systems within the Susitna River drainage. The end product will be baseline data that may be used in any future assessments related to beaver dams and ponds. Included is a description of the Susitna drainage, how the survey will be conducted, study objectives, methods, and data collection.

Key words: Beaver dams, Susitna River, impaired fish passage, helicopter surveys.

INTRODUCTION

The Susitna River drainage encompasses about 30,000 square miles, originating in the Alaska Range and Talkeetna Mountains and flowing south to Cook Inlet (Figure 1). Tributaries flowing into the Susitna River from the west generally originate in the Alaska Range and have relatively low gradient and velocity, and are generally accessible only by boat or airplane. Tributaries flowing into the Susitna River from the east mostly drain from the Talkeetna Mountains and generally have a relatively high gradient and velocity, and are easily accessible from the Parks Highway. As a whole, these tributary streams produce all 5 species of Pacific salmon, which are harvested in sport, commercial, and subsistence fisheries.

To index the spawning escapement of Chinook salmon, the Alaska Department of Fish and Game (ADF&G) has conducted single aerial surveys on the same 24 streams in northern Cook Inlet since 1979. These surveys are conducted from rotary-wing aircraft (i.e., helicopter) at slower speeds than traditional fixed-wing aircraft surveys, and provide a suitable means for inventorying beaver structures concurrently. In addition, foot surveys to index spawning coho salmon escapement are conducted on 4 streams in the Susitna River drainage.

Beaver dams in a natural stream can improve habitat for rearing salmonids (Pollock et al. 2004; Kemp et al. 2012) and can be easily navigated by migratory fish at higher water or via overflow channels. However, sites known to have nearby beaver activity can be reviewed using existing data and photographs to identify sites where beaver activity could potentially block the upstream movement of spawning adults or provide habitat for juvenile fish.

Currently, little information exists that describes the extent of beaver dams that may potentially impair fish passage or provide salmon rearing habitat in the Susitna River drainage. This project will document beaver dams and related ponds concurrently with the long-standing helicopter surveys of Chinook salmon during peak escapement and foot surveys of coho salmon escapement in the fall (Oslund 2013). Aerial photographs and geographic information system (GIS) analysis methods will be used to identify and document all beaver dams, particularly those that could potentially block or significantly impair fish passage.

These data should be considered an inventory of dam and related pond locations; further work would be necessary to assess the potential benefit or detriment to salmon production of dam removal on a case by case basis and is beyond the scope of this project.

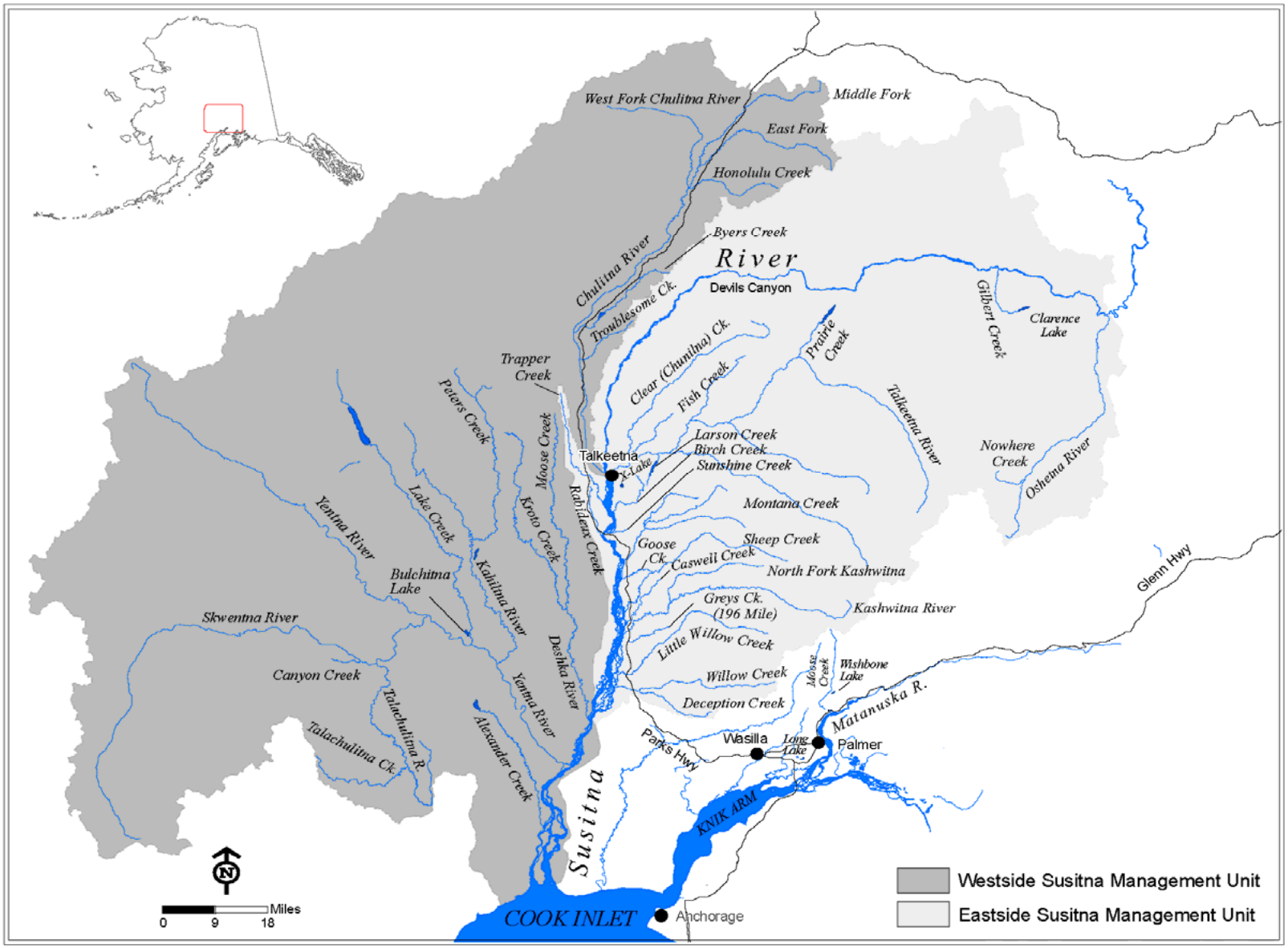

Figure 1.–Map depicting the Susitna River drainage.

OBJECTIVES

The primary objective of this study is to photograph, enumerate, and map the location of beaver dams and related ponds that exist in at least 22 selected Susitna River drainage streams from 15 July through 4 October 2015.

METHODS

STUDY DESIGN

A Survey for beaver dams and related ponds will be conducted once during each peak spawning period, as determined from past escapement surveys (Chinook salmon) or inspection of easily accessible streams (coho salmon) when water and viewing conditions are acceptable. Acceptable counting conditions can vary from stream to stream. The inventory will be conducted so that dams and ponds are documented regardless of whether they potentially impair adult fish passage. If adult salmon are seen upstream from a beaver dam, this will be recorded on the data sheets. Dams will also be visually categorized as either newly built or multigenerational. A geographic positioning system (GPS) location will be automatically recorded for each dam by a camera for both aerial (Chinook salmon) and foot (coho salmon) surveys. ADF&G Research and Technical Service (RTS) staff will develop a database for data storage and create a map of beaver dams and ponds.

Chinook Salmon Streams

Helicopter surveys indexing the escapement of Chinook salmon in 24 selected NCI streams occur on an annual basis through a separate project (Oslund 2013). Of those 24 streams, 18 are within the Susitna River drainage and will be included in this project. Exemptions from this project will be Knik Arm and West Cook Inlet streams included in the Chinook surveys. The beaver dam inventory project described in this plan will be conducted in tandem with the index surveys. The 18 streams in the Susitna River drainage surveyed annually for Chinook salmon are the East and Middle forks of the Chulitna River, the Talachulitna, Indian, Deshka, North Fork Kashwitna rivers and the Alexander, Clear, Goose, Lake, Willow, Little Willow, Moose, Peters, Portage, Prairie, Sheep, Montana, Red (Johnson Creek) and Cache creeks drainages (Appendix A1). Streams will be surveyed during the peak Chinook salmon spawning period, between 15 July to 7 August (as determined through past escapement surveys), and when water and viewing conditions are permissible.

All streams will be surveyed from the air using a helicopter with one observer. The chosen air speed and height above the ground will vary with light condition and terrain, but generally the aircraft will fly approximately 50 to 75 feet over the water. Generally, the streams are surveyed from their confluence with tidewater or a glacial river upstream to the upper-most reach to which Chinook salmon can ascend. All major clearwater secondary tributaries of each stream will also surveyed. If time is an issue, the counting of salmon will take precedence. A second survey may be flown if the initial survey does not provide adequate time to assess beaver dams in the same day.

Coho Salmon Streams

Currently 4 streams are indexed annually for coho salmon by foot survey in the Susitna River drainage (Appendix A2; Oslund 2013). Beaver dams will also be inventoried on these streams by foot during the period in which coho salmon are indexed.

DATA COLLECTION

The observer will note the position of beaver dams observed during surveys with a Garmin Montana 650t GPS[1]. The following data will also be recorded during each survey (Appendix B1):

General

1) stream name and the respective reach or tributary area surveyed
2) date
3) weather condition (clear, overcast, or turbulent)
4) stream level (low, normal, or high)
5) water visibility (clear or turbid)
6) observer

Dam-specific

7) GPS location of dam and related pond
8) photograph
9) potentially impairing fish passage (Yes or No)
10) multigenerational or newly built.
11) adult salmon sighted upriver of dam (Yes or No).

DATA REDUCTION AND ANALYSIS

Data will be entered into an Arc GIS database or Microsoft Excel spreadsheet by a Fish and Wildlife Technician II following completion of the surveys. The notebooks and original fish survey forms will be filed in the Palmer office.

SCHEDULE AND DELIVERABLES

Date	Activity
15 July–4 October	Data collection
15 August	Data analysis: Chinook salmon streams
30 October	Data analysis: Coho salmon streams

[1] Product names used in this publication are included for completeness but do not constitute product endorsement.

RESPONSIBILITIES

Fishery Biologist II. Oversees project by writing operational plan, coordinates and conducts the surveys, tracks implementation of operational plan, oversees daily reporting and data entry by technician. Provides data to appropriate personnel.

Fishery Biologist III. Assists with index surveys.

Fishery Biologist I. Conducts index surveys. Oversees daily reporting and summarization of data.

Fish and Wildlife Technician II/III. Performs index surveys. Trains crew members in how to conduct surveys and record data. Reports all data to Palmer office staff daily. Compiles data for appropriate personnel.

Fish and Wildlife Technician II/III. Data entry.

RTS staff: Assists with operational plan and creates map of beaver dams inventoried.

BUDGET SUMMARY FY15

Line Item	Category	Budget ($K)
100	Personal Services	5.6
200	Travel	0.0
300	Contractual	34.0
400	Commodities	3.6
500	Equipment	0.0
Total		43.2

Budget Manager: Sam Ivey

REFERENCES CITED

Kemp, P.S., T.A. Worthington, T.E.L. Langford, A.R.J. Tree, M.J. Gaywood 2012. Qualitative and quanitative effects of reintroduced beavers on stream fish. Fish and Fisheries 13(2): 158–181.

Lafferty, R. 1997. Summary of escapement index counts of Chinook salmon in the Northern Cook Inlet management area, 1958-1996. Alaska Department of Fish and Game, Fishery Data Series No. 97-8, Anchorage.

Oslund, S., S. Ivey., and D. Lescanec. 2013. Area Management Report for the recreational fisheries of Northern Cook Inlet, 2011–2012. Alaska Department of Fish and Game, Fishery Management Report No. 13-50, Anchorage.

Pollock, M.M., G.R. Pess, T.J. Beechie, and D.R. Montgomery. 2004. The importance of beaver ponds to coho salmon production in the Stillaguamish River Basin, Washington, USA. North American Journal of Fisheries Management 24: 749–760.

APPENDIX A: SUSITNA DRAINAGE CHINOOK AND COHO SALMON SURVEY STREAMS.

Appendix A1.–List of streams selected for Chinook salmon surveys in the Susitna River drainage.

Survey extents are listed for each stream. End points are indicated with latitude and longitude coordinates or obvious physical markers.

ALEXANDER CREEK

1) mainstem from the confluence with the Susitna River upstream to the confluence of Trail Creek
2) mainstem from the confluence of Trail Creek to the confluence of Sucker Creek
3) mainstem from the confluence of Sucker Creek to Alexander Lake
4) tributaries: Sucker Creek to Sucker Lake, Wolverine Creek to headwaters (N61.51137, W150.82497)

DESHKA RIVER

1) mainstem from the confluence with the Susitna River upstream to Loebb's Homestead
2) mainstem from Loebb's Homestead upstream to the confluence of Trapper Creek
3) mainstem from the confluence of Trapper Creek upstream to Neil Lake
4) mainstem from Neil Lake upstream to the confluence of Moose and Kroto creeks
5) tributaries:
    a. Trapper and Chijuk Creeks
    b. Moose Creek:
        i. from the confluence of Moose and Kroto Creeks upstream to Petersville Road bridge
        ii. from the Petersville Road bridge upstream to the headwaters of East Fork (N62.39734, W105.41153) and West Fork (N62.33533, W150.46620)
    c. Kroto Creek:
        i. from the confluence of Kroto and Moose Creeks upstream to Petersville Road bridge
        ii. from the Petersville Road bridge upstream to the headwaters (N62.41068, W150.57660)

LAKE CREEK

1) mainstem from the confluence with the Yentna River upstream to Chelatna Lake.
2) tributaries from their confluence until no more fish sighted: Yenlo (N62.07968 W151.01730), Home (N62.25320 W151.16231), No Name, Camp (N62.30724 W151.23127), and Sunflower Creeks (N62.36458 W151.29890)

-continued-

TALACHULITNA RIVER

1) mainstem from the confluence with the Skwentna River upstream to the lodges near Hiline Lake
2) mainstem from Hiline Lake area upstream to the confluence of Talachulitna Creek
3) mainstem from the confluence of Talachulitna Creek upstream to the headwaters
4) tributaries from their confluence until no more fish sighted: Friday; Saturday; and Talachulitna creeks.

RED CREEK

1) confluence with Johnson Creek to headwaters (N62.02861, W151.95656)

CACHE CREEK

1) from its confluence with the Kahiltna River to the headwaters of both forks (N62.50896, W150.91794).

PETERS CREEK

1) mainstem from the confluence with the Kahiltna River upstream to the confluence of Martin Creek
2) mainstem from the confluence with Martin Creek upstream to the headwaters (N62.53196, W150.81394).
3) tributary: Martin Creek (N62.45515, W150.78267)

PORTAGE CREEK

1) mainstem from the confluence with the Susitna River upstream to the headwaters of West Fork (N62.98241, W149.10471) and East Fork (N62.97684, W148.96189)

INDIAN RIVER

1) mainstem from the confluence with the Susitna River upstream to the headwaters (N62.93153, W149.39155)

CHULITNA RIVER

1) The East Fork from its confluence with the West Fork and the Chulitna River to the headwaters (N63.18740, W149.23045)
2) The Middle Fork from its confluence with the East Fork to the headwaters (N63.27765, W149.07295)

CLEAR CREEK

1) mainstem from the confluence with the Talkeetna River upstream to the headwaters (N62.64376, W149.4770)

PRAIRIE CREEK

1) mainstem from the confluence with the Talkeetna River upstream to Stephan Lake
2) tributary: Grizzly Creek to falls

-continued-

MONTANA CREEK

1) mainstem from the confluence with the Susitna River upstream to the Yoder Road Bridge
2) North Fork, Middle Fork and East Fork upstream to falls

GOOSE CREEK

1) mainstem from the confluence with the Susitna River upstream to the confluence of Sheep Creek

SHEEP CREEK

1) mainstem from the confluence with the Susitna River upstream to the headwaters (N62.14196, W149.70148)

N. FORK KASHWITNA RIVER

1) from its confluence with the Kashwitna River to the headwaters (N62.06201, W149.67786)

LITTLE WILLOW CREEK

1) mainstem from the confluence with the Susitna River upstream to the headwaters (N61.91220, W149.52529)

WILLOW CREEK

1) mainstem from the confluence with the Susitna River upstream to a four meter high falls in the canyon
2) tributaries: Deception Creek from confluence with Willow Creek upstream to weir

Appendix A2.–List of areas selected for coho salmon surveys in the Susitna drainage.

RABIDEUX CREEK

1. Sawmill Creek downstream to Rabideux Creek
2. confluence of Sawmill and Rabideux Creek downstream to the Glenn Highway culvert on Rabideux Creek

BIRCH CREEK

1. Talkeetna Spur Road downstream to the ARR Bridge
2. ARR Bridge downstream to the mouth

QUESTION CREEK

1. Talkeetna Spur Road downstream to the marsh (N62.22383, W150.09478)

ANSWER CREEK

1. Talkeetna Spur Road downstream to the marsh (N62.2030, W150.07680)
2. Talkeetna Spur Road upstream to old beaver dam (N62.201833, W150.0638)

APPENDIX B: BEAVER DAM INVENTORY FORM

Appendix B1.–Beaver dam inventory form.

Beaver Dam Inventory

Water: _____

Location: _____

					Beaver Dam					
		Conditions [2/]								
Date		Weather	Stream level	Visibility	GPS/photo	Potentially impairing fish passage?	Adult salmon up-stream from dam? Y/N		Multigenerational Y/N	Observer

Remarks

1/ A=aerial, B=Boat/Float, F=Foot

2/ Weather: C=Clear, O=Overcast, T=Turbulent

Stream: L=Low, N=Normal, H=High, C+Clear, T=Turbid