Regional Operational Plan No. ROP.SF.2A.2022.19

Operational Plan: Public Streambank Use and Conditions for the Lower and Middle Kenai River, 2020

by

Jeff Perschbacher

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and

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January 2022

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 NO. ROP.SF.2A.2022.19

OPERATIONAL PLAN: PUBLIC STREAMBANK USE AND CONDITIONS FOR THE LOWER AND MIDDLE KENAI RIVER, 2020

by
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SIGNATURE/TITLE PAGE

Project Title:	Public Streambank Use and Conditions for the Lower and Middle Kenai River, 2020
Project leader(s):	Jeff Perschbacher, Fishery Biologist II Robert Begich, Fishery Biologist III Tracy Smith, Fishery Biologist III
Division, Region and Area	Sport Fish, Region II, Soldotna
Period Covered	2020
Field Dates:	August 1 – October 30
Plan Type:	Category I

Approval

Title	Name	Signature	Date
Project leader	Jeff Perschbacher		9/19/20
Area Research Biologist	Robert Begich		9/19/20
Region II Access Coordinator	Tracy Smith		9/25/20
Region II Research Coordinator	Tim McKinley		1/21/22

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ABSTRACT

This project will assess public lands in areas that are either open or closed to sport fishing on the middle and lower Kenai River below Skilak Lake for current streambank conditions and shore-angler use.

Keywords: Sockeye salmon, Kenai River, sport fishery, riparian habitat, streambank

INTRODUCTION

PURPOSE

This project will assess current streambank conditions and shore-angler use of public lands that are either open or closed to sport fishing on the middle and lower Kenai River. An assessment of current streambank conditions and angler effort downstream of Skilak Lake will help public land management agencies identify where riparian habitat may need rehabilitation, where public access could be improved or developed for sport fishing, and areas where new protective measures may be required to preserve riparian habitat important for fish populations.

BACKGROUND

The Kenai River has one of the largest and most intensively managed sockeye salmon (*Oncorhynchus nerka*) sport fisheries in Alaska (Lipka et al. 2020). Sockeye salmon angling is principally a shore-based fishery, and the popularity and high demand for public access on the lower and middle sections of the Kenai River can cause overcrowding, trespass issues, and damage to riparian habitat (King and Hansen 2001). In 1996, the Alaska Board of Fisheries (BOF) created the *Riparian Habitat Fishery Management Plan* (Alaska Administrative Code 5 ACC 56.065) granting the commissioner of ADF&G regulatory authority to close state, federal, or municipal riparian habitats to angling if that activity was likely to result in damage to riparian habitat. From 1996 through 2017, the BOF has adopted proposed regulations that have closed approximately 18.5 miles of Kenai River streambank to sport fishing within 10 feet of the waterline. In addition to streambank sport fishing closures, public use is prohibited on an additional 2.69 miles of streambank and islands promulgated via the Kenai River Special Management Area administered by the Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation.

Habitat assessment projects have been conducted to monitor shore-angler impacts on vegetated areas (King and Hansen 1999, 2001, 2002, 2015a,b) and to determine the feasibility of using aerial photogrammetry to measure bank change over time (King 2007), but an assessment of current conditions of areas closed within the *Riparian Habitat Fishery Management Plan* have not been evaluated since its inception. An increase in shore-angler effort due to low returns of Chinook salmon (*O. tshawytscha*), high inriver abundance of sockeye salmon, seasonal changes in river discharge, and significant flood events may have altered shorelines and shoreline use that were once deemed suitable for shore-based fishing or streambank closure areas. An inventory study to identify current streambank habitat, angler effort, development, and human impacts on public streambanks will help land management agencies prioritize areas that may require bank rehabilitation, streambank closures, or improved public access for sport fishing.

OBJECTIVES

This project will take place on the lower and middle sections of the Kenai River in 3 reaches from Warren Ames Bridge to the outlet of Skilak Lake (river miles [RM] 5–50, respectively; Figure 1).

This project will be conducted during the late-run sockeye salmon fishery from August 1 through October 30. The objectives of this 2020 study are as follows:

1) Enumerate bank anglers on public lands open and closed to sport fishing.
2) Inventory current streambank conditions of areas open or closed to sport fishing by habitat type: non-vegetated substrate type (i.e., fines, gravel, cobble, boulder), vegetated classes (i.e., grass, roots, trees, sod, brush, trees), riparian damage from shore anglers, and sport-fishing infrastructure (i.e., elevated light penetrating [ELP] walkway, stairways, trails).

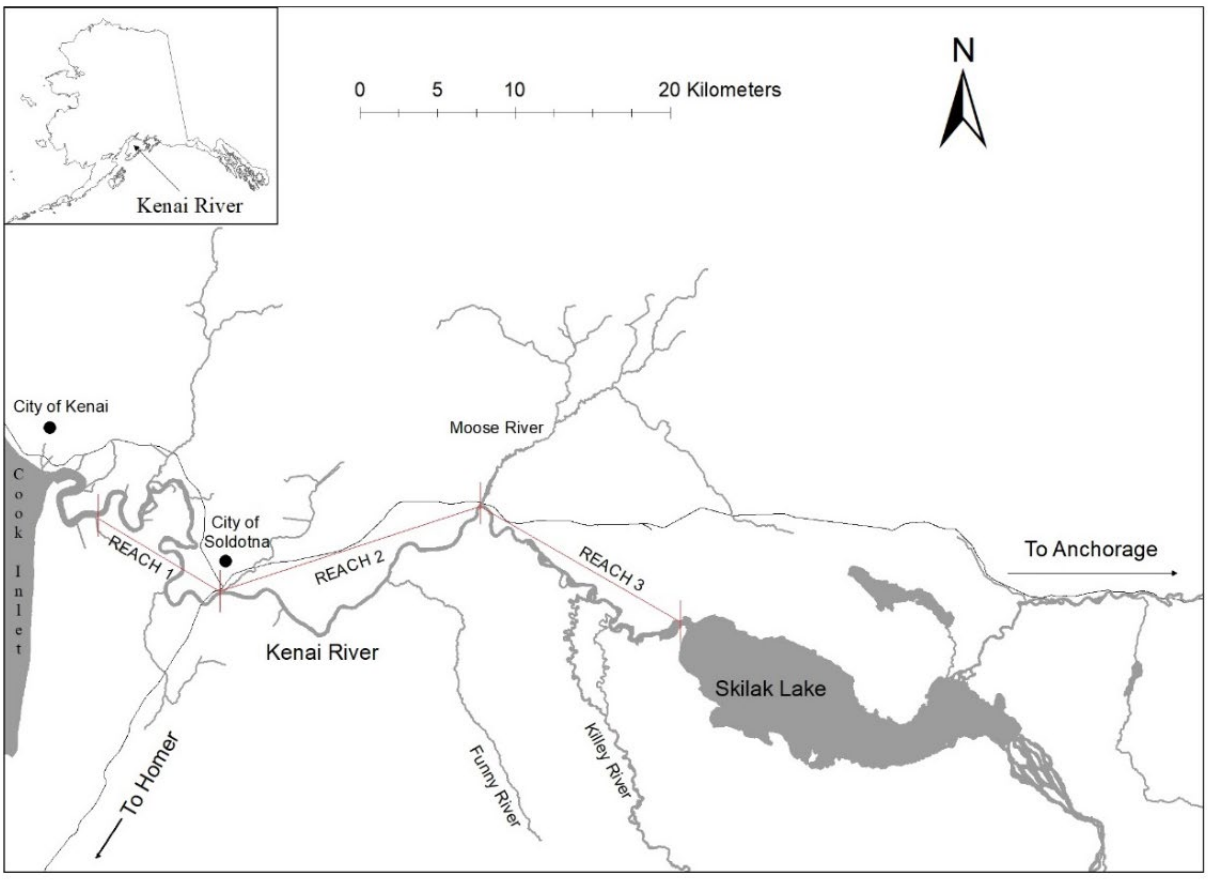

Figure 1.–Map of the Kenai River drainage and study area reaches 1–3.

METHODS

STUDY AREA

The section of the Kenai River from the Cook Inlet upstream to Warren Ames Bridge was excluded from this study because it is tidally influenced and primarily managed for a personal-use dip net fishery. The upper Kenai River (Skilak Lake to Kenai Lake) was excluded from this study due to logistical constraints, and although there is significant fishing effort on the upper Kenai River, most shore-based sockeye salmon angling, streambank habitat use by sport anglers, public-access overcrowding issues, and habitat impacts and degradation occur on the lower and middle sections of the Kenai River. For this study, the lower and middle Kenai River were divided into the 3 river reaches that were used in past habitat studies (Figure 1):

1) Reach 1: Warren Ames Bridge to Soldotna Bridge (RM 5–21)
2) Reach 2: Soldotna Bridge to Moose River (RM 21–36)
3) Reach 3: Moose River to the outlet of Skilak Lake (RM 36–50)

Public lands within these reaches were defined as either owned by the Alaska Department of Natural Resources (DNR), Alaska Department of Fish and Game (ADF&G), Kenai Peninsula Borough (KPB), United States Fish and Wildlife Service (USFWS), or municipalities (cities of Soldotna and Kenai). ArcGIS was used to map public lands and streambank closure areas (SCA hereafter) within the three river reaches (Figures 2–4).

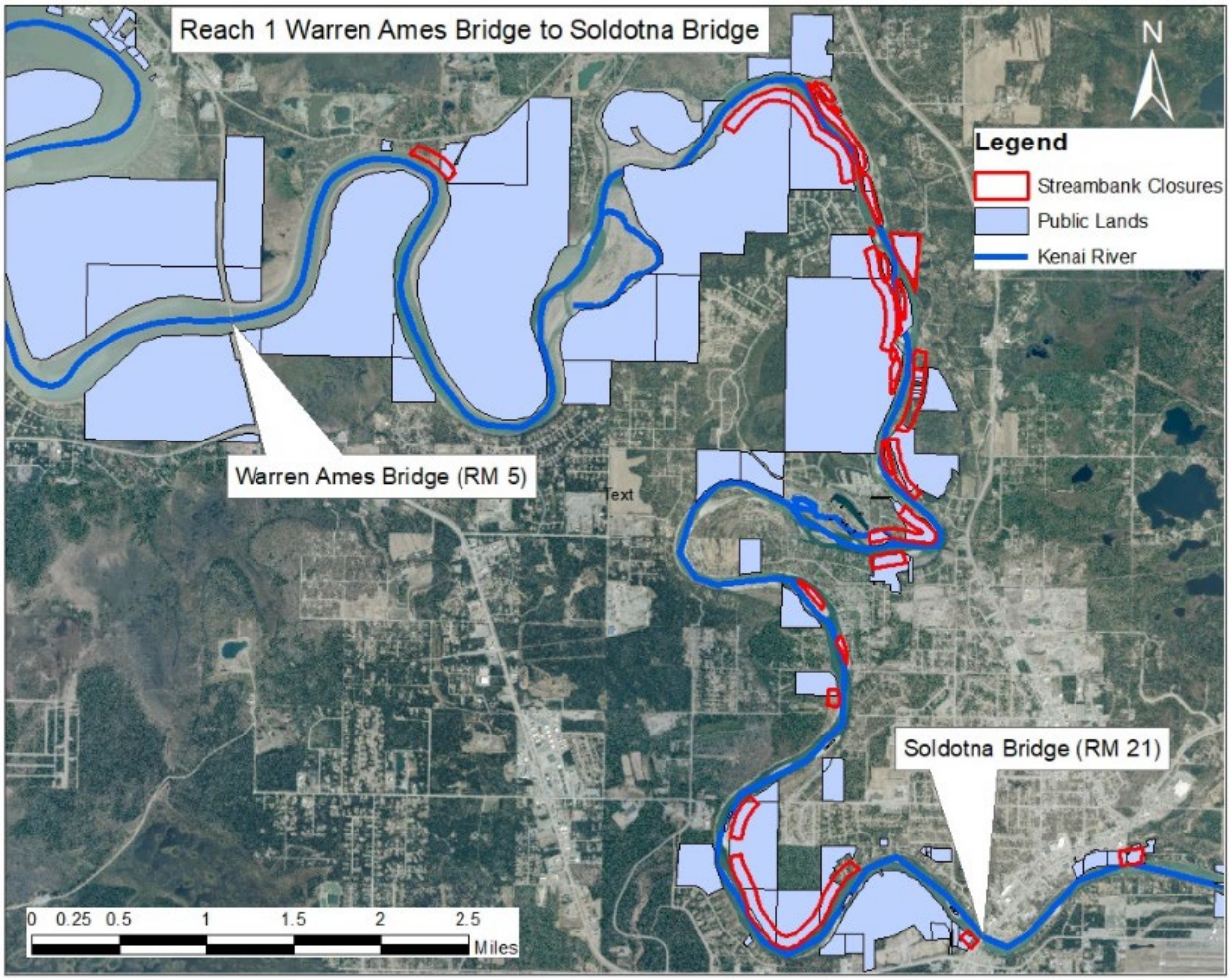

Figure 2.–Public lands and streambank closures in Reach 1.

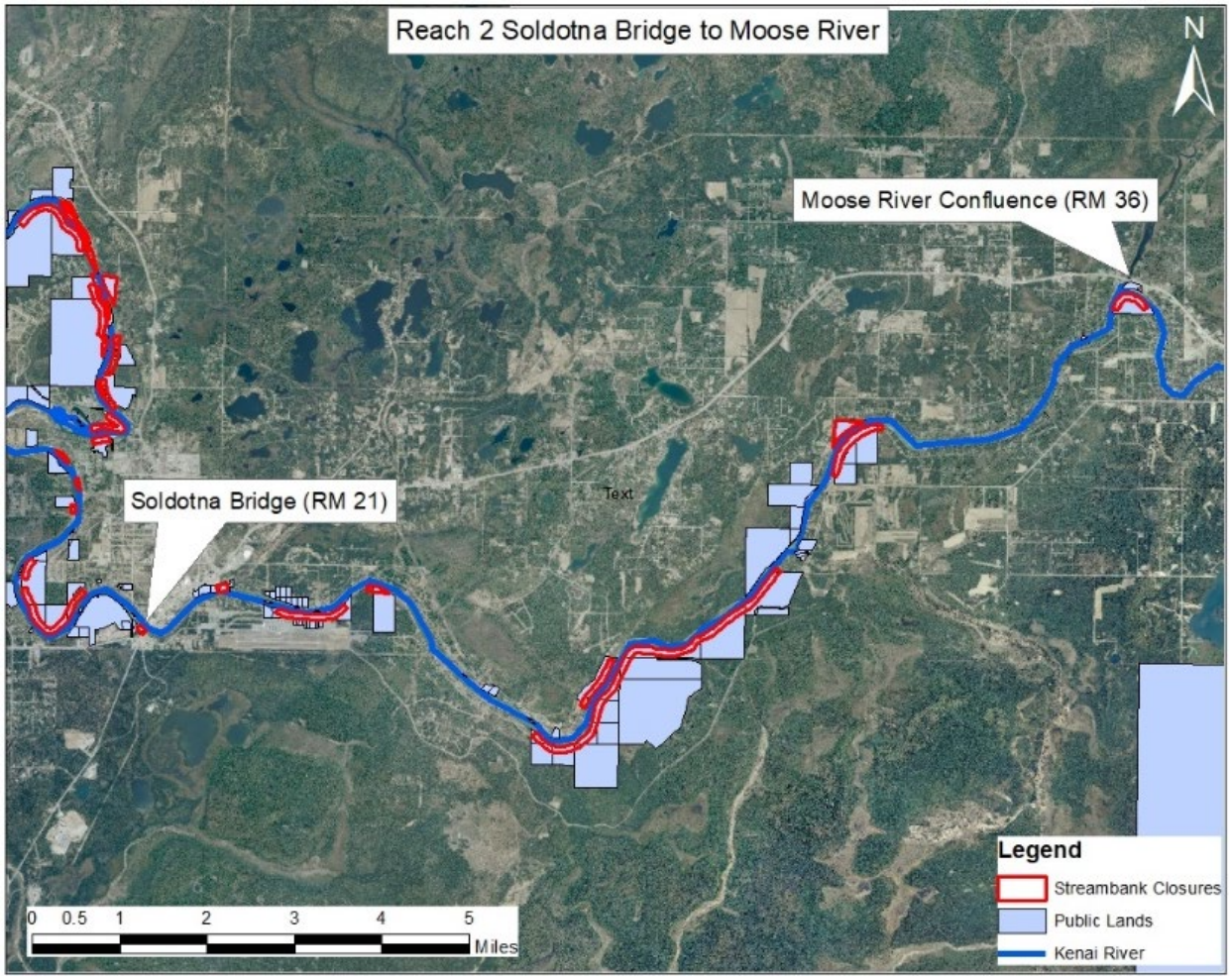

Figure 3.–Public lands and streambank closures in Reach 2.

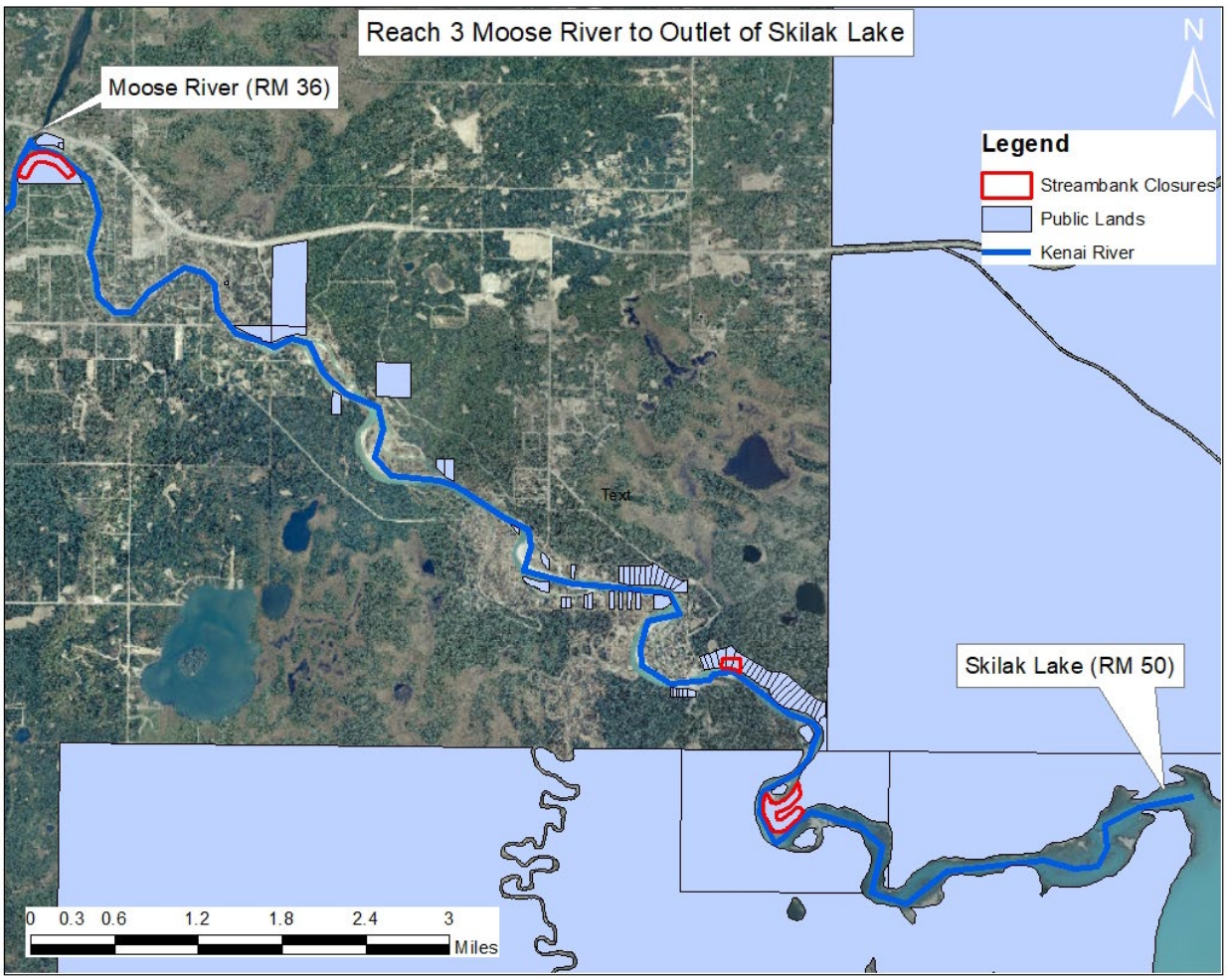

Figure 4.–Public lands and streambank closures in Reach 3.

Shore angler counts and habitat assessments of these public lands will be conducted twice during the summer of 2020 to compensate for changes in stream levels that may expose or conceal shorelines. The first assessment is scheduled during the beginning of August (approximately August 1–15) when stream levels are typically higher and shore angling is popular. The second assessment will occur during mid to late-October (approximately October 16–30) when river levels are typically lower and shore angling is significantly less. Data for each sampling event will be recorded on field forms (Appendix A1) and summarized postseason.

STUDY DESIGN

Shore-Angler Counts

Shore anglers will be counted on the public parcel, island, or SCAs to be sampled prior to the habitat assessments. A shore angler is defined as any person actively fishing from the shore (in or out of water); this excludes anglers fishing from boats. Each angler count will be conducted by traveling in an outboard powered boat in either an upstream direction from Reach 1 to Reach 3 or a downstream direction from Reach 3 to Reach 1 depending on logistical, tide, and time constraints. Each angler count and habitat assessment day will be conducted between the hours of 9:00 AM and 5:00 PM.

Habitat Assessment

Cross-sectional (transects perpendicular to the stream) profile surveys will be conducted along each sample site to create a geomorphic depiction of public parcels, islands, and SCAs. The length of each parcel's shoreline was predetermined using ArcGIS by measuring from the downstream end of the property line to the upstream end of the property line or the circumference for islands. The streambank lengths of SCAs were measured in ArcGIS between their designated downstream and upstream boundaries. In the field, a GPS and range finder will be used to mark the upstream and downstream boundaries of sample areas. Each site will be divided into 5 equally spaced cross-sectional transects (A–E) with a maximum distance between each transect of 200 m to prevent biased measurements of habitat (Platts et al. 1983). The 5 transects will be placed perpendicular to streamflow and the length of each transect will be measured to the nearest 0.25 m from the current waterline to the "bank-full width mark," which is created when the channel is filled by moderate-sized flooding events that typically occur every 1 to 2 years (Kaufman and Robison 1998); transect lengths are expected to be less than 50 m. Parcels, islands, or SCAs with streambank lengths longer than 1,000 m will have additional transects (predetermined with ArcGIS) with a maximum length between each transect of 200 m.

At each site, the slope of the bank at the waterline edge of each transect (A–E) will be measured as an angle, giving a minimum of 5 bank angle measurements per site. Each bank angle measurement will be taken by laying a measuring rod against the stream bank with one end of the rod touching the water's edge; the bank angle (degrees) will be determined from a clinometer placed on the measuring rod. A vertical bank is defined as having a 90-degree bank angle. Undercut bank angles, which are greater than 90 degrees, are measured by turning the clinometer over and subtracting the angle reading from 180 degrees (Kaufman and Robison 1998).

Streambank environments consist of many types of habitats that may have differing influence on fish productivity. To inventory habitat for this study, we will use the classification of nonvegetated habitats described in Kaufman and Robison (1998) and the classification of vegetated habitats described in Platts et al. (1983) (Table 1). Along the length of each transect (A–E), the streambank habitat type will be recorded at 10 equidistant points from the waterline to the bank-full width mark. The percentage of each streambank habitat type will be determined for each parcel, SCA, or island postseason. The presence of infrastructure will be recorded for each sample area (not each transect) along with the type of infrastructure present.

Table 1.–Classification, size, and description of streambank habitat types.

Streambank habitat type	Subtype	Size	Description
Nonvegetated habitat			
	Fines	<2 mm	Mud to gritty particles between fingers
	Gravel	>2 to 64 mm	Ladybug to tennis ball size
	Cobble	>64 to 250 mm	Tennis ball to basketball size
	Boulder	>250 mm	Basketball to car size
Vegetated habitat			
	Grass	Variable	Single bladed, shallow roots
	Sod	Variable	Taller and more extensive root systems than grass
	Root	Variable	Originating from brush or trees
	Brush	Variable	Small solid branched and deeply rooted
	Tree	Variable	Tall solid trunked with branches
Infrastructure			
	Boardwalks, docks, stairs	Presence/absence	Note types of infrastructure within sample area
	Public easements	Presence/absence	

Riparian area damage or loss from shore-angler activity (Table 2) will be estimated visually along each transect (A–E) as described in Platts et al. (1998). An example of loss due to past use would be an area where vegetation no longer exists because the streambank was trampled causing erosion. For each transect, the length from the waterline to the bank full width mark, a damage rating of 0% to 100% will be estimated visually. An overall damage rating for each site will be the average of all transects.

Table 2.–Description of riparian damage from shore-anglers by damage rating class.

Damage rating (%)	Class	Description
0 to 25	Light	Light to no disturbance. Vegetation cover is very close to that which would occur naturally without use.
26 to 50	Moderate	Moderate disturbance. At least one-half of the potential plant biomass remains.
51 to 75	High	Streambank use is high and less than half of the potential plant biomass remains.
75 to 100	Very high	Almost all of the potential vegetative biomass has been removed.

DATA SUMMARY AND REPORTING

Results of this study will provide an inventory of current habitat conditions and streambank use that will help identify where public access for sport fishing could be developed, where streambanks may need rehabilitation, or what changes to existing or future SCAs should be considered.

For each sample site, the number of anglers, percentage of streambank habitat types, a list of infrastructure, average bank angle, and percentage of human disturbance will be summarized for each sampling event (August and October).

Results of this assessment will be included in the Habitat Section of the 2020 Northern Kenai Peninsula Annual Management Report.

SCHEDULE AND DELIVERABLES

Dates	Activity
May-July	Operational planning
August 1 – October 30	Field work sampling days
November	Data analysis and results
December	Final report to Regional review

RESPONSIBILITIES

Jeff Perschbacher, Fishery Biologist II
Duties: Study design, field sampling, data analysis, and report writing.

Robert Begich, Fishery Biologist III
Duties: Assist with study design, report writing, and field sampling as needed.

Tracy Smith, Fishery Biologist III
Duties: Assist with planning, report writing, and field sampling as needed.

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APPENDIX A: FIELD FORM

Kenai River Streambank Habitat Assessment

DATE:_____ CREW: _____ **PAGE** _____**of** _____

SITE Name/#: _____ OWNER:_____ Angler Count: _____ Regulation: Open / Closed: ADF&G / State Parks

Latitude: _____ Length of SITE:_____ Subsampled: Yes / No

Longitude: _____ Length between Transects: _____ Length of Shoreline Not sampled:_____

Photo	Transect	Length (m)	Bank Angle	Streambank Habitat Types 1	2	3	4	5	6	7	8	9	10	Human Disturbance (%)	Comments
Y / N	A														
Y / N	Infrastucture														
Y / N	B														
Y / N	Infrastucture														
Y / N	C														
Y / N	Infrastucture														
Y / N	D														
Y / N	Infrastucture														
Y / N	E														
Y / N	Infrastucture														

SITE Name/#: _____ OWNER:_____ Angler Count: _____ Regulation: Open / Closed: ADF&G / State Parks

Latitude: _____ Length of SITE:_____ Subsampled: Yes / No

Longitude: _____ Length between Transects: _____ Length of Shoreline Not sampled:_____

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Y / N	A														
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Y / N	Infrastucture														
Y / N	C														
Y / N	Infrastucture														
Y / N	D														
Y / N	Infrastucture														
Y / N	E														
Y / N	Infrastucture														

Streambank Habitats: Fines (mud-sand), Gravel (< tennis ball), Cobble (tennis to basketball), Boulder (basketball to car), Grass (lawn), Sod (Natural), Root (from brush or tree), Brush (small branched), Tree.

Infrastructure: ELP, Launch, Stairs, Road, Easment..

Human Disturbance: 0-25% No to Light (Very close to natural), 25-50% Moderate (at least 1/2 biomass remains), 51-75% High (less than 1/2 biomass remains), 75-100% Very High (almost all biomass used).

Appendix A1.–Kenai River streambank habitat assessment field form.