Regional Operational Plan SF.2A.2015.10

Operational Plan: Kenai River Adult Chinook salmon monitoring

by

Tony Eskelin

May 2015

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 SF.2A.2015.10

OPERATIONAL PLAN: KENAI RIVER ADULT CHINOOK SALMON MONITORING AND REPORTING

by
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SIGNATURE PAGE

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Project leader(s):	Tony Eskelin
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Period Covered	May – December 2015
Field Dates:	May – August 2015
Plan Type:	Category II

Approval

Title	Name	Signature	Date
Project Leader	Tony Eskelin		4/30/15
Biometrician	Matt Tyers		5/1/2015
Research Coordinator	Tim McKinley		5/4/15

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ABSTRACT

The primary goal of this study is to determine the number of radiotagged Chinook salmon that enter the Killey River and the number of radiotagged Chinook salmon that migrate upstream of the USFWS Killey River weir in order to estimate Killey River Chinook salmon escapement. Chinook salmon captured during May and June at river mile (RM) 8 of the Kenai River will be tagged with radio transmitters. Fixed telemetry stations at the Killey River mouth and Killey River weir will count radiotagged Chinook salmon that migrate into the Killey River and those that pass the weir. Fixed stations will also be installed at the RM 13.7 Chinook salmon sonar site, Slikok Creek confluence, Funny River confluence, and the Kenai Lake outlet to monitor migration. Aerial surveys will be conducted to determine approximate spawning locations. The combined total of Killey River and Funny River Chinook salmon escapement will provide a coarse minimum estimate of early run Kenai River Chinook salmon abundance independent of sonar.

Key words: Chinook salmon, *Oncorhynchus tshawytscha*, Kenai River, Funny River, Killey River, radio transmitter.

PURPOSE

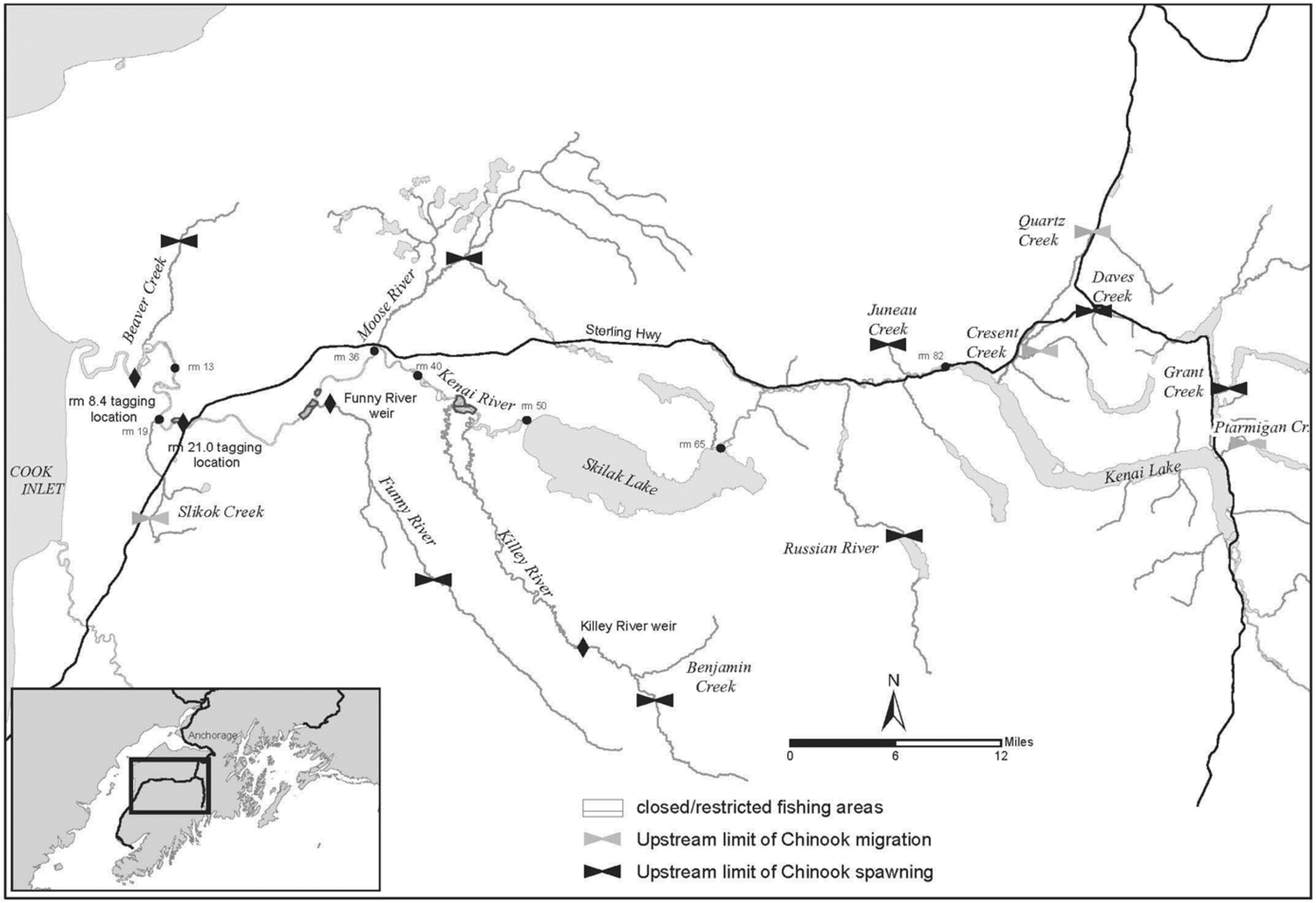
The primary purpose of this research is to provide a coarse minimum estimate of tributary-bound early-run Kenai River Chinook salmon abundance that is independent of the existing sonar program. Run size of returning Kenai River Chinook salmon is an important metric used for inseason and postseason stock assessment. This project will allow the Alaska Department of Fish and Game to indirectly monitor Kenai River early run Chinook salmon abundance and provide the distribution of Kenai River tributary-bound Chinook salmon.

BACKGROUND

The Kenai River watershed encompasses approximately 2,200 square miles of the Kenai Peninsula including diverse landscapes such as glaciers, large lakes, high mountains, and vast lowlands. The Kenai River mainstem is approximately 82 miles long including a 15 mile stretch through Skilak Lake (Figure 1). Populations of Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), pink salmon (*O. gorbuscha*), Dolly Varden (*Salvelinus malma*), and rainbow trout (*O. mykiss*) occur in the Kenai River and support valuable commercial and recreational fisheries.

For management purposes, Kenai River Chinook salmon are separated temporally into 2 runs: early-run fish are those that enter the river prior to July 1 and late-run fish are those that enter the river on or after July 1. The estimated total annual run of early-run Chinook salmon has ranged from 5,605 (CV 0.09) to 23,800 (CV 0.12) Chinook salmon (McKinley and Fleischman 2013). The estimated total annual run of late-run Chinook salmon has ranged from 28,550 (CV 0.09) to 99,690 (CV 0.10) Chinook salmon (Fleischman and McKinley 2013). The largest potential biases in estimates of early- and late-run abundance apply to the sonar-based inriver run estimate.

Biologically, Kenai River Chinook salmon are separated into tributary- and mainstem-spawning populations. Most populations of tributary-spawning Chinook salmon arrive from late April to early July (Bendock and Alexandersdottir 1992; Burger et al. 1983; Reimer 2013). Several Kenai River tributaries support spawning Chinook salmon (Figure 1) although the most abundant spawning populations utilize Funny River, Killey River, and Benjamin Creek, a tributary to the Killey River (Bendock and Alexandersdottir 1992; Burger et al. 1983; Johnson and Daigneault 2013; Reimer 2013). Mainstem-spawning Chinook salmon arrive from late June to mid-August and utilize the entire Kenai River mainstem upstream of river mile (RM) 12 (Bendock and Alexandersdottir 1992; Burger et al. 1983; Hammarstrom et al. 1985; Reimer 2013).



Note: Though not indicated on the map, the Kenai River upstream of Skilak Lake and all tributaries to the Kenai River are also closed to sport fishing for Chinook salmon.

Figure 1.–The Kenai River Drainage.

ABUNDANCE ESTIMATION

The Alaska Board of Fisheries (BOF) has adopted escapement goal ranges for both runs and prescribed the management actions available to achieve those goals. The early-run optimum escapement goal range (OEG) is currently 5,300–9,000 Chinook salmon. The late run sustainable escapement goal range (SEG) is currently 15,000–30,000 Chinook salmon. In the past 20 years, the 1997, 1998, 2000, 2002, 2010–2014 early runs, and the 1998, 2011– 2014 late runs were restricted to meet escapement goals. Implementation of these management plans attracts much public scrutiny.

The size of the inriver run is a key component for estimating spawning escapement and implementing management plans. Daily and seasonal estimates of Chinook salmon abundance at RM 8.6 have been generated since 1987 using hydroacoustic techniques (Miller et al. 2013). Acoustic assessment of Chinook salmon at RM 8.6 in the Kenai River has been complicated by the presence of more abundant sockeye salmon, which migrate concurrently with Chinook salmon, and by tidal influence, which allows some Chinook salmon to pass the site without being counted. Because of this uncertainty, Chinook salmon abundance estimates from the RM 8.6 sonar have been compared to genetic capture–recapture estimates since 2007, the Funny River weir escapements since 2006, the Killey River weir escapements since 2012, and a second sonar site operated near RM 13.7 since 2013. The sonar at RM 8.6 was discontinued after the 2014 season and all Chinook salmon sonar operations in 2015 will occur at RM 13.7. The sonar site at RM 13.7 allows for near complete riverwide (streambank to streambank) estimates of Chinook salmon passage and is outside of tidal influence.

Genetic capture–recapture estimates of abundance were also discontinued after the 2014 season. However, fish spawning in the Funny and Killey Rivers represent 68–78% of all early-run fish radiotracked between 2010 and 2013 (Reimer 2013). Thus, Funny River and Killey River passage estimates provide a coarse minimum value for early run abundance estimates generated by the sonar. Funny River and Killey River weir counts are not directly applicable because the Killey River weir is 28 river miles upstream from its confluence with the Kenai River and significant numbers of Chinook salmon spawn downstream of the Killer River weir but within the Killey River (Reimer 2013).

OBJECTIVES

PRIMARY OBJECTIVE

1) Estimate the Killey River Chinook salmon escapement such that the estimate is within 30% of the true value 80% of time.[1]

SECONDARY OBJECTIVES

1) Count the number of radiotagged Chinook salmon that enter the Killey River.
2) Count the number of radiotagged Chinook salmon that migrate above the Killey River weir.
3) Determine the dates when radiotagged Chinook salmon that spawned in the Funny River enter the Funny River.

[1] The USFWS will operate the Funny River and Killey River weirs. ADF&G will radio tag Chinook salmon and track them to spawning destinations. Killey River weir counts will be used with radio tag data to estimate the Killey River Chinook salmon escapement.

4) Determine the dates when radiotagged Chinook salmon that spawned in the Killey River enter the Killey River.

5) Determine the dates when radiotagged Chinook salmon migrate upstream of the Slikok Creek regulatory boundary in the Kenai River.

6) Determine approximate spawning locations of radiotagged Chinook salmon within tributaries of the Kenai River via aerial surveys.

7) Collect tissue samples to archive from Kenai River Chinook salmon sampled from inriver gillnets.

METHODS

ADF&G staff plan to discontinue a genetic capture–recapture effort designed to provide an independent estimate of adult Chinook salmon abundance in 2015. There are still 68 radio tags available from that effort. Those tags will be supplemented with 12 additional tags (80 total) and deployed in May and June 2015 to estimate the proportion of the Killey River escapement that migrated upstream of the Killey River weir.

RADIO TAG DEPLOYMENTS

Radio tags will be deployed by an existing inriver gillnetting study conducted in the lower Kenai River. Sampling will occur for approximately 6 hours per day using 60 ft long, 2-panel drift gillnets. Each net has one 30 ft section of 5.0 inch stretched mesh web and one 30 ft section of 7.5 inch stretched mesh web. Webbing size was chosen to reduce the size selectivity of the sample and also to reduce the probability of damage to gill filaments during capture. Nets will be deployed systematically with respect to bank, distance offshore, and mesh size closest to shore to ensure that fish of all sizes throughout the sampling area have a reasonable possibility of capture.

Up to 80 radio tags will be deployed in Chinook salmon of all sizes between 16 May and 30 June 2015. Negligible numbers of tributary-bound Chinook salmon were captured after 30 June in 4 years of radiotag deployments (Reimer 2014). Between 2012 and 2014, early-run catch rates resulted in tagging 84, 60, and 159[2] Chinook salmon each year. The minimum Chinook salmon tagging size will be 495 mm mid eye to tail fork (METF). In 2014, we tagged Chinook salmon of all sizes and no fish less than 495 mm were classified as "migrants" when determining fates, whereas fish in size classes 495 mm and above were classified as migrants in approximately the same proportions as they were tagged. Similar to 2014, two sizes of radio tags will be deployed. Chinook salmon less than 600 mm METF but at least 495 mm METF will be tagged with Advanced Telemetry Systems[3] (ATS, Isanti, MN) model F1835B[4] radio transmitters. Chinook salmon 600 mm METF and above will be tagged with either ATS model F1845B[5] or F1835B radio transmitters, depending on availability of each tag. All F1845B radio transmitters will be used to tag Chinook salmon 600 mm METF and above prior to using any F1835B for Chinook salmon of that size range. There will be 18 1835B and 62 1845b radio transmitters available for deployment. The 1835B to 1845B tag ratio will approximate the ratio corresponding to the size of Chinook salmon greater than 490 mm that were captured in 2014. It is likely that all Chinook

[2] In 2014, netting was conducted for approximately 12 h each day. In 2015, netting will be conducted for approximately 6 h each day.
[3] Product names used in this publication are included for completeness but do not constitute product endorsement.
[4] ATS 1835B radio tags are 17 mm diameter, 48 mm long, and weigh 16 grams.
[5] ATS 1845B radio tags are 19 mm diameter, 56 mm long, and weigh 26 grams.

salmon deemed healthy by tagging crews will be tagged until all tags are deployed, but if catch rates are significantly higher than 2014, we will only tag a sample of captured fish to ensure tags are distributed throughout the run. The latest date that we have tagged a Killey River bound Chinook salmon at RM 8 was June 27, so we will attempt to distribute tags at least through that date.

In addition, a tissue sample will be collected from every Chinook salmon captured (Appendix A1). These samples will be archived. From 2010 to 2014, 231–645 genetic sampleswere collected.

Radiotagged Chinook salmon will be located passively by stationary radio receiving stations. Pulse-coded radio transmitters broadcasting on 14 frequencies (151.264-151.635 MHz, 7 pulse codes per frequency) will be used for this project. During stationary radiotracking, the scan time for each frequency will be 2 s with a 15 s timeout. Thus, each frequency will be scanned for 2 s; if a transmission is detected, then the receiver pauses for 15 seconds on each antenna to decode the pulse code and signal strength. Total scan time will range from 28 s (14 frequencies * 2 s/frequency) when no signals are detected to 10.5 s (14 frequencies * 15 s/frequency * 3 antennas) when each frequency has at least 1 signal detected. Similar scan times have provided satisfactory detection and resolution for both manual and stationary tracking in past years. Fixed telemetry stations will be placed at the RM 13.7 Chinook salmon sonar site, Slikok Creek confluence, Funny River confluence, Killey River confluence, Killey River weir, and the Kenai Lake outlet. Stations will be equipped with 2 or 3 directional antennas; 1 antenna pointed upstream, 1 antenna pointed downstream, and 1 antenna pointed up from the tributary confluence when applicable. The direction of fish movement can be discerned by comparing signal strengths between antennas within the chronological data.

FUNNY RIVER WEIR

The Funny River weir has been operated by the United States Fish and Wildlife Service (USFWS) since 2006. Upstream migrating fish swim freely through a fish passage chute in the resistance board weir where they are recorded by a motion activated digital video recording device. The video footage from the site is reviewed by a technician to determine upstream passage. The weir will be operational from approximately late May until mid-August.

The weir is located approximately 0.75 miles upstream from the Funny River confluence with the Kenai River. A limited amount of spawning does occur downstream of the weir[6]. Since 2012, weir counts have averaged 928 (Boersma and Gates 2013, 2014; Gates and Boersma 2014b).

KILLEY RIVER WEIR

The Killey River weir has been operated by the USFWS since 2012. Similar to the Funny River weir, upstream migrating fish swim freely through a fish passage chute in the resistance board weir where they are recorded by a motion-activated digital video recording device. The video footage from the site is reviewed by a technician to determine upstream passage. The weir will be operational from approximately early June until mid-August.

[6] Between 2010 and 2013, 40 radiotagged Chinook salmon spawned within the Funny River drainage. Thirty-eight fish spawned upstream of the weir, 1 fish spawned immediately downstream of the weir and 1 fish that spawned near the weir was not confirmed as upstream or downstream.

The weir is located approximately 28 miles upstream from the confluence with the Kenai River, and there is significant spawning downstream of the weir. Radio tags will be used to determine the proportion of Killey River Chinook salmon that migrated upstream of the weir in order to estimate Killey River Chinook salmon escapement. Table 1 provides summary information for Killey river weir passage, radio tags, and escapement estimates. During 2014, the USFWS counted 1,713 Chinook salmon that passed the Killey River weir. Of the 59 radiotagged Chinook salmon that entered the Killey River drainage in 2014, 28 migrated upstream of the Killey River weir. Since 2012, the average proportion of Killey River radio tags that passed the weir is 0.46 (Table 1).

Table 1.–Killey River weir passage, number of tags, and estimate of Killey River Chinook salmon escapement, 2012–2014.

Year	Killey River weir passage	Number of Killey River tags	Number of tags above Killey River weir	Proportion of tags above Killey River weir	SE	Killey River escapement	SE
2012	1,602	53	21	0.40	0.012	3,934	627
2013	1,881	38	19	0.50	0.014	3,669	556
2014	1,713	50	24	0.48	0.011	3,496	486
Average	1,732	47	21	0.46		3,700	

Note: weir passage data provided by USFWS (Gates and Boersma 2013, 2014a,c).

SAMPLE SIZES

A total of 80 Chinook salmon will be tagged with radio transmitters in the lower Kenai River. In 2014, 61% of Chinook salmon tagged at RM 8 that were greater than or equal to 500 mm were classified as migrants, and of these, 54.25% were observed to enter the Killey River. Assuming the same proportion of tagged Chinook salmon enter the Killey River in 2015, we expect 27 tagged Chinook salmon to enter the Killey River. It is unknown how many will be observed, but assuming a binomial distribution, we can estimate greater than a 90% probability of at least 20 tagged Chinook salmon entering the Killey River. Using the 3-year averages for estimated total Killey river escapement and total weir count, a worst-case scenario of 20 tagged Chinook salmon entering the Killey river will still allow an abundance estimate to be within the stated objective criteria (Robson and Regier 1964).

DATA COLLECTION

Telemetry data will be collected primarily at automated, fixed, data-recording stations. A typical fixed station will consist of a guy-wire stabilized mast with 2 or 3 directional antennas, an antennae switch, radio receiver, a data collection computer, a 12-volt deep-cycle battery, and a weather-resistant box to house the battery and the receiving and data collection equipment. Antennas will be Yagi-style model P154-4 (Cushcraft, Inc. New Hampshire) tuned to receive the 150–154 MHz frequency band. The antennae switch will be ATS Model 100. Stations will be equipped with an ATS R4520C receiver/DCC. This system will be used to detect unique radio tags and record the radio frequency, pulse code, date, time, antenna on which the signal was detected, and a measure of signal strength.

Telemetry stations will be set up mid-May. After site installation, the detection range for each site will be tested and mapped with a reference tag. The testing procedure calls for 2 staff members communicating via walkie-talkie; 1 at the radio receiving station and 1 in a boat near the site. The boat is held stationary while a radio transmitter is lowered to the river bottom using a weighted string. The location-specific signal strength for each antenna is then recorded on a map of the site. This procedure is repeated until the detection area for the site has been accurately mapped and the ability to detect tags on each antenna is satisfactory. Of primary interest is a long reach with bank-to-bank detection on both antennas and ensuring that the pattern of signal strengths on each antenna allows correct determination of the tag location relative to the site.

Data collection computers will be downloaded approximately weekly using a laptop computer and software supplied by the manufacturer. During download sessions each fixed site will undergo routine maintenance. Two records of download and maintenance history will be kept. A site log will be kept at each fixed station and used to record the download and maintenance history at that station over the course of the season (Appendix B1). In addition, a fixed station download form will be used to document all download and maintenance activities during a given week (Appendix B2).

An ATS R4520 receiver with dual H-style antennas will be used for airplane surveys from a Cessna 180. The airplane will be flown slowly adjacent to the stream or river of interest while the receiver, gain set to max, scans all active frequencies. If a transmission is heard, the scan will be briefly held on the active frequency while the receiver decodes the transmission. In most cases, the plane continues its flight path without regard for the presence or absence of radio tags and tags are located 2–4 times at disjoint locations along the flight path. In areas with multiple co-located fish, the airplane will fly tight circles above the co-located radio tags to allow sufficient time to decode all tags present. Each successfully decoded transmission triggers the receiver to record the following information: date, time, frequency, pulse code, GPS coordinates, mortality switch position, and signal strength. The record with the largest signal strength will be considered the approximate location.

DATA REDUCTION

Raw telemetry data will be downloaded from ATS equipment in a proprietary format and saved with a file name that references the date and time when the download occurred. SAS software will be used to convert the individual downloads into a seasonal file in comma-separated file format. A data map for the fixed station telemetry file is shown in Appendix C1. The date, time, and direction of fish movement past each fixed station will be discerned by comparing signal strengths between the antennas at each station within the chronological data.

DATA ANALYSIS

The proportion of mainstem-spawning Chinook salmon that migrated upstream of the Killey River weir will be estimated as follows:

$$\hat{p} = \frac{x}{n} \tag{1}$$

where

x = the number of radiotagged Chinook salmon that passed upstream of the Killey River weir, and

n = the number of radiotagged Chinook salmon that entered into the Killey River.

The variance of the above proportion will be estimated according to Cochran (1977):

$$\operatorname{var}\left[\hat{p}\right] = \frac{\hat{p}\left(1-\hat{p}\right)}{n-1} \tag{2}$$

Killey River Chinook salmon abundance will be estimated using a Chapman estimator (Seber 1982):

$$\hat{N} = \frac{\left(n+1\right)\left(M+1\right)}{x+1} - 1 \tag{3}$$

where M is the number of Chinook salmon counted at the Killey River weir.

The variance of Killey River abundance will be estimated as follows (Seber 1982):

$$\operatorname{var}\left(\hat{N}\right) = \frac{\left(n+1\right)\left(M+1\right)\left(n-x\right)\left(M-x\right)}{\left(x+1\right)^2\left(x+2\right)} \tag{4}$$

Conditions for an unbiased Chapman Estimator

The following conditions must be met for the Chapman estimate to be unbiased. Based on satisfying most or all of these conditions, it is assumed that bias in Killey River Chinook salmon escapement estimate will be low in this study.

1) *The population must be closed to births, deaths, immigration, and emigration.*

Tagged fish that enter the Killey River bound for locations upstream of the Killey River weir may die before migrating above the weir, which could introduce bias; however, we will assume that this occurrence will happen to the same proportion of tagged and untagged Chinook salmon.

2) *Marking and handling will not affect the migratory behavior of Chinook salmon.*

It is well documented that Chinook salmon behavior is affected by capture and handling; migration is often delayed in fish that have been handled or survival of tagged fish is lower than untagged fish (Bernard et al. 1999). To mitigate this problem, every possible effort will be made to minimize the effect of handling. First, obviously stressed or injured fish will not be tagged. Holding and handling time of all captured fish will be minimized and tags will be applied as quickly and efficiently as possible. Also, tagged fish that enter the Killey River will have already migrated 35 miles upstream from the tagging location and short term tagging effects will be mitigated. For example, Chinook salmon radiotagged near RM 8.5 demonstrate similar run timing as unmarked fish at the Funny River and Killey River weirs (Reimer 2013).

3) *Killey River Chinook salmon will have equal probabilities of capture in either the first or the second sample; or, marked fish will mix completely with unmarked fish between samples.*

In the marking event, sampling will be conducted over nearly the entire span of the run. We will attempt to capture and distribute tags representatively through time and area by approximately equal daily netting effort and capturing fish from both banks and midchannel. The Killey River weir will attempt to enumerate all fish passage, and radio tags will be identifiable via fixed telemetry sites at the Killey River confluence, at the Killey River weir, and from aerial surveys. To examine the assumption that fish that spawn in the Killey River upstream of the weir will be captured in equal probabilities to those that spawn below the weir, we will examine the age, sex, and length (ASL) composition of tagged fish above and below the weir, and of all Chinook salmon that migrate upstream of the weir. In addition, radio tag fates will be analyzed by size class to examine possible differences in handling effect by size.

4) *Tagged fish will not lose their tags between events.*

Tags may be lost from fish between the tagging event and the resampling event, however radio transmitters are uniquely identifiable, which will allow for any discounting of fish that lost tags. Fish that regurgitate tags almost always do so within the first couple days of implant; however, if a tagged fish bound for upstream of the Killey River weir migrates into the Killey River, but loses the tag prior to migrating upstream of the weir, it would positively bias the Killey River escapement estimate. This occurrence is not likely to happen.

SCHEDULES, DELIVERABLES, AND RESPONSIBILITIES

List of Personnel, Duties, and Schedules:

Tony Eskelin, Fishery Biologist II Project leader.

- May–September 2015
  Radio telemetry: Responsible for field installation and removal of telemetry equipment, maintenance, downloading telemetry data, and conducting aerial surveys.
- Fall/Winter 2015
  Post season data reduction to determine the number of Killey River Chinook salmon escapement and spawning distribution of radio tagged Chinook salmon.
- Winter 2015/2016
  Write and publish 2014–2015 Kenai River Chinook salmon radio telemetry report, winter 2015/2016.

Matt Tyers, Biometrician I Biometrician

- April/May 2015, September 2015
  Assists project leader in operational planning and data analysis.

Adam Reimer, Fishery Biologist III Supervisor

- Supervises project leader.
- Oversees data reduction, analysis, and reporting.

BUDGET SUMMARY FY16

Line	Category	FY15 $K
100	Personnel Services	0.0
200	Travel	0.0
300	Contractual	10.2
400	Commodities	2.4
500	Equipment	0.0
Total		12.6

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APPENDIX A: GENETIC SAMPLING INSTRUCTIONS

Appendix A1.–Collection of axillary process tissue samples for DNA analysis, ADF&G Gene Conservation Lab, Anchorage.

I. General Information

We will be using tissue samples from the axillary process from individual fish to determine the genetic characteristics and profile of a particular run or stock of fish. This is a nonlethal method of collecting tissue samples from adult fish for genetic analysis. The most important thing to remember in collecting samples is that **only quality tissue samples give quality results** so the fish tissues need to be as "fresh" and cold as possible at all times.

Sample preservative: Ethanol (ETOH) preserves tissues for later DNA extraction without having to store frozen tissues. Avoid extended contact with skin.

II. Supplies included with sampling kit:

1. Dog toenail clipper & scissors–use to cut off the axillary process (fleshy spine)
2. Cryovial–a small (2 ml) plastic vial, prelabeled with caps
3. Cryovial rack–white plastic rack or neon box holds cryovials while sampling
4. Ethanol (ETOH)–bulk in Nalgene bottles
5. Squirt bottle–use to fill or "top off" each cryovial with ETOH
6. Paper towels–use to blot any excess water or fish slime off fin
7. Printout of sampling instructions
8. Data sheets or Rite-in-rain booklet
9. Gloves–lab gloves for decanting ethanol
10. Laminated "return address" labels

III. General set-up:

1. To insure that the tissues are kept fresh and cold, working fast is necessary. It is important to have your sampling area and supplies set up **before** the fish are caught.
2. Sample kits will come with prelabeled and numbered cryovials for each individual fish (i.e. 1,2,3, ...). If not, label the empty plastic cryovials with the preprinted labels in advance, with the adhesive labels provided in the sampling kit. Place the cryovials in the cryovial racks in an order that will allow you to work quickly. We find it easiest to set up ten individuals at a time.
3. Get set up in as comfortable a place as possible. You might use a portable table, piece of plywood, or anything to give you a surface at a good height.
4. Have the caps for the tubes set out along with the sampling tools provided.

IV. Sample procedure:

1. Tissue type: Axillary process samples should be "white" skeletal fleshy lobe just above the pelvic fin (see enclosed diagram). Pelvic or pectoral fin ray may be substituted if needed but **NO adipose tissue**.
2. Prior to sampling, fill the vials half way with ETOH. Fill only the vials that you will use for a particular sampling period.
3. Using dog toenail clippers or scissors, remove the entire axillary process or a portion of the lobe that will fit into the cryovial and place the tissue into the designated cryotube labeled as follows (Fish #1 has it's tissue loaded in cryotube labeled # 1 etc.). If you have trouble getting the tissue into the tubes, cut it into smaller pieces.
4. To avoid any excess water, blood, dirt or fish slime in the vial, wipe the axillary process prior to sampling. Place axillary process tissue into ETOH. The tissue/ethanol ratio should be slightly less than 1:3 to thoroughly soak the tissue in the buffer.
5. Top up tubes with ETOH and screw cap on securely. Invert tube twice to mix ETOH and tissue. **It is important** to wipe your toenail clippers, other sampling tools and area off before sampling the next fish to avoid cross contamination between fish.
6. Discard remaining ethanol from the bulk bottle before shipping. **Tissue samples must remain in 2 ml ethanol**, these small quantities do not require HAZMAT paperwork. Store vials containing tissues at room temperature, but away from heat. In the field: keep samples out of direct sun and rain and store capped vials in a dry, relatively cool location. Freezing the tissues collected in ETOH is not required.

V. Data to Record

Most field stations use electronic data recording devices. Otherwise, data forms are included in the sampling kit.

We appreciate your help with the sampling. If you have any questions, please give us a call.

VI. Shipping: No HAZMAT paperwork is required for return shipment of these samples.

Ship samples to:

Ship samples to:

ADF&G – Genetics Lab 333 Raspberry Road Anchorage Alaska 99518	Lab staff	1-907-267-2247
	Judy Berger	1-907-267-2175
	Bill Templin	1-907-267-2234

Shipping code:

APPENDIX B: SAMPLING FORMS

Appendix B1.–Fixed station site log.

Kenai River Chinook Salmon Fixed Station Site Log

Site Code: ___________ Site Name: ________________________________

Date	Time	Rec. /DCC	Batt. Volts	# of blocks	Comments

DCC capacity is 32,024 blocks, R4500 capactiy is 98,304 blocks (stationary)

Appendix B2.–Kenai River Chinook salmon fixed station download form.

Name: ___________________________ Week of:________________

Name	Date	Rec/ DCC	Batt. voltage	Blocks	filename	Comments
Chinook Sonar						
Slikok Creek						
Funny River						
Middle Killey River						
Bean Creek (Kenai Lake outlet)						

APPENDIX C: DATA MAPS

Appendix C1.–Fixed station telemetry data map.

Data map for files:
kkstation10.dta

Data Field Name	Start Column	End Column	Comma Column	Codes/ Comments
Date code	1	8	9	format YYYYMMDD
Hour	10	11	12	24-hour clock
Minute	13	14	15	
Antenna number	16	16	17	1–3
Frequency	18	23	24	KHz, six digit number, 151205–151464
Pulse code	25	27	28	
Mortality signal	29	29	30	Y or blank
(Blank)	31	34	35	
Signal strength	36	38	39	measure of signal strength
Station name	40	42	43	Character code
Latitude	40	50	51	DDD MM.MMMM
Longitude	52	62	63	DDD MM.MMMM
Rivermile	64	67	68	

Appendix C2.–Manual tracking telemetry data map.

Data Field Name	Start Colum	End Colum	Comm Colum	Codes/ Comments
Date code	1	8	9	format YYYYMMDD
Survey method	10	14	15	Boat, Plane or Foot
Survey start	16	19	20	Downstream extent of survey
Survey end rivermile	21	24	25	Upstream extent of survey
Time located	26	29	30	hhmm, 24-hour clock
Frequency	28	33	34	KHz, 6 digit number; Tracking freq is reported 151204-
Pulse code	25	27	28	
Latitude	29	39	40	DDD MM.MMMM
Longitude	41	51	52	DDD MM.MMMM
Signal strength	53	55	56	
Rivermile	57	60	61	
Drainage	64	78	79	
Mortality	80	80		Y or blank