Regional Operational Plan SF.2A.2013.25

Operational Plan: Kenai River Chinook Salmon Creel Survey, Inriver Gillnetting, and Age Composition Study

by

Jeff Perschbacher

February 2014

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

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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

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KENAI RIVER CHINOOK SALMON CREEL SURVEY, INRIVER GILLNETTING, AND AGE COMPOSITION STUDY

by

Jeff Perschbacher

Alaska Department of Fish and Game, Division of Sport Fish, Soldotna

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Division of Sport Fish

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SIGNATURE PAGE

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PURPOSE

A creel survey to estimate sport-angler effort, catch, and harvest of Chinook salmon (*Oncorhynchus tshawytscha*) and an inriver gillnetting study to estimate species catch rates and species composition are critical to inseason management, as well as development of management plans and escapement goals for Kenai River Chinook salmon.

BACKGROUND

The Kenai River (Figure 1) supports the largest freshwater sport fishery in Alaska (Jennings et al. 2009). Angler effort is distributed among the Chinook salmon fishery from mid-May through July, the sockeye salmon fishery from June through early August, the coho salmon fishery in August and September, and a rainbow trout and Dolly Varden fishery from mid-June through April. The Kenai River will likely receive substantial angler effort into the foreseeable future due to its reputation, easy accessibility, and location near major Alaskan population centers.

Chinook salmon returning to the Kenai River exhibit two distinct run-timing patterns: "early" (late April-late June) and "late" (late June-early August). For management purposes, the early run is composed of all Chinook salmon entering the river before July 1 and the late run is composed of those entering on or after July 1. During the 1988 Alaska Board of Fisheries (BOF) meeting, management policies were adopted to govern management of both runs. These policies, amended many times since, establish escapement goal ranges for both runs and specify the management actions available to achieve those goals. The early-run optimum escapement goal range (OEG) is currently 5,300 to 9,000 Chinook salmon. The late-run sustainable escapement goal range (SEG) is currently 15,000 to 30,000 Chinook salmon. The management plans for each run require timely predictions of escapement for inseason management. Age composition data is used postseason to develop brood tables necessary for stock-recruit analysis.

The Alaska Department of Fish and Game (ADF&G) implemented a creel survey in 1974 in response to an increase in the number of boat anglers targeting Chinook salmon, and to monitor the age, sex, and length (ASL) composition of harvested Chinook salmon. Prior to 1991, anglers were surveyed in the entire area open to Chinook salmon fishing (downstream of Skilak Lake, see. Since 1991 anglers were surveyed only in the downstream section of the Kenai River (between the Warren Ames Bridge (RM 5.1)[1] and the Soldotna Bridge (RM 21.1) (see Figure 2)[2]. Beginning in the mid 1980's, mark-recapture studies using gillnets for the marking phase were used to estimate the inriver run of Chinook salmon. The Division of Sport Fish (SF) began using sonar to estimate the inriver run of Chinook salmon in 1987 while the inriver gillnetting study provided age-sex-length (ASL) compositions of the inriver run. Inriver gillnetting was standardized to include catch rates in 1998 near the sonar site at RM 8.5, and further standardized to include species composition in 2002. This operational plan describes the creel survey and inriver gillnetting project design for the 2013 field season.

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[1] Warren Ames Bridge is traditionally the demarcation point between the lower end of the sport fishery and the beginning of the personal use dipnet fishery. We assume negligible catch and harvest in sport fisheries below the Warren Ames Bridge.

[2] Similar estimates are also obtained postseason from the Statewide Harvest Survey, and since 2006 from Freshwater Guide Log Books. However, the creel survey provides estimates inseason which allows for more effective inseason management.

OBJECTIVES

This project estimates parameters necessary for inseason management and postseason stock-recruit analysis of Kenai River Chinook salmon. These parameters include: 1) catch and harvest of Chinook salmon by the inriver sport fishery (for inseason monitoring of escapement), 2) proportion of Chinook salmon passing the Chinook salmon sonar site at RM 8.5 (used in augmenting the sonar estimate of inriver abundance), and 3) total return of Chinook salmon by brood year (for stock-recruit analysis). Specific primary objectives[3] are as follows:

1. Estimate catch and harvest of Chinook salmon[4] by the sport fishery in the mainstem Kenai River between Warren Ames and Soldotna Bridges[5] from 16 May through 30 June (early run) and from 1 July through 31 July (late run), such that the relative precision of the estimates for each run is within .20, or 1,000 fish, of the true values 95% of the time[6].
2. Estimate daily proportions of fish passing through the insonified zone at RM 8.5 (midriver) after high tide that are Chinook salmon, such that the resulting seasonal estimates of Chinook salmon passage[7], for each run, are within .10 of the true values 90% of the time.
3. Estimate total return for the early- and late-runs, by brood year, such that the estimates are within .10 of the true values 90% of the time. Total return consists of the inriver run as estimated by the sonar at RM 8.5, plus all commercial and/or sport harvest downstream of the sonar. Total return originating from one brood year is the sum of age-specific total runs across several calendar years. Secondary-objectives[8] associated with each of the major components of total return are as follows:
    a) Estimate the proportion by age of the Chinook salmon population passing the Chinook salmon sonar site RM 8.5, from May 16 through 10 August such that all age-proportion estimates, for each run, are within 0.10 of the true values 95% of the time.
    b) Estimate the proportion by age of the Chinook salmon harvested by the Central District Upper Subdistrict Eastside set gill net fishery (ESSN, late run only) within 0.10 of the true values 90% of the time[9].
    c) Estimate the proportion by age of Chinook salmon harvested by the sport fishery in the mainstem Kenai River between Warren Ames and Soldotna Bridge[10] such that all age-proportion estimates, for each run, are within 0.20 of the true values 80% of the time.
4. Test the hypothesis that the proportion of small Chinook salmon (<650mm) that are sampled nearshore in drift gillnets at RM 8.5 (pilot study) is the same as the proportion of small Chinook salmon that are sampled from the midriver netting corridor (existing project).

---

[3] Objective 3 related to estimation of total returns by brood year and stock recruit analysis are reported in ADF&G Fishery Data Series (FDS): *Stock Assessment of early- and late-run Chinook salmon in the Kenai River*.

[4] Harvest is the number of fish caught and retained while catch is the total number of fish caught (including those intentionally released).

[5] Catch and harvest upstream of the Soldotna Bridge are not estimated directly by this project. However, preliminary inseason estimates are obtained indirectly, using paired historical estimates above and below the bridge. See Study Design and Data Analysis sections.

[6] High relative precision is neither possible nor necessary when the harvest is small; meeting the absolute precision goal is sufficient in this case.

[7] Daily Chinook salmon proportions are multiplied by sonar estimates of total upstream midriver fish passage to obtain net-apportioned daily estimates of Chinook salmon passage to compare with daily sonar estimates of Chinook salmon passage.

[8] These sub-objectives lead to sample sizes that, on average, satisfy the precision criterion for historical estimates of total return listed in primary objective 3.

[9] The ESSN commercial fishery sampling design is described in another operational plan (Eskelin FY13/FY14 Operational Plan Upper Cook Inlet Commercial Eastside Set Gillnet Chinook Salmon Sampling Study).

[10] Age proportions from the sport fishery below the Soldotna bridge (RM 21) are used as a proxy for age proportions below the sonar (RM 8.5).

In addition to the objectives outlined above, this project is responsible for completing the following tasks[11]:

1. Estimate total sport angler effort, by run, in angler-hours. Precision of the effort estimates are driven by that of the catch and harvest estimates (Objective 1).
2. Estimate catch per unit effort (CPUE) and harvest per unit effort (HPUE) of sport anglers for days surveyed between Warren Ames and Soldotna Bridges.
3. Estimate daily CPUE of Chinook salmon captured in midriver gillnets at RM 8.5. Precision of CPUE estimates are driven by that of the Chinook salmon proportion estimates (Objective 2).
4. Insert esophageal radio transmitters in Chinook salmon captured in inriver gillnets between May 16 and August 10, in conjunction with *Kenai River King Salmon Abundance and Migratory Timing Study*[12].
5. Investigate the feasibility of sampling Chinook salmon that migrate outside of the midriver netting corridor. During 2 days per week, drift gillnets nearshore (behind the RM 8.5 sonar transducer) to capture Chinook salmon.[13]
6. Determine the age, sex, and length compositions of Chinook salmon captured nearshore in drift gillnets at RM 8.5.
7. Quantify the effect of size-selective sampling on DIDSON-based estimates of Chinook salmon passage SSART estimates of inriver abundance, and estimates of the age composition of each run.
8. Examine Chinook salmon sampled from the sport harvest and the inriver drift gillnets for external sexual characteristics, presence or absence of the adipose fin, and presence of a radio tag.
9. Collect tissue samples from Kenai River Chinook salmon sampled from inriver gillnets and the sport fish harvest for genetic analysis[14].
10. Collect secchi disk and water temperature readings midchannel at RM 15.3 during creel survey sampling days and collect daily secchi disk readings at RM 8.5.

METHODS

STUDY DESIGN

Objective 1 and Tasks 1-2: Inriver Sport Effort, Catch, and Harvest

A stratified two-stage roving-access creel survey (Bernard et al. 1998) will be used to estimate sport fishing effort, catch, and harvest of Chinook salmon from the Warren Ames Bridge to the Soldotna Bridge [15]. First-stage sampling units will be days. Daily catch and harvest will be estimated as the product of effort (angler hours) and CPUE or HPUE, respectively. Second-stage units for estimating effort will be periodic counts of anglers done from a boat. Second-stage

[11] Tasks are of secondary importance and can be accomplished without driving study design and sample size.

[12] Reimer FY13/FY14 Operational Plan, *Kenai River Chinook Salmon Abundance and Migratory Timing Study*.

[13] A separate crew will be drifting gillnets nearshore from each bank to where the normal gillnetting is conducted.

[14] Tips of the dorsal fin will be taken from Chinook salmon sampled in the inriver gillnetting study and tips of the axillary process will be sampled from Chinook salmon sampled in the creel survey.

[15] Predicting inseason estimates of effort, catch, and harvest upstream of Soldotna Bridge are described in Memorandum: *Projected savings in Kenai River Chinook salmon in-river fisheries* (KenaiKSeoSvgs, Tim McKinley), dated 5/7/2012.

units for estimating CPUE and HPUE will be angler-trips, sampled by interviewing anglers who have completed fishing for the day and are exiting the fishery.

A potential problem with the current study design is that the criteria for recording angler effort during angler interviews are not necessarily equivalent to the criteria used during angler counts. For example, an angler as observed during the angler boat count could be defined as inactive (due, for instance, to numerous short trips between fishing holes) for a greater fraction of his/her fishing trip than he/she would recall during an interview. In this particular scenario an angler would report his angling time (hours actively fishing) higher than it actually was, which would result in a lower catch rate and an underestimation of CPUE, HPUE, catch, and harvest. Criteria for recording angler effort, and angler counts were attempted in 2010, 2011, and 2012. To estimate total trip length, creel technicians asked for each boats time of launch during 2010 and 2011; 2012 was incomplete due to fishery restrictions. Angler counts to record total anglers considered to be fishing for Chinook salmon regardless of line or travel status was unsuccessful due to time restraints, and the complexity of the Kenai River's mixed stock fisheries of sockeye, coho, and Chinook salmon. Although discrimination of the total time an angler or boat was specifically targeting Chinook salmon was unsuccessful, the proportion of time guided and unguided anglers reported to have fished during the day was different. The proportion of time an angler spent fishing each day was the ratio of time the angler reported to have been fishing to the total time the boat was on the river (launch time to time of interview). Guided anglers reported to be actively fishing 75% of the total time they were on the river, and unguided angler reported to be actively fishing 81% of the total time on the river. Assuming guided anglers are more efficient, and have a better knowledge of the river and fishing holes, a greater proportion of their day would be expected to be spent fishing compared to unguided anglers. These preliminary results may lead credence to the fact that anglers (especially unguided) may be reporting to actively fish longer than in actuality. During 2013, creel survey technicians will stress "actively fishing for Chinook salmon" does not include time spent launching the boat, traveling upstream/downstream, fishing for other species, or other activities that do not include rigging or having a line in the water.

The creel survey will be conducted from 16 May through July 31 on the Kenai River between the Warren Ames Bridge and the Soldotna Bridge. A fishing day is defined as 0400-2359 hours (20 hours); however, guided anglers are restricted to a 12-hour fishing day (0600-1800) by regulation.

Creel Survey Stratification

Angler counts will be geographically stratified into the following three areas;

1. Between the Warren Ames Bridge and the Chinook salmon sonar site (RM 8.5).
2. Between the Chinook salmon sonar site (RM 8.5) and the proposed new Chinook salmon sonar site (RM 13.7).
3. Between the proposed new Chinook salmon sonar site (RM 13.7) and the Soldotna Bridge.

The Chinook salmon sonar site at RM 8.5 will be referred to as the lower sonar, while the Chinook salmon sonar site at RM 13.7 will be referred to as the upper sonar hereafter. Counts between the lower sonar site and the upper sonar site will be used for preliminarily estimation of

sport angler effort, CPUE, and HPUE within this stratum. Only counts above and below the lower sonar are currently required for this project.

Angler counts and catch and harvest rates have differed significantly between biweekly or weekly time intervals, between weekdays and weekend/holidays, and between guided[16] and unguided user groups (Reimer 2004b). Therefore, the creel survey will be temporally stratified into weekly intervals, by day type (weekdays and weekends/holidays) and will be post-stratified by angler-type to improve precision and to minimize bias. Angler effort will be stratified upstream/downstream of the lower sonar and upstream/downstream of the upper sonar site. Estimates of CPUE and HPUE will be stratified upstream/downstream of the upper sonar site, but not the lower sonar site[17]. Based on these factors, the following strata will be used for estimating creel statistics:

Stratum	# of strata	Type of strata
Geographic	3	Warren Ames Bridge to lower sonar, lower sonar to upper sonar, upper sonar to Soldotna Bridge
Temporal	13	Weekly
Day type	2	Weekdays, Weekends/Holiday
Angler type	2	Guided and Unguided

During the early run, two of the four available powerboat fishing weekdays will be randomly chosen to sample. Both weekend days will be sampled each week (Table 1).. The two person crew four days per week sampling schedule has been in place since 2002 and has not hindered our ability to meet objective precision criteria. An exception to this sampling regime is the week of 21-27 May when two days were selected randomly from the three weekend/holiday days available [Saturday, 25 May; Sunday, 26 May; and Monday, 27 May (Memorial Day)]. Non-holiday Mondays (when only unguided fishing from drift boats is allowed) will not be sampled during the early run because angler effort, catch, and harvest have been observed to be less than 1% of total early-run angler effort, catch, and harvest; however, angler effort will be indexed by conducting one angler count between the hours of 10:00-14:00. Thus, the early run will be composed of the following 28 strata:

[16] Guides register and place a decal on their boat(s), making guide boats easily identifiable on the river.

[17] Past attempts to stratify H/CPUE by location were unsuccessful due to small sample sizes below the lower sonar. Thus, stratified estimates of effort will be multiplied by pooled estimates of HPUE regardless of location, to estimate harvest above and below the lower sonar.

Table 1.–Proposed sampling schedule for early-run Chinook salmon in Kenai River, 2013.

Stratum	Time Stratum	Dates	Day Type	Angler Type
1	16-19 May	16, 17 May	Weekday	Unguided
2				Guided
3		18, 19 May	Weekend/Holiday	Unguided
4		18-May		Guided
5	21-27 May	21, 22 May	Weekday	Unguided
6				Guided
7		25, 26 May	Weekend/Holiday	Unguided
8		25-May		Guided
9	28 May - 2 June	28, 31 May	Weekday	Unguided
10				Guided
11		1, 2 June	Weekend/Holiday	Unguided
12		1-Jun		Guided
13	4-9 June	4, 5 June	Weekday	Unguided
14				Guided
15		8, 9 June	Weekend/Holiday	Unguided
16		8-Jun		Guided
17	11 - 16 June	13, 14 June	Weekday	Unguided
18				Guided
19		15, 16 June	Weekend/Holiday	Unguided
20		15-Jun		Guided
21	11 - 16 June	19, 20 June	Weekday	Unguided
22				Guided
23		22, 23 June	Weekend/Holiday	Unguided
24		22-Jun		Guided
25	11 - 16 June	26, 28 June	Weekday	Unguided
26				Guided
27		29, 30 June	Weekend/Holiday	Unguided
28		29-Jun		Guided

During the late run, the sampling design is the same as the early run with two of the four available powerboat fishing weekdays randomly chosen, with both weekend days sampled (Table 2). Non-holiday Mondays during the late run will consist of single boat count between 10:00-14:00, to index angler effort on late run, non-holiday Mondays.

Table 2.–Proposed sampling schedule for late-run Chinook salmon in the Kenai River, 2013.

Stratum	Time Stratum	Dates	Day Type	Angler Type
1	2-7 July	2, 5 July	Weekday	Unguided
2				Guided
3		6, 7 July	Weekend/Holiday	Unguided
4		6-Jul		Guided
5	9-14 July	9, 11 July	Weekday	Unguided
6				Guided
7		13, 14 July	Weekend/Holiday	Unguided
8		13-Jul		Guided
9	16-21 July	18, 19 July	Weekday	Unguided
10				Guided
11		20, 21 July	Weekend/Holiday	Unguided
12		20-Jul		Guided
13	23-28 July	24, 25 July	Weekday	Unguided
14				Guided
15		27, 28 July	Weekend/Holiday	Unguided
16		27-Jul		Guided
17	30-31 July	30, 31 July	Weekday	Unguided
18				Guided

During the early run, the creel survey will sample 28 of 41 (68%) days when fishing from powerboats is allowed. During the late run, the creel survey will sample 18 of 26 (69%) possible powerboat fishing days. The creel survey will sample 46 of 67 (69%) possible powerboat fishing days the fishery is open from May 16 to July 31.

Creel Survey Sampling

Completed-trip angler interviews will be conducted at access locations between angler counts and will not begin until after the first count of the day has been completed. Analysis of the 2001 data showed that very few interviews will be lost by not interviewing until after the first count of the day and that the mean CPUE and HPUE of anglers interviewed before 0800 was similar to the overall mean (Reimer 2003). Technicians will attempt to interview all anglers exiting the fishery at their interview location.

Anglers will be interviewed at the following five access locations:

1. Centennial Campground (RM 20.3)
2. Poacher's Cove (RM 17.4)
3. River Bend Campground (RM 14.0)
4. Stewart's Landing (RM 14.1)
5. Pillars Boat Launch (RM 12.3)
6. Eagle Rock Launch Area (RM 11.4)

Most anglers access the early-run fishery in May at Pillars Boat Launch and Stewart's Landing (Reimer 2003). The department was allowed access during the early run in 2012 after being denied access since 2000. We will begin interviewing at Pillars Boat Launch and Stewart's Landing on May 16 and will add more access locations when boat traffic increases at each location. The draft 2013 schedule, which will likely be revised during the season, commences sampling at Pillars Boat Launch and Stewart's Landing on May 16, Centennial Campground on May 28, River Bend Campground on June 1, Poacher's Cove on June 19, and Eagle Rock Boat Launch on July 6.

Angler counts will be conducted from a boat and four counts will be made during each sample day. Time to begin the first count (0400, 0500, 0600, 0700, or 0800) will be chosen at random and all remaining counts in a day will be done systematically every five hours thereafter. This schedule guarantees at least two counts during the guided-angler hours of 0600-1800. Although each angler count may take up to one hour to complete, they are treated as instantaneous counts of the entire study area. Since the study area is 14.8 miles long, it can take up to an hour to drive the boat to and from interview locations before and after angler counts. To maximize interview time, the direction (upstream or downstream) that the technician travels to conduct angler counts will be selected to minimize travel distance and time.

With four equally spaced angler counts per day, three periods for conducting angler interviews are always available between angler counts, plus one possible additional period after the last count. Scheduling of interviews at access locations will proceed as follows. During May to early June (when fewer than 4 access locations are being sampled) each location will be sampled at least once before any are repeated, with time and access location paired randomly. Beginning in mid-June (when there are more available access locations than sampling periods) 3-4 access locations will be sampled without replacement from the 5 available with time and access location paired randomly. The creel survey sampling schedule is in Appendix A.

Non-holiday Mondays are excluded from the regular creel study. Results of including Mondays into the creel survey during 2009 and 2010 indicate less than 5% of harvest occurs on non-holiday Mondays during the late run. A shift in angler effort towards mid-day, compared to angler counts conducted in 1999-2001, warranted recalibration of the index (Perschbacher 2012c). During 2013, a single index angler count will be conducted during the middle of the day (1000 to 1400), at a time and in a direction that is convenient to the project biologist.

The current objective criterion[18] for precision of catch and harvest estimates have been met every year except for early-run catches in 2005, and 2007. Early and late-runs were restricted before being closed to fishing for all Chinook salmon during 2012. Estimates of catch and harvest, with estimated absolute precision (AP)[19], and estimated relative precision (RP) from 2002-2012 are presented in Table 3.

Objective 2 and Task 3: Proportion Chinook Salmon Inriver at RM 8.5

Gillnets of two mesh sizes (5.0 and 7.5 inches) will be used to estimate species composition within the insonified area of the lower Chinook salmon sonar site, and to collect ASL and genetic samples. There will be no inriver gillnetting conducted at the upper sonar site in 2013. The nets are constructed of a multi-fiber mesh in colors that closely match Kenai River water. Nets of two mesh sizes will be fished with equal frequency. Specifications are shown below:

1. 5.0 inch (stretched mesh) multi-fiber, 80 meshes deep, 10 fathoms long, Shade 1 (clear-steel blue), MS73 (14 strand) twine.
2. 7.5 inch (stretched mesh) multi-fiber, 55 meshes deep, 10 fathoms long, Shade 1, MS93 (18 strand) twine.

[18] The current objectives are: harvest and catch within .20, or 1000 fish, 95% of the time.

[19] Absolute and relative precision levels were based on 95% C.I.'s.

Table 3.–Estimates of harvest and catch, with estimated absolute precision (AP) and estimated relative precision (RP) for early and late runs of Kenai River Chinook salmon from the Soldotna Bridge to Warren Ames Bridge, 2002-2012 (Reimer 2004a; 2004b; Reimer 2007;Eskelin 2007; 2009; 2010; Perschbacher 2012a; 2012b; 2012c; 2012d, In prep).

		Harvest				Catch			
Run	Year	N	SE	AP	RP	N	SE	AP	RP
Early	2002	376	85	167	0.44	419	84	165	0.39
	2003	1,948	399	782	0.40	2,817	484	949	0.34
	2004	2,285	338	663	0.29	3,534	435	853	0.24
	2005	2,876	329	645	0.22	4,430	735	1,441	0.33
	2006	3,397	412	808	0.24	4,523	441	864	0.19
	2007	2,645	456	894	0.34	3,944	645	1,271	0.32
	2008	2,602	218	427	0.16	3,552	304	596	0.17
	2009	898	143	280	0.31	1,058	151	296	0.28
	2010	837	94	184	0.22	1,203	151	296	0.25
	2011	816	156	306	0.38	1,090	186	365	0.33
	2012	316	93	182	0.58	471	109	214	0.45
Late	2002	11,381	715	1,401	0.12	16,866	1,028	2,015	0.12
	2003	13,837	1,168	2,289	0.17	28,769	1,746	3,422	0.12
	2004	14,493	975	1,911	0.13	22,456	1,462	2,865	0.13
	2005	15,313	1,161	2,276	0.15	25,663	2,214	4,339	0.17
	2006	13,190	905	1,774	0.13	19,788	1,323	2,593	0.13
	2007	9,258	637	1,255	0.14	13,408	815	1,606	0.12
	2008	9,272	726	1,423	0.15	10,929	825	1,618	0.15
	2009	7,378	487	955	0.13	10,352	728	1,427	0.14
	2010	5,375	441	864	0.16	6,039	462	906	0.15
	2011	6,458	525	1,029	0.16	9,580	716	1,403	0.15
	2012	105	52	102	0.97	1,299	160	314	0.24

Netting will be scheduled to begin 5 hours before low tide to one hour after low tide in 2013. The preliminary sampling schedule is in Appendix A2. The study area is approximately 0.3 mi in length, located just downstream of the Chinook salmon sonar site at RM 8.5, and was chosen because of its location relative to the sport fishery, and is not known as spawning habitat for Chinook salmon (Miller and Burwen 2000). The location of the drifts within the study area is critical to the success of the species apportionment part of the project (Objective 2 and 3a). The goal is to net and sample fish that will pass through the insonified area of the river channel. During 2002-2011 nets were drifted within the split-beam sonar insonified area that extended from a point 15m out from the right-bank transducer to 10m out from the left-bank transducer. For historical comparability, gillnets continued to be drifted in the same location during 2012 even though the DIDSON sonar insonfies a larger area than the split-beam sonar. New in 2013, the nets will be drifted within the DIDSON insonified area that extends from a point 3m out from the right-bank transducer to 3m out from the left-bank transducer. Netting will begin at the upstream end of the study area, immediately downstream from the sonar transducers. The net will be deployed across the river such that the entire length of the net is within the same section of the channel as the DIDSON insonified zone specified. The crew will then drift the net downriver roughly perpendicular to the bank, and within the cross-section area of the insonified area. The drift will be terminated if any of the following occur: 1) the net becomes snagged on the bottom or is not fishing properly, 2) the net is not fishing in the area insonified by the Chinook salmon sonar, 3) the end of the study area is reached or, 4) at least 5 fish are thought to be captured in the net.

Task 4: Radio Transmitter Deployment

A separate Kenai River Chinook salmon Abundance and Migratory Timing Study will be conducted during 2013 and the inriver gillnetting study will perform the marking event. Advanced Telemetry Systems (ATS, Isanti, MN) model F1845B radio transmitters will be deployed in Chinook salmon from May 16 through August 10. Chinook salmon must be greater than 550mm MEF to receive a radio tag. During May 16 through July 5, all Chinook salmon sampled for ASL will receive a radio transmitter; during July 6 through August 10, every other Chinook salmon sampled for ASL will receive a radio tag. Fish with profusely bleeding gills or observed to be lethargic will be released without tagging to minimize potential differences in survival and behavior between tagged and untagged populations.

This additional task should not interfere with the main objectives of the inriver gillnetting study. The gillnetting sample design has changed little since 2002, although the Kenai River Chinook salmon sonar transitioned from split-beam to DIDSON in 2012. Precision criteria (within .10 of true value 90% of the time) have not been met in 5 of the last 6 years of the early run, and during the last 3 years of the late run possibly due to low Chinook salmon passage (Table 4).

Table 4. Net-apportioned estimates of Chinook salmon passage at RM 8.5 (2002-2012), and relative precision (90% interval; RP90), derived[20] from daily gillnet estimates of Chinook proportion from this project and unfiltered sonar estimates of Chinook salmon passage at RM 8.5 (Objective 2).

	Early Run				Late Run			
Year	$\hat{N}$	se($\hat{N}$)	cv	RP90	$\hat{N}$	se($\hat{N}$)	cv	RP90
2002	6,132	321	5.2%	8.6%	41,804	1639	3.9%	6.5%
2003	12,657	406	3.2%	5.3%	61,618	2,005	3.3%	5.4%
2004	17,998	710	3.9%	6.5%	75,049	2,679	3.6%	5.9%
2005	12,334	592	4.8%	7.9%	85,593	3,456	4.0%	6.6%
2006	7,449	505	6.8%	11.1%	48,824	1,573	3.0%	5.0%
2007	4,516	299	6.6%	10.9%	29,455	1,516	5.1%	8.5%
2008	4,822	349	7.2%	11.9%	36,012	1,426	4.0%	6.5%
2009	2,834	73	2.6%	4.2%	17,725	297	1.7%	2.8%
2010	2,644	297	11.2%	18.5%	12,501	768	6.1%	10.1%
2011	4,041	273	6.8%	11.1%	18,766	1,421	7.6%	12.5%
2012	2,786	298	10.7%	17.6%	20,435	1,667	8.2%	13.4%

Note: Net apportioned estimates are based on split-beam sonar (2002-2011), and DIDSON (2012) passage.

Objective 3: Total Return by Brood Year

Total return by brood year is the sum of age-specific returns across multiple calendar years. For example, the total return from the 1990 brood year consists of 3-year-old fish returning in 1993, 4-year-olds returning in 1994, 5-year-olds returning in 1995, 6-year-olds returning in 1996, and 7-year-olds returning in 1997. In each case, the age specific return is the sum of age-specific inriver run (RM 8.5) as estimated by the sonar, age-specific commercial harvest (marine, late run only), age-specific personal-use harvest below the Warren Ames bridge, and age-specific sport harvest below the sonar at RM 8.5.

[20] Relative precision levels were based on 90% C.I.s. of Chinook salmon passage. See Data Analysis section for details.

Inriver Run by Age

Chinook salmon captured in midriver gillnets within the insonified area (RM 8.5) will constitute the ASL sample for the inriver run. Samples will be stratified temporally, post season, into approximately three-week time intervals[21] (two strata during each run), if found to be significantly different:

1. 16 May - 6 June
2. 7 June - 30 June
3. 1 July - 20 July
4. 21 July - 10 August

Assuming a simple random (not stratified) sample and 15% unreadable scales, a minimum of 149 fish in each run will be required to be within 10 percentage points of the true value 95% of the time (Thompson 1987). This is equivalent to 127 valid ages for each run. Since 2002, the sample size goal has been met for both the early and late runs except for the 2012 early run (Table 5).

Table 5.- Number (n) of Kenai River Chinook salmon with valid ages sampled with gillnets from the inriver run, and relative precision (95% interval; RP95) for ages 1.3 and 1.4, 2002-2012 (Reimer 2004a, 2004b; 2007, Eskelin 2007; 2009; 2010, Perschbacher 2012a; 2012b; 2012c; 2012d; *In prep.*).

	Early Run			Late Run		
Year	n	RP95 (1.3)	RP95 (1.4)	n	RP95 (1.3)	RP95 (1.4)
2002	306	5.4%	5.5%	945	2.4%	3.1%
2003	724	2.9%	3.6%	1,114	2.4%	2.9%
2004	351	4.9%	5.2%	933	2.8%	3.2%
2005	362	4.7%	5.2%	519	3.4%	4.0%
2006	251	4.9%	6.1%	703	2.6%	3.7%
2007	213	9.5%	9.1%	437	5.0%	6.3%
2008	163	7.6%	7.6%	496	3.5%	4.3%
2009	128	7.5%	8.6%	338	3.4%	5.3%
2010	137	8.7%	6.6%	221	6.5%	6.5%
2011	204	6.7%	7.2%	327	4.5%	5.7%
2012[a]	82	10.6%	10.3%	232	6.3%	6.4%

[a] Sample size goal of 127 readable scales was not met during 2012 early run due to low abundance

Commercial Harvest by Age

A separate study will be conducted in 2013 and will estimate the number of Kenai River Chinook salmon harvested in the ESSN fishery and the age composition FY13/14 Eskelin: Upper Cook Inlet commercial eastside Set gillnet Chinook salmon sampling study.

Sport Harvest by Age

The recreational harvest will be sampled for age composition by collecting scale samples from Chinook salmon encountered during creel survey angler interviews. Angler type (guided or unguided), length (MEF), and sex will be recorded for each Chinook salmon. Assuming a

[21] Previous experience has shown that age composition changes relatively slowly; thus two strata per run are sufficient to reduce bias.

simple random (not stratified) sample and 15% unreadable scales, 24 fish are required to be within 20 percentage points of the true value 80% of the time (Thompson 1987). This is equivalent to 19 valid ages for each run. Since 2002, the sample size goal has been met for both the early and late runs except for the 2012 late run (Table 6).

Table 6.- Number (n) of Kenai River Chinook salmon sampled from the creel survey and relative precision (80% interval, RP80) for ages 1.3 and 1.4 fish during the early and late runs, 2002-2010 (Reimer 2004a; 2004b; 2007, Eskelin 2007; 2009; 2010, Perschbacher *in prep A, B, C, and D).* Relative precision RP80 is 1.28 times the coefficient of variation of the estimate.

	Early Run			Late Run		
Year	n	RP80 (1.3)	RP80 (1.4)	n	RP80 (1.3)	RP80 (1.4)
2002	31	11.5%	11.5%	275	3.8%	3.8%
2003	81	9.0%	9.0%	311	2.6%	3.8%
2004	99	6.4%	6.4%	305	3.8%	3.8%
2005	134	5.5%	5.5%	429	2.4%	2.7%
2006	129	3.4%	4.8%	313	2.9%	3.5%
2007	106	6.0%	6.7%	237	3.7%	4.8%
2008	198	7.3%	6.6%	218	6.1%	6.7%
2009	66	12.6%	12.8%	195	5.7%	6.8%
2010	56	14.1%	11.1%	184	7.2%	7.0%
2011	56	12.7%	13.1%	233	5.3%	6.4%
2012[a]	38	8.9%	9.3%	4	NA	49.0%

[a] Sample size goal of 19 readable scales was not met during 2012 late run due to low abundance and fishery restrictions. "NA"=no age-1.3 fish harvested.

Brood Year Return Reconstruction

Theoretically, to reconstruct returns by brood year, age composition must be estimated for each component of total return. In practice, only major components need be sampled for age composition, and the estimates need not be overly precise [22]. In previous operational plans, it was demonstrated that individual sample size goals of 149, 119, and 24 for the late-run inriver run, ESSN harvest, and late-run sport harvest result in achieving the overall precision objective for brood year returns. This analysis was based on a sampling error CV of 2.2% for the inriver run, which we now know to be unrealistically low (Miller et al. 2012). Kenai River Chinook salmon run reconstructions are currently in the process of being revised, given recent advances in understanding about historical run sizes. Upon completion of this revision, the sample size analysis will be repeated.

Objective 4 and Tasks 5–8: Nearshore Gillnetting

The netting program will be supplemented with a small auxiliary study in 2013. In 2012, relatively large numbers of small (<650 mm MEFL) Chinook salmon were sampled at tributary weirs (Funny River and Killey River) that the netting program cannot account for. At the Funny River weir 62% of sampled Chinook salmon were small. At the Killey River weir 20% of sampled Chinook salmon were small. By comparison, in the netting program, only 12% of Chinook salmon sampled in the early run were small. When multiplying length compositions by

[22] Simulation studies show that stock recruit analysis is relatively insensitive to moderate errors in age composition estimates. For example a simple random sample size of less than 100 has been shown to produce sufficiently precise age composition for total run.

weir and sonar passage estimates, more small fish passed the two weirs than were estimated to have passed rm 8.5 in the early run. Evidence of size-selective sampling in the late run occurs in the ESSN fishery which in some years captures large numbers of small Chinook salmon that aren't reflected in the netting program. The 5.0" net should capture those fish efficiently; therefore we suspect that something other than net selectivity may be causing the discrepancy. A tendency for small Chinook to travel closer to shore, consistent with wave drag, is a possible explanation (Hughes 2004).

Failure to get a representative sample of Chinook with the nets would bias the mixture model estimates of Chinook passage and SSART estimates of abundance. Undersampling small kings would underestimate the total number of Chinook salmon and the fraction of fish that are small. The amount of bias is depended on how different the nearshore length distribution is relative to the midriver length distribution.

For this pilot study, nearshore gillnetting will be conducted with a separate crew in addition to the normal midriver gillnetting. Gillnets will be deployed from each bank to a point 3m from the DIDSON sonar face, where the midriver gillnetting begins. Capturing techniques will be similar to midriver gillnetting, although modifications may be done as appropriate. The nearshore netting schedule was designed for two netting days per week beginning approximately 2 hours before high tide to 4 hours after high tide (Appendix A3). Modifications to timing of the schedule relative to the tides may be done dependent of catch rates, water levels, and the feasibility of netting as the tide recedes. All other aspects of nearshore gillnetting will be similar to the midriver gilletting regarding data collection and analysis.

DATA COLLECTION

Objective 1 and task 1-2: Creel Survey of Inriver Sport Fishery

The creel survey crew will be composed of two fishery technicians, with both technicians working each sampling day. The Chinook salmon creel survey will be conducted from May 16 through July 31. Each technician is responsible for conducting angler interviews and angler counts during their shift. Each technician will also take a Secchi disk and water temperature reading in the main river channel adjacent to River Quest Resort (RM 15.3) at the beginning of his or her shift to monitor river conditions that affect the sport fishery. Information regarding any other condition that technicians think is unique or might otherwise affect the fishery will be recorded in a field notebook. Finally, technicians will return their data sheets and field computer to the Soldotna office daily to be downloaded into a computer database.

Angler Counts

Angler counts are conducted as the boat is driven through the entire length of the survey area. Upon arrival at the Soldotna Bridge, Stewart's Landing, Chinook salmon sonar site, or Warren Ames Bridge the technician will record the count data for that river section. A count is usually accomplished in less than one hour.

The total number for each of the following categories is tallied using ten thumb counters:

1. Unguided power boats.
2. Unguided drift boats.
3. Guided power boats.

4. Guided drift boats.
5. Unguided anglers fishing from power boats.
6. Unguided anglers fishing from drift boats.
7. Guided anglers fishing from power boats (excluding the guide).
8. Guided anglers fishing from drift boats (excluding the guide).
9. Shore anglers above and below Sockeye salmon sonar site (RM 19.2) during July.
10. Active power boats (no active anglers on board, but under power at time of count).

Only counts numbered (5-8) are required for this project; numbers (1-4), and (9-10) are collected as auxiliary information for management and historical comparisons. A person is tallied as an angler if he/she is fishing or rigging a rod. If a boat is traveling with no lines in the water, none of the people in that boat are considered to be angling. The count numbered (9) will record boats that are under power but do not contain anglers actively fishing or preparing to fish (i.e. rigging their lines). Upon completion of each angler count for a given location, the values will be recorded electronically using data entry software on a Juniper Systems Inc.™ Allegro CX field computer. If the field computer is not functioning properly, angler count data will be recorded manually on an angler count data form (Appendix B1).

Angler Interviews

Between angler counts, the technician will travel by boat to the scheduled access location and interview anglers who are finished angling for the day (completed-trip interviews). The technician will attempt to interview all anglers leaving the fishery at their location. If more anglers are leaving the fishery than can be interviewed, the technician will select anglers to interview in the order they arrived at the launch. It is critical that the decision to interview an angler is <u>not</u> based on their success (in harvesting or catching fish). During each completed-trip interview, the following information will be recorded from each angler contacted:

1. Time of interview.
2. Boat type (power or drift).
3. Angler type (guided or unguided).
4. Total hours fished downstream of the Soldotna Bridge, not including travel time or time spent in the boat after the angler has harvested a Chinook salmon, rounded to the nearest 1/4 hour.
5. If angler fished exclusively upstream, or downstream of upper sonar site (RM 13.7)[23].
6. Number of Chinook salmon harvested downstream of the Soldotna Bridge[24].
7. Number of Chinook salmon released downstream of the Soldotna Bridge.

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[23] Data collected will be used post season to test for differences in HPUE and CPUE rates between anglers who fished exclusively upstream or downstream of the upper Chinook salmon sonar site. A series of z-tests will be used to test for the differences.

[24] Location of harvested Chinook salmon will be recorded as upstream (1) or downstream (2) of upper sonar site. Data collected will be used post season to estimate harvest statistics related to the upper Chinook salmon sonar site.

8. *Early run only*: for each Chinook salmon released the angler will be asked if the fish was below the lower limit (less than 46 inches), within the protected slot limit (46 – 54.99 inches total length) or above the slot limit (55 inches or greater).
9. If a harvested Chinook salmon has a radio transmitter then the approximate location (RM) of harvest, frequency #, and pulse code # of radio transmitter will be recorded.[25]

Data will be recorded electronically on the field computer and if the computer is not working properly, data will be entered on an angler interview data form (Appendix B2).

Chinook salmon,[26], will be sampled for MEFL, total length during early run slot-limit restriction, sex, and genetic tissue. Scales will be sampled following the procedures described under Objective 3 below. Biological data will be recorded on data forms (Appendix B3).

Objective 2 and Tasks 3-4: Inriver Gillnetting

The midriver inriver gillnetting crew will be composed of 3 fishery technicians, with 2 technicians working per shift. Sampling will be conducted from an outboard-powered skiff. Primary responsibilities are to capture Chinook salmon in a drift gillnet; sample captured Chinook salmon for ASL data and genetic tissue, count other species of salmon captured , and recording data directly into a handheld computer. Each technician will be scheduled for 8 hours per day, 5 days each week (this schedule allows for sampling every day during the entire season). During the workday, approximately 6 hours will be allocated to gillnetting. The remainder will be for travel to and from the work site, required maintenance, and a lunch break. Gillnets, 60 feet in length of 2 mesh sizes will be deployed: 5.0 in and 7.5 in. One sampling 'replicate' will consist of four drifts; one drift of each mesh size drifted from one side of the river followed by one drift of each mesh size drifted from the other side of the river. The mesh size to be drifted first will alternate daily. From four to eight repetitions will be completed daily. The start and stop time will be recorded for each drift. The start time is the time the crew begins setting the net. The stop time is the time the crew begins pulling the net.

All Chinook salmon captured in nets will be examined for the presence of an adipose fin during both runs. To avoid re-sampling, a 'hole-punch' will be given to each captured Chinook salmon in the upper lobe of the caudal fin regardless of whether or not it was sampled. In addition, crews will be instructed to record a Chinook salmon as an escape if they visually inspected that the fish was a Chinook salmon, but were unable to hole-punch the caudal fin. All other salmon species captured will be counted each day, and sampled for length every other day. For other non salmon species captured, only the species and the number of fish captured will be recorded.

During the early run, May 16 to June 30, <u>*every*</u> Chinook salmon captured will be sampled for ASL data, and will receive a radio tag. During the late run, July 1 to August 10, <u>*every other*</u> Chinook salmon will be sampled for ASL data; specifically the first, third, fifth, etc., Chinook salmon captured per drift. Of the Chinook salmon sampled during the late run, every other fish sampled for ASL data will receive a radio tag. It is critical that fish be selected for sampling in a way that does not bias the sample toward large or small fish. Chinook salmon to be sampled for ASL data will be untangled from nets and have cotton "tail ties" placed around the caudal

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[25] This information will be used by the Kenai River King Salmon Abundance and Migratory Timing study described in another operational plan (Reimer FY11/FY12 Operational Plan, Kenai River King Salmon Abundance and Migratory Timing Study).

[26] Very rarely, during the peak of the late run, it may become difficult to sample all boats at some exit locations. To the extent that this occurs, sampling for age composition and genetic tissue can be slightly depensatory if data are pooled across time strata.

peduncle with the other end affixed to the boat gunnels so the tethered fish remains in the water while other fish are released from the net. The tethered Chinook salmon will be placed in a padded, restraint cradle (Larson 1995) to immobilize the captured fish while biological data are collected. During sampling the cradle will hang from the side of the boat with its base approximately 15 cm below the water line, thus Chinook salmon will not be removed from the water for sampling.

The MEFL (measured to the nearest 5 mm) and sex of each sampled Chinook salmon will be recorded. The MEFL (measured to the nearest 5 mm) of sockeye salmon will also be recorded every other day. Scales will be sampled following the procedures described under Objective 3 below.

Prior to tagging Chinook salmon, all radio transmitters will be activated by removing a magnet taped to the side of the transmitter (thus closing a magnetic reed switch inside the capsule), and tested to assure proper working condition. Transmitters will be inserted with an applicator made from 2 concentric pipes of polyvinyl chloride. The outer pipe is ¾ in outside diameter with rounded edges and one end split into quarters. The inner pipe fits snugly inside the outer pipe but slides with minimal effort. Likewise, the narrow end of the transmitter fits snugly within the split end of the outer pipe. Each transmitter will be fit with a retention device (e.g., rubber band) around the diameter of the tag to prevent the salmon from regurgitating the transmitter. Transmitters, lubricated with glycerin, will be inserted by gently pressing the tag against the esophageal sphincter until the sphincter relaxes allowing the tag to pass into the stomach. The transmitter will then be dislodged from the applicator using the inner pipe as a plunger.

Radio tags for this project are esophageal implant model F1845B fabricated by Advanced Telemetry Systems and broadcasting between 151.200-151.525 MHz. The bottle shaped radio tags are 19 mm in diameter, 56 mm long and weigh 24 g. Given that tag weight should not exceed 2% of the fish weight (Winter 1996), fish as small as 2.64 lbs could be tagged, which is smaller than any age-.2+ Chinook salmon.

Data will be recorded electronically using data entry software on a Juniper Systems Inc.™ Allegro CE field computer. After sampling, the crew will download the data onto a desktop PC. If the field computer is not functioning properly, data will be recorded on data forms and given to their supervisor. In addition, crews will also fill out a field notebook daily to document observations not covered by the electronic data entry system, and will be instructed to contact their supervisor about all complaints or negative contacts they field during the course of their shift which will get forwarded to the Soldotna ADF&G Area Research Biologist, and Area Managers.

Objective 3: Scale Sampling

Inriver Run and Sport Harvest

For all Chinook salmon sampled from the inriver run (gillnetting) or the sport harvest (creel survey), three scales will be taken from the left side of the body of each sampled fish, at a point on a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, two rows above the lateral line (Clutter and Whitesel 1956; Welander 1940), and placed on an adhesive-coated card. An impression is made of the scales on the card using a press under 25,000 PSI and then the scales growth patterns are viewed with a 40x microfiche reader to determine freshwater and marine residence times.

Task 8: Coded Wire Tag (CWT) Recovery

All Chinook salmon sampled during the course of the creel survey and all fish captured during inriver gillnetting will be examined for an adipose fin clip. Technicians will remove the head of all adipose fin clipped Chinook salmon encountered, provided permission can be obtained from the angler/processor in possession of the fish. A cinch strap will be attached to the head which will be returned to the office for storage in a freezer. All data, including the number of Chinook salmon examined and the number observed missing the adipose fin, will be recorded. The cinch strap number will also be recorded alongside ASL data to enable cross-referencing between datasets. Data collected during the creel survey or the inriver gillnetting survey will be returned to the project leader (Jeff Perschbacher).

Task 9: Genetic Sampling

Genetic samples will be taken from every Chinook salmon sampled for ASL from the creel survey. Genetic samples will be taken from every Chinook salmon captured in the inriver gillnetting study. These samples will used in the *Kenai River Chinook Salmon Abundance and Migratory Timing Study*. A ½ inch sized piece of tissue from the anterior portion of the dorsal fin will be removed from each fish sampled from the inriver gillnets, placed in a 2ml plastic vial (Nalgene, VWR Cat. # 66008-710) and completely covered with a Sigma Reagent Grade 95% Alcohol (Sigma Cat. # R 8382) buffer solution such that the liquid/tissue ratio is approximately 3:1. A ½ inch piece from the tip of an axillary process will be taken from Chinook salmon sampled in the creel survey will be stored in the same way as genetic samples taken from Chinook salmon sampled from the inriver gillnets. Each plastic tube will be sequentially numbered and the vial number will be recorded in the field computer. All plastic vials will be stored at the Soldotna office until the end of the season when all tubes will be sent to the Gene Conservation Laboratory for analysis.

Task 10: Secchi and Temperature

A Secchi disc depth reading will be recorded at the beginning, end, and midpoint of each midriver gillnetting shift to monitor river conditions that affect netting catch rates at RM 8.5. The Secchi reading will be taken at the same location, near the lower sonar site each day. Each creel technician will take a Secchi disk and water temperature (F) reading in the main river channel adjacent to River Quest Resort (RM 15.3) at the beginning of his or her shift to monitor river conditions that affect sport angler catch rates.

Objective 4 and Tasks 5-7 : Nearshore Gillnetting

Nearshore gillnetting will be conducted two days each week with a separate crew of two and approximately 6 hours allocated to gillnetting. Gillnetting conducted nearshore will collect the same type of data for captured Chinook salmon (genetic and scale samples, deployment of radio transmitters, sex, and length will be recorded, etc.) as is collected for midriver gillnetting. All Chinook salmon captured nearshore will be sampled for ASL and genetics. In the early run, <u>all</u> Chinook salmon will be tagged with a radio transmitter and in the late run, every <u>third</u> Chinook salmon will be tagged with a radio transmitter. No length measurements will be taken from non-Chinook species. All other aspects of nearshore gillnetting will be the same as mentioned above for midriver gillnetting.

Gillnets will be deployed in the same manner with alternating deployment locations by bank and mesh size. To prevent resampling all sampled Chinook salmon captured in nearshore gillnets

will be given a ventral caudal hole punch. All gillnetting crews (nearshore and midriver) will be instructed to inspect captured Chinook salmon for hole punches on both lobes of the caudal fin. Those observed with a hole punch will be released without being sampled.

DATA REDUCTION

Creel technicians will return their scale cards and field ASL data forms to the Soldotna office daily and will be responsible for ensuring the data is legible and accurate. Technicians are also responsible for entering most data (except for ASL data) into the field computer and downloading data to the project biologist desktop computer that can output the dataset in fixed width comma separated values (.csv) format for analysis. Netting data will be entered electronically in the field. Paper forms will be available as a backup in the event the field computer fails. Age data are keypunched directly into master electronic data files after age is determined by scale reading. The project biologist will ensure all data are returned, are legible, and are entered correctly. Data maps for all of the information collected in this project are shown in Appendix C.

The project biologist will edit creel, inriver gillnetting, and biological data to ensure values of counts, interview data, age, and length-at-age are within regular bounds. The biologist will also edit the data for obvious coding errors, prepare inseason data summaries daily, conduct postseason data analyses, and write the Division Fishery Data Series report. All creel survey, inriver gillnetting, and biological data will be in computer files and edited by 1 December. A final edited copy of all data files along with a data map will posted to the Alaska Department of Fish and Game Research and Technical Services (RTS) DocuShare[27] website for archiving.

DATA ANALYSIS

Objective 1 and task 1-2: Inriver Effort, Catch, and Harvest

Estimates of angler effort, catch, and harvest of Chinook salmon downstream of Soldotna Bridge will be calculated by following the procedures outlined in (Bernard et al. 1998). Daily estimates of angler effort and their variances will be calculated using equation 2.9 and 2.10 from (Bernard et al. 1998). Estimates of daily catch and harvest rates and their variances will be calculated using equations 2.11a and 2.11b in (Bernard et al. 1998)[28]. Daily estimates of catch and harvest are then calculated by combining the daily estimate of angler effort with the catch and harvest rates as outlined in sections 2.2.3 and 2.2.4 of (Bernard et al. 1998). Angler effort estimates, estimates of catch and harvest rates, and estimates of catch and harvest will be conducted in a post-stratified manner for each angler type. Since the correct angler type can be determined for fishing anglers as they are counted then no prorating of angler counts will be necessary. Additionally, adjustments in the variance estimates for covariances due to post-stratifying by angler type, are expected to be minor and will be ignored (Bernard et al. 1998).

Stratum estimates of angler effort as well as catch and harvest will then be calculated by equation 2.1 of Table 2.1 of (Bernard et al. 1998). The stratum variances for these estimates are calculated following equation 2.5 of Table 2.4 in (Bernard et al. 1998).

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[27] http://docushare.sf.adfg.state.ak.us/dsweb/HomePage

[28] The jackknife estimating procedure as outlined in Appendix D of Bernard et al. (1998b) may be used in lieu of these procedures if sample sizes are deemed to be low (i.e., less than 5 anglers interviewed in a day).

During the early run a single angler count, and no interviews will be conducted on non-holiday Mondays in 2013. The following ad hoc estimation procedure will be used to obtain rough estimates of Monday effort, catch, and harvest. These estimates are not intended to conform to the same standard of statistical rigor as those for the remainder of the week.

1. The relationship between index counts and mean count on Mondays for 2009-2010 will be used to estimate the relationship between index counts and mean counts on Mondays for 2013. The mean number of anglers during 2009-2010 was approximately 52% of the number of anglers counted during the "index" period (1000-1400).
2. To estimate angler-hours of effort *E*, the estimated mean count will be multiplied by the length of the unguided angler day (20 hours).
3. To estimate CPUE and HPUE on Mondays without angler interviews, we exploit the tendency for angler success to exhibit an autocorrelated time trend. CPUE and HPUE will be plotted versus time for days sampled with angler interviews, and then we will impute CPUE and HPUE values for each Monday.
4. Catch and harvest will be estimated as the product of the imputed values of CPUE and HPUE and the estimate of *E* derived from the index count.

Creel survey estimates of CPUE and HPUE for non-holiday Mondays, during 2009 and 2010, did not show a significant difference compared to the ad hoc method in step 3 (Perschbacher 2012c). Therefore, the only change to estimate non-holiday Monday effort, catch, and harvest will be using the recalibrated proportion of anglers observed during the index in step 1.

Objective 2 and task 3: Proportion Chinook Salmon at RM 8.5

Two gillnet mesh sizes will be deployed: 5.0 and 7.5 inches. Two drifts (*l*) will be conducted with one mesh size, originating from each side (*k*) of the river; then this sequence will be repeated with the other mesh size. A repetition (*j*) will consist of a complete set of four such drifts. Complete repetitions (four drifts total, two meshes on two banks) will be used for calculation of species proportions.

The proportion of species *s* passing through the insonified zone of the river channel on day *i* will be estimated as follows:

$$\hat{p}_{si} = \frac{\sum_{j}^{J_i} \hat{r}_{sij}}{\sum_{s} \sum_{j}^{J_i} \hat{r}_{sij}}, \tag{1}$$

where J_i is the number of repetitions completed on day *i*, the CPUE *r* for species *s* during repetition *j* of day *i* is estimated as the mean of the CPUEs, pooled across bank, for each mesh size:

$$\hat{r}_{sij} = \frac{1}{2} \sum_{m=1}^{2} \frac{\sum_{k=1}^{2} c_{smijk}}{\sum_{k=1}^{2} e_{mijk}} \tag{2}$$

and where c_{smijk} is the catch of species s in mesh m during a drift originating from bank k during repetition j on day i, and e_{mijk} is the effort (minutes of soak time) for that drift.

The variance of the species s proportion p on day i will be estimated[29] as (Cochran 1977:66):

$$\hat{\text{var}}(\hat{p}_{si}) = \frac{\sum_{j=1}^{J_i}\left(\hat{r}_{sij} - \hat{p}_{si}\hat{r}_{ij}\right)^2}{\bar{r}_i^2 J_i (J_i - 1)} \tag{3}$$

where

$\hat{r}_{ij} = \sum_s \hat{r}_{sij}$ is the CPUE summed across all species caught during repetition j of day i, and

$\bar{r}_i$ = the mean CPUE of salmon (all species) caught across all drifts k during day i.

Daily Chinook proportions $\hat{p}_{Ci}$ will subsequently be multiplied by total daily upstream midriver sonar estimates of fish passage $\hat{x}_i$ (Miller et al 2005) to produce alternative daily estimates of Chinook salmon passage $\hat{y}_i$.

$$\hat{y}_i = \hat{x}_i \hat{p}_{Ci} \tag{4}$$

$$\hat{\text{var}}(\hat{y}_i) = \hat{x}_i^2\, \hat{\text{var}}(\hat{p}_{Ci}) + \hat{p}_{Ci}^2\, \hat{\text{var}}(\hat{x}_i) - \hat{\text{var}}(\hat{p}_{Ci})\hat{\text{var}}(\hat{x}_i) \tag{5}$$

The relative magnitude of the sums of the daily $\hat{y}_i$ and $\hat{\text{var}}(\hat{y}_i)$ form the basis for the Objective 2 precision criterion. Equation 8 follows Goodman (1960).

Objective 3: Total Return by Brood Year

Total return originating from one brood year is the sum of age-specific total returns across five calendar years bracketing 3- through 7-year-old fish.

$$\hat{R}_y = \sum_{a=3}^{7} \hat{R}_{y+a,a} \tag{6}$$

where $\hat{R}_{y+a,a}$ is the sum of the estimates of inriver run I_a at RM 8.5 (estimated by sonar, Miller et al., 2005), plus commercial harvest C (censused from ESSN and upper Cook Inlet Drift gillnet fisheries), the Kenai River personal use harvest P, the late-run marine sport harvest M, and sport harvest S downstream of the sonar (estimated by creel survey), each restricted to the appropriate age a and calendar year t=y+a.

$$\hat{R}_{t,a} = \hat{I}_{t,a} + \hat{C}_{t,a} + \hat{P}_{t,a} + \hat{M}_{t,a} + \hat{S}_{t,a} \tag{7}$$

[29] Schaeffer et al (1990) state that this "is a good estimator only when the sample size is large" (≥20). Sample sizes are small (J<10) in this study, thus there is potential for bias. The direction of the bias is currently unknown.

Omitting t for simplicity, age-specific commercial harvest will be estimated as the product of the commercial harvest C and an age proportion p:

$$\hat{C}_a = C\ \hat{p}_{Ca} \tag{8}$$

$$\mathrm{var}\left(\hat{C}_a\right) = C^2\ \mathrm{var}\left(\hat{p}_{Ca}\right) \tag{9}$$

where

$$\hat{p}_{Ca} = \frac{n_{Ca}}{n_C} \tag{10}$$

$$\mathrm{var}\left(\hat{p}_{Ca}\right) = \frac{\hat{p}_{Ca}\left(1-\hat{p}_{Ca}\right)}{n_C - 1} \tag{11}$$

n_C is the number of valid ages sampled from the commercial harvest, of which n_{Ca} are age a.

Similarly, age-specific sport harvest below the sonar will be estimated as:

$$\hat{S}_a = \hat{S}\ \hat{p}_{Sa} \tag{12}$$

$$\mathrm{var}\left(\hat{S}_a\right) = \hat{S}^2\ \mathrm{var}\left(\hat{p}_{Sa}\right) + \hat{p}_{Sa}^2\ \mathrm{var}\left(\hat{S}\right) - \mathrm{var}\left(\hat{p}_{Sa}\right)\mathrm{var}\left(\hat{S}\right) \tag{13}$$

where

$$\hat{p}_{Sa} = \frac{n_{Sa}}{n_S} \tag{14}$$

$$\mathrm{var}\left(\hat{p}_{Sa}\right) = \frac{\hat{p}_{Sa}\left(1-\hat{p}_{Sa}\right)}{n_S - 1} \tag{15}$$

n_S is the number of valid ages sampled from the sport harvest, of which n_{Sa} are age a.

Age specific personal use P will be estimated using equations 8-11 and substituting P for C. Age specific marine sport harvest M will be estimated using equations 12-15 and substituting M for S.

Finally, the estimate of age-specific inriver return will be stratified into two 3-week periods (subscript h):

$$\hat{I}_a = \sum_{h=1}^{2} \hat{I}_h \hat{p}_{Iha} \tag{16}$$

$$\mathrm{var}\left(\hat{I}_a\right) = \sum_{h=1}^{2}\left[\hat{I}_h^2\ \hat{\mathrm{var}}\left(\hat{p}_{Iha}\right) + \hat{p}_{Iha}^2\ \hat{\mathrm{var}}\left(\hat{I}_h\right) - \hat{\mathrm{var}}\left(\hat{p}_{Iha}\right)\hat{\mathrm{var}}\left(\hat{I}_h\right)\right] \tag{17}$$

where

$$\hat{p}_{Iha} = \frac{n_{Iha}}{n_{Ih}} \tag{18}$$

$$\mathrm{var}(\hat{p}_{Iha}) = \frac{\hat{p}_{Iha}(1-\hat{p}_{Iha})}{n_{Ih}-1} \tag{19}$$

and n_{Ih} is the number of valid ages sampled from the inriver run during stratum h, of which n_{Iha} are age a. All analyses will be conducted separately for the early and late runs. Variance estimates for species proportions (equations 9, 11, 13, 15, 17, and 19) assume that each fish sampled is an independent observation (i.e., that simple random sampling, SRS, was employed). In reality, the sport harvest is sampled with a multistage design (creel survey), and the inriver return with a cluster design (netting); and technically, the age proportion variances should be estimated in the context of those designs. However age composition changes very slowly over time; and in the past we have assumed that variability between sampling stages and among clusters is negligible. To verify this, we recently re-analyzed the 2006 netting data, calculated the age proportions following equations 1-5 and compared them to the simple random sampling estimators in equations 14 and 15. The point estimates and their standard errors were essentially equivalent. Based on this evidence, we continue to use the SRS equations for convenience.

Objective 4 and Tasks 5–8: Nearshore versus Midriver Chinook Size

A one tail z-test will be performed to test the difference between proportions of small (<650 mm) Chinook salmon sampled from nearshore and from midriver. Power analysis was conducted to determine effort and sample sizes needed to detect a difference in the proportion of small fish. We assumed the ratio of midriver to nearshore fish would be 0.35:0.65 or 54% (about half as many fish in the nearshore region) (McKinley and Fleischman 2013) and by netting 2 days per week the nearshore catch will be approximately 15% of the midriver netting catch. The power analysis showed that we would have a greater than 70% power to show that proportion of small fish nearshore is significantly greater than the proportion of small fish midriver, if the true proportion difference between them is 0.30.

TECHNICIAN MANUAL

An explanation and background of the projects are detailed in the Technician Manual (Appendix F). The manual also has expectations, responsibilities and general operating procedures for crewmembers to reference and follow. Crews will be required to read this manual and keep it in their clipboard for reference while on duty.

SCHEDULES AND DELIVERABLES

The schedule for conducting angler counts and interviews is in Appendix A, and for the inriver netting program is in Appendix B. A general schedule for completion of tasks is outlined below.

1. Prepare equipment for the field season..... April 1 - May 10 (Perschbacher)
2. Field season preparation and preseason training. .....April 1 - May 15 (All Staff)
3. Creel Survey..... May 16 - July 31 (Vacant)
   (Karic)
4. Midriver Gillnetting..... May 16 - Aug 10 (Johnson)
   (Vacant)
   (Alaniz)
5. Nearshore gillnetting pilot study .....May 16 – Aug 10 (Eskelin)
   (Barbaza)

6. Inseason angler effort, harvest, and netting CPUE estimates. .....Daily (Perschbacher)
7. Interview and count data edited. .....Daily (Perschbacher)
8. Interview and count data summarized. .....Daily (Perschbacher)
9. Prepare equipment for winter storage. .....Aug 10 – Aug 20 (Perschbacher)
10. Scales read. .....Oct 15 (Perschbacher)
11. Age composition summary. .....Oct 15 (Perschbacher)
12. Final creel estimates.....Oct 15 (Perschbacher)
13. Chinook salmon stock assessment report ..... March 1 (McKinley)
14. Annual report submitted and data archived. .....November 30 (Perschbacher)
15. 2013 operation plan..... May 8 (Perschbacher)

The results of this project will be presented in an Alaska Department of Fish and Game, Sport Fish Division, Fishery Data Series report. The estimates of catch, harvest, and age will also be presented in separate Fishery Data Series reports describing assessment of each run of Chinook salmon.

RESPONSIBILITIES

Principal Investigators

Jeff Perschbacher, Project Leader, Fishery Biologist I, April 1 – November 30:

The project leader is responsible for writing the operational plan. This position will serve as the project biologist and will be responsible for removing equipment from winter storage, readying it for use, for hiring and training any new personnel and completion of Monday index counts. The project biologist will be responsible for inseason data reduction and conducting daily data analysis, postseason data analysis, and writing the fishery data series report. This position will be involved in any presentation that may be required at the Board of Fisheries concerning the creel survey, inriver gillnetting project or Kenai Chinook ASL data. This position will also ensure all data is in proper format and archived with RTS at the completion of the field season and will be expected to generate all harvest and effort estimates as well as projections for the inriver run, final escapement for each run, and will post regular summaries of inseason estimates and projections on the intranet.

This position is responsible for ensuring all pressing and aging of Chinook salmon scale samples from the creel survey and inriver gillnets is accomplished and will summarize the age composition data and forward the information to the area research biologist. All data will be entered into a mark sense format file for archiving and scale cards will be archived as well.

It will also be the responsibility of this position to keep the area research biologist informed of any problems with equipment and/or personnel affecting the completion of this project.

Timothy McKinley, Area Research Supervisor, Fishery Biologist III, January 1 – December 31:

This position will serve as the overall supervisor for the project and personnel involved. When necessary, the Area Research Supervisor will assist project personnel with all aspects of this project.

Consulting Biometrician

Jiaqi Huang, Biometrician II, January 1 – December 31:

Provides guidance on sampling design and data analysis; assists with preparation of operational plan and report.

Project Leader Supervisor

Tony Eskelin, Fishery Biologist II, January 1 – December 31:

This position will serve as the direct supervisor of the project leader and will assist the project leader when necessary in all aspects of crew supervision, field season preparation and collection of data, data analysis, report writing, and operational planning. This position will also be responsible for all aspects of the nearshore gillnetting pilot study.

Creel Survey Crew

Vacant, Fish and Wildlife Technician III: May 13 – July 31.

Ivan Karic, Fish and Wildlife Technician III: May 13 – July 31.

Responsibilities of these positions include: interviewing and counting sport anglers and boats while adhering to strict sampling schedule; sampling harvested Chinook salmon for ASL and CWT information; recording data accurately; entering data into a computerized database in a timely manner; answering questions from the public on a variety of subjects such as sport fishing regulations and local fishery issues.

Further duties are to carefully document fishery violations observed during the course of normal duties and forward the information to the project leader and potentially other enforcement agencies and preventative maintenance and/or repair of assigned equipment.

Inriver Gillnetting Crew

Kas Johnson, Fish and Wildlife Technician II: May 13 – August 12.

Amanda Alaniz, Fish and Wildlife Technician II: May 13 – August 12.

Vacant, Fish and Wildlife Technician II: May 13 – August 12.

Responsibilities of these positions include; capturing Chinook salmon in gillnets while adhering to strict sampling schedules and protocols, sampling captured Chinook salmon for ASL and CWT information, recording data accurately and entering data into a computerized database in a timely manner. Further duties are preventative maintenance and/or repair of assigned equipment.

BUDGET SUMMARY

Proposed FY13 and FY14 Costs:

Line Item	Category	FY13 Budget ($K)	FY 14 Budget ($K)
100	Personnel	351.0	351.0
200	Travel	4.5	4.5
300	Contractual	21.1	21.1
400	Commodities	8.5	8.5
500	Equipment	0	0
Total		385.1	385.1

Funded Personnel FY 13:

PCN	Name	Level	Funded Man Months
114023	McKinley, Timothy	Fishery Biologist III	12.0
115244	Eskelin, Anthony	Fishery Biologist II	12.0
114190	Perschbacher, Jeff	Fishery Biologist I	8.0
114133	Vacant	FWT III	2.9
114253	Karic, Ivan	FWT III	2.9
114260	Johnson, Kas	FWT II	3.1
114213	Amanda Alaniz	FWT II	3.1
114306	Vacant	FWT II	3.1
Total			51.4

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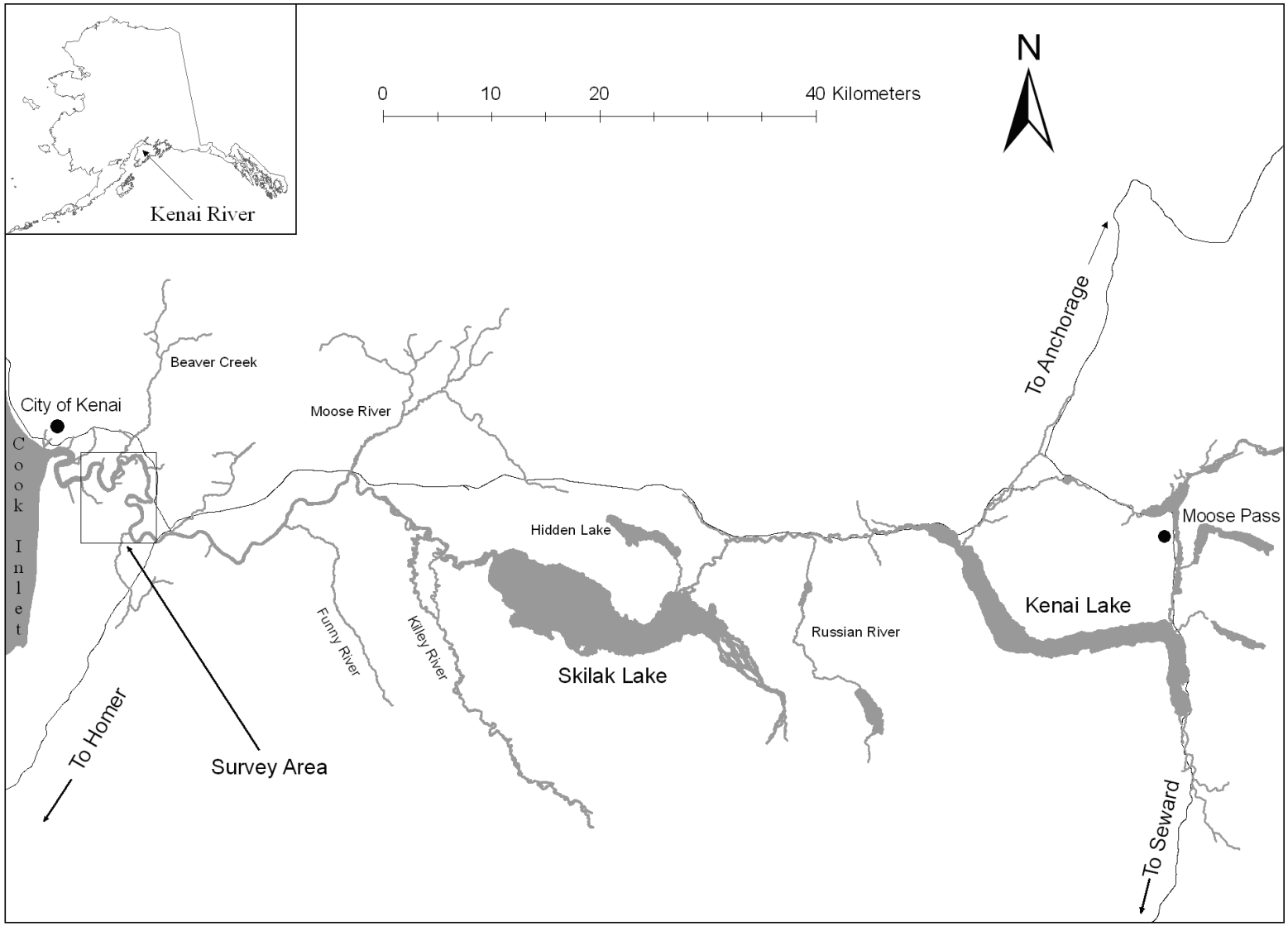

Figure 1.- Map of the Kenai River drainage.

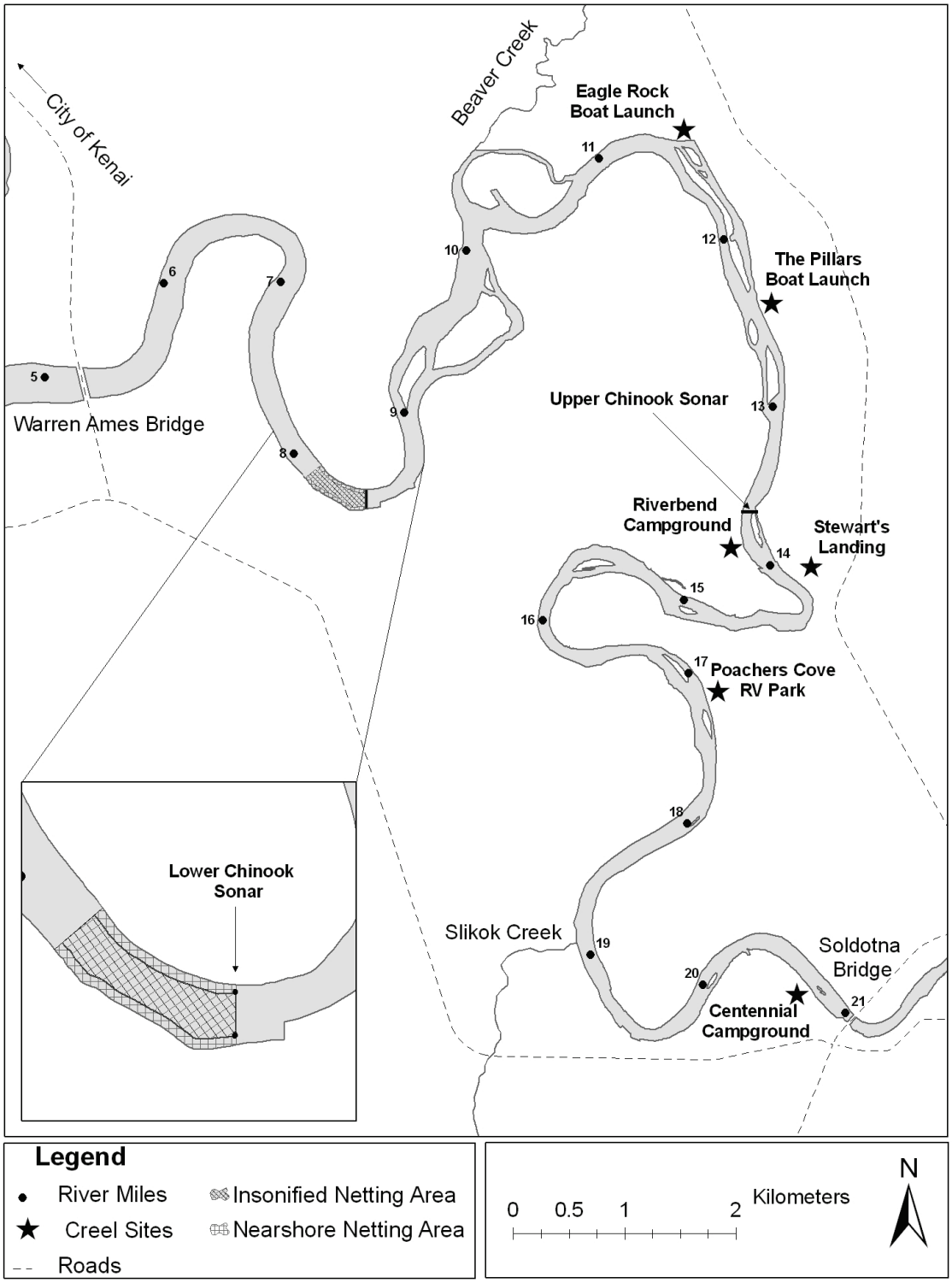

Figure 2.- Map of the Kenai River creel survey and inriver gillnetting study areas.

APPENDIX A. SAMPLING SCHEDULES FOR THE KENAI RIVER CHINOOK SALMON CREEL SURVEY AND INRIVER GILLNETTING STUDY, 2013

Appendix A1.–Sampling schedule for the Kenai River Chinook salmon creel survey.

Early Run Week One	Thursday May 16, 2013			Friday May 17, 2013			Saturday May 18, 2013			Sunday May 19, 2013		
	7:15	Morning shift begins		4:15	Morning shift begins		7:15	Morning shift begins		6:15	Morning shift begins	
	8:00 - 9:00	Count UP	IK	5:00 - 6:00	Count DOWN	IK	8:00 - 9:00	Count UP	IK	7:00 - 8:00	Count DOWN	IK
	9:00 - 13:00	Stewart's	IK	6:00 - 10:00	Pillar's	IK	9:00 - 13:00	Stewart's	IK	8:00 - 12:00	Pillar's	IK
	13:00 - 14:00	Count DOWN	IK	10:00 - 11:00	Count UP	IK	13:00 - 14:00	Count DOWN	IK	12:00 - 13:00	Count UP	IK
	14:00 - 15:45	Pillar's	IK	11:00 - 14:15	Stewart's	IK	14:00 - 15:45	Pillar's	IK	13:00 - 15:15	Stewart's	IK
	15:45	Shift change		14:15	Shift change		15:45	Shift change		15:15	Shift change	
	15:45 - 18:00	Pillar's	SM	14:15 - 15:00	Stewart's	SM	15:45 - 18:00	Pillar's	SM	15:15 - 17:00	Stewart's	SM
	18:00 - 19:00	Count UP	SM	15:00 - 16:00	Count DOWN	SM	18:00 - 19:00	Count UP	SM	17:00 - 18:00	Count DOWN	SM
	19:00 - 23:00	Stewart's	SM	16:00 - 20:00	Pillar's	SM	19:00 - 23:00	Stewart's	SM	18:00 - 22:00	Pillar's	SM
	23:00 - 0:00	Count UP	SM	20:00 - 21:00	Count UP	SM	23:00 - 0:00	Count UP	SM	22:00 - 23:00	Count UP	SM
				21:00 - 23:45	Stewart's	SM				23:00 - 23:45	Stewart's	SM
	1:00	Evening shift ends		0:45	Evening shift ends		1:00	Evening shift ends		0:45	Evening shift ends	

Early Run Week Two	Tuesday May 21, 2013			Wednesday May 22, 2013			Saturday May 25, 2013			Sunday May 26, 2013		
	6:15	Morning shift begins		5:15	Morning shift begins		7:15	Morning shift begins		6:15	Morning shift begins	
	7:00 - 8:00	Count DOWN	IK	6:00 - 7:00	Count DOWN	IK	8:00 - 9:00	Count DOWN	IK	7:00 - 8:00	Count DOWN	IK
	8:00 - 12:00	Pillar's	IK	7:00 - 11:00	Pillar's	IK	9:00 - 13:00	Pillar's	IK	8:00 - 12:00	Pillar's	IK
	12:00 - 13:00	Count UP	IK	11:00 - 12:00	Count UP	IK	13:00 - 14:00	Count UP	IK	12:00 - 13:00	Count UP	IK
	13:00 - 15:15	Stewart's	IK	12:00 - 14:45	Stewart's	IK	14:00 - 15:45	Stewart's	IK	13:00 - 15:15	Stewart's	IK
	15:15	Shift change		14:45	Shift change		15:45	Shift change		15:15	Shift change	
	15:15 - 17:00	Stewart's	SM	14:45 - 16:00	Stewart's	SM	15:45 - 18:00	Stewart's	SM	15:15 - 17:00	Stewart's	SM
	17:00 - 18:00	Count DOWN	SM	16:00 - 17:00	Count DOWN	SM	18:00 - 19:00	Count DOWN	SM	17:00 - 18:00	Count DOWN	SM
	18:00 - 22:00	Pillar's	SM	17:00 - 21:00	Pillar's	SM	19:00 - 23:00	Pillar's	SM	18:00 - 22:00	Pillar's	SM
	22:00 - 23:00	Count UP	SM	21:00 - 22:00	Count UP	SM	23:00 - 0:00	Count UP	SM	22:00 - 23:00	Count UP	SM
	23:00 - 23:45	Stewart's	SM	22:00 - 23:45	Stewart's	SM				23:00 - 23:45	Stewart's	SM
	0:45	Evening shift ends		0:45	Evening shift ends		1:00	Evening shift ends		0:45	Evening shift ends	

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Early Run Week Three	Tuesday May 28, 2013	Friday May 31, 2013	Saturday June 1, 2013	Sunday June 2, 2013
	5:15 Morning shift begins	5:15 Morning shift begins	6:15 Morning shift begins	7:15 Morning shift begins
	6:00 - 7:00 Count DOWN IK	6:00 - 7:00 Count UP IK	7:00 - 8:00 Count DOWN IK	8:00 - 9:00 Count UP IK
	7:00 - 11:00 Pillar's IK	7:00 - 11:00 Stewart's IK	8:00 - 12:00 Pillar's IK	9:00 - 13:00 Centennial IK
	11:00 - 12:00 Count UP IK	11:00 - 12:00 Count DOWN IK	12:00 - 13:00 Count UP IK	13:00 - 14:00 Count DOWN IK
	12:00 - 14:45 River Bend IK	12:00 - 14:45 Pillar's IK	13:00 - 15:15 River Bend IK	14:00 - 15:45 Stewart's IK
	14:45 Shift change	14:45 Shift change	15:15 Shift change	15:45 Shift change
	14:45 - 16:00 River Bend SM	14:45 - 16:00 Pillar's SM	15:15 - 17:00 River Bend SM	15:45 - 18:00 Stewart's SM
	16:00 - 17:00 Count UP SM	16:00 - 17:00 Count UP SM	17:00 - 18:00 Count UP SM	18:00 - 19:00 Count DOWN SM
	17:00 - 21:00 Stewart's SM	17:00 - 21:00 River Bend SM	18:00 - 22:00 Stewart's SM	19:00 - 23:00 Pillar's SM
	21:00 - 22:00 Count DOWN SM	21:00 - 22:00 Count UP SM	22:00 - 23:00 Count UP SM	23:00 - 0:00 Count UP SM
	22:00 - 23:45 Pillar's SM	22:00 - 23:45 Stewart's SM	23:00 - 23:45 Centennial SM	
	0:45 Evening shift ends	0:45 Evening shift ends	0:45 Evening shift ends	1:00 Evening shift ends

Early Run Week Four	Tuesday June 4, 2013	Wednesday June 5, 2013	Saturday June 8, 2013	Sunday June 9, 2013
	7:15 Morning shift begins	4:15 Morning shift begins	6:15 Morning shift begins	7:15 Morning shift begins
	8:00 - 9:00 Count UP IK	5:00 - 6:00 Count UP IK	7:00 - 8:00 Count UP IK	8:00 - 9:00 Count DOWN IK
	9:00 - 13:00 Centennial IK	6:00 - 10:00 Stewart's IK	8:00 - 12:00 Stewart's IK	9:00 - 13:00 River Bend IK
	13:00 - 14:00 Count DOWN IK	10:00 - 11:00 Count DOWN IK	12:00 - 13:00 Count UP IK	13:00 - 14:00 Count UP IK
	14:00 - 15:45 Stewart's IK	11:00 - 14:15 Pillar's IK	13:00 - 15:15 Centennial IK	14:00 - 15:45 Centennial IK
	15:45 Shift change	14:15 Shift change	15:15 Shift change	15:45 Shift change
	15:45 - 18:00 Stewart's SM	14:15 - 15:00 Pillar's SM	15:15 - 17:00 Centennial SM	15:45 - 18:00 Centennial SM
	18:00 - 19:00 Count DOWN SM	15:00 - 16:00 Count UP SM	17:00 - 18:00 Count DOWN SM	18:00 - 19:00 Count DOWN SM
	19:00 - 23:00 Pillar's SM	16:00 - 20:00 River Bend SM	18:00 - 22:00 Pillar's SM	19:00 - 23:00 Stewart's SM
	23:00 - 0:00 Count UP SM	20:00 - 21:00 Count UP SM	22:00 - 23:00 Count UP SM	23:00 - 0:00 Count UP SM
		21:00 - 23:45 Centennial SM	23:00 - 23:45 River Bend SM	
	1:00 Evening shift ends	0:45 Evening shift ends	0:45 Evening shift ends	1:00 Evening shift ends

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Early Run Week Five

Thursday June 13, 2013	Friday June 14, 2013	Saturday June 15, 2013	Sunday June 16, 2013
4:15 Morning shift begins	*5:15 Morning shift begins*	*6:15 Morning shift begins*	*7:15 Morning shift begins*
5:00 - 6:00 Count DOWN IK	6:00 - 7:00 Count UP IK	7:00 - 8:00 Count UP IK	8:00 - 9:00 Count DOWN IK
6:00 - 10:00 River Bend IK	7:00 - 11:00 Centennial IK	8:00 - 12:00 Centennial IK	9:00 - 13:00 River Bend IK
10:00 - 11:00 Count DOWN IK	11:00 - 12:00 Count DOWN IK	12:00 - 13:00 Count DOWN IK	13:00 - 14:00 Count DOWN IK
11:00 - 14:15 Pillar's IK	12:00 - 14:45 Stewart's IK	13:00 - 15:15 River Bend IK	14:00 - 15:45 Pillar's IK
14:15 Shift change	*14:45 Shift change*	*15:15 Shift change*	*15:45 Shift change*
14:15 - 15:00 Pillar's SM	14:45 - 16:00 Stewart's SM	15:15 - 17:00 River Bend SM	15:45 - 18:00 Pillar's SM
15:00 - 16:00 Count UP SM	16:00 - 17:00 Count DOWN SM	17:00 - 18:00 Count DOWN SM	18:00 - 19:00 Count UP SM
16:00 - 20:00 Stewart's SM	17:00 - 21:00 River Bend SM	18:00 - 22:00 Pillar's SM	19:00 - 23:00 Centennial SM
20:00 - 21:00 Count UP SM	21:00 - 22:00 Count DOWN SM	22:00 - 23:00 Count UP SM	23:00 - 0:00 Count DOWN SM
21:00 - 23:45 Centennial SM	22:00 - 23:45 Pillar's SM	23:00 - 23:45 Stewart's SM	
0:45 Evening shift ends	*0:45 Evening shift ends*	*0:45 Evening shift ends*	*1:00 Evening shift ends*

Early Run Week Six

Wednesday June 19, 2013	Thursday June 20, 2013	Saturday June 22, 2013	Sunday June 23, 2013
6:15 Morning shift begins	*4:15 Morning shift begins*	*7:15 Morning shift begins*	*7:15 Morning shift begins*
7:00 - 8:00 Count UP IK	5:00 - 6:00 Count DOWN IK	8:00 - 9:00 Count DOWN IK	8:00 - 9:00 Count UP IK
8:00 - 12:00 Stewart's IK	6:00 - 10:00 River Bend IK	9:00 - 13:00 Pillar's IK	9:00 - 13:00 Stewart's IK
12:00 - 13:00 Count DOWN IK	10:00 - 11:00 Count UP IK	13:00 - 14:00 Count UP IK	13:00 - 14:00 Count DOWN IK
13:00 - 15:15 Pillar's IK	11:00 - 14:15 Poacher's IK	14:00 - 15:45 River Bend IK	14:00 - 15:45 Pillar's IK
15:15 Shift change	*14:15 Shift change*	*15:45 Shift change*	*15:45 Shift change*
15:15 - 17:00 Pillar's SM	14:15 - 15:00 Poacher's SM	15:45 - 18:00 River Bend SM	15:45 - 18:00 Pillar's SM
17:00 - 18:00 Count UP SM	15:00 - 16:00 Count DOWN SM	18:00 - 19:00 Count UP SM	18:00 - 19:00 Count UP SM
18:00 - 22:00 River Bend SM	16:00 - 20:00 Pillar's SM	19:00 - 23:00 Centennial SM	19:00 - 23:00 River Bend SM
22:00 - 23:00 Count UP SM	20:00 - 21:00 Count UP SM	23:00 - 0:00 Count DOWN SM	23:00 - 0:00 Count UP SM
23:00 - 23:45 Poacher's SM	21:00 - 23:45 Stewart's SM		
0:45 Evening shift ends	*0:45 Evening shift ends*	*1:00 Evening shift ends*	*1:00 Evening shift ends*

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Early Run Seven

Wednesday	June 26, 2013		Friday	June 28, 2013		Saturday	June 29, 2013		Sunday	June 30, 2013	
3:15	*Morning shift begins*		*4:15*	*Morning shift begins*		*6:15*	*Morning shift begins*		*5:15*	*Morning shift begins*	
4:00 - 5:00	**Count DOWN**	**IK**	**5:00 - 6:00**	**Count DOWN**	**IK**	**7:00 - 8:00**	**Count DOWN**	**IK**	**6:00 - 7:00**	**Count UP**	**IK**
5:00 - 9:00	**River Bend**	**IK**	**6:00 - 10:00**	**Pillar's**	**IK**	**8:00 - 12:00**	**Pillar's**	**IK**	**7:00 - 11:00**	**Poacher's**	**IK**
9:00 - 10:00	**Count UP**	**IK**	**10:00 - 11:00**	**Count UP**	**IK**	**12:00 - 13:00**	**Count UP**	**IK**	**11:00 - 12:00**	**Count DOWN**	**IK**
10:00 - 13:45	**Poacher's**	**IK**	**11:00 - 14:15**	**Centennial**	**IK**	**13:00 - 15:15**	**Stewart's**	**IK**	**12:00 - 14:45**	**River Bend**	**IK**
13:45	*Shift change*		*14:15*	*Shift change*		*15:15*	*Shift change*		*14:45*	*Shift change*	
			14:15 - 15:00	**Centennial**	**SM**	**15:15 - 17:00**	**Stewart's**	**SM**	**14:45 - 16:00**	**River Bend**	**SM**
14:00 - 15:00	**Count UP**	**SM**	**15:00 - 16:00**	**Count DOWN**	**SM**	**17:00 - 18:00**	**Count UP**	**SM**	**16:00 - 17:00**	**Count UP**	**SM**
15:00 - 19:00	**Centennial**	**SM**	**16:00 - 20:00**	**River Bend**	**SM**	**18:00 - 22:00**	**Poacher's**	**SM**	**17:00 - 21:00**	**Centennial**	**SM**
19:00 - 20:00	**Count DOWN**	**SM**	**20:00 - 21:00**	**Count UP**	**SM**	**22:00 - 23:00**	**Count DOWN**	**SM**	**21:00 - 22:00**	**Count DOWN**	**SM**
20:00 - 23:45	**Pillar's**	**SM**	**21:00 - 23:45**	**Poacher's**	**SM**	**23:00 - 23:45**	**River Bend**	**SM**	**22:00 - 23:45**	**Stewart's**	**SM**
0:45	*Evening shift ends*		*0:45*	*Evening shift ends*		*0:45*	*Evening shift ends*		*0:45*	*Evening shift ends*	

Late Run Week One

Tuesday	July 2, 2013		Friday	July 5, 2013		Saturday	July 6, 2013		Sunday	July 7, 2013	
7:15	*Morning shift begins*		*7:15*	*Morning shift begins*		*6:15*	*Morning shift begins*		*4:15*	*Morning shift begins*	
8:00 - 9:00	**Count DOWN**	**IK**	**8:00 - 9:00**	**Count UP**	**IK**	**7:00 - 8:00**	**Count DOWN**	**IK**	**5:00 - 6:00**	**Count UP**	**IK**
9:00 - 13:00	**Pillar's**	**IK**	**9:00 - 13:00**	**Poacher's**	**IK**	**8:00 - 12:00**	**River Bend**	**IK**	**6:00 - 10:00**	**Centennial**	**IK**
13:00 - 14:00	**Count UP**	**IK**	**13:00 - 14:00**	**Count DOWN**	**IK**	**12:00 - 13:00**	**Count UP**	**IK**	**10:00 - 11:00**	**Count DOWN**	**IK**
14:00 - 15:45	**River Bend**	**IK**	**14:00 - 15:45**	**River Bend**	**IK**	**13:00 - 15:15**	**Poacher's**	**IK**	**11:00 - 14:15**	**Pillar's**	**IK**
15:45	*Shift change*		*15:45*	*Shift change*		*15:15*	*Shift change*		*14:15*	*Shift change*	
15:45 - 18:00	**River Bend**	**SM**	**15:45 - 18:00**	**River Bend**	**SM**	**15:15 - 17:00**	**Poacher's**	**SM**	**14:15 - 15:00**	**Pillar's**	**SM**
18:00 - 19:00	**Count UP**	**SM**	**18:00 - 19:00**	**Count DOWN**	**SM**	**17:00 - 18:00**	**Count DOWN**	**SM**	**15:00 - 16:00**	**Count UP**	**SM**
19:00 - 23:00	**Poacher's**	**SM**	**19:00 - 23:00**	**Pillar's**	**SM**	**18:00 - 22:00**	**Pillar's**	**SM**	**16:00 - 20:00**	**River Bend**	**SM**
23:00 - 0:00	**Count DOWN**	**SM**	**23:00 - 0:00**	**Count UP**	**SM**	**22:00 - 23:00**	**Count DOWN**	**SM**	**20:00 - 21:00**	**Count UP**	**SM**
						23:00 - 23:45	**Eagle Rock**	**SM**	**21:00 - 23:45**	**Poacher's**	**SM**
1:00	*Evening shift ends*		*1:00*	*Evening shift ends*		*0:45*	*Evening shift ends*		*0:45*	*Evening shift ends*	

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Late Run Week Two

Tuesday July 9, 2013			Thursday July 11, 2013			Saturday July 13, 2013			Sunday July 14, 2013		
6:15	*Morning shift begins*		*5:15*	*Morning shift begins*		*7:15*	*Morning shift begins*		*4:15*	*Morning shift begins*	
7:00 - 8:00	Count UP	IK	6:00 - 7:00	Count DOWN	IK	8:00 - 9:00	Count DOWN	IK	5:00 - 6:00	Count DOWN	IK
8:00 - 12:00	Centennial	IK	7:00 - 11:00	River Bend	IK	9:00 - 13:00	Eagle Rock	IK	6:00 - 10:00	Pillar's	IK
12:00 - 13:00	Count DOWN	IK	11:00 - 12:00	Count UP	IK	13:00 - 14:00	Count UP	IK	10:00 - 11:00	Count UP	IK
13:00 - 15:15	Pillar's	IK	12:00 - 14:45	Poacher's	IK	14:00 - 15:45	Pillar's	IK	11:00 - 14:15	Poacher's	IK
15:15	*Shift change*		*14:45*	*Shift change*		*15:45*	*Shift change*		*14:15*	*Shift change*	
15:15 - 17:00	Pillar's	SM	14:45 - 16:00	Poacher's	SM	15:45 - 18:00	Pillar's	SM	14:15 - 15:00	Poacher's	SM
17:00 - 18:00	Count DOWN	SM	16:00 - 17:00	Count DOWN	SM	18:00 - 19:00	Count UP	SM	15:00 - 16:00	Count DOWN	SM
18:00 - 22:00	Eagle Rock	SM	17:00 - 21:00	Eagle Rock	SM	19:00 - 23:00	Poacher's	SM	16:00 - 20:00	Eagle Rock	SM
22:00 - 23:00	Count UP	SM	21:00 - 22:00	Count UP	SM	23:00 - 0:00	Count DOWN	SM	20:00 - 21:00	Count UP	SM
23:00 - 23:45	River Bend	SM	22:00 - 23:45	Centennial	SM				21:00 - 23:45	Centennial	SM
0:45	*Evening shift ends*		*0:45*	*Evening shift ends*		*1:00*	*Evening shift ends*		*0:45*	*Evening shift ends*	

Late Run Week three

Thursday July 18, 2013			Friday July 19, 2013			Saturday July 20, 2013			Sunday July 21, 2013		
7:15	*Morning shift begins*		*7:15*	*Morning shift begins*		*5:15*	*Morning shift begins*		*7:15*	*Morning shift begins*	
8:00 - 9:00	Count DOWN	IK	8:00 - 9:00	Count DOWN	IK	6:00 - 7:00	Count DOWN	IK	8:00 - 9:00	Count DOWN	IK
9:00 - 13:00	River Bend	IK	9:00 - 13:00	River Bend	IK	7:00 - 11:00	Eagle Rock	IK	9:00 - 13:00	River Bend	IK
13:00 - 14:00	Count DOWN	IK	13:00 - 14:00	Count UP	IK	11:00 - 12:00	Count UP	IK	13:00 - 14:00	Count UP	IK
14:00 - 15:45	Eagle Rock	IK	14:00 - 15:45	Poacher's	IK	12:00 - 14:45	Pillar's	IK	14:00 - 15:45	Centennial	IK
15:45	*Shift change*		*15:45*	*Shift change*		*14:45*	*Shift change*		*15:45*	*Shift change*	
15:45 - 18:00	Eagle Rock	SM	15:45 - 18:00	Poacher's	SM	14:45 - 16:00	Pillar's	SM	15:45 - 18:00	Centennial	SM
18:00 - 19:00	Count UP	SM	18:00 - 19:00	Count DOWN	SM	16:00 - 17:00	Count UP	SM	18:00 - 19:00	Count DOWN	SM
19:00 - 23:00	Poacher's	SM	19:00 - 23:00	Eagle Rock	SM	17:00 - 21:00	Centennial	SM	19:00 - 23:00	Pillar's	SM
23:00 - 0:00	Count DOWN	SM	23:00 - 0:00	Count UP	SM	21:00 - 22:00	Count DOWN	SM	23:00 - 0:00	Count UP	SM
						22:00 - 23:45	Poacher's	SM			
1:00	*Evening shift ends*		*1:00*	*Evening shift ends*		*0:45*	*Evening shift ends*		*1:00*	*Evening shift ends*	

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Late Run Week Four	Wednesday	July 24, 2013		Thursday	July 25, 2013		Saturday	July 27, 2013		Sunday	July 28, 2013	
	6:15	Morning shift begins		6:15	Morning shift begins		3:15	Morning shift begins		4:15	Morning shift begins	
	7:00 - 8:00	Count DOWN	IK	7:00 - 8:00	Count DOWN	IK	4:00 - 5:00	Count DOWN	IK	5:00 - 6:00	Count DOWN	IK
	8:00 - 12:00	River Bend	IK	8:00 - 12:00	Eagle Rock	IK	5:00 - 9:00	Pillar's	IK	6:00 - 10:00	Eagle Rock	IK
	12:00 - 13:00	Count UP	IK	12:00 - 13:00	Count UP	IK	9:00 - 10:00	Count UP	IK	10:00 - 11:00	Count UP	IK
	13:00 - 15:15	Poacher's	IK	13:00 - 15:15	River Bend	IK	10:00 - 13:45	Poacher's	IK	11:00 - 14:15	River Bend	IK
	15:15	Shift change		15:15	Shift change		13:45	Shift change		14:15	Shift change	
	15:15 - 17:00	Poacher's	SM	15:15 - 17:00	River Bend	SM				14:15 - 15:00	River Bend	SM
	17:00 - 18:00	Count DOWN	SM	17:00 - 18:00	Count UP	SM	14:00 - 15:00	Count DOWN	SM	15:00 - 16:00	Count UP	SM
	18:00 - 22:00	Pillar's	SM	18:00 - 22:00	Centennial	SM	15:00 - 19:00	Eagle Rock	SM	16:00 - 20:00	Poacher's	SM
	22:00 - 23:00	Count UP	SM	22:00 - 23:00	Count DOWN	SM	19:00 - 20:00	Count UP	SM	20:00 - 21:00	Count UP	SM
	23:00 - 23:45	Centennial	SM	23:00 - 23:45	Poacher's	SM	20:00 - 23:45	Centennial	SM	21:00 - 23:45	Centennial	SM
	0:45	Evening shift ends		0:45	Evening shift ends		0:45	Evening shift ends		0:45	Evening shift ends	

Late Run Week Five	Tuesday	July 30, 2013		Wednesday	July 31, 2013	
	4:15	Morning shift begins		5:15	Morning shift begins	
	5:00 - 6:00	Count DOWN	IK	6:00 - 7:00	Count DOWN	IK
	6:00 - 10:00	River Bend	IK	7:00 - 11:00	Pillar's	IK
	10:00 - 11:00	Count UP	IK	11:00 - 12:00	Count UP	IK
	11:00 - 14:15	Poacher's	IK	12:00 - 14:45	Centennial	IK
	14:15	Shift change		14:45	Shift change	
	14:15 - 15:00	Poacher's	SM	14:45 - 16:00	Centennial	SM
	15:00 - 16:00	Count DOWN	SM	16:00 - 17:00	Count DOWN	SM
	16:00 - 20:00	Eagle Rock	SM	17:00 - 21:00	Eagle Rock	SM
	20:00 - 21:00	Count UP	SM	21:00 - 22:00	Count UP	SM
	21:00 - 23:45	Centennial	SM	22:00 - 23:45	River Bend	SM
	0:45	Evening shift ends		0:45	Evening shift ends	

Appendix A2.–Sampling schedule for the Kenai River Chinook salmon midriver netting project.

Week 1	Monday 13-May	Tuesday 14-May	Wednesday 15-May	Thursday 16-May	Friday 17-May	Saturday 18-May	Sunday 19-May
AMANDA	X	CPR			X	X	X
STAN	X	X		X			X
KAS	X	CPR		X	X	X	
red lengths?				*no*	*yes*	*no*	*yes*
First mesh				*7.5*	*5.0*	*7.5*	*5.0*
Office				10:00	11:00	12:00	13:00
Net In				11:00	12:00	13:00	14:00
Net Out				17:00	18:00	19:00	20:00
Office				18:00	19:00	20:00	21:00
Week 2	**20-May**	**21-May**	**22-May**	**23-May**	**24-May**	**25-May**	**26-May**
AMANDA	X			X	X	X	X
STAN	X	X	X	Office			X
KAS		X	X	JP	X	X	
red lengths?	*no*	*yes*	*no*	*yes*	*no*	*yes*	*no*
First mesh	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*
Office	14:00	15:15	16:00	5:00	5:30	6:15	7:00
Net In	15:00	16:15	17:00	6:00	6:30	7:15	8:00
Net Out	21:00	22:15	23:00	12:00	12:30	13:15	14:00
Office	22:00	23:15	0:00	13:00	13:30	14:15	15:00
Week 3	**27-May**	**28-May**	**29-May**	**30-May**	**31-May**	**1-Jun**	**2-Jun**
AMANDA	X			Office	X	X	X
STAN	X	X	X	X			X
KAS		X	X	X	X	X	
red lengths?	*yes*	*no*	*yes*	*no*	*yes*	*no*	*yes*
First mesh	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*
Office	7:45	8:30	9:30	10:15	11:15	12:15	13:30
Net In	8:45	9:30	10:30	11:15	12:15	13:15	14:30
Net Out	14:45	15:30	16:30	17:15	18:15	19:15	20:30
Office	15:45	16:30	17:30	18:15	19:15	20:15	21:30
Week 4	**3-Jun**	**4-Jun**	**5-Jun**	**6-Jun**	**7-Jun**	**8-Jun**	**9-Jun**
AMANDA	X			X	X	X	X
STAN	X	X	X	JP			X
KAS		X	X	Office	X	X	
red lengths?	*no*	*yes*	*no*	*yes*	*no*	*yes*	*no*
First mesh	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*
Office	14:30	15:30	16:00	5:00	5:30	6:15	6:45
Net In	15:30	16:30	17:00	6:00	6:30	7:15	7:45
Net Out	21:30	22:30	23:00	12:00	12:30	13:15	13:45
Office	22:30	23:30	0:00	13:00	13:30	14:15	14:45

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Week 5	Monday 10-Jun	Tuesday 11-Jun	Wednesday 12-Jun	Thursday 13-Jun	Friday 14-Jun	Saturday 15-Jun	Sunday 16-Jun
AMANDA	X			Office	X	X	X
STAN	X	X	X	X			X
KAS		X	X	X	X	X	
red lengths?	*yes*	*no*	*yes*	*no*	*yes*	*no*	*yes*
First mesh	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*
Office	7:15	7:45	8:30	9:00	9:45	10:30	11:15
Net In	8:15	8:45	9:30	10:00	10:45	11:30	12:15
Net Out	14:15	14:45	15:30	16:00	16:45	17:30	18:15
Office	15:15	15:45	16:30	17:00	17:45	18:30	19:15
Week 6	**17-Jun**	**18-Jun**	**19-Jun**	**20-Jun**	**21-Jun**	**22-Jun**	**23-Jun**
AMANDA	X			X	X	X	X
STAN	X	X	X	Office			X
KAS		X	X	JP	X	X	
red lengths?	*no*	*yes*	*no*	*yes*	*no*	*yes*	*no*
First mesh	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*
Office	12:15	13:30	14:30	4:00	4:30	5:30	6:00
Net In	13:15	14:30	15:30	5:00	5:30	6:30	7:00
Net Out	19:15	20:30	21:30	11:00	11:30	12:30	13:00
Office	20:15	21:30	22:30	12:00	12:30	13:30	14:00
Week 7	**24-Jun**	**25-Jun**	**26-Jun**	**27-Jun**	**28-Jun**	**29-Jun**	**30-Jun**
AMANDA	X			X	X	X	X
STAN	X	X	X	X			X
KAS		X	X	Office	X	X	
red lengths?	*yes*	*no*	*yes*	*no*	*yes*	*no*	*yes*
First mesh	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*
Office	6:45	7:30	8:15	9:00	9:45	10:45	11:30
Net In	7:45	8:30	9:15	10:00	10:45	11:45	12:30
Net Out	13:45	14:30	15:15	16:00	16:45	17:45	18:30
Office	14:45	15:30	16:15	17:00	17:45	18:45	19:30
Week 8	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**
AMANDA	X			X	X	X	X
STAN	X	X	X	Office			X
KAS		X	X	X	X	X	
red lengths?	*no*	*yes*	*no*	*yes*	*no*	*yes*	*no*
First mesh	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*
Office	12:45	13:45	15:00	4:00	4:45	5:15	6:00
Net In	13:45	14:45	16:00	5:00	5:45	6:15	7:00
Net Out	19:45	20:45	22:00	11:00	11:45	12:15	13:00
Office	20:45	21:45	23:00	12:00	12:45	13:15	14:00

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Week 9	Monday 8-Jul	Tuesday 9-Jul	Wednesday 10-Jul	Thursday 11-Jul	Friday 12-Jul	Saturday 13-Jul	Sunday 14-Jul
AMANDA	X			Office	X	X	X
STAN	X	X	X	X			X
KAS		X	X	X	X	X	
red lengths?	*yes*	*no*	*yes*	*no*	*yes*	*no*	*yes*
First mesh	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*
Office	6:30	7:00	7:30	8:00	8:30	9:15	10:00
Net In	7:30	8:00	8:30	9:00	9:30	10:15	11:00
Net Out	13:30	14:00	14:30	15:00	15:30	16:15	17:00
Office	14:30	15:00	15:30	16:00	16:30	17:15	18:00
Week 10	**15-Jul**	**16-Jul**	**17-Jul**	**18-Jul**	**19-Jul**	**20-Jul**	**21-Jul**
AMANDA	X			X	X	X	JP
STAN	X	X	X	X			X
KAS		X	X	Office	X	X	
red lengths?	*no*	*yes*	*no*	*yes*	*no*	*yes*	*no*
First mesh	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*
Office	10:30	11:30	12:45	14:00	15:15	16:00	5:00
Net In	11:30	12:30	13:45	15:00	16:15	17:00	6:00
Net Out	17:30	18:30	19:45	21:00	22:15	23:00	12:00
Office	18:30	19:30	20:45	22:00	23:15	0:00	13:00
Week 11	**22-Jul**	**23-Jul**	**24-Jul**	**25-Jul**	**26-Jul**	**27-Jul**	**28-Jul**
AMANDA	X			Office	X	X	X
STAN	X	X	X	X			X
KAS		X	X	X	X	X	
red lengths?	*yes*	*no*	*yes*	*no*	*yes*	*no*	*yes*
First mesh	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*
Office	6:00	6:30	7:15	8:00	8:30	9:15	10:00
Net In	7:00	7:30	8:15	9:00	9:30	10:15	11:00
Net Out	13:00	13:30	14:15	15:00	15:30	16:15	17:00
Office	14:00	14:30	15:15	16:00	16:30	17:15	18:00
Week 12	**29-Jul**	**30-Jul**	**31-Jul**	**1-Aug**	**2-Aug**	**3-Aug**	**4-Aug**
AMANDA	X			X	X	X	JP
STAN	X	X	X	Office			X
KAS		X	X	X	X	X	
red lengths?	*no*	*yes*	*no*	*yes*	*no*	*yes*	*no*
First mesh	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*
Office	11:00	12:00	13:00	14:15	15:30	16:00	5:00
Net In	12:00	13:00	14:00	15:15	16:30	17:00	6:00
Net Out	18:00	19:00	20:00	21:15	22:30	23:00	12:00
Office	19:00	20:00	21:00	22:15	23:30	0:00	13:00

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Week 13	Monday 5-Aug	Tuesday 6-Aug	Wednesday 7-Aug	Thursday 8-Aug	Friday 9-Aug	Saturday 10-Aug
AMANDA	X			X	X	X
STAN	X	X	X	X		
KAS		X	X	Office	X	X
red/coho lengths?	*yes*	*no*	*yes*	*no*	*yes*	*no*
First mesh	*5.0*	*7.5*	*5.0*	*7.5*	*5.0*	*7.5*
Office	5:30	6:00	6:30	7:00	7:30	8:00
Net In	6:30	7:00	7:30	8:00	8:30	9:00
Net Out	12:30	13:00	13:30	14:00	14:30	15:00
Office	13:30	14:00	14:30	15:00	15:30	16:00

Appendix A3.– Sampling schedule for the Kenai River Chinook salmon nearshore netting project.

Week 1	Monday 13-May	Tuesday 14-May	Wednesday 15-May	Thursday 16-May	Friday 17-May	Saturday 18-May	Sunday 19-May
Crew				*TE/AB*		*TE/AB*	
First mesh				*7.5*		*5.0*	
Office				5:45		7:45	
Net In				6:45		8:45	
High Tide				8:45		10:45	
Net Out				12:45		14:45	
Office				13:45		15:45	
Week 2	**20-May**	**21-May**	**22-May**	**23-May**	**24-May**	**25-May**	**26-May**
Crew	*TE/AB*		*TE/AB*				
First mesh	*7.5*		*5.0*				
Office	10:15		12:15				
Net In	11:15		13:15				
High Tide	13:15		15:15				
Net Out	17:15		19:15				
Office	18:15		20:15				
Week 3	**27-May**	**28-May**	**29-May**	**30-May**	**31-May**	**1-Jun**	**2-Jun**
Crew	*TE/AB*				*TE/AB*		
First mesh	*7.5*				*5.0*		
Office	16:15				7:00		
Net In	17:15				8:00		
High Tide	19:15				10:00		
Net Out	23:15				14:00		
Office	0:15				15:00		
Week 4	**3-Jun**	**4-Jun**	**5-Jun**	**6-Jun**	**7-Jun**	**8-Jun**	**9-Jun**
Crew	*TE/AB*			*AB/KAS*			
First mesh	*7.5*			*5.0*			
Office	10:45			13:30			
Net In	11:45			14:30			
High Tide	13:45			16:30			
Net Out	17:45			20:30			
Office	18:45			21:30			

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Week 5	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
	10-Jun	11-Jun	12-Jun	13-Jun	14-Jun	15-Jun	16-Jun
Crew	*TE/AB*			*AB/Amanda*			
First mesh	*7.5*			*5.0*			
Office	15:45			4:30			
Net In	16:45			5:30			
High Tide	18:45			7:30			
Net Out	22:45			11:30			
Office	23:45			12:30			
Week 6	**17-Jun**	**18-Jun**	**19-Jun**	**20-Jun**	**21-Jun**	**22-Jun**	**23-Jun**
Crew	*TE/AB*			*AB/netter*			
First mesh	*7.5*			*5.0*			
Office	8:15			12:00			
Net In	9:15			13:00			
High Tide	11:15			15:00			
Net Out	15:15			19:00			
Office	16:15			20:00			
Week 7	**24-Jun**	**25-Jun**	**26-Jun**	**27-Jun**	**28-Jun**	**29-Jun**	**30-Jun**
Crew			*AB/Amanda*		*AB/Amanda*		
First mesh			*7.5*		*5.0*		
Office			16:45		5:30		
Net In			17:45		6:30		
High Tide			19:45		8:30		
Net Out			23:45		12:30		
Office			0:45		13:30		
Week 8	**1-Jul**	**2-Jul**	**3-Jul**	**4-Jul**	**5-Jul**	**6-Jul**	**7-Jul**
Crew	*TE/AB*				*TE/AB*		
First mesh	*7.5*				*7.5*		
Office	9:00				13:15		
Net In	10:00				14:15		
High Tide	12:00				16:15		
Net Out	16:00				20:15		
Office	17:00				21:15		

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Week 9	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
	8-Jul	9-Jul	10-Jul	11-Jul	12-Jul	13-Jul	14-Jul
Crew		*TE/AB*		*TE/AB*			
First mesh		*7.5*		*5.0*			
Office		15:30		16:30			
Net In		16:30		17:30			
High Tide		18:30		19:30			
Net Out		22:30		23:30			
Office		23:30		0:30			
Week 10	**15-Jul**	**16-Jul**	**17-Jul**	**18-Jul**	**19-Jul**	**20-Jul**	**21-Jul**
Crew	*TE/AB*			*AB/KAS*			
First mesh	*7.5*			*5.0*			
Office	6:30			10:30			
Net In	7:30			11:30			
High Tide	9:30			13:30			
Net Out	13:30			17:30			
Office	14:30			18:30			
Week 11	**22-Jul**	**23-Jul**	**24-Jul**	**25-Jul**	**26-Jul**	**27-Jul**	**28-Jul**
Crew			*TE/AB*	*AB/Amanda*			
First mesh			*7.5*	*5.0*			
Office			15:45	16:15			
Net In			16:45	17:15			
High Tide			18:45	19:15			
Net Out			22:45	23:15			
Office			23:45	0:15			
Week 12	**29-Jul**	**30-Jul**	**31-Jul**	**1-Aug**	**2-Aug**	**3-Aug**	**4-Aug**
Crew		*TE/AB*		*AB/Netter*			
First mesh		*7.5*		*5.0*			
Office		8:15		11:15			
Net In		9:15		12:15			
High Tide		11:15		14:15			
Net Out		15:15		18:15			
Office		16:15		19:15			

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Week 13	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	5-Aug	6-Aug	7-Aug	8-Aug	9-Aug	10-Aug
Crew	*TE/AB*		*AB/New netter*			
First mesh	*5.0*		*5.0*			
Office	14:00		15:00			
Net In	15:00		16:00			
High Tide	17:00		18:00			
Net Out	21:00		22:00			
Office	22:00		23:00			

APPENDIX B. KENAI RIVER CHINOOK SALMON CREEL SURVEY FORMS, 2013.

Appendix B 1.–Kenai River Chinook creel count form.

KENAI RIVER CHINOOK CREEL COUNT FORM

Date: _____ Secchi one: _____ Secchi two: _____

Time one: _____ Time two: _____

Tech.	Time	River Section *	Non Guided				Guided				active boats	non active boats	Shore Angler
			Power		Drift		Power		Drift				
			Boat	Angler	Boat	Angler	Boat	Angler	Boat	Angler			
Count number one													
		Warren Ames Bridge-Lower sonar site											
		Lower sonar site-Upper sonar site											
		Upper sonar site-Soldotna Bridge											
Count number two													
		Warren Ames Bridge-Lower sonar site											
		Lower sonar site-Upper sonar site											
		Upper sonar site-Soldotna Bridge											

-continued-

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Count number three													
		Warren Ames Bridge-Lower sonar site											
		Lower sonar site-Upper sonar site											
		Upper sonar site-Soldotna Bridge											
Count number four													
		Warren Ames Bridge-Lower sonar site											
		Lower sonar site-Upper sonar site											
		Upper sonar site-Soldotna Bridge											

Tech: Initials **Time:** Military time at start of count **River Section:** reset counters at each section. **Angler:** count a person as an angler if they are actively fishing or rigging a line.

Boats: count a boat as if it contains at least one angler Active boats: count all boats that are underway, although they have no one is actively angling.

Non-active boats: boats not underway with no active anglers but have run their boat during that day.

Appendix B2.–Kenai River Chinook creel interview form.

KENAI RIVER CHINOOK CREEL INTERVIEW FORM Page ____ of ____

Date:_____ Name:_____

							Chinook Salmon							Radio Tag Information			
Time	Site	Boat #	Ang. #	Hours Fished	Fishing Method	Fish Loc.*	Kept	K. Loc.*	scale#	vial#	Ad Clip	Rel.	slot?	Frequency	Pulse #	RM	Comments
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			
														151 .			

Time: nearest minute **Site:** codes 1=Centennial, 2=Riverquest, 3=Riverbend, 4=Not used, 5= Eagle rock, 6=Pillar's, 7=Poachers Cove. **Boat #**: Start at 1 each day. **Ang.#:** Restarts at 1 with each new boat. **Hours Fished:** time line was in the water to the nearest half hour. **Angler type**: (G)uided or (U)nguided. **Fishing method** Power boat (P) or Drift boat (D) or Shore angler (S)

Chinook Salmon Section **Kept:** # harvested **Scale#:** write card#-fish# (ex. 2-4) and length (to nearest 5mm) and sex in comments, if not sampled write 'NS'. **Vial#:** Record the vial#. **Ad clip:** Check if harvest chinook was ad cliped, write AFC# or 'no head' in comments **Rel:** # released **Slot?:** ask if fish was below/within/above 46"-55" slot limit. **Frequency:** Record frequency # on tag. **Pulse Code:** Record pulse code# (1-26). **RM**: Location Chinook was caught (hole or river mile). * Fish Loc. and K. Loc: "1"= Below Upper sonar site, "2" = Above Upper Sonar site. **Comments:** Relevant notes.

Appendix B3.–Kenai River Chinook creel ASL form.

KENAI RIVER CHINOOK CREEL ASL SAMPLING FORM

Date:
Sampler: Mallette/Karic

Card	Fish #	Angler type	Sex	MEF Length	Total Length	Vial #	Age	CWT#	Radio TAG Information Freq #	Radio TAG Information Pulse #	Comments
	1										
	2										
	3										
	4										
	5										
	6										
	7										
	8										
	9										
	10										

Card	Fish #	Angler type	Sex	MEF Length	Total Length	Vial #	Age	CWT#	Radio TAG Information Freq #	Radio TAG Information Pulse Code	Comments
	1										
	2										
	3										
	4										
	5										
	6										
	7										
	8										
	9										
	10										

Card	Fish #	Angler type	Sex	MEF Length	Total Length	Vial #	Age	CWT#	Radio TAG Information Freq #	Radio TAG Information Pulse Code	Comments
	1										
	2										
	3										
	4										
	5										
	6										
	7										
	8										
	9										
	10										

APPENDIX C. DATA MAPS FOR KENAI RIVER CHINOOK SALMON CREEL SURVEY AND INRIVER GILLNETTING STUDY, 2013.

Appendix C1.–Kenai River Chinook creel count file data map.

Data Map for file:
Kscnt2013.dta

Data Field Name	Start Column	End Column	Comma Column	Codes/ Comments
Month	1	2	3	
Day	4	5	6	
Year	7	10	11	Four digit year
Location	12	12	13	1 = Warren Ames Bridge to Lower salmon sonar site, 2 = Lower Chinook sonar site to Upper sonar site, 3= Upper sonar site to Soldotna Bridge
Count Time	14	17	18	Military time when count began
Unguided Power Boat Count[a]	19	22	23	A boat was counted if it contained at least one angler
Unguided Power Angler Count[a]	24	27	28	Anglers were defined as people who had a line in the water or were rigging a line
Unguided Drift Boat Count[a]	29	32	33	A boat was counted if it contained at least one angler
Unguided Drift Angler Count[a]	34	37	38	Anglers were defined as people who had a line in the water or were rigging a line
Guided Power Boat Count[a]	39	42	43	A boat was counted if it contained at least one angler
Guided Power Angler Count[a]	44	47	48	Anglers were defined as people who had a line in the water or were rigging a line
Guided Drift Boat Count[a]	49	52	53	A boat was counted if it contained at least one angler
Guided Drift Angler Count[a]	54	57	58	Anglers were defined as people who had a line in the water or were rigging a line
Shore Angler Count[a]	59	62	63	Anglers were defined as people who had a line in the water or were rigging a line
Active Boat Count	64	67	68	A boat was counted if it was under power but contained no active anglers
Non Active Boat Count	69	71	End	A boat was counted if it was not under power but was under power at one time that day

a Count fields left *blank* if fishing is closed at that time for that group or a scheduled count was missed.

Appendix C2.–Kenai River Chinook creel interview file data map.

Data Map for files:
Ksint2013.txt

Data Field Name	Start Column	End Column	Comma Column	Codes/ Comments
Date Code	1	8	9	
Year	1	4		Four digit year
Month	5	6		
Day	7	8		
Interview time	10	11	12	Time of interview (truncated to nearest hour prior to 2005)
(Blank)	13	13	14	
Interviewer	15	16	17	Initials of interviewer
Interview Location	18	19	20	01=Centennial Park, 03=Riverbend, 04=Stewarts Landing, 05=Eagle Rock, 06=Pillars, 07=Poacher's Cove.
(Blank)	21	22	23	
(Blank)	24	25	26	
Survey Area Code	27	28	29	P0 = Kenai Pen.
Site Code	30	32	33	001 = Kenai River, Cook Inlet to Soldotna Bridge
(Blank)	34	35	36	
(Blank)	37	38	39	
Boat Number	40	42	43	Does not reset to 01 at start of each person shift
Angler Number	44	45	46	Angler number starts at 01 for each boat
(Blank)	47	47	48	
Interview Type	49	49	50	always C = Completed trip interview
Boat/Shore	51	51	52	B = Boat, S = Shore
Unguided/Guided	53	53	54	U = Unguided, G = Guided
Fishing Time (Hours)	55	56	57	Hours fished
Fishing Time (Minutes)	58	59	60	Minutes fished (rounded to nearest .25 hour)

-continued-

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Data Field Name	Start Column	End Column	Comma Column	Codes/ Comments
Location Fished	61	61	62	1 = Exclusively fished below Upper sonar site, 2 = Exclusively fished above Upper sonar site, 3 = Fished above and below Upper sonar site
Species (Chinook)	63	65	66	410 = Chinook
Harvest	67	67	68	K = Chinook harvested
Number Harvested	69	70	71	Number of Chinook harvested (generally 1 although 2 possible w/ proxy)
Location of harvest	72	72	73	1 = Harvested below Upper sonar site, 2 = Harvested above Upper sonar site
Species (Chinook)	74	76	77	410 = Chinook
Released	78	78	79	R = Chinook released
Number Released	80	81	82	Number of Chinook released
(Blank)	83	83	84	
Species (sockeye)	85	87	88	420 = sockeye
Harvest/Released	89	89	90	Number of sockeye harvested
Number Harvested/Released	91	92	93	Number of sockeye released
(Blank)	94	94	95	
Species (coho)	96	98	99	430 = coho
Harvest/Released	100	100	101	Number of coho harvested
Number Harvested/Released	102	103	104	Number of coho released
(Blank)	105	105	106	
Species (pink)	107	109	110	440 = pink
Harvest/Released	111	111	112	Number of pink harvested
Number Harvested/Released	113	114	115	Number of pink released
(Blank)	116	116	117	
Species (rainbow)	118	120	121	511 = Rainbow
Harvest/Released	122	122	123	Number of rainbow harvested
Number Harvested/Released	124	125	126	Number of rainbow released
Fishing Location	127	128	129	"Always" set to 1 since 2000

-continued-

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Data Field Name	Start Column	End Column	Comma Column	Codes/ Comments
Boat Type	130	131	132	1 = power boat, 2 = drift boat, "blank" = shore
Adipose Finclip	133	134	135	N = no adclip, C = adclip present
Released Chinook <46 in	136	136	137	
Released Chinook 46-54.99 in	138	138	139	
Released Chinook >55 in	140	140	141	column 141=# of released Chinook 55 inches or greater
Vial #	142	145	146	
Frequency #	147	150	151	Four digit Frequency #
Pulse Code #	152	153	154	Two digit Pulse Code #
Location Caught	155	158	159	Location where tagged Chinook was caught (river mile)
Age	160	161	162	
Age err	163	163	END	”R=regenerated, “M”=missing, “I”=inverted, “A”=absorbed

Appendix C3.–Kenai River Chinook creel ASL data map.

Data Map for files:
ksintage13.txt

Data Field Name	Start Column	End Column	Comma Column	Codes/ Comments
(Blank)	1	1	2	
Date Code	3	8	9	
Year	3	4		Two digit year
Month	5	6		
Day	7	8		
(Blank)	10	13	12,14	
Survey Area Code	15	16	17	P0 = Kenai Pennisula fresh water (not Kenai/Kasilof).
Site Code	18	20	21	001 = Kenai River, Cook Inlet to Soldotna Bridge
(Blank)	22	23	24	
	25	26	27	
Species	28	30	31	410 = chinook
(Blank)	32	44	35,39,43,45	
(Blank)	46	57	47,49,58	
Collector	59	60	61	Initials of sampler
Sex	62	62	63	= M or F
(Blank)	64	64	65	
MEF length	66	69	70	MEFL, millimeters
Total length	71	75	76	TL, inches
Vial	77	80	81	
	82	89	84,87,90	
Angler Type	91	95	96	G = guided, NG = Unguided
Scale Card Number	97	99	100	
Fish Number	101	102	103	Number on scale card (Values 1-10)
Age	104	105	106	column 104=freshwater age, column 105=marine age
Age error	107	108	end	R=regen, M=missing, I=inverted, A=absorbed

Appendix C4.–Kenai River Creel Secchi Data Map.

Data Map for files:
creelsecchi2013.txt

Data Field Name	Start Column	End Column	Comma Column	Codes/ Comments
Date Code	1	8	9	
Year	1	4		Four digit year
Month	5	6		
Day	7	8		
Time	10	13	14	Military time
Secchi	15	18	19	secchi depth (meters) mid-channel at rm 15.3, #.## format
Water temperature	20	23	end	water temperature (degrees C) midchannel at rm 15.3, ##.# format

Appendix C5.–Kenai River Chinook inriver gillnetting file data map.

Data Map for files:
Ksawl2013.txt

Files are in Tagging Length mark-sense format.

Data Field Name	Start Column	End Column	Comma Column	Codes/ Comments
Crew Number	1	2	3	1,2,3 or 4
Date Code	4	11	12	
Year	4	7		Four digit year
Month	8	9		
Day	10	11		
(Blank)	13	23	15,17,21,24	
Statewide location/stat code	25	28	29	"Always" = 009 (Kenai River)
(Blank)	30	54	32,39,47,51,55	
Length Type	56	57	58	EF=Mid-eye-fork length, TL= Total Length
(Blank)	59	68	62,64,67,69	
Mesh size (inches)	70	70	71	
Drift Start Time (Hour)	72	74	75	Military hours
Drift Start Time (Minutes)	76	78	79	
Drift Start Time (Seconds)	80	82	83	
Drift Stop Time (Hour)	84	86	87	Military hours
Drift Stop Time (Minutes)	88	90	91	
Drift Stop Time (Seconds)	92	94	95	
Scale Card Number	96	98	99	
Fish Number	100	102	103	Number on scale card (Values 1-10)
Age	104	105	106	column 104=Freshwater, column 105=Marine
Age error	107	108	109	R=regen, M=missing, I=inverted, A=absorbed, D=Dirty
Repetition number	110	117	118	Begins at 1 each day and increments by one every four drifts
Drift Number	119	120	121	Begins at 1 each day and increments with every drift
Sex	122	122	123	= M or F
Length	124	127	128	MEFL, millimeters
Genetics vial number	129	133	134	Starts at 1 and increments with each sampled fish

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Data Field Name	Start Column	End Column	Comma Column	Codes/ Comments
Fin Punch	135	136	137	Not used in 2004-2006
Fate	138	138	139	R=release, E=escape, Y=recap, H=harvested
Bank	140	140	141	N=north, S=south, bank that drift was set on (throw bouy towards)
(Blank)	142	142	143	
Species code	144	146	147	410=Chinook, 420=sockeye, 430=coho, 440=pink, exc.
Number Caught	148	149	150	
Adipose Finclip	151	156	157	Coded Wire Tag #
Frequency #	158	161	162	Four digit Frequency # of radio tagged Chinook
Pulse Code #	163	164	165	Two digit Pulse Code # of radio tagged Chinook
Condition/Injury Status	166	168	end	1=OK, 2=bleeding gills, 3=cut or scraped, 4=lethargic, 5=other

Appendix C6.–Kenai River Chinook inriver gillnetting secchi and tide data map.

Data Map for files:

creelsecchi2013.txt

Data Field Name	Start Column	End Column	Comma Column	Codes/ Comments
Date Code	1	8	9	
Year	1	4		Four digit year
Month	5	6		
Day	7	8		
Time	10	13	14	Military time
Secchi	15	18	19	secchi depth (meters) mid-channel at RM 15.3, #.## format
Water temperature	20	23	end	water temperature (degrees C) midchannel at RM 15.3, ##.# format

APPENDIX D. TECHNICIAN MANUAL FOR THE KENAI RIVER CHINOOK SALMON CREEL SURVEY AND INRIVER GILLNETTING STUDY, 2013

Appendix D.- Technician manual for the 2013 Kenai River Chinook Salmon Creel Survey and Inriver Gillnetting Study.

INTRODUCTION AND BACKGROUND

This manual provides the specific procedures for technicians conducting the 2013 Kenai River Chinook Salmon Creel Survey and Inriver Gillnetting Project. These projects are critical to effective inseason and postseason management of Chinook salmon in the Kenai River. The data collected from these projects are highly scrutinized and used daily in projecting returns, assessing run strength, harvest, effort and escapement of Kenai River Chinook salmon.

Creel survey personnel will be counting boats and anglers, interviewing sport anglers, and collecting biological samples from harvested Chinook salmon. The information collected in this survey will be used to estimate the sport harvest of Kenai River Chinook salmon between the Soldotna bridge and Warren Ames bridge. The harvest estimate is used to make both inseason and postseason management decisions regarding the Kenai River Chinook salmon fishery.

The netting crew will be capturing salmon using gill nets to collect species composition information and relative abundance (CPUE) and as well as biological information from captured Chinook salmon (ie. genetics samples, sex, age, length and CWT information) and length and abundance information from other salmon species. This information is used inseason to estimate the age composition of returning Chinook salmon and as an alternative estimate of the species composition of fish passing the Chinook salmon sonar.

DUTIES

Creel Personnel:

- Conduct angler/boat counts and interview anglers on the Kenai River while adhering to a rigid sampling schedule.
- Sample Chinook salmon harvested by sport anglers for ASL and CWT information and record the appropriate information on a handheld computer and sampling forms.
- Download collected data on the Allegro CE handheld computer to the project biologist's personal computer. This is to be done at the end of the day after returning to the office.
- Answer questions from the public on a variety of subjects such as sport fishing regulations and local fishery information.
- Carefully document fishery violations observed during the course of normal duties and forward information to the project leader and other enforcement agencies.

Both Creel and Inriver Netting Personnel:

- Carefully edit all data forms before turning them into the immediate supervisor.
- Maintain and repair state equipment provided such as boats, motors, trailers and state highway vehicles. Only minor maintenance and repair will be done at the discretion of the project biologist. Major maintenance and repair will be forwarded to the maintenance

supervisor for boats, motors and trailers and the State Department of Transportation for highway vehicles.

- Complete time sheets no later than the 15th and 30th/31st of each month.
- Clean and maintain appropriate areas of the ADF&G warehouse and shed.
- Ensure all boats and vehicles are kept clean.
- Report any problems to your immediate supervisor.

SAMPLING, INTERVIEWS and ANGLER COUNTS

Interviews: Interviews are to be conducted at the times and locations in the interview schedule. When conducting interviews always identify yourself as working for the Alaska Department of Fish and Game and only interview boats that are leaving the fishery and anglers that are done fishing for that trip (completed trip anglers). Anglers to be interviewed are randomly selected, i.e., do not target only anglers with fish, but do attempt to interview all anglers exiting the fishery at your selected location. If you cannot interview all anglers, then document the number and type of anglers that you missed.

While completing the interview, record the information into the handheld computer. When sampling harvested Chinook salmon, record the sex, mid-eye fork (MEF) length and total length on the AWL sampling form in addition to entering all the necessary data into the computer. The MEF length measurement, to the nearest 1 mm, is from the mid-eye to the fork of tail. The total length measurement, to the nearest 1 mm, is from the snout to tip of tail measured across the lateral line of the body. Collect three scales on the left side of the fish 3 rows above the lateral line at a 45 degree line posterior of the dorsal fin to the tail, place them concave (curled) side down on the scale card and label each fish with the MEF length. Be sure to label the form and card correctly (date, location, sampler, species, etc.). In addition, a genetics sample will be taken from the axillary process of all sampled fish if permission is granted from the angler. Genetics sample numbers will be entered into the computer and samples will be stored in vials filled with ethyl alcohol and stored in the project biologist's office.

Boat and angler counts: Counts are to begin on the whole hour as designated on the schedule and should not take more than one hour to complete. Plan your schedule so that you are at the designated end of the study area at the designated time and location. Direction of travel is labeled in the schedule to minimize travel distance.

Categories of to be tallied during each count include:

a. Guided power boats.
b. Guided power anglers.
c. Guided drift boats.
d. Guided drift anglers.
e. Unguided power boats.

f. Unguided power anglers.
g. Unguided drift boats.
h. Unguided drift anglers.
i. Shore anglers.
j. Active boats (boats not on bank with no active anglers and boat had motor run during the day)

Four individual counts will be conducted during each scheduled count period. These areas include:

a. between the Warren Ames Bridge (RM5.2) and the lower salmon sonar site (RM 8.5),
b. between the lower salmon sonar site (RM 8.5) and upper sonar site (RM 13.7),
c. between upper sonar site (RM 13.7) and the Soldotna Bridge (RM 21.1),

For example, a count will be made from the Soldotna Bridge downstream to upper sonar site then entered into the handheld computer. Thumbcounters will be reset and the next count will be from upper sonar site to the lower sonar site, and so on for each area. During the late run, we will also be stratifying shore angler counts between the Sockeye salmon sonar site (RM 19) and the Soldotna Bridge and from the Sockeye salmon sonar site to the Warren Ames Bridge. Each creel personnel will take a secchi disc reading and water temperature (in degrees F) in front of RiverQuest during their shift and enter it into the computer. If the handheld computer is not functioning properly, data will be entered onto data forms and turned into the project biologist at the end of his/her shift.

Inriver Netting: Each day a crew of two people will be scheduled to net from 5 hours before low tide until one hour after low tide. Netting will take place in the 0.6 km section of river downstream of the Chinook salmon sonar. The mesh size and bank from which to set the net will be specified by the handheld computer. It is critical that the net is only drifted in the area that would be insonified by the Chinook salmon sonar. This will be stressed to you all season and if you have any questions regarding where the insonified area is do not hesitate to ask the project biologist. The time that each set begins and ends is automated and recorded on the handheld computer as well as all the biological information on sampled Chinook and sockeye salmon. If the computer is functioning properly, the only writing you will have to do for sampling will be to record the length on the scale card and fill out the back of the scale card. The MEF length measurement, to the nearest 5 mm, is from the mid eye to the fork of tail on Chinook salmon and is the length that is recorded on the scale card. On each sampled Chinook salmon, collect three scales and place them on the scale card concave side down. Be sure to label the form and card appropriately (date, location, sampler, species, etc.). All Chinook salmon

sampled from May 16 to June 31 will receive an esophageal radio transmitter. From July 1 to August 10 every third fish sampled for ASL will receive an esophageal radio transmitter. The frequency # and pulse code # for each tagged salmon will be recorded on the handheld computer. Before releasing the fish, mark the fish with a 'hole punch' on the dorsal side of the caudal fin and do not sample a fish that already has a hole punched in that area, record it as a recapture. Also be sure to examine all captured Chinook salmon for the presence of an adipose fin and kill all Chinook salmon without at an adipose fin. Once the fish is on board, cut the head off and affix a cinch strap to the head. There won't be many Chinook salmon without adipose fins so be sure to examine every one. An escape is a fish that got out of the net without being sampled only if it was positively identified as a Chinook salmon (4 bobbing corks do not count if you did not visually see that it was a Chinook salmon). Each day the netting crew will take both a secchi disc reading and tide staff reading in front of the Chinook salmon sonar at the beginning, midpoint and end of their shift and enter it in the handheld computer.

Each week one crewmember will spend one day mending nets, repairing equipment and various odd tasks such as scale pressing, editing data and potentially working on other projects as time allows. This office day will be alternated so that each crewmember will have an office day every third week.

Radio Transmitter Deployment and retrieval: During 2013 the inriver gillnetting and creel survey crews will be collaborating with a separate study that is estimating Kenai River Chinook salmon abundance. The inriver netting crew will have additional responsibilities of tagging early run Chinook salmon with radio transmitters and recording tag information (frequency #, and pulse code #), as well as collecting genetics samples from all captured Chinook salmon in the early and late runs. The creel survey crews additional responsibilities will be recording information (frequency #, pulse code #, and location caught), for all tagged Chinook salmon sampled during angler interviews.

EQUIPMENT NEEDED

At the start of the season, each crew will be issued and be responsible for a clipboard. At the start of each sampling period you should make sure at a minimum that it contains:

20-30 scale cards and acetates in a ziplock bag

3 sets of tweezers

2 standard pencils

2 cloth measuring tapes

Sampling forms (At least 5 of each)

1 *rite in the rain* logbook

1 pair of sharp scissors

5 statement forms

Laminated Kenai Chinook contact list

Laminated State Parks and ABWE contact list

Sport fish regulation booklet

Copy of State Parks Permit for over-horsepower motors (netting crew)

A copy of this manual

In addition, you will need the handheld Allegro computer, a box of genetics vials, a bottle of ethyl alcohol, and a camera as well as extra hole punches on the boat. Be sure and double check you have what you need before leaving the office area.

The netting crew will have an additional clipboard of radio transmitters to be deployed sequentially, and three radio transmitter deploying devices that will be required every day.

UNIFORMS

Your uniform is your hat. Please try and wear a Fish and Game issued hat during your fieldwork. Fish and Game patches sewn on your PFD will be another form of identification. You will be held to a higher standard than the public, so when on duty, act professional, represent the department well and be aware that you are being watched a lot closer than you may think.

PERSONAL FLOATATION DEVICES (LIFE JACKETS)

Life jackets are to be worn at all times when on the boat, or near water deep enough that you could drown. There will be no exceptions to this rule and crews are instructed to notify the project biologist if there is any noncompliance to this rule. You may take off your PFD to change clothes but must promptly put your life jacket back on.

SAMPLING GEAR

You will be issued a high quality rain coat and bibs, rubber boots, a PDF, both arm length and short rubber coated gloves as well as a dry bag for each crew. You will be instructed to turn in all sampling gear at the end of the field season.

CELL PHONES

The netting crew and creel crew will each be issued a cell phone. At a minimum, all the numbers on the Kenai Chinook contact list should be entered into the phone book. The cell phone is to be on and easily accessible at all times when on duty. Charge the cell phone in the project biologist's office at the end of the workday and bring the phone with you when you start your workday. Limit phone use to state business, however you can use the phone in an emergency. . Please keep track of the phone while on duty and notify the project biologist if the phone is lost or is not functioning properly. The phones are not waterproof, nor do they float so

keep them dry and in a zippered or snapped pocket when getting in and out of the boat. Waterproof phone bags will be supplied.

SAFETY

Safety is the utmost priority. Please try and be safe and aware of your surroundings. Do not do anything to jeopardize your or members of your crews' safety. There is no piece of data that is worth jeopardizing safety. If you feel uncomfortable doing a task that could potentially jeopardize your safety, do not do it and contact your supervisor.

TIME SHEETS

Time sheets must be completed twice monthly, one for the 1st through the 15th and one for the 16th through the 30th or 31st. This is your responsibility and you will be reminded when they are due. You will be instructed as to how to properly fill out your timesheet online. Save and review the timesheet with your supervisor, but do not press the submit button. The website address is http://www.tears.adfg.state.ak.us/tears/help/#. Print out both the timesheet and project accounting detail sheet. Don't forget to sign your timesheet. You do not need to sign the project accounting detail sheet but turn in both to the project biologist. You will be paid for grave and swing shifts if you work during these times along with regular time and will be compensated overtime if you work more than 37.5 hours per week. You need to fill in start/stop times and the number of hours worked each day. Lunch is one-half hour per day and is not compensable. There are two 15-minute compensable breaks per day. The payroll officer will determine how many hours of grave, etc. that you have worked. The netting crew should try and take lunch at different times per day. The creel crew should try and take lunch at a break in sampling.

OVERTIME is any time worked in excess of 37.5 hours per week. The workweek always begins on Monday and ends on Sunday at midnight.

SWING shift pay is any shift that begins between 1200 (noon) and 1959 (7:59 p.m.). Employees working this shift are entitled to an additional 0.0375 times their hourly rate for the hours worked.

GRAVE shift pay is any shift that begins between 2000 (8:00 p.m.) and 0559 (5:59 a.m.). Employees working this shift are entitled to an additional 0.075 times their hourly rate for the hours worked.

PURCHASING and INVOICES

You may be instructed to make purchases at various local stores. You must sign the invoice when you receive the goods. Make sure the invoice or receipt states exactly what you purchased (i.e. sporting goods is not specific enough). You should also print your name below your signature, put Kenai River Chinook somewhere on the invoice and turn it in promptly to the appropriate bin in the project biologist's office. If you need something, let the project biologist know and get what you need to do your job effectively (ie, gloves, boots, sampling equipment, rain gear).

TIMELINESS and TIME OFF

It is very important to show up on time for your scheduled workday, timing is critical and it is important to follow the specified sampling schedule. Please notify the project biologist if for some reason you will not be able to complete your regular workday at the times specified by your schedule. The netting crew will work five consecutive days with two consecutive days off. The creel crew will work four out of seven days per week with no guarantee of two consecutive days off. The creel crew will work all weekend days, two of the four days between Tuesday through Friday and will not work Mondays. If you need time off, contact the project biologist and he will try and find someone to fill in for you. Please try and give some time in advance if you know you need the time off and most of the time it shouldn't be a problem. In an emergency, contact the project biologist.

SPORTFISHING VIOLATIONS

Fish and wildlife law enforcement is not a primary job responsibility of ADF&G employees; however, during the course of your fieldwork you may come across sportfishing violations. If you come across violations, you are instructed to promptly call the project biologist; in the event that you cannot contact him, call either State Parks or the Alaska Division of Wildlife Troopers (DWT). Laminated cell phone lists are provided and should be in the sampling clipboard. You are not to check fishing licenses or do any type of enforcement. The creel crew will be taking total length on fish and may come across harvested fish within the restricted slot limit in the early run. In this situation, promptly notify the project biologist. Carefully note what you witnessed and take down boat numbers, license plates, physical descriptions and document all witnessed violations in your logbook. Enforcement is not your responsibility, so use discretion and should you come across violations, promptly notify your supervisor. If you come across a Chinook salmon that is larger than 55 inches total length, needing to be sealed, contact the project biologist to make arrangements for the angler to bring the fish to the Fish and Game office to be sealed.

EVALUATION

Data collection and editing are the primary duties of these positions. Each person will be evaluated on the quality, cleanliness, and thoroughness of the data that they turn in as well as dependability and timeliness arriving to work. Also, it is important to act professional and communicate regularly with your supervisor and crewmembers to discuss problems, suggestions, etc.