Regional Operational Plan SF.2A.2014.18

Operational Plan: Kodiak Chinook Salmon Marine Recreational Harvest Assessment

by

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and

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March 2015

Alaska Department of Fish and Game **Sport Fish Division**

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

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KODIAK CHINOOK SALMON MARINE RECREATIONAL HARVEST ASSESSMENT

by

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This document should be cited as:
Tracy, D., and T. H. Dann. 2014. Kodiak Chinook salmon marine recreational harvest assessment. Alaska Department of Fish and Game, Regional Operational Plan ROP.SF.2A.2014.18, Anchorage.

SIGNATURE/TITLE PAGE

Project Title:	Kodiak Chinook marine recreational harvest
Project leader(s):	*Donn Tracy, Fishery Biologist III* *Tyler H. Dann, Fisheries Geneticist II*
Division, Region and Area	*Sport Fish Division, Region II*
Project Nomenclature:	Project
Period Covered	January 2014 – January 2017
Field Dates:	May – September 2014-2016
Plan Type:	Category III

Approval

Title	Name	Signature	Date
Project Leader	Donn Tracy		05/01/2014
Project Leader	Tyler H. Dann		11/11/14
Area Management Biologist	Donn Tracy		11/25/14
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Chinook Salmon Research Initiative Approval

Title	Name	Signature	Date
Fish and Game Coordinator	Ed Jones		2-18-15
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ABSTRACT

This project will collect and analyze age, sex, and length (ASL) data, genetic tissue samples, coded wire tag (CWT) recoveries, and conduct angler interviews for timing and location of harvested Chinook salmon in the Kodiak Regulatory Area (KRA) marine recreational fishery. Results will be used to estimate age composition and marine life-stage growth (ASL), marine survival (CWT), and stock composition (CWT and genetics). Objectives will be met by targeted sampling of Chinook salmon harvests exiting the fishery at harbors servicing the port city of Kodiak. Additional sampling, particularly genetics tissue for mixed stock analysis, will be conducted on an opportunistic basis at other locations within the KRA, including harbors servicing the villages of Old Harbor and Larsen Bay.

Key words: marine recreational harvest, Chinook salmon, *Onchorhynchus tshawytscha*, age, sex, length, genetic tissue, coded wire tag, angler interview, Kodiak, Kodiak Regulatory Area.

PURPOSE

Information to delimit key biological parameters needed for harvest assessment and management of the Chinook salmon sport fishery in the marine waters of the Kodiak Regulatory Area (KRA; Figure 1) remain unknown. This project will collect and analyze age, sex, and length (ASL), genetic tissue samples, and coded wire tag (CWT) recoveries from Chinook salmon harvested in the KRA marine recreational fishery. Results will be used to estimate age composition and marine life-stage growth (ASL), marine survival (CWT), and stock composition (CWT and genetics). Stock composition information will provide the relative proportions by geography of Chinook salmon stocks harvested in the marine recreational fishery. Of particular interest are Chinook salmon belonging to any of the 12 stocks chosen by the Alaska Department of Fish and Game (ADF&G) as indicators of statewide population trends relating to recent changes in overall Chinook salmon abundance. Two of these stocks are the Karluk River and Chignik River Chinook salmon runs, which serve as 'sentinel' indicator stocks representative of the Kodiak, Alaska Peninsula, and Aleutian Islands region (ADF&G Chinook Salmon Research Team, 2013).

ADF&G Division of Sport Fish (SF) is responsible for the collection of genetic tissue samples and CWTs, and both collection and analysis of ASL data. Genetic tissue samples will be sent to the Division of Commercial Fisheries (CF) Gene Conservation Lab (GCL), which will be responsible for mixed stock analysis (MSA). Recoveries from CWT-marked fish will be submitted to the CF Mark, Tag, and Age Lab (MTA), which will be responsible for stock composition analysis. Archived ASL data will also be forwarded from SF to MTA.

The need for data from the recreational fishery is underscored by lack of information from the marine recreational sector, measured or perceived declines in abundance, and continued competition among user groups. Fishery managers, regulators, and user groups will benefit from obtaining accurate data on this fishery because the ability to assign stock composition to harvests will enable more precise assessment of abundance and productivity for individual Chinook salmon populations and will ensure long-term sustainability of the resource.

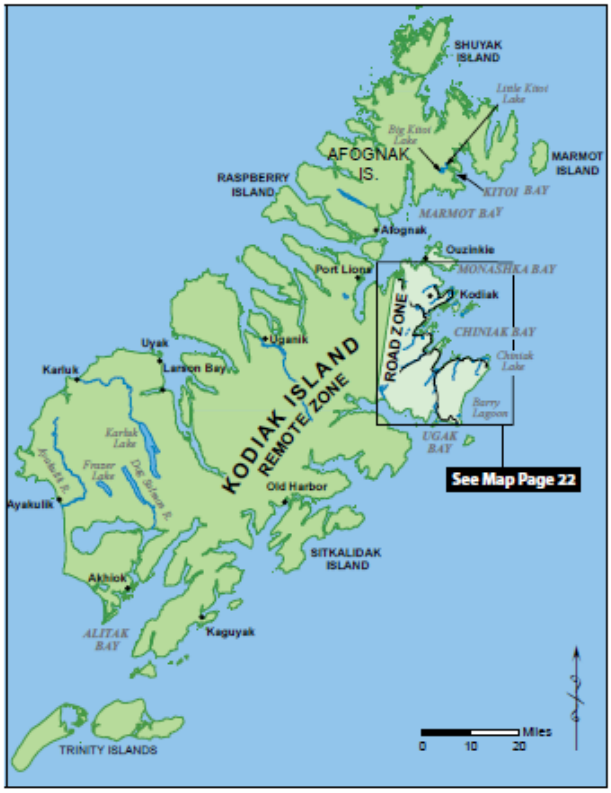

Figure 1.–Map of Kodiak Regulatory Area for sport fisheries.

OBJECTIVES

PRIMARY OBJECTIVES

1) Estimate the proportions of overall Chinook salmon harvest for the KRA marine recreational fishery by reporting group for the 2014 season such that the estimated proportions are within 5% of the true values 90% of the time.
2) Estimate the harvests of Chinook salmon in the KRA marine recreational fishery by reporting group for such that the estimates are within 20% of the true value 95% of the time.
3) Estimate the age composition of the Chinook salmon harvested by the KRA marine recreational fishery such that the estimates are within 10% of the true values 95% of the time.

SECONDARY OBJECTIVES

1) Collect tissue and scale samples from approximately 20% of Chinook salmon harvested in the KRA marine recreational fishery.
2) Recover CWT-marked Chinook salmon harvested in the KRA marine recreational fishery through direct observation of catches, angler interviews, and also public outreach.
3) Estimate the sex and length compositions of Chinook salmon harvested in the KRA marine recreational fishery.
4) Document the timing and geographic location of harvest.
5) Assess gender and sexual maturity of sampled Chinook salmon whenever possible.

Objectives will be met by targeted sampling of Chinook salmon harvests exiting the fishery at harbors servicing the port city of Kodiak, specifically St. Paul's Harbor, St. Herman's Harbor (Dog Bay), and the U.S. Coast Guard Base.

Additional sampling, particularly for MSA, will be conducted on an opportunistic basis at other locations within the KRA, including harbors servicing the villages of Old Harbor and Larsen Bay.

METHODS

This project will survey anglers and sample Chinook salmon catches and use these data to estimate Chinook salmon biological parameters. Angler survey information can be gathered from the ADF&G Statewide Harvest Survey (SWHS) and guided angler logbook records. The SWHS provides total estimates of the harvest and catch of the sport fishery, and logbook records census the guided angler sector, but neither data source provides insight to biological parameters. Collection of ASL data and genetic tissue requires onsite sampling of Chinook salmon at primary access points, such as harbors and boat launches. Estimates of proportions or averages will be made for specific elements of the sport fishery and these estimates will be applied to the corresponding logbook censuses and estimates from the SWHS.

Samples to determine age structure and stock composition will be collected by means of temporally stratified sampling of Chinook salmon harvests brought dockside at Kodiak City harbors. Tissue samples for genetic analysis to determine stock composition from additional landing sites will be obtained opportunistically. Chinook salmon harvests will also be monitored for recovery of coded wire tags. Angler interviews will document characteristics of the sport fishery including angler effort and catch location. Stock composition of the sport harvest will be estimated by catch location within and outside of Chiniak Bay.

The Division of Sport Fish (SF) is responsible for the collection of genetic tissue samples and CWTs, and both collection and analysis of ASL data. Genetic tissue samples will be sent to the Division of Commercial Fisheries (CF) Gene Conservation Lab (GCL), which will be responsible for mixed stock analysis (MSA). Recoveries from CWT-marked fish will be submitted to the CF Mark, Tag, and Age Lab (MTA), which will be responsible for stock composition analysis. Archived ASL data will also be forwarded from SF to MTA.

STUDY DESIGN

This project will estimate age, size, sex, and the genetic stock composition of Chinook salmon landed by anglers at KRA ports. Directed sampling of recreational Chinook salmon harvest will occur in 3 Kodiak city access locations: St. Paul's Harbor, St. Herman's Harbor (Dog Bay), and the U.S. Coast Guard Base recreational boating launch. These ports typically account for more than 60% of Chinook salmon landings in the KRA. Opportunistic sampling will also occur at other locations where Chinook salmon are periodically landed, including the villages of Larsen Bay, Old Harbor, and Port Lions, as well as numerous remote lodges. Harvests from these sources will be sampled for genetic analysis, to gain further insight on the stock composition of Kodiak harvests, and for ASL when possible.

In 2014, the goal will be to sample as many Chinook salmon as possible while distributing sampling effort over time to ensure a consistent proportion of the total harvest of Chinook salmon taken by recreational boat anglers is sampled throughout the survey period. A technician

will be assigned to visit each of 3 Kodiak city port access locations on a daily basis. Inseason analyses of the proportion of the salmon harvest sampled by area will be conducted and the results used to make modifications to the sampling strategy during future years.

Sampling consists of 2 primary components:

1) biological sampling for ASL, sexual maturity, and tissues for genetic analysis
2) angler interviews to recover CWTs, and to estimate timing and geographic distribution of angler effort

Biological sampling and interviews will be conducted simultaneously. Ideally, sample sizes would be proportional to the total harvest over time, but in many instances the numbers of fish available to the sampler are not proportional to the estimated harvest because some landing sites are not sampled, fish are processed and carcasses dumped at sea or in the harbor, or fish are kept on the boat and taken home to be processed later.

SAMPLE RATE

During 2014, effort will be limited to a single sampler frequenting only Kodiak city ports so a constant sample rate of 20% will be targeted throughout the study period. Based on the 2003–2012 average for total KRA Chinook salmon harvests (Table 1), potentially, 1,000 fish may be sampled under ideal circumstances. This potential sample size will be more than adequate to achieve precision goals for all primary objectives of this project. The planned precision of stock composition estimates and the variability of SWHS estimates based on data from 2007 to 2010 should allow us to estimate the Chinook salmon marine recreational harvest in each stratum within 20% of the true values 95% of the time. Results from data collected in 2014 will be subsequently evaluated to determine if alternative sampling rates will achieve more optimal future outcomes.

Ideally, samples will be collected proportional to and representative of the harvest. However, given the highly variable nature of the fishery, there will be times when daily harvests are relatively low and most fish landed are sampled; conversely, at times when the sampler is working at maximum capacity, only a small fraction of the harvest may be sampled. In order to address this disparity, subsampling of the collection postseason will be conducted as needed to allow for improved representation of the harvest.

Table 1.–Statewide Harvest Survey estimates of total KRA marine water Chinook salmon harvests landed in Chiniak Bay and other locations, 2003–2012.

Year	*Kodiak Regulatory Area*				
	Chiniak Bay		Other Locations		Total
2003	3,714	(46%)	4,310	(64%)	8,024
2004	5,415	(55%)	4,372	(45%)	9,787
2005	4,014	(48%)	4,264	(52%)	8,278
2006	5,640	(55%)	4,693	(45%)	10,333
2007	7,203	(68%)	3,423	(32%)	10,626
2008	7,714	(82%)	1,694	(18%)	9,408
2009	6,628	(76%)	2,145	(24%)	8,773
2010	2,747	(53%)	2,461	(47%)	5,208
2011	4,171	(64%)	2,320	(36%)	6,491
2012	4,516	(63%)	2,660	(37%)	7,176
Avg.	5,176	(61%)	3,234	(39%)	8,410

Source: Jennings et al. (2006, 2007, 2009 a-b, 2010 a-b, 2011 a-b, 2011, *In prep*).

SAMPLING STRATEGY

At all targeted sites, sampling will reflect the goals of the overall study. The following sections outline any significant details regarding individual sites, selected sampling days of the week, specific sampling periods of each day, and the corresponding allocation of technician work shifts. Additional site-specific details regarding data collection and recording procedures will be precisely outlined in a project field procedures manual (Appendix E).

A single technician will be assigned to the project from June to August, working 7.5 hours each scheduled day. All weekends and holidays will be worked, and the technician will get 2 consecutive days off each week. Sampling scheduled outside the technician's employment dates will be conducted by the project biologist.

Kodiak City

The city of Kodiak is the only population center with an appreciable level of recreational Chinook salmon harvest in the KRA. Kodiak city ports (Chiniak Bay) averaged about 61% of the sport harvest of Chinook salmon from 2003 to 2012 (Table 1). The remainder came mostly from remote lodges located in outlying areas (Larson Bay, Old Harbor, and Port Lions) where it is cost-prohibitive to implement a full-time sampling program. Therefore, for overall project data collection objectives, harvest landed at Kodiak is assumed to represent the KRA, although this assumption may not be valid because the age and stock composition of non-Chiniak harvests may differ due to their proximity to other Kodiak area stocks (e.g., Karluk River). In order to test for bias in sampling results derived only from Kodiak city landings of Chinook salmon, efforts will be made to opportunistically collect additional samples from harvests landed at a number of outlying locations.

The Kodiak city Chinook salmon marine recreational fishery will be surveyed annually from 24 May to 15 September. Biological sampling and angler interviews will be conducted by the

project technician at St. Paul's Harbor, St. Herman's Harbor (Dog Bay), and the U.S. Coast Guard Base recreational boating launch between 1330 hrs and 2100 hrs (Appendix A1). This period captured a majority of returning Kodiak area charter vessel anglers during sport-caught groundfish dockside sampling projects conducted in prior years (B. Failor, Fisheries Biologist, ADF&G, pers. comm.). The distance between the 3 harbors is too great to intercept all returning anglers at all locations in a single day. However, samples can be collected at all locations in a single day. Starting at approximately 1330 hours, the technician will begin sampling at an initially assigned area and then rotate systematically through the 3 sites in a predetermined order. The technician will stay at each site long enough to interview returning anglers and sample available fish. Using this scheme, each site is typically visited 2–3 times per day.

Ideally, sampling will also be distributed between private- and charter-caught fish and throughout the technician's shift to spread data collection over time and avoid selecting for early or late-returning boats. Until more information becomes available, it is assumed that sampling efficiency for the charter and private fisheries will be similar and that a sample representative of the charter harvest will also be representative of the private harvest.

Although a daily random selection of several charter boats from a list of all known charter boats would be ideal, this type of sampling is not practical for the following reasons: 1) none of those vessels may have gone out that day, 2) when the sampler arrives at a dock, some boats may have already returned and processed all or a portion of their harvest, or 3) all may have returned at once, forcing a sampler to choose a single boat from the list. Instead, the sampler will systematically move through the processing locations (processing tables, charter offices, and vessels that process fish on their decks) to obtain samples.

In recent years, many of the charter boats have delivered their fish directly to 2 local processing facilities, making it difficult to obtain samples. In this circumstance, the technician will contact the charter skipper in the harbor and may follow up with sampling later, at the convenience of the processor. This sampling is neither systematic nor random. Therefore, the technician will attempt to make the sample representative by allocating sampling effort among charters that do and do not use these processors in proportion to their share of the charter harvest.

Some charter services in Kodiak process their Chinook salmon and dispose of the carcasses at sea. To minimize potential bias in estimation of age and length composition, charter services that process their Chinook salmon at sea will be asked to voluntarily retain their fish whole, or at least the carcasses of all fish that are processed at sea. No portion of the daily harvest from any one boat will be sampled unless all fish or processed carcasses from that vessel are returned to port.

Outlying Locations

Because it is impractical and cost-prohibitive to deploy a project sampler to villages and remote lodges within the KRA, data collection from these harvest sources will be limited to obtaining CWT and genetics samples through charter service operators on a voluntary basis. At the outset of the Chinook salmon fishery, a charter operator list generated from guided angler logbook records will be used to contact those remotely-based from Kodiak city. Each operator will be requested to collect tissues and record time and location of Chinook salmon catch from marine waters by their clients whenever possible. Operators complying with this request will be issued instructions and supplies needed for data collection and return of samples to ADF&G. These

samples will be processed and analyzed as permitted by availability of project funding, and also as deemed necessary by interpretation of systematically gathered data results.

DATA COLLECTION AND REDUCTION

Biological Sampling

All Chinook salmon accessible to the technician will be recorded by statistical area and sampled for ASL, gender, sexual maturity, and genetics, and also examined for the presence or absence of an adipose fin. For all genetics samples, tissue consisting of a one-half to 1 inch piece from the tip of an axillary process fin will be removed from each fish and placed in a 2 ml plastic vial with ethanol (ETOH) completely covering the tissue as a preservative. The liquid to tissue ratio by volume will be approximately 3 ETOH:1 tissue, as detailed in Appendices B1 and B2. Each plastic vial will be prelabeled, sequentially numbered, and recorded in the field computer or on the Chinook Genetics Sampling Form (Appendix B3). All plastic vials will be stored in a cool and dry location at the Kodiak SF office until the end of the season when all vials will be sent to GCL for analysis.

To age each sampled fish, 3 scales will be taken from the left side of the body of each fish, at a point on a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, 2 rows above the lateral line (Welander 1940), and placed on an adhesive-coated card (Appendices C1–C4). If the scales in the preferred location cannot be obtained, another set of scales will be taken from as close to the preferred scale area as possible. However, scales will only be taken from the area bounded dorsally by the fourth row of scales above the lateral line, ventrally by the lateral line, and between lines drawn vertically from the posterior insertion of the dorsal fin and the anterior insertion of the anal fin. If no scales are available in the preferred area on the left side of the fish, scales will be collected from the preferred area on the right side of the fish.

All data associated with scale collection will be recorded directly onto scale cards containing the sampled scales from each fish. After sampling, scales will be inspected to ensure they are clean and oriented correctly before they dry. An impression is made of the scales on the card using a press under 22,500 pounds per square inch (PSI) and the scale growth patterns are viewed with a 40× power microfiche reader to determine ages. Sex will be determined using external visual cues.

Mid eye to tail fork (METF) length will be measured to the nearest 5 millimeters. Technicians will attempt to inspect each harvested Chinook salmon for a missing adipose fin. The number of Chinook salmon inspected for adipose finclips will be recorded, and heads from Chinook salmon with adipose finclips will be collected and identified with a uniquely numbered cinch strap. Cinch-strapped heads from Chinook salmon will be forwarded to the ADF&G Mark, Tag, and Age Laboratory for eventual dissection, tag removal, and decoding. Relative maturity (immature or prespawning) will be determined for as many Chinook salmon whenever possible[1].

[1] All Chinook salmon harvested by each charter boat party will be sampled for maturity with the anglers' permission. If any angler within a boat party disapproves (i.e., does not want their fish cut open for inspection of gonads) or all fish are not available (i.e., some were processed at sea), then none of the Chinook salmon within that boat party will be sampled for maturity. This procedure is designed to avoid possible biases that might exist (e.g., anglers not wanting larger fish "mutilated").

Angler Interviews

The technician will attempt to contact all boat parties as they exit the fishery at each access location. Because of the seasonal nature of recreational and subsistence fishing, the initial step in each contact will be to determine whether the individual or party were sport fishing and whether anglers targeted or caught any Chinook salmon. To avoid congestion due to the interview process, the interviews will be brief and conducted in a manner as convenient as possible for the anglers.

Once it is established that a vessel is eligible for and consents to an interview, the following information will be recorded for each boat trip:

1) port
2) date and time
3) boat name (if charter) or private vessel designator
4) user group (charter, private)
5) statistical area of harvest
6) number of private anglers, charter anglers, and guides fishing
7) hours spent targeting Chinook salmon
8) specific location of Chinook salmon harvest and approximate depth fished
9) numbers of Chinook salmon kept and released that were greater than or equal to 20 inches in length, and number kept and released that were less than 20 inches in length.

Charter boat skippers, rather than crew or clients, will be interviewed to obtain accurate reporting of statistical areas and harvest location. Whenever possible, the technician will observe and count all harvested Chinook salmon and record the appropriate data to indicate that these fish were counted. The technician will also check to ensure that counted fish represent the harvest for that trip (i.e., no other fish were processed or stored elsewhere on the vessel). Common situations that may preclude counting the actual harvested fish include the following: 1) any number of Chinook salmon were processed and their carcasses tossed at sea, 2) fish were consumed at sea, 3) some fish were already offloaded and carried away, 4) returning boat traffic was extremely heavy and the technician needed to conduct other interviews, or 5) time taken to count fish would be disruptive. Whenever the number of fish counted is anecdotal, rather than based on actual observation, the technician will make a notation in the data.

Interview data will be recorded on Allegro CX field computers using DataPlus Professional data capture software. The DataPlus software contains numerous data validation routines that should catch most errors at the point of data entry. The technician will create a new data file each interview day and back it up to a desktop computer at the end of each shift.

CWT Recovery

Any Chinook salmon sampled for genetics tissue or ASL and displaying an adipose finclip will be set aside and sampled additionally for CWT information. Additionally during interviews, all anglers will be asked to recount the number of adipose finclipped Chinook salmon observed in their catch, and efforts will be made to recover fish marked for potential CWTs not already accounted for by genetic and ASL sampling. Outreach efforts will be made with all KRA charter vessel operators to turn in Chinook salmon heads from adipose finclipped catches, both through written information supplied with logbooks and via direct contact by ADF&G staff, the latter

method employed especially for operators based in the communities of Old Harbor and Larsen Bay.

A uniquely numbered cinch strap will be attached to the head (Appendix D2) recovered from an adipose finclipped fish and recorded in the Chinook Genetics Sampling Form (Appendix B3) comments field. The head will be removed carefully with a serrated utility knife. Each head, with the numbered cinch strap visible, will be placed in an individual plastic bag. After tissue sampling is completed, a CWT sampling form (Appendix D1) will be completed if any adipose finclipped fish were present. All data recorded on the CWT sampling form will be transposed from the Chinook Genetics Sampling Form (Appendix B3). It is important to differentiate the Chinook salmon code (410) from the "jack" Chinook salmon code (411, for fish less than 660 METF) on the "*Sampling Information*" portion of the CWT form in the lower left-hand area. All Chinook salmon heads collected will be frozen and returned to the ADF&G office in Kodiak, and subsequently shipped with corresponding data to MTA in Juneau.

Data Reduction

Electronic copies of data files will be created and labeled with the date on a daily basis. A backup copy of all data files will be saved on desktop computer plus an external jump drive at the end of each day. The technician will return their genetic vial boxes, scale cards, the jump drive, and field data to the project biologist weekly and will be responsible for ensuring recorded data are legible and accurate. Paper data forms will be available for the technician's use in the event the field computer fails. The project biologist will ensure all data are returned, are legible, and are entered correctly.

Scales will be read using a microfiche reader and aged with methods described by Mosher (1969). Age data are keypunched directly into master electronic data files after age is determined by scale reading. Prior to recording ages, known-age reference sets from previous years will be read until a high proportion of assigned ages agree and differences are unbiased and independent of age. A subsample (random 20%) will be read twice to assess within-reader error over time. Scale cards and acetate impressions will be archived at the SF Office in Kodiak.

Interview data files and Excel workbooks containing biological data will be reviewed by the project biologist weekly for error checking and compilation of sampling summaries. At the end of the season, all interview and biological data files will be converted to ASCII format for analysis and archiving (ASCII file structure will also be documented). All files will be named using conventions established by SF Division's Office of Research and Technical Services.

Initial editing of biological data files will include checks of the frequency of listings of irrational or unlikely data, and will also cross-reference collected ages. After ageing is complete and age data are entered, data files will be reviewed using a program developed to spot insidious data entry errors and outliers not detectable with frequency listings. The program outputs a list of suspect records that subsequently will be compared to the original data.

Copies of edited biological and interview files will be stored on the Kodiak CF Region IV LAN server, the project leader's computer, and backed up on external hard drive.

DATA ANALYSIS

Genetic Analysis

Genetic stock identification will be conducted by the ADF&G Gene Conservation Laboratory following standardized procedures similar to those described by Dann et al. (2012a). Genomic DNA will be extracted from tissue samples using a DNeasy® 96 Tissue Kit by QIAGEN® (Valencia, CA). DNA will be screened for 96 SNP markers using a Fluidigm® platform. If necessary, SNPs may be rescreened on an Applied Biosystems® platform as a backup method for assaying genotypes. Approximately 8% of individuals analyzed for this project will be reextracted and genotyped as a quality control measure to identify laboratory errors and to measure the background discrepancy rate of the genotyping process. Genotypes will be imported and archived in the Gene Conservation Laboratory Oracle database, LOKI.

Mixed Stock Analysis

Estimates of stock composition will be based on the most current genetic baseline representing spawning Chinook salmon from known origins throughout the Pacific Rim. At this time, the baseline is composed of 172 populations of spawning Chinook salmon ranging from Russia to California and genotyped for 45 SNPs (Templin et al. 2011). Additional collections will be incorporated into the baseline used for this project. Baseline development will follow procedures similar to Dann et al. (2012b). Collections that do not conform to Hardy-Weinberg Equilibrium (HWE) will be removed from the baseline and will not be used for MSA. Collections will be pooled when appropriate to obtain better estimates of allele frequencies. Each pair of nuclear SNPs in each population in the baseline will be tested for linkage disequilibrium and adjusted to ensure that analyses will be based on independent markers. If significant linkage disequilibrium is identified, either one of the linked SNPs will be removed or the pair will be combined into a composite, haploid marker, depending on the relative value of information the single or combined marker provides for MSA (e.g., f_{ORCA}; Rosenberg 2005).

Defining reporting groups

Stocks, in the context of MSA, are referred to as "reporting groups." Reporting groups are made up of 1 or more populations that are either geographically or temporally grouped or both. Management needs are used to establish initial reporting groups. These initial reporting groups are then subjected to guidelines that incorporate genetic distinctiveness, representation in the baseline, and expectations for the fishery mixture to come up with reporting groups appropriate for specific fishery mixtures (Habicht et al. 2012a). These guidelines include the following:

1) *Adequate MSA performance*. Performance of the proposed reporting groups will be tested using proof tests as outlined in Dann et al. (2012a). ADF&G generally seeks to achieve minimum metrics for MSA performance of 90% correct allocation to reporting group.
2) *Adequate numerical representation in the baseline*. Numbers of individuals available within reporting groups will be set at a minimum of 400 fish.
3) *Adequate representation of within reporting group genetic variation in the baseline*. Variation within reporting groups will be visualized using trees or multidimensional scaling (MDS) as outlined in Dann et al. (2012a). Verification that adequate representation is present in the baseline will be obtained from 1) people who have local knowledge that abundant spawning aggregates are represented in the baseline, 2) the clustering of spawning aggregates on trees and MDS, and 3) the provision of acceptable results from proof tests as a surrogate for escapement tests.

4) *Adequate expected number of fish from reporting groups in the mixture*. The minimum number of fish from a reporting group expected to occur within the mixture is 5%, or 20 fish.

Adequate MSA performance will be determined by assessing the identifiability of reporting groups using baseline evaluation tests. Templin et al. (2011) described the existing baseline's ability to identify 11 broad and 44 fine-scale reporting groups based upon genetic data from 45 SNPs. A majority of fine-scale groups, and all broad-scale groups, exhibited correct allocations greater than 90%, a standard bar of success for GSI (Seeb et al. 2000). However, interest in greater resolution among Western Alaska populations of Chinook salmon precipitated further marker development. This marker development work has resulted in thousands of new SNPs, and we expect to use a panel of 96 SNPs that will allow for accurate and precise estimates of stock composition for Chinook salmon reporting groups of interest in the region fisheries. We will evaluate the baseline with 100% proof tests, where individuals are sampled without replacement from each reporting group and analyzed as a mixture against the reduced baseline.

From previous genetic differentiation studies (Templin et al. 2011; Larson et al. 2013) the following reporting groups can be identified with acceptable certainty and will serve as the basis of reporting for this study. However, we will define reporting groups using the guidelines outlined above and may report to finer-scale groups in the Kodiak area if the final panel of 96 SNPs provides sufficient genetic resolution and broader groups outside the Kodiak area depending on expected number of fish from reporting groups in the mixtures.

1) Russia
2) Coastal West Alaska/Yukon
3) Cook Inlet
4) Copper River
5) SE Alaska/NE Gulf of Alaska
6) British Columbia
7) West Coast U.S.
8) Alaska Peninsula
9) Chignik River
10) Kodiak

The size of the mixture sample will also have an effect on the number and scale of reporting groups because the final guideline sets a minimum number of fish from a reporting group expected to occur within the mixture at 5%, or 20 fish. Therefore, small mixture sizes will not be used to allocate to large numbers of reporting groups. For example, for a mixture size of 100 fish, the maximum reporting group allowed by the guideline is 5, assuming they are all represented evenly within the mixture. Only individuals with high quality data will be included in MSA. Data quality control will include identifying and removing individuals missing greater than 20% genotypic data, duplicate individuals, and non-Chinook salmon. Stock composition of the KRA marine recreational fishery harvest for each stratum will be estimated using the software package BAYES (Pella and Masuda 2001). A series of independent Markov Chain Monte Carlo (MCMC) chains with different starting values for each population will be combined to form the posterior distribution. The analysis will tabulate summary statistics from these distributions to describe stock compositions and apply stock proportions to the harvest that each area by time stratum represents to provide estimates of stock-specific harvests.

Ideally, estimates of Chinook salmon stock composition and harvest by reporting group will be stratified geographically. The geographic strata are as follows: 1) Chiniak Bay (Northeast Kodiak Island), and 2) Other. However, strata may be collapsed into one geographic stratum due to small sample sizes.

Estimating Stock-Specific Harvest of Chinook salmon in the Marine Recreational Harvest

The number of Kodiak-origin Chinook salmon ($\hat{H}$) harvested in the Kodiak marine recreational fishery will be estimated as

$$\hat{H} = \sum_{j=1}^{S} \hat{H}_j \hat{p}_j \tag{1}$$

where

$\hat{p}_j$ = estimated proportion of marine recreational Chinook salmon harvest from geographic stratum *j* comprising Kodiak-origin Chinook salmon (based on Bayesian mixed stock analysis as described in the previous section).

$\hat{H}_j$ = marine recreational Chinook salmon harvest from geographic stratum *j* obtained from SWHS data.

S = number of geographic strata (Chiniak Bay and other).

$\text{var}(\hat{H})$ will be estimated using Goodman's formula (Goodman 1960) as follows:

$$\text{var}(\hat{H}) = \sum_{j} (\hat{H}_j)^2 \text{var}(\hat{p}_j) + (\hat{p}_j)^2 \text{var}(\hat{H}_j) - \text{var}(\hat{H}_j)\text{var}(\hat{p}_j) \tag{2}$$

where $\text{var}(\hat{p}_j)$ will be available from the Bayesian mixed stock analysis (Pella and Masuda, 2001) and $\text{var}(\hat{H}_j)$ from the SWHS.

The number of other-origin Chinook salmon harvested in the Kodiak marine recreational fishery and its variance will be estimated using equations (1) and (2) with the estimated proportion of other-origin Chinook salmon from geographic stratum *j*.

Age, Sex, and Length Composition of Chinook salmon in the Marine Recreational Harvest

The age proportions of Chinook salmon harvested in the KRA marine recreational fishery by sampling stratum will be estimated as

$$\hat{p}_j^z = \frac{n_j^z}{n_j} \tag{3}$$

where $\hat{p}_j^z$ is the estimated proportion of salmon of age category *z* from sampling stratum *j*, n_j^z equals the number of fish sampled from sampling stratum (*j*) that were classified as age category

z, and n_j equals the number of Chinook salmon sampled for age determination from sampling stratum j.

The variance of $\hat{p}_j^z$ will be calculated by

$$\text{var}\left[\hat{p}_j^z\right] = \left(1 - \frac{n_j}{\hat{H}_j}\right) \frac{\hat{p}_j^z\left(1 - \hat{p}_j^z\right)}{n_j - 1} \tag{4}$$

where $\hat{H}_j$ is the estimated number of Chinook salmon harvested in a sampling stratum j.

The estimates of harvest by age categories in each sampling stratum will be calculated by

$$\hat{H}_j^z = \hat{H}_j \hat{p}_j^z \tag{5}$$

with its variance estimated as follows (Goodman 1960):

$$\text{var}\left[\hat{H}_j^z\right] = \hat{H}_j^2 \,\text{var}(\hat{p}_j^z) + (\hat{p}_j^z)^2 \,\text{var}(\hat{H}_j) - \text{var}(\hat{H}_j)\,\text{var}(\hat{p}_j^z) \tag{6}$$

The total harvest by age category and its variance will then be estimated by the following summation:

$$\hat{H}^z = \sum_{j=1}^{S} \hat{H}_j^z \quad \text{and} \tag{7}$$

$$\text{var}\left[\hat{H}^z\right] = \sum_{j=1}^{S} \text{var}\left[\hat{H}_j^z\right] \tag{8}$$

where $S = 2$ are the number of geographic strata.

Finally, the total proportion of the harvest by age category and its variance will be estimated as follows:

$$\hat{p}^z = \frac{\hat{H}^z}{\hat{H}} \quad \text{and} \tag{8}$$

$$\text{var}\left[\hat{p}^z\right] = \frac{1}{\hat{H}^2}\,\text{var}(\hat{H}^z) + (\hat{H}^z)^2 \,\text{var}\left(\frac{1}{\hat{H}}\right) - \text{var}\left(\frac{1}{\hat{H}}\right)\text{var}(\hat{H}^z)\,. \tag{9}$$

The delta method will be used to estimate $\text{var}\left(\frac{1}{\hat{H}}\right)$ as follows:

$$\text{var}\left(\frac{1}{\hat{H}}\right) = \left(\frac{1}{\hat{H}}\right)^4 \text{var}(\hat{H})\,. \tag{10}$$

Length and sex composition will be estimated using equations 3–10, substituting length or sex for age.

SCHEDULE AND DELIVERABLES

Annual project activities (2014–2016) are scheduled as follows:

Date	Activity
March	Hiring of seasonal staff
March–May	Opportunistically collect winter Chinook salmon CWT from Chiniak Bay (Northeastern Kodiak Island) and Old Harbor
May	Staging for sampling by technician at directed sampling sites
June–August	Chinook salmon harvest sampling at designated sites
Late Aug–early Sep	Data edited and tissue collection transferred to GCL
September	Scales aged, ASL composition estimated
Winter 2015–2016	Genetic analysis of 2014 and 2015 tissues
November	Harvest estimates completed by temporal, geographic strata and reporting group
Winter 2016–2017	Genetic analysis of 2016 tissues
February–May 2017	FDS report draft out for review and subsequent publication

RESPONSIBILITIES

PRINCIPAL INVESTIGATOR(S)

Donn Tracy, Project Leader, Fishery Biologist III:
The project leader is responsible for formulating research objectives to meet regional management goals, reviews operational plan, oversees budgets, and supervises project biologists.

Tyler Dann, Genetics Project Leader, Fisheries Geneticist II:
This position is responsible for supervising all aspects of the genetic analysis, including planning, budget, personnel, training, and final reporting.

Tyler Polum, Project Biologist, Fishery Biologist II (FB II),
Vacant, Project Biologist, Fishery Biologist I (FB I):

These positions will serve as project biologists and will be responsible for authoring the operational plan, hiring (FB II) and training personnel and supervision of data collection (FBII, FB I). The FB I project biologist will be responsible for editing and collating data, transferring MSA tissue samples plus associated data to the GCL, and coauthoring Fishery Data Series (FDS) project reports. The FB II will ensure all data is in proper format and archived with RTS at the completion of the field season and will be primary author on FDS project reports. Additionally, project biologists will submit invoices, manage, and prepare the budget.

CONSULTING BIOMETRICIAN

Adam Craig, Biometrician III:
This position provides guidance on sampling design and data analysis, prepares estimates of harvest of Chinook salmon by reporting group, and assists with preparation and review of the operational plan and FDS reports.

SAMPLING CREW

Vacant, Fish and Wildlife Technician III:
Collects biological and fishery data following procedures outlined in the operational plan, field procedure manual, and other instructions, completes data forms in an accurate and timely manner, identifies sampling needs and problems, provides fishery information to the project biologists for weekly fishing reports, explains the sampling program to the general public, maintains state vehicles and other equipment in good working order, and submits all necessary paperwork in a neat and timely manner. The technician will also be responsible for assisting with enforcement of sport fishing regulations, computer data entry, and preparation and reading of age structures.

BUDGET SUMMARY

Proposed FY14–FY17 Costs for Sport Fish Division:

		Cost ($K) per fiscal year			
Line item	Category	14/15	15/16	16/17	Total budget ($K)
100	Personal services	63.8	66.7	70.0	200.5
200	Travel	3.5	3.5	3.5	10.5
300	Contractual	12.6	55.2	35.3	103.1
400	Commodities	3.5	4.0	4.5	12.0
500	Equipment	1.5	1.8	2.0	5.3
Total		76.8	80.5	174.5	331.8

Budget Manager(s): Donn Tracy

Project Personnel:

				Cost ($K) per fiscal year		
PCN	Name	Level	Months	14/15	15/16	16/17
5233	Vacant	FB I	4.0	30.0	31.2	33.0
4101	Adam Craig	BIOM III	1.0	10.3	11.0	11.5
1594	Amanda Bowers	FWT III	3.5	23.5	24.5	25.5

Proposed FY14-FY17 Costs for Commercial Fisheries Division:

		Cost ($K) per fiscal year				Total budget
Line Item	Category	14	15	16	17	($K)
100	Personal Services	2.8	5.7	22.4	18.7	46.8
200	Travel	–	–	–	–	–
300	Contractual	–	–	2.0	1.0	3.0
400	Commodities	2.0	2.0	25.8	12.3	40.2
500	Equipment	–	–	–	–	–

Total	4.8	7.7	50.2	32.1	90.0

Budget Manager(s): Tyler H. Dann

Project Personnel:

			Months per fiscal year				
PCN	Name	Level	14	15	16	17	Total cost ($K)
7607	Christy Cupp	FWTIII	0.5	1	1	1	20.4
4263	Paul Kuriscak	FBI	0	0	1	0.5	12.7
7080	Kyle Shedd	FGI	0	0	1	1	16.5
Total			0.5	1	3	2.5	49.6

REFERENCES CITED

ADF&G Chinook Salmon Research Team. 2013. Chinook salmon stock assessment and research plan, 2013. Alaska Department of Fish and Game, Special Publication No. 13-01, Anchorage.

Barclay, A. W., C. Habicht, R. A. Merizon and R. J. Yanusz. 2012. Genetic baseline for Upper Cook Inlet Chinook Salmon: 46 SNPs and 5,279 fish. Alaska Department of Fish and Game, Fishery Manuscript Series No. 12-02, Anchorage.

Dann, T. H., A. Barclay and C. Habicht. 2012a. Western Alaska Salmon Stock Identification Program Technical Document 5: Status of the SNP baseline for sockeye salmon. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J12-10, Anchorage.

Dann, T.H., C. Habicht, J. R. Jasper, E. K. C. Fox, H. A. Hoyt, H.L. Liller, E. S. Lardizabal, P.A. Kuriscak, Z.D. Grauvogel, and W.D. Templin. 2012b. Sockeye salmon baseline for the Western Alaska Salmon Stock Identification Project. Alaska Department of Fish and Game, Special Publication No. 12-12, Anchorage.

Habicht, C., J. R. Jasper, T. H. Dann, N. DeCovich, and W. D. Templin. 2012a. Western Alaska Salmon Stock Identification Program Technical Document 11: Defining reporting groups. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J12-16, Anchorage.

Habicht, C., A. R. Munro, T. H. Dann, D. M. Eggers, W. D. Templin, M. J. Witteveen, T. T. Baker, K. G. Howard, J. R. Jasper, S. D. Rogers Olive, H. L. Liller, E. L. Chenoweth and E. C. Volk. 2012b. Harvest and Harvest Rates of Sockeye Salmon Stocks in Fisheries of the Western Alaska Salmon Stock Identification Program (WASSIP), 2006-2008. Alaska Department of Fish and Game, Special Publication No. 12-24, Anchorage.

Jennings, G. B., K. Sundet, and A. E. Bingham. 2007. Participation, catch, and harvest in Alaska sport fisheries during 2004. Alaska Department of Fish and Game, Fishery Data Series No. 07-40, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/fds07-40.pdf

Jennings, G. B., K. Sundet, and A. E. Bingham. 2009a. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2005. Alaska Department of Fish and Game, Fishery Data Series No. 09-47, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/FDS09-47.pdf

Jennings, G. B., K. Sundet, and A. E. Bingham. 2009b. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2006. Alaska Department of Fish and Game, Fishery Data Series No. 09-54, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/FDS09-54.pdf

REFERENCES CITED (Continued)

Jennings, G. B., K. Sundet, and A. E. Bingham. 2010a. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2007. Alaska Department of Fish and Game, Fishery Data Series No. 10-02, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/Fds10-02.pdf

Jennings, G. B., K. Sundet, and A. E. Bingham. 2010b. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2008. Alaska Department of Fish and Game, Fishery Data Series No. 10-22, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/FDS10-22.pdf

Jennings, G. B., K. Sundet, and A. E. Bingham. 2011a. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2009. Alaska Department of Fish and Game, Fishery Data Series No. 11-45, Anchorage. http://www.adfg.alaska.gov/FedAidpdfs/FDS11-45

Jennings, G. B., K. Sundet, and A. E. Bingham. 2011b. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2010. Alaska Department of Fish and Game, Fishery Data Series No. 11-60, Anchorage. http://www.adfg.alaska.gov/FedAidpdfs/FDS11-60

Jennings, G. B., K. Sundet, and A. E. Bingham. *In prep*. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2012. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.

Jennings, G. B., K. Sundet, A. E. Bingham, and D. Sigurdsson. 2006b. Participation, catch, and harvest in Alaska sport fisheries during 2003. Alaska Department of Fish and Game, Fishery Data Series No. 06-44, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/fds06-44.pdf.

Larson, W. A., F. M. Utter, K. W. Myers, W. D. Templin, J. E. Seeb, C. M. Guthrie III, A. V. Bugaev, and L. W. Seeb. 2013. Single-nucleotide polymorphisms reveal distribution and migration of Chinook salmon (*Oncorhynchus tshawytscha*) in the Bering Sea and North Pacific Ocean. Canadian Journal of Fisheries and Aquatic Sciences 70(1):128–141.

Mosher, K. H. 1969. Identification of Pacific salmon and steelhead trout by scale characteristics. U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Circular 317.

Pella, J., and M. Masuda. 2001. Bayesian methods for analysis of stock mixtures from genetic characters. Fishery Bulletin 99:151-167.

Rosenberg, N. A. 2005. Algorithms for selecting informative marker panels for population assignment. Journal of Computational Biology 12(9):1183–1201.

Seeb, L. W., C. Habicht, W. D. Templin, K. E. Tarbox, R. Z. Davis, L. K. Brannian, and J. E. Seeb. 2000. Genetic diversity of sockeye salmon of Cook Inlet, Alaska, and its application to management of populations affected by the Exxon Valdez oil spill. Transactions of the American Fisheries Society 129(6):1223–1249.

Templin, W. D., J. E. Seeb, J. R. Jasper, A. W. Barclay, and L. W. Seeb. 2011. Genetic differentiation of Alaska Chinook salmon: the missing link for migratory studies. Molecular Ecology Resources 11: 226–246.

Templin, W. D., N. A. DeCovich, S. D. Rogers Olive, H. L. Liller, E. K. C. Fox, J. R. Jasper, M. J. Witteveen, T. T. Baker, K. G. Howard, A. R. Munro, E. C. Volk, and C. Habicht. 2012. Stock composition of chum salmon harvests in fisheries of the Western Alaska Salmon Stock Identification Program (WASSIP), 2007–2009. Alaska Department of Fish and Game, Special Publication No. 12-23, Anchorage.

Welander, A. D. 1940. A study of the development of the scale of Chinook Salmon *Oncorhynchus tschawytscha*. Master's Thesis. University of Washington, Seattle.

APPENDIX A: CHINOOK SALMON CATCH SAMPLING WORK SCHEDULE

Appendix A1.–Kodiak Chinook salmon catch sampler work schedule, 2014.

Date	Day	Duty[a]	Paperwork due[b]	Comments
24-May	Sat	B+I		
25-May	Sun	B+I		
26-May	Mon	B+I		Holiday worked
27-May	Tue	B+I		PAYROLL
28-May	Wed	B+I	WSR, FR	
29-May	Thu	B+I		
30-May	Fri	B+I		
31-May	Sat	B+I	TIMESHEET	
1-Jun	Sun	B+I		
2-Jun	Mon	--Off--		
3-Jun	Tue	--Off--		
4-Jun	Wed	B+I	WSR, FR	
5-Jun	Thu	B+I		
6-Jun	Fri	--Off--		
7-Jun	Sat	--Off--		
8-Jun	Sun	B+I		
9-Jun	Mon	B+I		
10-Jun	Tue	B+I		
11-Jun	Wed	B+I	WSR, FR	PAYROLL
12-Jun	Thu	B+I		
13-Jun	Fri	B+I		
14-Jun	Sat	B+I		
15-Jun	Sun	--Off--	TIMESHEET	
16-Jun	Mon	--Off--		
17-Jun	Tue	B+I		
18-Jun	Wed	B+I	WSR, FR	
19-Jun	Thu	B+I		
20-Jun	Fri	B+I		
21-Jun	Sat	B+I		
22-Jun	Sun	B+I		
23-Jun	Mon	--Off--		
24-Jun	Tue	--Off--		
25-Jun	Wed	--Off--		
26-Jun	Thu	--Off--		
27-Jun	Fri	B+I	WSR, FR	PAYROLL
28-Jun	Sat	B+I		
29-Jun	Sun	B+I		
30-Jun	Mon	B+I	TIMESHEET	
1-Jul	Tue	B+I		
2-Jul	Wed	B+I	WSR, FR	
3-Jul	Thu	B+I		
4-Jul	Fri	--Off--		Holiday worked
5-Jul	Sat	--Off--		
6-Jul	Sun	B+I		
7-Jul	Mon	B+I		
8-Jul	Tue	B+I		

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Date	Day	Duty[a]	Paperwork due[b]	Comments
9-Jul	Wed	B+I	WSR, FR	
10-Jul	Thu	B+I		
11-Jul	Fri	B+I		PAYROLL
12-Jul	Sat	B+I		
13-Jul	Sun	--Off--		
14-Jul	Mon	--Off--		
15-Jul	Tue	B+I	TIMESHEET	
16-Jul	Wed	B+I	WSR, FR	
17-Jul	Thu	B+I		
18-Jul	Fri	--Off--		
19-Jul	Sat	--Off--		
20-Jul	Sun	B+I		
21-Jul	Mon	B+I		
22-Jul	Tue	B+I		
23-Jul	Wed	B+I	WSR, FR	
24-Jul	Thu	--Off--		
25-Jul	Fri	--Off--		PAYROLL
26-Jul	Sat	B+I		
27-Jul	Mon	B+I		
28-Jul	Tue	B+I		
29-Jul	Wed	B+I	WSR, FR	
30-Jul	Thu	B+I		
31-Jul	Fri	--Off--	TIMESHEET	
1-Aug	Sat	--Off--		
2-Aug	Sun	B+I		
3-Aug	Mon	B+I		
4-Aug	Tue	B+I		
5-Aug	Wed	B+I	WSR, FR	
6-Aug	Thu	B+I		
7-Aug	Fri	B+I		
8-Aug	Sat	B+I		
9-Aug	Sun	--Off--		
10-Aug	Mon	--Off--		
11-Aug	Tue	B+I		
12-Aug	Wed	B+I	WSR, FR	
13-Aug	Thu	B+I		PAYROLL
14-Aug	Fri	B+I		
15-Aug	Sat	B+I	TIMESHEET	
16-Aug	Sun	B+I		
17-Aug	Mon	B+I		
18-Aug	Tue	--Off--		
19-Aug	Wed	--Off--		
20-Aug	Thu	B+I	WSR, FR	
21-Aug	Fri	B+I		
22-Aug	Sat	B+I		
23-Aug	Sun	--Off--		
24-Aug	Mon	--Off--		
25-Aug	Tue	B+I		
26-Aug	Wed	B+I	WSR, FR	

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Date	Day	Duty[a]	Paperwork due[b]	Comments
27-Aug	Thu	B+I		PAYROLL
28-Aug	Fri	B+I		
29-Aug	Sat	B+I		
30-Aug	Sun	--Off--		
31-Aug	Wed	--Off--	TIMESHEET	
1-Sep	Thu	B+I		Holiday worked
2-Sep	Fri	B+I		
3-Sep	Sat	B+I		
4-Sep	Sun	--Off--		
5-Sep	Mon	--Off--		
6-Sep	Tue	B+I		
7-Sep	Wed	B+I	WSR, FR	
8-Sep	Thu	B+I		
9-Sep	Fri	B+I		
10-Sep	Sat	B+I		
11-Sep	Sun	B+I		PAYROLL
12-Sep	Mon	--Off--		
13-Sep	Tue	--Off--		
14-Sep	Wed	B+I		
15-Sep	Thu	B+I	TIMESHEET, WSR, FR	

Note: Horizontal lines delimit work weeks. Hours for all shifts are 1330–2100 hours.

[a] Duty code B+I indicates concurrent biological and interview sampling.

[b] Paperwork codes include WSR = weekly sampling report and FR = fishing report.

APPENDIX B: CHINOOK SALMON GENETIC SAMPLING

Appendix B1.–Procedure for collecting genetic and biological information from Chinook salmon.

I. General Information

Axillary process tissue samples are collected from individual fish to determine the genetic characteristics. When sampling the commercial harvest, tissues need to be as "fresh" and as cold as possible; do not sample from fungal fins. The sample preservative is ethanol (ETOH) which preserves tissues for later DNA extraction without having to store frozen tissues. Avoid extended contact with skin.

II. Sample procedure:

1) Tissue type: Axillary process; clip one axillary process from each fish (Appendix B2).
2) Prior to sampling, fill the tubes half way with ETOH from the squirt bottle. Fill only the tubes that you will use for a particular sampling period.
3) To avoid any excess water or fish slime in the vial, wipe the axillary process dry prior to sampling. Using the dog toe nail clipper or scissors, clip off axillary process (1/2–1″ max) to fit into the cryovial.
4) Place axillary process into ETOH. The ethanol/tissue ratio should be slightly less than 3:1 to thoroughly soak the tissue in the buffer.
5) Top off tubes with ETOH and screw cap on securely. Invert tube twice to mix ETOH and tissue. After each sample, wipe the dog toe nail clippers or scissor blade so not to cross contaminate samples.
6) Record vial number to paired data information (Appendix B3).
7) Measure fish length in millimeters from mideye to tail fork (METF) and record on the paired data form. Measure to the nearest mm (Appendix C1).
8) Determine the sex of the fish and record on paired data form (Appendix B3).
9) Remove three (3) scales from the preferred area (on the left side of fish) by grasping the scale's exposed posterior edge with forceps and pulling free (Appendix C3). Wipe slime, grit, and skin from the scale (neoprene wristers work well for this). Select scales within the preferred area on the other side of the fish. If no scales are present in the preferred area on either side of the fish, sample a scale as close to the preferred area as possible. Do not select a scale located on the lateral line.
10) Place three (3) scales vertically on gum card (Appendix C4). It is important to take care that scales adhere to the gum card, rough side up. Therefore, without turning the forceps over, clean, moisten, and mount the scale on the gum card with your thumb or forefinger. Exert just enough pressure to spread and smooth the scales directly over the number as shown in Appendix C4. The ridges on the sculptured side can be felt with a fingernail or forceps. Mount the scale with the anterior end oriented toward top of gum card. All scales should be correctly oriented on the card in the same direction (Appendix C4).
11) Check for presence or absence of adipose fin (if absent see Appendix D).
12) Salmon species identification guide is depicted in Appendix C5.
13) Repeat steps 1 through 11 for up to 10 fish on each card.

-continued-

III. Supplies included with sampling kit:

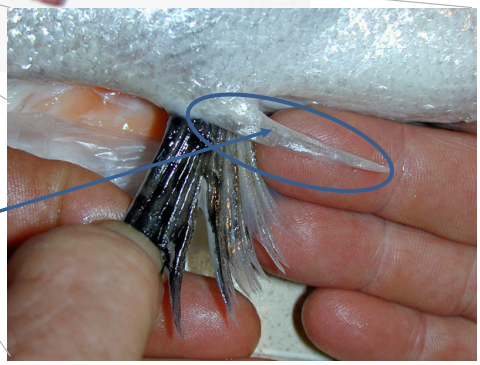
1) Clippers – used for cutting the axillary process.
2) Cryovial – a small (2.0ml) plastic vial, pre-labeled.
3) Caps – to prevent evaporation of ETOH.
4) Cryovial box – box for holding cryovials while sampling.
5) Ethanol (ETOH) – in bulk Nalgene bottle.
6) Squirt bottle – to fill or "top off" each cryovial with ETOH. Squirt bottle not for ethanol storage.
7) Forceps (tweezers) – to grasp and collect scales.
8) Gum Cards – to accommodate scale collection.
9) Acetate cards – separates and protects gum cards.
10) Measuring board – to measure fish (mm) mideye to tail fork.
11) Aluminum clipboard – holding sampling forms, pencils, and gum cards.
12) Uniquely number CWT cinch strap – locked through mouth of adiposed clipped fish head.
13) Plastic bags – for holding CWT heads to be frozen.

IV. What to do after sampling:

1) Double check the sample forms with gum cards, cryovials and with the log book to ensure accuracy.
2) Store cryovials containing tissues at cool or room temperature, away from heat in the white sample boxes provided. In the field: keep samples out of direct sun, rain and store capped vials in a cool, dry location. Do not Freeze.
3) Let gum cards dry in a warm area, stack with other gum cards placing acetate cards between each. Rubber band together and retain in plastic storage file case with sampling forms (IMPORTANT).
4) Carefully copy data from sampling forms to HTML5-based offline data entry form with personal computing device. Email resultant file daily to donn.tracy@alaska.gov if samples were collected that day.
5) If adipose-clipped fish was sampled, make sure that CWT paperwork is filled out and matches up with cinch strap numbers on collected heads.

Appendix B2.–Procedure for clipping axillary process from Chinook salmon.

The axillary process is located above the pelvic fin. Each clip should maintain a ratio 3 ETOH:1 axillary process in vials for best results. Using clipper, cut ½–1″ maximum.



Appendix B3.–"Chinook Genetics Sampling Form" for recording data associated with tissue samples.

Harvest Date: **Month:** _____ **Day:** _____ **Year:** _____ **Species:** _____

Sampling Area: _____

Statistical Areas: _____

Sampler: _____ **Sampling Port:** _____

Gear: _____ **Tender or F/V:** _____

Gum Card No: _____ Port Gum card prefixes: Kod-1; LB-2; ALZ-3; Chig-4; SP-5; KC-6; PM-7.

Fish Number	Sex (M or F)	Length (mm) METF	Adipose Fin √ ∅	Axillary Tissue Vial Number	No. Scales per Fish	Comments/CWT #
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

APPENDIX C: CHINOOK SALMON AGE, SEX, AND LENGTH SAMPLING

Adult salmon length is measured from mid eye to tail fork (METF) because the shape of the salmon's snout changes as it approaches sexual maturity. The procedure for measuring METF by this method is as follows:

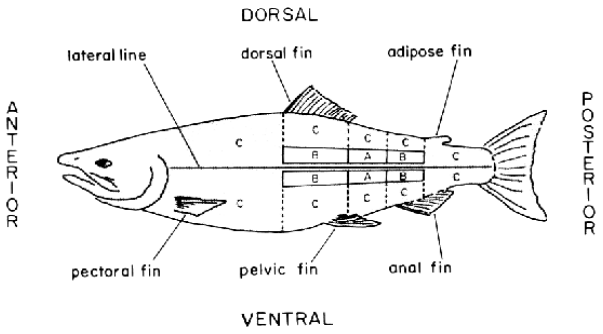
1) Place the salmon flat on its right side (on the measuring board) with its head to your left and the dorsal fin away from you.
2) Slide the fish in place so that the middle of the eye is in line with the edge of the meter stick and hold the head in place with your left hand.
3) Flatten and spread the tail against the board with your right hand.
4) Read and record the METF length to the nearest millimeter.

Sexual characteristics on maturing Chinook salmon can be difficult to determine:

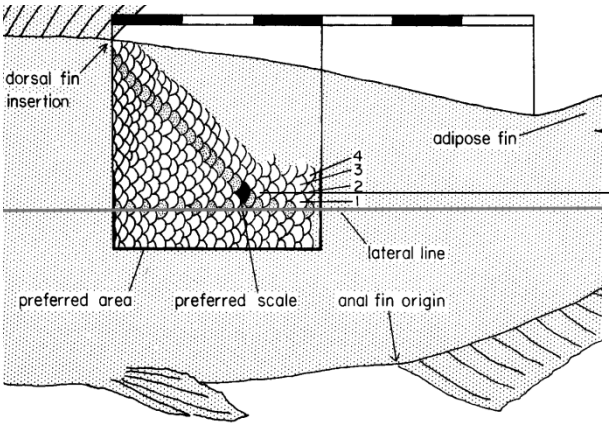
1) Male: large head, *concave forehead*, large adipose fin, no vent protrusion.

2) Female: smaller head, *convex forehead*, smaller adipose fin, slight vent protrusion.

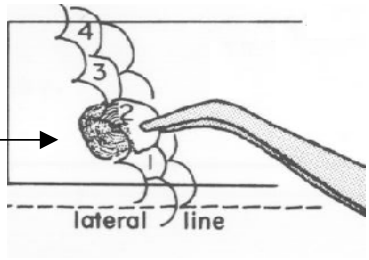
If acceptable with the harvester, the sampler can make a small slit in belly with a serrated utility knife for sex determination via visual inspections of the gonads.



International North Pacific Fisheries Commission (INPFC) rated areas for scale removal. Area A is the preferred area. If scales on the left side are missing, try the right side. Area B is the second choice if there are no scales in Area A on either side of the fish. Area C designates non-preferred areas.



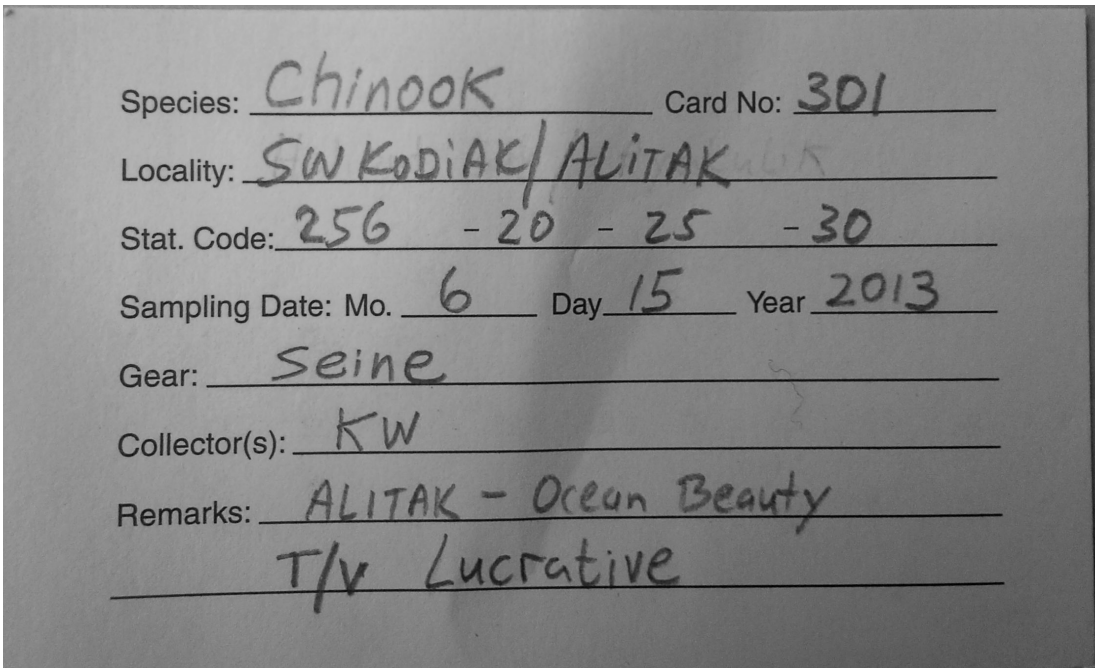
Do not turn scale over.



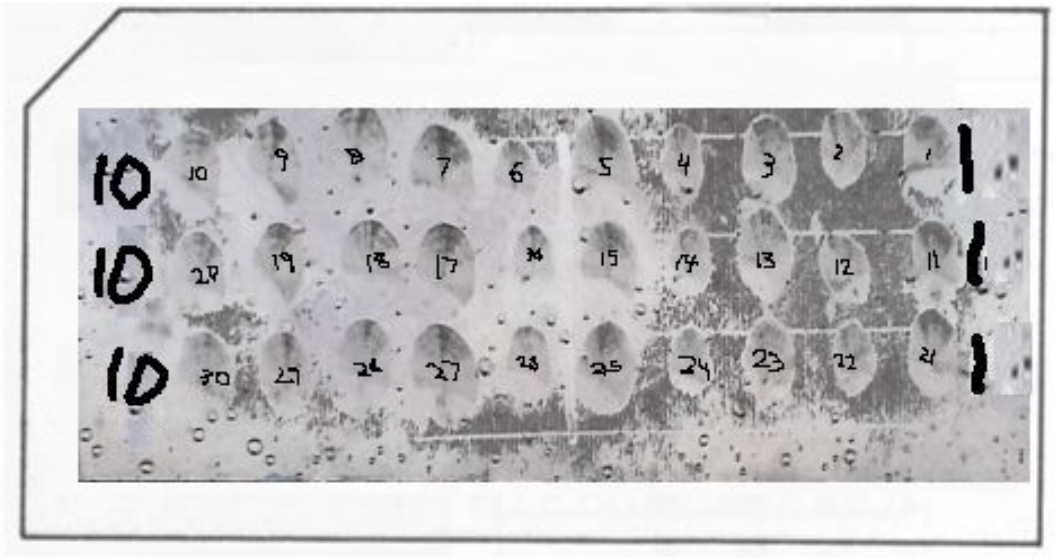
The preferred 3 scales would be 2, 3, 4 in the picture above.

The preferred scale in this diagram is solid black. It is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin "back" toward the origin of the anal fin.

Appendix C3.–Mounting of salmon scales: completed scale (gum) card.



Appendix C4.–Mounting of salmon scales: Chinook salmon sampled scale orientation, 3 scales per fish, going top to bottom, 10 fish per card, going right to left.



Appendix C5.–Marine phase salmon identification (courtesy of Washington Department of Fish and Wildlife).

Chinook (king)

- Mouth is dark with a black gum line
- Large, sharp teeth
- Spots on both lobes of tail
- Large spots on back

Coho (silver)

- Mouth is light with a white gum line
- Medium size, sharp teeth
- Spots only on upper lobe of tail
- Spots on back
- Wide caudal peduncle

Pink (humpy)

- Mouth is white with a black gum line.
- In marine areas, almost no teeth
- Large oval spots on both lobes of tail
- Large black spots on back
- Pointed lower jaw
- No silver on tail
- Very small scales

Chum (dog)

- Mouth is white with a white gum line
- Well developed teeth
- No spots on tail or back
- Calico markings (vertical bars) – faint on bright fish
- Narrow caudal peduncle
- White tip on anal fin

Sockeye (red)

- Mouth is white with a white gum line
- Almost toothless
- No spots on tail or back
- Large, bright gold, glassy eye

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-continued-

Washington Department of FISH and WILDLIFE

Chinook
Jaw – The chinook has a dark mouth and black gums at the base of its teeth. Immature chinook are known as a "blackmouth"

Tail – Both the upper and lower lobes of the tail are covered with spots and silver is prominent.

Coho
Jaw – The mouth is white and the gum line is almost white, but the tongue may be black. The teeth are sharp and strong.
Tail – The coho tail has just a few scattered spots, usually on the upper lobe, with silver streaks. It has a wide caudal peduncle.

Pink
Jaw – The mouth of a pink is white, but the gums and tongue are black, as they are in a chinook. It does not have "teeth" on its tongue.
Tail – The pink salmon tail is covered with large oval spots. It does not have silver on the tail. The scales are very small compared to other salmon of the same size.

Chum
Jaw – The mouth is white and the gum line is white, but the tongue may be black. The lips are fleshy with well developed teeth in both jaws, but there are no teeth on the base of the tongue.
Tail – The tail has no spots, but does have silver streaks covering about half of the fin. The caudal peduncle is narrow.

Sockeye
Jaw – The mouth is white and the gum line is white. The lips are fleshy. The teeth are small and well developed in both jaws. There are no teeth on the base of the tongue.
Tail – There are no spots on the tail.

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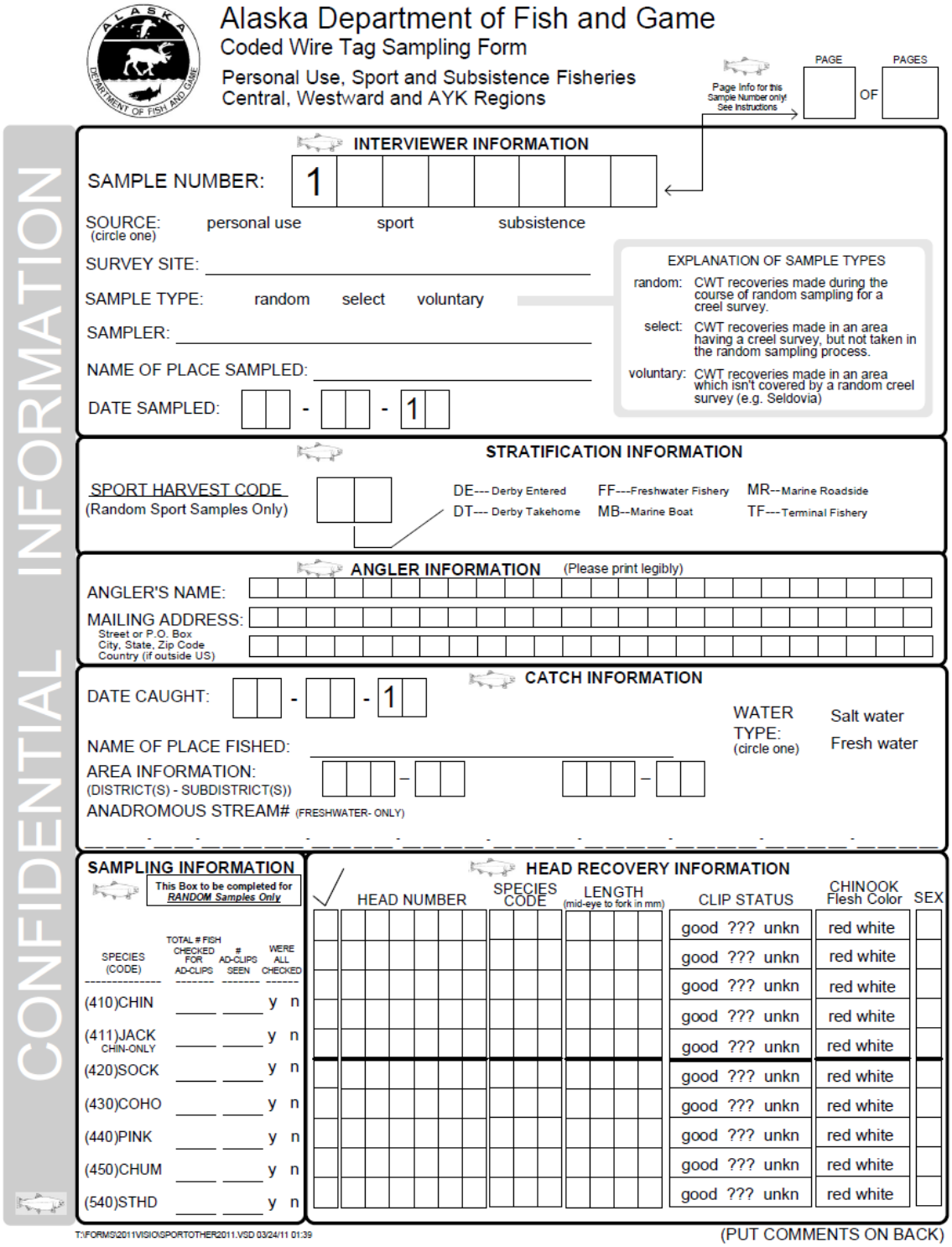
APPENDIX D: CHINOOK SALMON CODED WIRE TAG SAMPLING

Appendix D1.–"Coded Wire Tag Sampling Form" for recording data associated with adipose finclipped fish heads.



Alaska Department of Fish and Game
Coded Wire Tag Sampling Form
Personal Use, Sport and Subsistence Fisheries
Central, Westward and AYK Regions

PAGE ____ OF ____ PAGES
Page Info for this Sample Number only! See Instructions

CONFIDENTIAL INFORMATION

INTERVIEWER INFORMATION

SAMPLE NUMBER: 1

SOURCE: (circle one) personal use sport subsistence

SURVEY SITE: _____

SAMPLE TYPE: random select voluntary

SAMPLER: _____

NAME OF PLACE SAMPLED: _____

DATE SAMPLED: __ - __ - 1__

EXPLANATION OF SAMPLE TYPES
random: CWT recoveries made during the course of random sampling for a creel survey.
select: CWT recoveries made in an area having a creel survey, but not taken in the random sampling process.
voluntary: CWT recoveries made in an area which isn't covered by a random creel survey (e.g. Seldovia)

STRATIFICATION INFORMATION

SPORT HARVEST CODE (Random Sport Samples Only) ____

DE--- Derby Entered FF---Freshwater Fishery MR--Marine Roadside
DT--- Derby Takehome MB--Marine Boat TF---Terminal Fishery

ANGLER INFORMATION (Please print legibly)

ANGLER'S NAME:

MAILING ADDRESS:
Street or P.O. Box
City, State, Zip Code
Country (if outside US)

CATCH INFORMATION

DATE CAUGHT: __ - __ - 1__

WATER TYPE: (circle one) Salt water Fresh water

NAME OF PLACE FISHED: _____

AREA INFORMATION: (DISTRICT(S) - SUBDISTRICT(S))

ANADROMOUS STREAM# (FRESHWATER- ONLY)

SAMPLING INFORMATION

This Box to be completed for RANDOM Samples Only

SPECIES (CODE)	TOTAL # FISH CHECKED FOR AD-CLIPS	# AD-CLIPS SEEN	WERE ALL CHECKED
(410)CHIN			y n
(411)JACK CHIN-ONLY			y n
(420)SOCK			y n
(430)COHO			y n
(440)PINK			y n
(450)CHUM			y n
(540)STHD			y n

HEAD RECOVERY INFORMATION

✓	HEAD NUMBER	SPECIES CODE	LENGTH (mid-eye to fork in mm)	CLIP STATUS	CHINOOK Flesh Color	SEX
				good ??? unkn	red white	
				good ??? unkn	red white	
				good ??? unkn	red white	
				good ??? unkn	red white	
				good ??? unkn	red white	
				good ??? unkn	red white	
				good ??? unkn	red white	
				good ??? unkn	red white	
				good ??? unkn	red white	
				good ??? unkn	red white	
				good ??? unkn	red white	

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(PUT COMMENTS ON BACK)

Appendix D2.–Sampling CWT Chinook salmon and attaching cinch strap to the head of an adipose finclipped fish.

Sample procedures:

1) Attach uniquely numbered cinch strap to head of Chinook.
2) Record cinch strap number on Chinook Genetics Sampling Form (Appendix B3).
3) Using a serrated utility knife, carefully cut head off of Chinook salmon.
4) Place head in plastic bag to be frozen at the end of sampling.
5) When genetics sampling is done, enter all biological information from CWT on one form (Appendix D1).

APPENDIX E: KODIAK CHINOOK SALMON MARINE RECREATIONAL HARVEST ASSESSMENT FIELD SAMPLING MANUAL