

**Assessment of the Hatchery and Wild components of
the Willow and Deception Creek Chinook salmon
escapement 2013 - 2015**

by

Samantha Oslund

July 2013

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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

Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	Alaska Administrative Code	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H_A
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
hectare	ha	at	@	catch per unit effort	CPUE
kilogram	kg	compass directions:		coefficient of variation	CV
kilometer	km	east	E	common test statistics	(F, t, χ^2 , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient	
milliliter	mL	west	W	(multiple)	R
millimeter	mm	copyright	©	correlation coefficient (simple)	r
		corporate suffixes:		covariance	cov
Weights and measures (English)		Company	Co.	degree (angular)	$^\circ$
cubic feet per second	ft ³ /s	Corporation	Corp.	degrees of freedom	df
foot	ft	Incorporated	Inc.	expected value	E
gallon	gal	Limited	Ltd.	greater than	>
inch	in	District of Columbia	D.C.	greater than or equal to	≥
mile	mi	et alii (and others)	et al.	harvest per unit effort	HPUE
nautical mile	nmi	et cetera (and so forth)	etc.	less than	<
ounce	oz	exempli gratia	e.g.	less than or equal to	≤
pound	lb	(for example)		logarithm (natural)	ln
quart	qt	Federal Information Code	FIC	logarithm (base 10)	log
yard	yd	id est (that is)	i.e.	logarithm (specify base)	log ₂ , etc.
		latitude or longitude	lat. or long.	minute (angular)	'
Time and temperature		monetary symbols (U.S.)	\$, ¢	not significant	NS
day	d	months (tables and figures): first three letters	Jan, ..., Dec	null hypothesis	H_0
degrees Celsius	°C	registered trademark	®	percent	%
degrees Fahrenheit	°F	trademark	™	probability	P
degrees kelvin	K	United States (adjective)	U.S.	probability of a type I error (rejection of the null hypothesis when true)	α
hour	h	United States of America (noun)	USA	probability of a type II error (acceptance of the null hypothesis when false)	β
minute	min	U.S.C.	United States Code	second (angular)	"
second	s	U.S. state	use two-letter abbreviations (e.g., AK, WA)	standard deviation	SD
Physics and chemistry				standard error	SE
all atomic symbols				variance	
alternating current	AC			population sample	Var
ampere	A			sample	var
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				

REGIONAL OPERATIONAL PLAN SF.2A.2013.18

**ASSESSMENT OF THE HATCHERY AND WILD COMPONENTS OF
THE WILLOW AND DECEPTION CREEKS CHINOOK SALMON
ESCAPEMENTS 2013 - 2015**

by

Samantha Oslund

Alaska Department of Fish and Game, Sport Fish, Palmer

Alaska Department of Fish and Game
Sport Fish

July 2013

The Regional Operational Plan Series was established in 2012 to archive and provide public access to operational plans for fisheries projects of the Divisions of Commercial Fisheries and Sport Fish, as per joint-divisional Operational Planning Policy. Documents in this series are planning documents that may contain raw data, preliminary data analyses and results, and describe operational aspects of fisheries projects that may not actually be implemented. All documents in this series are subject to a technical review process and receive varying degrees of regional, divisional, and biometric approval, but do not generally receive editorial review. Results from the implementation of the operational plan described in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author if you have any questions regarding the information provided in this plan. Regional Operational Plans are available on the Internet at: <http://www.adfg.alaska.gov/sf/publications/>

*Samantha Oslund,
Alaska Department of Fish and Game, Sport Fish,
1800 Glenn Hwy, Suite 2, Palmer, Alaska*

This document should be cited as:

Oslund, S. 2013. Assessment of the Hatchery and Wild components of the Willow and Deception Creek Chinook salmon escapement 2013–2015. Alaska Department of Fish and Game, Division of Sport Fish, Regional Operational Plan ROP.SF.2A.2013.18, Anchorage.

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act (ADA) of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:

ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK 99811-5526

U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA 22203

Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW MS 5230, Washington DC 20240

The department's ADA Coordinator can be reached via phone at the following numbers:

(VOICE) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648,

(Juneau TDD) 907-465-3646, or (FAX) 907-465-6078

For information on alternative formats and questions on this publication, please contact:

ADF&G, Division of Sport Fish, Research and Technical Services, 333 Raspberry Rd, Anchorage AK 99518 (907) 267-2375

Signature Page

Project Title: Assessment of the Hatchery and Wild components of the Willow and Deception Creek Chinook Salmon Escapement

Project leader(s): *Samantha Oslund, Fisheries Biologist II*

Division, Region and Area: Sport Fish, Region II, Palmer

Project Nomenclature:

Period Covered: 2013-2015

Field Dates: July; 2013-2015

Plan Type: Category II

Approval

Title	Name	Signature	Date
Project leader	<i>Samantha Oslund</i>	<i>[Signature]</i>	<i>6-7-13</i>
Biometrician	<i>Anton Antonovich</i>	<i>A. Antonovich</i>	<i>6-7-13</i>
Research Coordinator	<i>[Signature]</i>	<i>Jack Erickson</i>	<i>6-8 July 13</i>

TABLE OF CONTENTS

	Page
LIST OF FIGURES	ii
LIST OF APPENDICES	ii
PURPOSE.....	1
OBJECTIVES.....	2
METHODS.....	2
SCHEDULE AND DELIVERABLES	4
RESPONSIBILITIES	4
REFERENCE CITED.....	5

LIST OF TABLES

Table	Page
1. Contribution of hatchery-reared Chinook salmon to the sport harvest at Willow Creek and the Escapements at Willow and Deception Creeks, 2005-2012.....	8
2. Recent Chinook salmon stocking history for the Willow Creek drainage.....	9

LIST OF FIGURES

Figure	Page
1. The Northern Cook Inlet Management Area.....	10
2. Map of the Willow Creek study area.....	11

LIST OF APPENDICES

Appendices	Page
A1. Instructions for filling out escapement sampling forms.....	13
A2. Example of Excel file of Number Sampled report.....	23
A3. Example of Tag lab file from a Non-Commercial Fisheries survey site report.....	24
B1. Little Susitna Weir.....	26

PURPOSE

The Alaska Department of Fish and Game (ADF&G) has stocked the Willow Creek drainage with Chinook salmon since 1985. The purpose of the Willow Creek enhancement program is to increase recreational Chinook salmon fishing opportunities in a cost-effective manner, by supplementing the existing wild run with hatchery-reared Chinook salmon. There was extensive evaluation of the stocking program for the first twenty years of returns (Peltz and Sweet 1992, 1993, Sweet and Peltz 1994, Sweet 1999). In 2006, the evaluation of hatchery fish contribution to the sport fishery was dropped because the program had stabilized and was producing consistent results and research needs changed. Since 2005, the contribution of hatchery-reared Chinook salmon to the sport harvest and the escapements at Willow and Deception creek has been evaluated (Table 1).

Chinook salmon eggs are taken from spawners in Deception Creek (a tributary to Willow Creek; (Figure 2), reared at an ADF&G hatchery and released as smolts back into Deception Creek at 4 Mile Road. Since 2005, all or nearly all (Table 2) hatchery-reared and released fish have been marked by clipping their adipose fin. The Fish Transport Permit (FTP) that covers this project (FTP 12A-0001) has been reviewed and renewed with new requirements in 2011 and will expire in 2019. This operational plan will address the requirement for determining the percentage of hatchery-reared Chinook salmon in the spawning escapement of Deception Creek. The original goals of enhancing Deception Creek wild stock with hatchery reared fish were: to have minimal straying (less than 5%) into Willow Creek, and to maintain a natural return of Chinook salmon to Deception Creek of at least 50% of the spawning escapement. The proportion of hatchery-reared Chinook salmon in the survey section of Deception creek from 2008 – 2012 was over 50% only in 2008, it was 20.5% in 2012 (Table 1).

The other need for this project is that Chinook salmon in the Willow Creek system are managed according to the Policy for the Management of Sustainable Salmon Fisheries (5AAC 39.222) and the Policy for Statewide Salmon Escapement Goals (5AAC 39.223). The Willow creek sustainable escapement goal (SEG) is 1,600 – 2,800 naturally-produced Chinook salmon only (Fair et al. 2007). Accordingly, annual carcass surveys are conducted in Willow Creek and the estimated number of hatchery-reared Chinook salmon in the spawning population is deducted from the escapement index count to determine if the escapement goal is met.

BACKGROUND

Willow Creek on average supports the second largest sport fishery in the Northern Cook Inlet Management Area (NCIMA; Figure 1) in terms of angler days expended, and consistently produces one of the largest Chinook salmon (*Oncorhynchus tshawytscha*) harvests in the NCIMA. On average, from 2001-2010 anglers annually spent an estimated 24,107 angler-days fishing Willow Creek and harvested approximately 2,359 Chinook salmon. Hatchery-reared Chinook salmon accounted for approximately 42 % of the Chinook harvest (2001-2005 average) (Ivey et al. *In prep.*). The Willow creek recreational harvest was not sampled after 2005.

OBJECTIVES

The objectives of this project are:

1. To estimate the relative contribution of hatchery-reared Chinook salmon to the spawning escapement in upper Willow Creek such that the estimate is within ± 5 percentage points of the true value 90% of the time.
2. To estimate the relative contribution of hatchery-reared Chinook salmon to the spawning escapement in Deception Creek such that the estimate is within ± 5 percentage points of the true value 90% of the time.

METHODS

STUDY DESIGN

The majority of Chinook salmon spawning takes place in both the main stem Willow and Deception creeks upstream from their confluence. The specific survey areas have traditionally been mainstem Willow Creek upstream of its confluence with Deception Creek to the Shirley Town Road Bridge, and Deception Creek from the confluence with Willow Creek upstream to 4 Mile Road (Figure 2).

Chinook salmon spawning activity peaks during the last week of July and carcass survey sampling will occur during the first week of August. Assuming all hatchery-reared fish have their adipose fin clipped, the precision criterion for objective (2) will be met if at least 271 Chinook salmon from Deception Creek are inspected for adipose fin clips (Cochran, 1977). This number is based on a binomial distribution with $d=0.05$, $\alpha=0.1$ and expected proportion $p=0.5$. In Willow Creek from 2005 - 2012 the estimated proportion of hatchery-reared Chinook salmon in the escapement ranged from 0.7% to 4.5 %. Assuming conservatively that it can go up to 10%, only 100 Chinook salmon from Willow Creek will need to be inspected for adipose-fin clips to meet the precision criterion for objective (1) ($d=0.05$, $\alpha=0.1$ and expected proportion $p=0.1$).

The sample size goals should be met using a two-person crew for one day on upper Willow Creek. A four-person crew will be used for up to three days on Deception Creek. The highest percentage of clipped fish are found directly at smolt release site in Deception Creek, although in 2010 smolt had to be stocked lower in Deception creek because of road problems. If after three days of surveying at Deception Creek the number of Chinook salmon inspected in Deception creek is less than 271 Chinook salmon, no further days of surveying will be attempted because of limited time to survey due to high water events and due to limited staff time. The sample size goal for Deception Creek has not been met since 2007. Additionally, it is expected that the overall number of Chinook salmon available for sampling will be low from 2013 - 2015, given the lower numbers of smolt stocked into Deception creek in recent years (Table 2).

DATA COLLECTION

Carcasses found in the survey reaches will be inspected for a missing adipose fin. The surveyor will first identify the species of fish and then, if it is a Chinook salmon, decide if there is enough of an adipose fin area present and caudal fin present to be able to correctly determine if either fin has been clipped or not. If there are, the fish will be counted as inspected. After inspecting the fish, the surveyor will clip upper portion of the caudal fin to avoid repeat sampling the fish during a subsequent survey. Heads will not be taken during the surveys from either of the study areas due to the long history of all of the decoded tags being the tag codes that we released in the

drainage. If an adipose fin is clipped, partially clipped, or questionable, it will be treated as an adipose-clipped fish. If the carcass is sufficiently complete, surveyors will measure only adipose-clipped fish from mid-eye to fork-of-tail to the nearest 5 mm and determine sex, as requested by the tag lab. For both Deception and Willow creek areas, surveyors will record the number of Chinook salmon inspected in a field notebook, and will record, for each adipose-clipped fish, the length, the clip status, and the sex of the marked fish. This information will be transferred to a Coded Wire Tag Sampling Form for Hatchery [Rack_{\[j\]}](#) and Escapement Surveys. Detailed instructions are found in Appendix A1.

DATA REDUCTION AND ANALYSIS

CONTRIBUTION ESTIMATES

The Tag Lab will add records to the coded wire tag database for each adipose clipped fish inspected. The principle investigator will download both Number Sampled Reports and Non-Commercial Survey Site Reports from the Tag Lab’s internet database into Microsoft Excel workbooks in Tag Lab file format. The [Tag Lab](#) is the centralized state resource for tracking salmon using coded wire tags. The Tag Lab maintains the database for all escapement surveys that involve coded wire tagged salmon even if heads from inspected adipose clipped fish are not sent to the lab. Examples of both files are located in Appendices A2 and A3, with a few extraneous fields (such as district and sub district) deleted to fit this document. The Tag Lab will be the primary source for archiving coded wire tag data; a copy of the forms will be kept in the principle investigator’s office in Palmer.

CONTRIBUTION OF HATCHERY-REARED CHINOOK SALMON TO WILLOW AND DECEPTION CREEKS CHINOOK SALMON ESCAPEMENT

Assuming that all or nearly all hatchery-reared fish are marked (Table 3) and all marked fish are identifiable during sampling event, the relative contribution of hatchery-reared Chinook salmon to Willow and Deception creeks escapement (Objectives 1 and 2) will be estimated by:

$$\hat{p}_i = \frac{a_i}{n_i} \tag{1}$$

Where n_i is the number of carcasses surveyed at location i (i.e. Willow or Deception Creek), a_i the subset of that sample composed of adipose-clipped fish, and \hat{p}_i the estimated proportion of the hatchery-reared Chinook salmon in the spawning escapement at location i .

The variance of \hat{p}_i is estimated according to the binomial distribution (Cochran, 1977):

$$\text{var}[\hat{p}_i] = \frac{\hat{p}_i(1 - \hat{p}_i)}{n_i - 1} \tag{2}$$

SCHEDULE AND DELIVERABLES

Dates of sampling events and other activities are summarized below. 2013 results will be published in a Report to the Board of Fisheries (FMR), in 2014, and data from 2014 and 2015 will be reported in the Area Management Report for the recreational fisheries of Northern Cook Inlet, 2014 and 2015.

SCHEDULES AND REPORTING

<i>Date</i>	<i>Activity</i>
August 1 through August 15	Data collection
November 30	Data Analysis

RESPONSIBILITIES

List of Personnel and Duties:

Fishery Biologist II Oversees project by writing operational plan, conduct carcass surveys, tracking budgets, hiring and supervising crewmembers, tracking implementation of operational plan, daily reporting and summarization of data, providing assistance and direction when needed. Provides contribution estimates for inclusion in the Area Management Report.

Biometrician III Assists in preparing operational plan, provides sample size determination and estimation procedures, advises project biologist on statistical procedures and practices, and performs data analysis and statistical tests of assumptions.

Fishery Biologist I (vacant) Coordinates and conducts the carcass surveys. Supervises collection and processing of field data.

Fish and Wildlife Technician III and Technician II Gathers all supplies needed for conducting surveys, conducts carcass surveys, and completes Tag Lab forms.

BUDGET

TOTALS		
100	PERSONNEL	\$10.3
200	TRAVEL	\$ 0.0
300	SERVICES	\$.6
400	SUPPLIES	\$ 1.6
500	EQUIPMENT	\$ 0.0
Total 100-500		\$12.5

REFERENCES CITED

- Cochran, W. G. 1977. Sampling techniques, third edition. John Wiley and Sons, New York.
- Fair, L.F., R. A. Clark, and J. J. Hasbrouck. 2007. Review of salmon escapement goals in Upper Cook Inlet, Alaska, 2007. Alaska Department of Fish and Game, Fisheries Manuscript No. 07-06, Anchorage.
- Ivey, S. S., C. Brockman and D.Rutz. *In Prep.* Area management report for the recreational fisheries of Northern Cook Inlet, 2005 and 2006. Alaska Department of Fish and Game, Fishery Management Report, Anchorage.
- Oslund, S.A., S.S. Ivey. 2010 Recreational Fisheries of Northern Cook Inlet, 2009-2010; Report to the Alaska Board of Fisheries, February 2011.
- Peltz, L. and D. E. Sweet. 1992. Performance of the Chinook salmon enhancement program in Willow Creek, Alaska, 1985-1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-33, Anchorage.
- Peltz, L. R. and D. E. Sweet. 1993. Performance of the Chinook salmon enhancement program in Willow Creek, Alaska, 1985-1992. Alaska Department of Fish and Game, Fishery Data Series No. 93-22, Anchorage.
- Sweet, D. E. and L. R. Peltz. 1994. Performance of the Chinook salmon enhancement program in Willow Creek, Alaska, 1985-1993. Alaska Department of Fish and Game, Fishery Manuscript No. 94-3, Anchorage.
- Sweet, D.E. 1999. Performance of the Chinook salmon enhancement program in Willow Creek, Alaska, through 1996. Alaska Department of Fish and Game, Fishery Manuscript No. 99-2, Anchorage.

TABLES AND FIGURES

Table 1.—Contribution of hatchery-reared Chinook salmon to the sport harvest at Willow Creek and the Escapements at Willow and Deception Creeks, 2005-2012.

Year	Brood Year (Age)	Willow Creek						Deception Creek		
		Harvest ^a			Escapement ^b			Escapement ^b		
		n	# Recov	Contrib ^c	n	# Recov	Contrib ^c	n	# Recov	Contrib
2005	2000- (0.4)		63	7.0%		0	0.0%		ND	ND
	2001- (0.3)		272	29.9%		2	0.9%		ND	ND
	2002- (0.2)		6	0.7%		0	0.0%		ND	ND
	2002- (1.1)		2	0.2%		0	0.0%		ND	ND
	2003- (0.1)		18	2.0%		0	0.0%		ND	ND
	Total	965	361	39.8% ^d	331	2	0.9% ^d	174	113	64.9%
2006 ^f	2001- (0.4)		ND	ND		1	0.4%		ND	ND
	2002- (0.3)		ND	ND		0	0.0%		ND	ND
	2003- (1.1)		ND	ND		1	0.4%		ND	ND
	2003- (0.1)		ND	ND		1	0.4%		ND	ND
	Total	ND	ND	ND	277	3	1.1% ^d	248	151	60.9%
2007	2003- (1.2)		ND	ND		1	0.7%			
	Total	ND	ND	ND	274	1	0.7% ^d	258	175	67.8%
2008		ND	ND	ND	118	3	2.5%	156	105	67.3%
2009		ND	ND	ND	117	4	3.4%	96	48	50.0%
2010		ND	ND	ND	104	2	1.9%	25	7	28.0%
2011		ND	ND	ND	101	1	1.0%	8	4	50.0%
2012		ND	ND	ND	66	3	4.5%	44	9	20.5%

Note: n = the total number of fish sampled; # Recov = number of adipose fin clipped (hatchery reared) fish with coded wire tags recovered at the Tag Lab; Contrib = percent contribution; ND = no data because no attempts were made to collect it.

^a Creel survey.

^b Carcass sampling.

^c Percent contribution may differ from the quotient of number recovered to number sampled due to head or tag loss.

^d Sum of contribution by brood year. Tags from the heads of adipose clipped fish were decoded at the State Mark, Tag, and Age Lab in Juneau, AK.

^e Ratio of adipose clipped (marked) fish to total fish inspected during a carcass survey.

^f The Willow Creek creel survey was discontinued in 2006; no sport fish harvests on this stream were sampled that year.

Table 2.–Recent Chinook salmon stocking history for the Willow Creek drainage.

Brood Year	Number of Smolts	Proportion marked	Release date	Last Return Year
1996	310,600	0.9906	6/11/97 –6/20/97	2001
1997	197,392	1.0000	6/17/98 – 6/26/98	2002
1998	201,586	0.9911	6/14,16,17/1999	2003
1999	206,946	0.9908	6/2,13,14/00	2004
2000	207,465	0.9856	6/18 & 6/19/2001	2005
2001	197,277	0.9966	6/21 & 6/24/2002	2006
2002	101,181	0.9840	6/19/2003	2008
2002	113,523	0.9170	6/8/2004	2008
2003	99,047	0.9860	6/9/2004	2008
2003	163,016	0.9964	6/6/2005	2009
2004	50,426	0.9993	6/8/2006	2010
2005	103,016	1.0000	5/29/2007	2011
2006	112,219	0.9920	6/16/2008	2012
2007	111,322	1.0000	6/4/2009	2013
2008	155,125 ^a	1.0000	5/27/2010	2014
2009	140,266	1.0000	7/8/2011	2015
2010	151,220	1.0000	7/9/2012	2016

^a 93,075 of this 155, 125 total smolt were stocked at the Hatcher Pass road bridge.

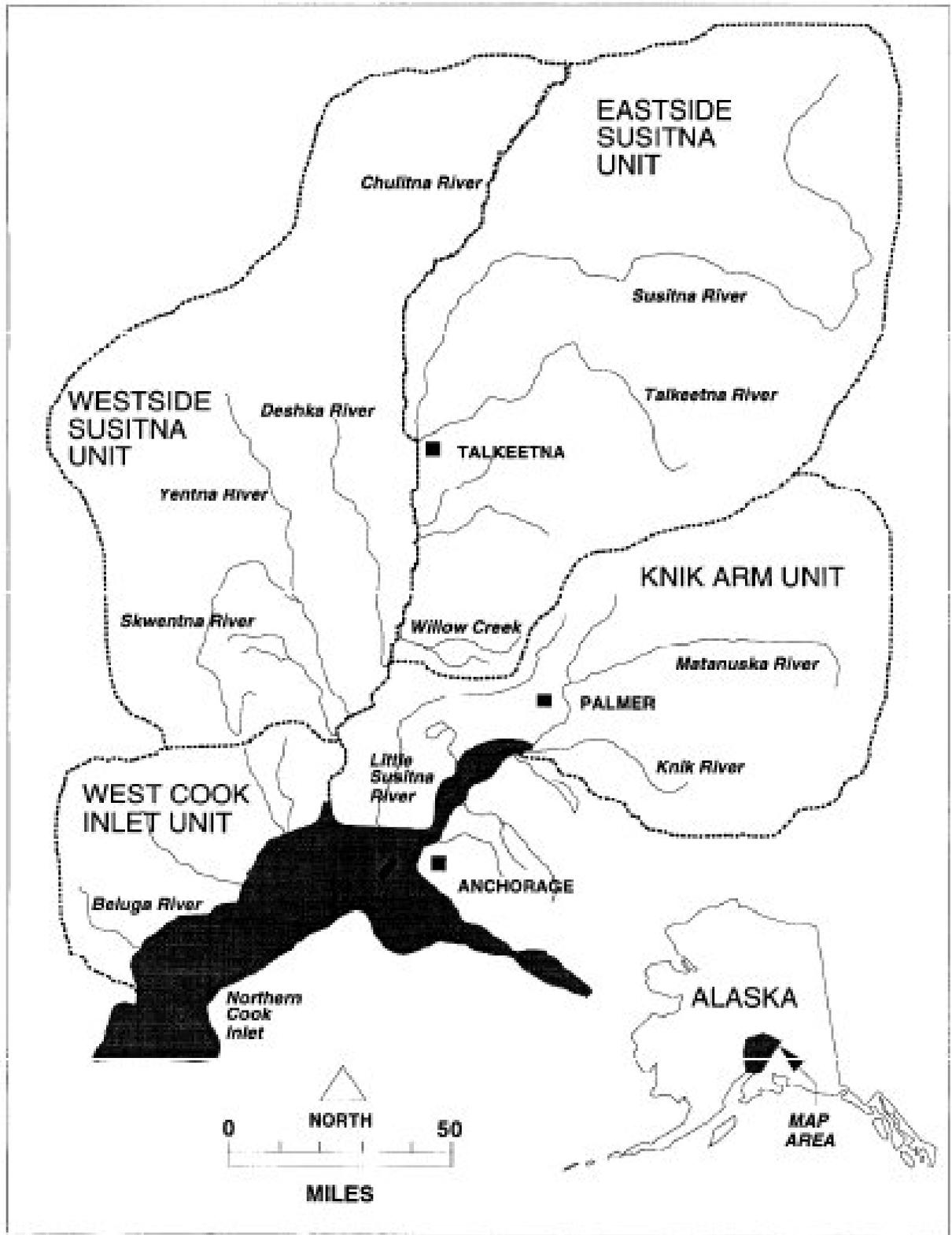


Figure 1.—The Northern Cook Inlet Management Area.

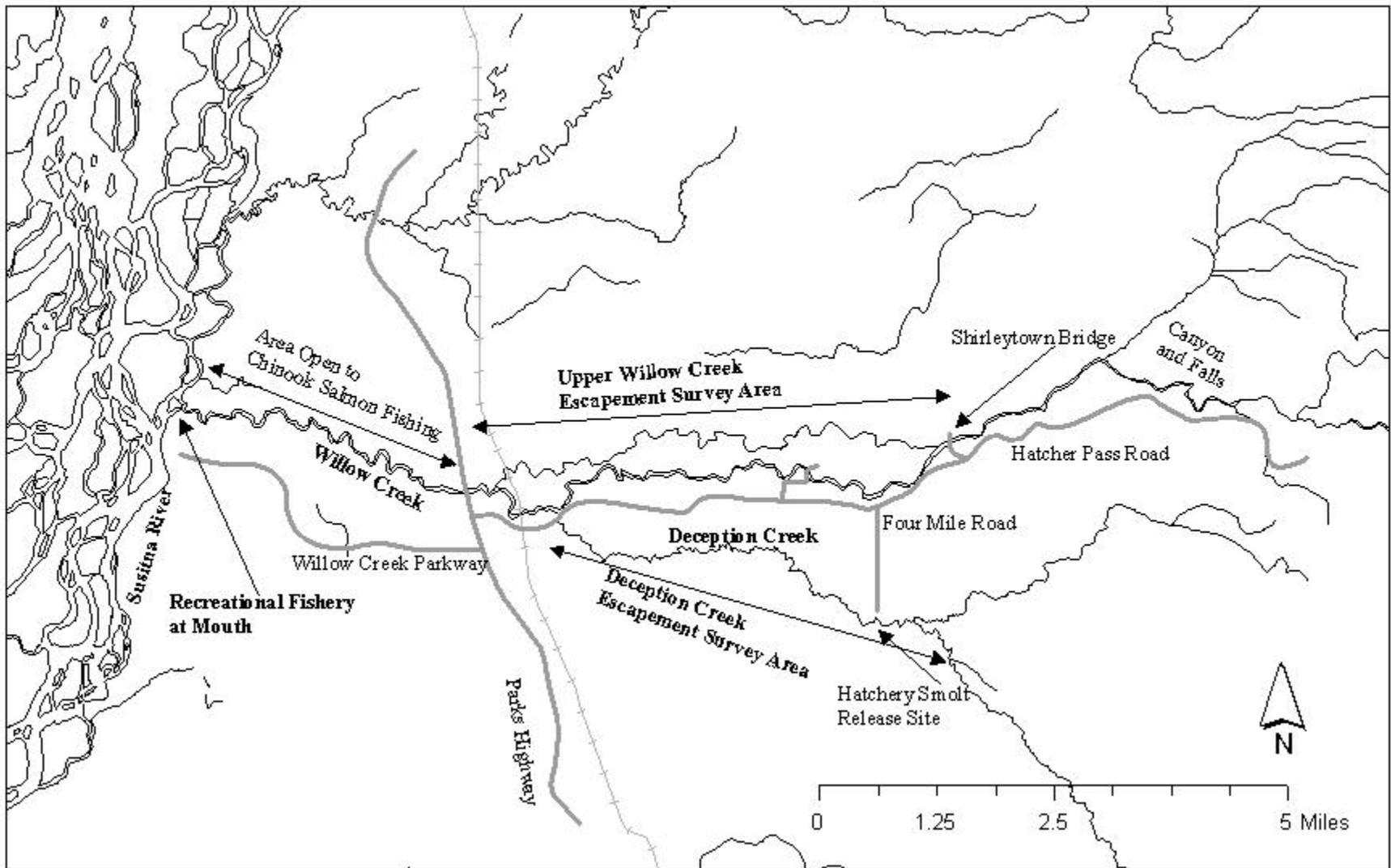


Figure 2.—Map of the Willow Creek study area.

APPENDIX A: CODED WIRE TAG SAMPLING PROGRAM

ALASKA DEPARTMENT OF FISH AND GAME
CODED WIRE TAG SAMPLING PROGRAM
DETAILED SAMPLING INSTRUCTIONS
RACK and ESCAPEMENT

SOUTH CENTRAL (COOK INLET) AND AYK REGIONS

Introduction

Coded wire tags (CWT) recovered from properly designed and conducted studies can provide scientists, fishery managers, and hatchery operators with data for evaluating and managing salmon stocks. The use of this stock identification tool has increased dramatically in the years since it was first introduced.

Sampling fish at hatchery racks, at weirs, or during escapement surveys is the last of a series of sampling programs designed to look for, identify, and collect heads from coded wire tagged fish. Tags recovered in commercial and sport fishery sampling programs expanded by catch/sample and release/tag ratios are coupled with tags recovered and expanded by escapement/sample ratios to produce overall survival estimates and to determine commercial and sport fishery exploitation rates.

General Instructions

All species of salmon and steelhead have been tagged in various areas of the state. The species you check for CWT's (externally identified by a missing adipose fin) is dependent on location and your project's goals, objectives, and sampling design. **Individual project objectives, sampling design criteria, and specific instructions for how, when, and where you conduct your sampling will be provided by the project leader or your supervisor.** Adipose clipped fish should be handled in the following manner. Complete a CWT Sampling Form; insert a uniquely numbered cinch strap through the mouth and out the operculum; and collect the head. Your supervisor may instruct you to remove the heads of only a portion of the adipose clipped fish observed, in some instances. **You should only sub-sample adipose clipped fish if specifically instructed to do so by your supervisor and if fewer heads collected randomly will provide you with data within acceptable confidence limits.**

-continued-

Specific Instructions for Completion of CWT Sampling Form

Note: Specific data items listed on the CWT Sampling Form (sampling form) are identified in these instructions by the use of all capital letters. The sampling form and the specific instructions are divided into five major sections: General Information; Sampling Information; Area Information; Head Recovery Information; and Comments. One sampling form (Figure 1) will be completed for each head or group of heads recovered at a hatchery rack, weir, or stream survey site.

Only a single value for each requested data item is allowed. Only heads recovered from a single day at a single site should be recorded on the same sampling form. **Samples from multiple days or locations cannot be listed on the same sampling form.** You may have multiple pages for a single sample.

General Sample Information Section Please record the counts on all pages of each sampling form for samples with multiple sheets.

- **SAMPLE NUMBER:** This number identifies each unique sampling form in the CWT database. The supervisor has been given a sample number series to assign. If you do not know what sample number series to assign, please contact the Tag Lab.
- **PAGE ___ OF ___ PAGES:** additional pages will be required if more than 15 heads are recovered on a single day at a single site. Page numbers are specific to each individual sample; e.g., a sample with 17 heads will have page 2 of 2 with the same sample number assigned to both sheets. Number of fish sampled and clips observed should be recorded on all pages when multiple pages are used for one sample.
- **SOURCE:** circle one—Check with your supervisor or the Tag Lab for clarification, if unsure.

rack return: for sampling at a hatchery or other central incubation facility.
escapement survey: for sampling at a weir, stream, river, lake or spawning grounds.
- **SURVEY SITE :** name of hatchery, stream, lake or weir surveyed

-continued-

- **SAMPLE TYPE:** circle one

Random samples are those samples where you actually count and inspect all or part of the returning fish for the presence of CWTs. The data from the fraction of the return sampled can be used to make inferences about the unsampled return, if all returning fish are not inspected for CWTs. Detailed instructions for random sampling procedures for your location will be given to you by the project leader or your supervisor. To ensure that a reliable estimate of marked and unmarked fish is attained, sampling must be done in the following two step manner:

First - **select fish you are going to inspect, count it**

Second - **determine if the adipose fin is absent**

You must first choose a fish to inspect, then look to see if the adipose fin is absent. Turn fish over if fin is not visible. Fish with partially regenerated adipose fins or poor quality marks should be set aside and treated as if coded wire tagged. **Complete a sampling form for each day and location sampled even if no adipose clips were observed.**

Select samples are those heads that have been recovered from a source outside of a random sampling program. These heads would not have been recovered in your random sampling activities. For example, you are walking along a stream and happen to look down at a fish and see that it is clipped, then take the head. You are not actually looking for tagged fish. These recoveries cannot be used to make inferences about a larger unsampled population. Fish that have been sampled previously in the same year in the same system for CWT should be marked select so that they are not accounted for twice.

- **SAMPLER:** your last name.
- **DATE SAMPLED:** date fish are sampled by you. Heads sampled from only one day at one location can be listed on a single sampling form.

Sampling Information Section

A sampling form must be completed for all random samples each day and location fish were sampled even if no adipose clipped fish were observed. Random and select recoveries cannot be listed on the same sampling form. For samples with multiple sheets, please record the counts on all pages of each sampling form. Record for each species:

- **TOTAL # FISH CHECKED FOR AD-CLIPS:** count and record each fish, by species, you choose to inspect. Included in that count will be both unclipped and adipose clipped fish. **Count only those fish you are sure either have or do not have an adipose fin. If you did not get a good look at the fin do not count that fish.**
- **# ADIPOSE CLIPS SEEN:** record by species the number of fish counted that are missing adipose fins. "Zero" adipose clips seen is a valid observation and must be recorded.

Note: If your supervisor instructed you to collect only a portion of the heads of adipose clipped fish observed and counted (sub-sampling the heads) you should record the number of adipose clips observed and make a clear note in the COMMENTS section about the your sub-sampling activities. (For example you sampled 21 coho on August 23 at Elmendorf Hatchery (Ship Creek) and observed 8 adipose clipped coho. You were instructed by your supervisor to remove heads from only 3 fish. The remaining 5 adipose clipped fish were allowed to pass through the weir.) You would record the following (see Figure 3) for this example:

TOTAL # FISH CHECKED FOR AD-CLIPS = 21

ADIPOSE CLIPPED OBSERVED = 8*

COMMENTS: **Sub-Sampled**

3 heads taken

5 heads not taken

*8 total adipose clipped fish observed

Tag Lab staff will assign phantom head numbers to the remaining 5 heads and list them as LOST (adipose clipped fish observed but not received at the Tag Lab for processing). This is still a **Random Sample** because you are accounting for all fish observed and counted and listing the ones that did not actually have the head removed.

- **WERE ALL CHECKED?** Circle **yes** or **no** (for each species checked). It is vital that you count only those fish you are sure have or do not have an adipose fin and that you have actually determined this by visual sight. If you circle yes, you are stating that you looked at every single fish that possibly went by you in the stream, the weir, etc., and that you positively determined that each fish did or did not have a clip. This does not refer to the number of heads taken. Circle **yes** or **no**.

-continued-

Area Information Section

- **AREA INFORMATION (DISTRICT-SUBDISTRICT):** record current and valid commercial fishing district and subdistrict where fish were sampled/recovered: (e.g.; Wasilla Creek is 247-50, Nancy Lake is 247-41, Little Susitna River is 247-41, Kenai River is 244-32, etc.).
- **NAME of PLACE SURVEYED (HATCHERY OR STREAM):** location of facility, weir, stream, lake or spawning ground.
- **WATER TYPE:** were fish collected in saltwater or freshwater? Circle one.
- **ANADROMOUS STREAM # (freshwater-only):** Please enter the Anadromous Stream Catalog number listed in the latest edition of the "Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes" published by the Department's Sport Fish Division for fish that were sampled/recovered in freshwater. This will be at least a ten digit number but could have as many as thirty-eight digits. Please call your local Sport Fish office or the Tag Lab for assistance if a catalog is unavailable. Be as descriptive as possible when you record the NAME OF HATCHERY OR STREAM. See attached list for ANADROMOUS STREAM #s.

Head Recovery Information Section

- : Each fish head should be checked off as it is boxed for shipment to the Tag Lab.
- **HEAD NUMBER*:** insert a pre-numbered cinch strap through the mouth and out the operculum (gill plate) of each head identified as bearing a CWT. Insert these so that the number can be read when the head is frozen. A series of cinch straps have been assigned to you for this specific project. Use them in numerical order. Cinch-up the strap and record its imprinted 6-digit number under HEAD NUMBER on the sampling form. If a cinch strap is missing from the sequence assigned to you, list that number(s) on the sampling form on which it should have appeared. The number along with the word "**Void**" should be written in the comments section of the sampling form.
*Note: If you are using a cinch strap with only five digits or numbers simply insert a leading zero for the first digit.

-continued-

- **SPECIES CODE:** Record species code of each adipose clipped fish using the following codes:
 - 410 = CHIN** - king or Chinook salmon
 - 411 = JACK** - king or Chinook salmon only; check with your site sampling supervisor for length criteria prior to selection and entry as a JACK (generally < 28 inches total length). Many projects do not use this designation and later sort the data based on length and age.
 - 420 = SOCK** - sockeye or red salmon
 - 430 = COHO** - coho or silver salmon
 - 440 = PINK** - pink or humpback salmon
 - 450 = CHUM** - chum or dog salmon
 - 540 = STHD** - steelhead trout

- **LENGTH:** record the length (mid-eye to the fork-of-tail), if measured, to the nearest 5 millimeter (mm). See Figure 2.
 - lengths ending in 1 or 2 are rounded to 0
 - lengths ending in 3 or 4 are rounded to 5
 - lengths ending in 6 or 7 are rounded to 5
 - lengths ending in 8 or 9 are rounded to 0

- **CLIP:** note quality of adipose clip using the following codes:
 - 1 - OK (fish must be observed)
 - 2 - Questionable - partially regenerated or poor quality clip (fish must be observed)
 - 3 - Unknown (use for select samples where the fish is not observed by the sampler)

- **SEX:** record the sex of the fish using the following codes: (Note: Completion of this item is optional, however it is recorded on the CWT database if reported on the sampling form.)
 - F - female
 - M - male

- **COMMENTS:** Record any comments you may have about the sample, or its irregularities in the comments section of the sampling form or on the back of the sampling form. Please indicate that we should "see back of the sampling form" if you write notes on the back.

-continued-

Head Preparation and Shipment Instructions

1. At the end of each day, check sampling forms.
 - Be sure that **all** data items have been completed.
 - Be sure all heads recovered are accounted for on the sampling forms for that day.
 - Be sure that all heads listed on sampling forms were retrieved, bagged, and are in a freezer.
2. Heads should be shipped to the Tag Lab periodically during the season, as often as once a week.
3. When collected, heads must be placed in an individual plastic bag, provided by the Tag Lab. Heads must be frozen (**if a freezer is not available, preserved in borax or salt**). Place individually bagged heads in large garbage bags inside a box (wet lock boxes not required if heads are double bagged). If time permits, please thoroughly rinse or remove gills from escapement fish. Residual sand and debris from the ground can cause problems with the magnetic detectors and false signals can occur when trying to dissect the tags.
4. Place all **original** sampling forms in a single plastic bag and place in the box with heads.
5. The person in charge of shipping heads to the Tag Lab will complete the HEAD SHIPMENT SUMMARY FORM and include it with the head shipment. Instructions for completion of that form will be sent to the person in charge of each project. Check off heads on sampling form as they are being boxed for shipment in order to ensure that all heads are sent to Juneau.
6. If your shipment includes more than one box, put data in one box and write **Data Enclosed** on the outside of the box.
7. Please number the boxes you ship to us. If you number the boxes 1 of 5, 2 of 5, etc. we can be sure that the air carrier gives us your complete shipment. It is also helpful to call or email the Tag Lab with the AWB number, number of boxes and estimated time of arrival into Juneau if you have access to a phone or computer. If a shipment is going to be delayed, call (907) 465-3483 and inform Cathy Robinson of the problem.
8. Label the box sides with the words **Keep Frozen** or use **Keep Frozen** labels provided by the air carrier.
9. If you live in a community served by Alaska Airlines, send heads and data directly to the Tag Lab on that carrier. If you work in a community not served directly by Alaska Airlines send shipments to Juneau on a regularly scheduled commuter flight that transfers to Alaska Airlines.

-continued-

10. Use shipping labels provided. Send heads **Prepaid** (see exception in #11 below) to:

Alaska Department of Fish and Game
CF Division, Mark, Tag, and Age Lab
P.O. Box 115526
Juneau, Alaska 99811-5526

CALL UPON ARRIVAL IN JUNEAU
(907) 465-3483

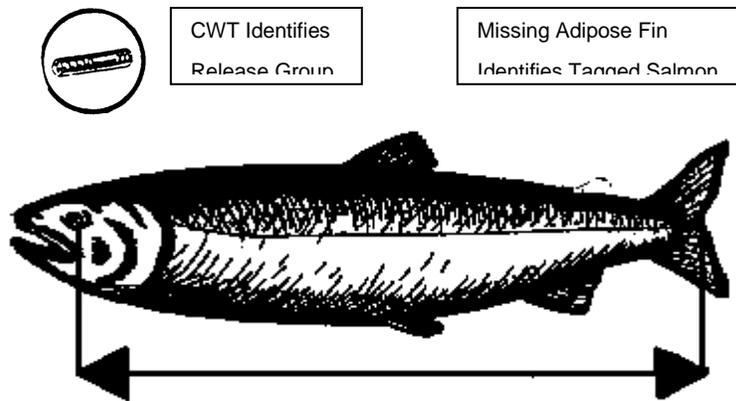
11. Cook Inlet escapement/sport heads should be sent to the Tag Lab **Freight Collect**. All other projects should send heads to us Prepaid.

12. **Heads shipped without data will not be processed.**

13. Please call if you have questions or if you need additional supplies. Thanks for your hard work and cooperation. Have a good season.

-continued-

SALMON MEASUREMENT



Mid-eye to Fork Measurement

Appendix A2.–Example of Excel file of Number Sampled report.

Year	Sample	Survey Site	A-Stream	Source	Harvest	Gear Class	Water Region Code	Quadrant	District	Sub-District	Date Sampled	Sample Stat Week	Stat Week (CWT)	Species	Number Sampled	Clips
2000	00DC0023	PALMER	DECEPTION 247-41	CR ESCAPE			2 F	UC	247	41	8/10/2000	33	33	CHIN	118	54
2001	01DC0026	PALMER	DECEPTION 247-41	CR ESCAPE			2 F	UC	247	41	8/2/2001	31	31	CHIN	81	41
2001	01DC0028	PALMER	DECEPTION 247-41	CR ESCAPE			2 F	UC	247	41	8/8/2001	32	32	CHIN	40	28
2002	02DC0006	PALMER	DECEPTION 247-41	CR ESCAPE			2 F	UC	247	41	8/6/2002	32	32	CHIN	88	75
2002	02DC0006	PALMER	DECEPTION 247-41	CR ESCAPE			2 F	UC	247	41	8/6/2002	32	32	JACK	11	11
2000	00DC0020	PALMER	WILLOW 41	CR ESCAPE	247-		2 F	UC	247	41	8/7/2000	33	33	CHIN	84	14
2000	00DC0022	PALMER	WILLOW 41	CR ESCAPE	247-		2 F	UC	247	41	8/7/2000	33	33	CHIN	138	18
2001	01DC0027	PALMER	WILLOW 41	CR ESCAPE	247-		2 F	UC	247	41	8/6/2001	32	32	CHIN	230	11
2002	02DC0007	PALMER	WILLOW 41	CR ESCAPE	247-		2 F	UC	247	41	8/7/2002	32	32	CHIN	242	42

Appendix A3.—Example of Tag lab file from a Non-Commercial Fisheries survey site report

Year	Survey Site	Stream	Team Name	Sample	Head	Sampling Type Code	Source	Week (CWT)	Date (CWT)	Species	Length	Length Type Code	Tag Code	Tag Status	Year Brood	Agency	Rearing Code	Location (Facility or Wild Stock)	Date Released	Last Release Site	Tag Ratio	
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221409	R	ESCAPE	32	8/7/2002	CHIN	820	1 401031112	OK	1996	ADFG	W	(W) WILLOW CR 247-41	9/14/1997	WILLOW 247-41	CR	1.009
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221418	R	ESCAPE	32	8/7/2002	CHIN	945	1 401031205	OK	1996	ADFG	W	(W) WILLOW CR 247-41	8/19/1997	WILLOW 247-41	CR	1.008
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221928	R	ESCAPE	32	8/7/2002	CHIN	830	1 130102130	6 OK	1997	ADFG	W	(W) WILLOW CR 247-41	7/25/1998	WILLOW 247-41	CR	1.017
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221924	R	ESCAPE	32	8/7/2002	CHIN	740	1 130102130	7 OK	1997	ADFG	W	(W) WILLOW CR 247-41	7/31/1998	WILLOW 247-41	CR	1.007
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221920	R	ESCAPE	32	8/7/2002	CHIN	570	1 310144	OK	1999	ADFG	H	FORT RICHARDSON	6/14/2000	CR 247-41	DECEPTION	1.008
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221905	R	ESCAPE	32	8/7/2002	CHIN	670	1 310144	OK	1999	ADFG	H	FORT RICHARDSON	6/14/2000	CR 247-41	DECEPTION	1.008
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221919	R	ESCAPE	32	8/7/2002	CHIN	710	1 310144	OK	1999	ADFG	H	FORT RICHARDSON	6/14/2000	CR 247-41	DECEPTION	1.008
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221412	R	ESCAPE	32	8/7/2002	CHIN	580	1 310233	OK	1999	ADFG	H	FORT RICHARDSON	6/14/2000	CR 247-41	DECEPTION	1.007
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221420	R	ESCAPE	32	8/7/2002	CHIN	635	1 310233	OK	1999	ADFG	H	FORT RICHARDSON	6/14/2000	CR 247-41	DECEPTION	1.007
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221933	R	ESCAPE	32	8/7/2002	CHIN	555	1 310234	OK	1999	ADFG	H	FORT RICHARDSON	6/2/2000	CR 247-41	DECEPTION	1.006
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0008	97938	S	ESCAPE	30	7/24/2002	CHIN	830	1	TAG LOST								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221934	R	ESCAPE	32	8/7/2002	CHIN	770	1	NO TAG								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221904	R	ESCAPE	32	8/7/2002	CHIN	815	1	NO TAG								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221927	R	ESCAPE	32	8/7/2002	CHIN	815	1	NO TAG								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221421	R	ESCAPE	32	8/7/2002	CHIN	870	1	NO TAG								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221416	R	ESCAPE	32	8/7/2002	CHIN	880	1	NO TAG								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221413	R	ESCAPE	32	8/7/2002	CHIN	885	1	NO TAG								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221922	R	ESCAPE	32	8/7/2002	CHIN	950	1	NO TAG								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221907	R	ESCAPE	32	8/7/2002	CHIN			HEAD LOST								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221908	R	ESCAPE	32	8/7/2002	CHIN			HEAD LOST								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221909	R	ESCAPE	32	8/7/2002	CHIN			HEAD LOST								
2002	PALMER	247-41-10200-2120	WILLOW	CR 247-41	02DC0007	221910	R	ESCAPE	32	8/7/2002	CHIN			HEAD LOST								

APPENDIX B: SAMPLING FORMS

