Chignik River Sockeye Salmon Inseason Genetic Stock Identification Operational Plan, 2010

by

Mark J. Witteveen

and

Mary Beth Loewen

May 2010

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

fork length	FL
mideye to fork	MEF
mideye to tail fork	METF
standard length	SL
total length	TL

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

CHIGNIK RIVER SOCKEYE SALMON INSEASON GENETIC STOCK IDENTIFICATION OPERATIONAL PLAN, 2010

by

Mark J. Witteveen
Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak

and

Mary Beth Loewen
Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

May 2010

The Regional Information Report Series was established in 1987 and was redefined in 2006 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric, and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: http://www.sf.adfg.ak.us/statewide/divreports/html/intersearch.cfm..

Mark J. Witteveen
Alaska Department of Fish and Game, Division of Commercial Fisheries,
211 Mission Road, Kodiak, AK 99615, USA

and

Mary Beth Loewen
Alaska Department of Fish and Game, Division of Commercial Fisheries,
211 Mission Road, Kodiak, AK 99615, USA

This document should be cited as:
*Witteveen, M. J. and M. E. Loewen, 2010. Chignik River sockeye salmon inseason genetic stock identification operational plan, 2010. [**In**] Salmon operational plans for the Chignik Area, 2010. Alaska Department of Fish and Game, Regional Information Report. 4K10-01, Kodiak.*

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 Road, Anchorage AK 99518 (907) 267-2375.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS i
LIST OF APPENDICES ii
ABSTRACT 1
INTRODUCTION 1
GOAL 1
OBJECTIVES 2
SUPERVISION 2
PROCEDURES 2
REFERENCES CITED 3
APPENDIX A: SAMPLING PROCEDURES 5
APPENDIX B. CHIGNIK SAMPLING FORM 11

LIST OF APPENDICES

Appendix **Page**

A1. Proposed sampling dates at Chignik River Weir, 2010 6
A2. Procedure for collecting genetic tissue. 7

B1. The Chignik Inseason genetic stock identification Sampling Form. 12

ABSTRACT

In order to achieve escapement goals for the Black Lake and Chignik Lake sockeye salmon stocks simultaneously, as well as maximize surpluses available to subsistence and commercial harvesters, inseason estimates of the proportion of each stock in the daily escapement to the Chignik River are required. Genetic stock identification can be used to identify the proportion of Black Lake early run and Chignik Lake late run fish as they pass the Chignik River Weir. Fin clips will be taken from sockeye salmon caught in the Chignik Weir trap and preserved in ethanol. Samples will be sent to the Gene Conservation Laboratory in Anchorage for analysis.

Key words: Chignik, sockeye salmon, *Oncorhynchus nerka*, genetic stock identification, sampling, Black Lake, Chignik Lake, operational plan.

INTRODUCTION

There are primarily two runs of sockeye salmon that spawn in the Chignik River watershed. The majority of the early run enters the Chignik watershed in June and July and ascends to Black Lake and its tributaries (Narver 1966). The late run enters the Chignik watershed between mid June and September and spawns primarily along the beaches and tributaries of Chignik Lake. There is substantial temporal overlap of the two runs each year during late June and early July, and the actual proportion of each run within the overlap is undefined. Inseason management of each stock is required to accurately meet each run's escapement goal in order to protect harvest levels and ensure future run productivity.

In order to achieve escapement goals for the Black Lake and Chignik Lake stocks simultaneously, as well as maximize surpluses available to subsistence and commercial harvesters, inseason estimates of the proportion of each stock in the daily escapement to the Chignik River are required. Prior to 1980, time-of-entry relationships based on tagging studies and age groups were employed to divide the catch and escapement between the two runs. From 1980 to 2003, with the exception of 1982, stocks were separated using scale pattern analysis (Witteveen and Botz 2003). Currently, Black Lake early-run escapement is estimated based on escapement through July 4. After July 4, salmon that pass upstream through the weir are assumed to be Chignik Lake late-run fish (Stichert et al. 2009).

Annually, the Alaska Department of Fish and Game (ADF&G) samples sockeye salmon from the Chignik River escapement for biological characteristics (age, sex, and length; ASL). These samples provide the foundation for preseason run forecasts, escapement goal evaluation, and accurate assignment of the run to stock of origin (run reconstruction). During the years of 2010-2012, genetic tissue samples will also be collected to provide stock identification estimates of the early and late sockeye salmon runs throughout the run transition. In 2010 and 2011, tissue samples will be collected inseason to determine logistic feasibility and analyzed for stock of origin post-season. In 2012, the stock proportions of early- and late-run sockeye salmon passing the weir will be determined inseason and used to manage both runs of sockeye salmon throughout the season to appropriately meet escapement goals and direct the commercial harvest.

GOAL

The goal of this project is to collect genetic samples from sockeye salmon escapement at the Chignik River weir that will be used to provide accurate mixed-stock analysis annually from 2010 to 2012. The results of this three-year study will be used to determine if a long term stock separation project is feasible.

OBJECTIVES

Collect genetic tissue samples from 190 individual sockeye salmon passing the Chignik river weir once per week in the early part of the Chignik salmon run, every three days during the overlap time period between the early and late run (approximately June 26 through July 8 and once per week after the overlap for a total of 2,090 individual samples from June through August each year from 2010 through 2012.

SUPERVISION

Todd Anderson is the Area Management Biologist for the Chignik Management Area and will oversee sampling inseason at the Chignik River weir. Together with the Assistant Area Management Biologist, he will schedule sampling, ensure data quality, quantity and timeliness, and provide feedback to the sampling crew as well as Research staff regarding project progression and quality. Mark Witteveen is a finfish research biologist in the Westward Region and will oversee project progress inseason and analysis of samples postseason.

PROCEDURES

ADF&G currently operates the Chignik River weir to enumerate salmon escapement, and collects ASL data from sockeye salmon on a daily basis to meet inseason weekly goals of 240 sampled fish per week (see Chignik Management Area Salmon Escapement Sampling Operational Plan, 2010; Anderson 2010).

A trap incorporated into the Chignik River weir is used to capture fish for ASL sampling. On days when genetic tissue collection is scheduled to occur (Appendix A1), paired non-lethal tissue samples and ASL samples will be collected from 190 fish by the crew. An axillary process will be clipped from each salmon and placed in ethanol in an individually labeled cryovial (Appendix A2). Scale samples will be collected according to the Chignik Management Area Salmon Escapement Sampling Operational Plan, 2010. All scales will be aged by either the Chignik Area Management Biologist or the Assistant Area Management Biologist at the Chignik River weir facility, following designation criteria established by Mosher (1968).

All samples will be recorded on the *Chignik Inseason GSI Sampling Form* (Appendix B1). Samplers must be careful to track the fish number on the scale card and the scale card number and make sure they are aligned with the proper cryovial number for fin clip samples.

If escapement numbers decline and there is concern that the minimum sample size will not be achieved, adjustments in sampling efforts should be implemented so that the daily goal of 190 is met. The camera gates installed in the Chignik River weir may be closed during the operation of the fish trap to increase the number of fish captured in the weir's fish trap. At the start of each season, the crew leader will train new technicians and review training for returning technicians in ASL and tissue sample collection from sockeye salmon at the Chignik River Weir.

In 2010 and 2011, samples will be stored at the Chignik River weir site until August, when they will be shipped via PenPak to the ADF&G Gene Conservation Laboratory in Anchorage. In 2012, samples will be shipped via PenPak the day of collection or as soon as possible if weather constraints prevent shipment that day. All sockeye salmon scales, scale cards, and completed Opscan (see *Chignik Management Area Salmon Escapement Sampling Operational Plan, 2010* for details) forms will be delivered to Birch Foster in Kodiak for analysis and archiving. Data

collected as part of this project will be reported in ADF&G reports and in reports to the Alaska Sustainable Salmon Fund.

REFERENCES CITED

Anderson, T. J. 2010. Chignik Management Area sockeye salmon escapement sampling operational plan, 2010. [*In*] Salmon operational plans for the Chignik area, 2010. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K10-01, Kodiak.

Mosher, K. H. 1968. Photographic atlas of sockeye salmon scales. Bureau of the U.S. Fish and Wildlife Service. Fishery Bulletin 67(2):243-280.

Narver, D. W. 1966. Pelagial ecology and carrying capacity of sockeye salmon in the Chignik Lakes, Alaska. University of Washington, Seattle.

Stichert, M. A., T. J. Anderson, and T. H. Dann. 2009. Chignik Management Area salmon and herring annual management report, 2007. Alaska Department of Fish and Game, Fishery Management Report No. 09-09.

Witteveen, M. J. and J. C. Botz. 2003. Chignik Lakes Scale Pattern Analysis, Run Apportionment, and Sockeye Salmon Catch Sampling Results, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Informational Report 4K03-1, Kodiak, AK.

APPENDIX A: SAMPLING PROCEDURES

Appendix A1.–Proposed sampling dates at Chignik River Weir, 2010

June 2010							July 2010						
S	M	TU	W	TH	F	S	S	M	TU	W	TH	F	S
		1	2	3	4	5					1	2	**3**
6	7	8	9	10	**11**	12	4	5	**6**	7	8	**9**	10
13	14	15	16	17	**18**	19	11	**12**	13	14	**15**	16	17
20	21	22	23	24	**25**	26	18	19	20	21	**22**	23	24
27	28	**29**	30				25	26	27	28	**29**	30	31

Note: Sampling dates are represented in bold and can be adjusted inseason by management staff based on the first returns of the early-run; i.e., if the run appears earlier than usual, sampling may occur earlier in June, with intensive sampling occurring in late June. Conversely, late run timing will necessarily shift the greatest intensity of sampling later into the summer, perhaps with sampling occurring into August.

Appendix A2.–Procedure for collecting genetic tissue.

Non-lethal Sampling Finfish Tissue for DNA Analysis

ADF&G Gene Conservation Lab, Anchorage

I. General Information

We use axillary process samples from individual fish to determine the genetic characteristics and profile of a particular run or stock of fish. This is a non-lethal method of collecting tissue samples from adult fish for genetic analysis. The most important thing to remember in collecting samples is that only quality tissue samples give quality results. If sampling from carcasses: tissues need to be as "fresh" and as cold as possible and recently moribund, do not sample from fungal fins.

Sample preservative: Ethanol (ETOH) 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 (see attached print out).

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. Data to record: Record each vial number to paired data information.

7. Discard remaining ethanol from the 500ml bottle before returning samples. Tissue samples must remain in 2ml ethanol after sampling. HAZ-MAT paperwork will be required for return shipment. Store vials 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 dry, cool location. Freezing not required.

-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- neon 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. Printout of sampling instructions.
8. Laminated "return address" label.

Shipping: HAZMAT paperwork is required for return shipment of these samples and is included in the kit.

Return shipping code: Use today's date

Ship samples to:

ADF&G – Genetics	Lab staff: 1-907-267-2247
333 Raspberry Road	Judy Berger: 1-907-267-2175
Anchorage, Alaska 99518	Chris Habicht: 1-907-267-2169

- continued-

What to do with the samples after they are done and refreshed:

1. If you are doing paired sampling, label all the vials at the beginning of the season, you may not have time to do it later.
2. Double check the sample information with the log book to ensure accuracy.
3. Make sure all the bottles have internal labels and external port and series numbers (e.g. Chignik 20=CG20).
4. Put into air approved boxes that sampling supplies arrived in.
5. Place an unopened bag of vermiculite on top of sample bottles so that the bottles are held in place but not buried in vermiculite.

APPENDIX B. CHIGNIK SAMPLING FORM

Appendix B1.–The Chignik inseason genetic stock identification sampling form.

Chignik Inseason GSI Sampling Form					
Date	Sampling Location	Scale Card	Fish Numbers	Cryotube Numbers	Notes
6/29/2010	Chignik weir trap	15	1-35	421-456	None