Pacific Salmon Commission, Northern Fund Final Report

Northern & Transboundary Sockeye Salmon Matched Scale-Tissue Sampling – Final Report for Northern Fund, NF-2012-I-5; COOP-13-016

By

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Alaska Department of Fish and Game **Division of 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, Special Publications and the Division of Commercial Fisheries Regional Reports. 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

PACIFIC SALMON COMMISSION, NORTHERN FUND FINAL REPORT

NORTHERN & TRANSBOUNDARY SOCKEYE SALMON MATCHED SCALE-TISSUE SAMPLING YEAR 5

(COOP-13-016; NF-2012-I-5)

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ABSTRACT

Correct estimates of the Nass, Skeena, Stikine River, and Taku River sockeye salmon contribution to the commercial catch in Southeast Alaska must be calculated to fulfill Pacific Salmon Treaty harvest-sharing agreements. Matched sockeye salmon scale and tissue samples for stock identification analyses were collected from the weekly catches in the 2012 and early 2013Southeast Alaska drift gillnet fishing districts 101, 106, 108, and 111. Matched samples were also collected from sockeye harvested in the Southeast Alaska purse seine fisheries in districts 101, 102, 103, 104, and 107. A total of 18,773 matched samples were collected from July 1–August 25, 2012 and 3,567 matched samples were collected from June 16–June 30, 2013. These matched samples will be used to determine the age composition (scales), hatchery contribution (otoliths), and stock composition proportions (DNA) of the sockeye caught in commercial net fisheries in Southeast Alaska.

Key words: sockeye salmon, *Oncorhynchus nerka*, matched biological sampling, scale pattern analysis, Southeast Alaska, Canada, Northern Boundary Area, Transboundary Area

INTRODUCTION

Provisions of the 2009 Pacific Salmon Treaty (PST) specify abundance-based harvest sharing agreements for Canadian Nass and Skeena River and Transboundary Stikine River and Taku River sockeye salmon in selected Southeast Alaska fisheries. In these fisheries the United States is allowed to harvest a fixed percentage of the return of Nass, Skeena, Stikine, and Taku sockeye stocks. Accurate estimates of the catch of these stocks of sockeye salmon in all United States and Canadian commercial fisheries is required, along with escapement estimates, to calculate their total return, and the percentage of that return caught in treaty-limited fisheries.

In the District 101 gillnet fishery the United States is allowed to harvest 13.8% of the Annual Allowable Harvest (AAH) of Nass River sockeye stocks. In the District 104 purse seine fishery, prior to statistical week 31 (late July), the United States is allowed to harvest 2.45% of the combined AAH of Nass and Skeena River sockeye salmon returns. In the Southeast Alaska fishing Districts 106 and 108 the United States is allowed to harvest 50% of the Total Allowable Catch (TAC) of Stikine River sockeye salmon each week as determined by the pre-season forecast and in-season model. In Southeast Alaska fishing District 111 the PST specifies that the United States and Canada will manage the return of Taku River sockeye to ensure that each country obtains catches equivalent to their share of wild sockeye and a 50% share of enhanced sockeye. The relative strength of the wild and enhanced returns of sockeye salmon need to be assessed in season by inspecting otoliths for thermal marks to avoid over-harvest of wild stocks.

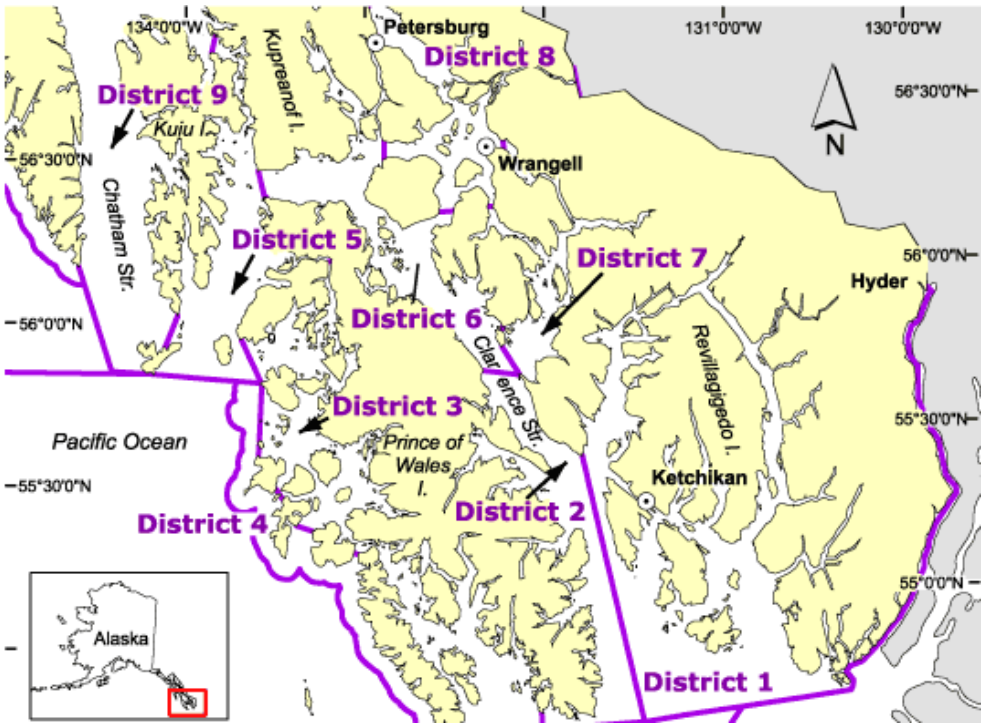

Figure 1. – Geographic location of ADF&G commercial fishing districts 101-109. Map obtained from the ADF&G web page (http://www.cf.adfg.state.ak.us/region1/finfish/salmon/maps).

In the District 106, 108 and 111 gillnet fisheries the United States is allowed to harvest 50% of the annual Total Allowable Catch (TAC) of Stikine River wild and enhanced sockeye salmon (Figure 1 and Figure 2). Significant numbers of enhanced sockeye propagated under treaty agreement are caught in the District 106, 108 and 111 gillnet fisheries and the relative strength of the wild and enhanced returns need to be assessed in season by inspecting otoliths for thermal marks to avoid over-harvest of wild stocks.

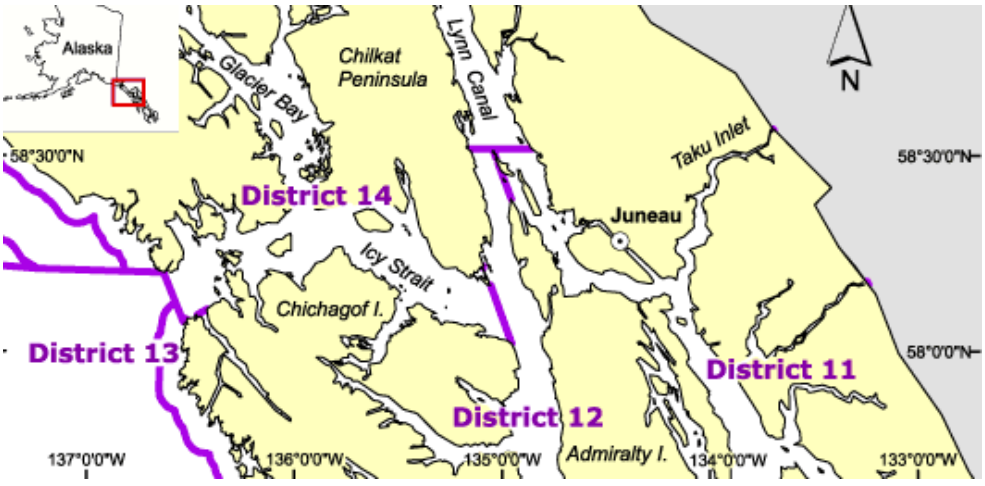

Figure 2. – Geographic location of ADF&G commercial fishing district 111 (labeled District 11). Map obtained from the ADF&G web page (http://www.cf.adfg.state.ak.us/region1/finfish/salmon/maps).

In 1982 the Alaska Department of Fish and Game conducted a study to determine if scale pattern analysis (SPA) of sockeye salmon scales was useful in discriminating stocks harvested in Southeast Alaska (Marshall, 1984). Results of this study showed that SPA could accurately distinguish sockeye scales

From 1982–2010 the catch of Canadian Nass and Skeena sockeye salmon in the District 101, 106, and 108 gillnet fisheries and the Districts 101-104 purse seine fisheries has been estimated using scale pattern analysis (SPA). SPA has also been used from 1982–2011 to estimate the catch of Transboundary Stikine River sockeye salmon in the District 106 and 108 gillnet fisheries and the catch of Transboundary Taku River sockeye salmon in the District 111 gillnet fishery.

Scale pattern stock identification analysis of sockeye salmon, primarily based on patterns of freshwater rearing growth, can only identify relatively large groups of stocks; e.g. Alaska, Nass, Skeena, and Stikine. Scale analysis is not cost effective, is labor intensive, time consuming and requires yearly sampling of escapements to form an annual baseline which precludes its use in-season. These and other problems in accurately estimating stock-specific catches and total returns of sockeye salmon resulted in an extensive investigation by the Northern Boundary Technical Committee (NBTC) of the run reconstruction modeling process currently used. The NBTC concluded that improved stock identification techniques capable of accurately estimating specific groups of stocks are needed to accurately evaluate effectiveness of and improve, if possible, existing run reconstruction methods.

Genetic Stock Identification (GSI) analyses are a powerful emergent technology. Various types of genetic stock identification techniques, including mitochondrial (mDNA) and single nucleotide polymorphism (SNP) analyses, have demonstrated accuracy in estimating the contribution of specific sockeye salmon stocks to mixed stock fisheries in Southeast Alaska and northern British Columbia. Fisheries and Oceans Canada (DFO) started using mixed stock analysis (MSA) based on genetic markers as a marine stock identification tool in 1996. This method has been used along with SPA for stock separation of Canadian Nass and Skeena in-river fisheries and DFO has a long-term plan to use MSA solely in their analysis.

Matched scale-tissue samples have allowed side-by-side comparison of GSI and SPA based stock identification estimates in Southeast Alaska fisheries. This will be useful in indexing the new GSI estimates to the SPA estimates which go back to 1982 and were used in calculating the current harvest sharing agreements.

OBJECTIVE

The objective of this study was to representatively collect matched scale and tissue samples from sockeye that were commercially harvested each statistical week from the Districts 101, 106, 108 and 111 gillnet fisheries, the District 182-30 set gillnet fishery, and the Districts 101, 102, 103, 104, 105, and 107 purse seine fisheries. Matched samples are required for several PST related stock identification projects including: 1) Boundary Area Alaska-Nass-Skeena run reconstruction, 2) McDonald Lake run reconstruction, 3) Stikine River run reconstruction, and 4) Taku-Snettisham run reconstruction. Scales were used for age composition and DNA tissues

were used for stock identification. Otoliths are used in-season to estimate the relative strength of wild and enhanced McDonald, Taku, Snettisham, and Stikine sockeye returns.

This report covers only matched sampling collection as performed by the Alaska Fish and Game Commercial Fisheries Port Sampling Project. GSI and otolith analysis are separate projects.

METHODS

ADF&G commercial port samplers were stationed onboard tenders buying fish on the fishing grounds and in port during dockside deliveries in Ketchikan, Petersburg, Wrangell, and Juneau. Port samplers determined where a specific boat was fishing or from what fishing districts a tender bought fish and collected up to 40 sockeye from each boat or up to 200 from a tender. Port samplers also collected biological data from each fish, including scale samples, sex, and an axillary fin clip. A measurement (nearest 5mm mid-eye to fork) was collected for a sub-set of fish that were sampled. Scale samples were collected from the left side of the fish; two rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin. Scales were mounted on gum cards with forceps. Scale samples were sent to the ADF&G Region 1 Scale Aging Laboratory in Douglas weekly for age processing. Impressions of the scales were made in cellulose acetate. Scale impressions were then examined under moderate (70x) magnification to determine age. Criteria used to assign ages were similar to those of Mosher (1968), and ages were reported in European notation (Koo 1962).

For those sockeye sampled from fishing Districts 106, 108, and 111 port samplers applied a uniquely numbered six digit coordination tag to the fish head so it could later be collected in a processing plant. The six digit coordination tag number was recorded in the right margin of the ADF&G Commercial Fisheries Age-Sex-Length (ASL) form and on the back of the form for upload into the ADF&G Southeast Region database. Tagged heads were recovered at processing plants and shipped to the ADF&G Thermal Mark Laboratory in Juneau for otolith extraction and processing. The coordination tag number linked the otolith tray and specimen numbers to the scale and DNA specimens.

Approximately 0.5-1 inch of the axillary process or “spine” located above the pelvic fin was collected for DNA from each sockeye using clippers. Each axillary process was placed in a uniquely numbered 2ml cryovial filled with ethanol to preserve the tissue. The vial number was recorded next to the corresponding coordination tag number on the ADF&G Matched Sample Form. The DNA vial number was entered into the ADF&G Region database by technicians working in the Douglas Scale Aging Laboratory on a weekly basis.

The DNA tissue samples were processed and analyzed by the ADF&G Gene Conservation Laboratory and the Auke Bay Laboratories/Ted Stevens Marine Research Institute.

RESULTS

A total of 22,340 matched scale-tissue samples were collected from July 1, 2012- June 30, 2013 (Tables 1-11). Weekly sampling goals were sometimes not achieved due to low catches or catches from different fisheries being mixed onboard fish tenders before being delivered to processors. Sub district specific purse seine samples in particular are difficult to obtain since numerous areas are open at the same time and seiners move between areas frequently seeking concentrations of fish resulting in mixed sub-area deliveries in port.

There were no samples collected from the District 105 purse seine harvest. The purse seine fishery in District 105 was only open for two statistical weeks and very few sockeye were harvested.

Scale age analysis shows that sockeye harvested in the seine and gillnet fisheries were dominated by five year old fish (Table 12). Genetic analysis is on-going.

DISCUSSION

Pacific Salmon Treaty based harvest sharing agreements were renewed in 2009 for the Northern Boundary area fisheries – Alaska District 104 purse seine, Alaska District 101 drift gillnet, Canadian Area 3 net, and Canadian Area 1 troll. The agreements are "abundance based" where the allowable harvest is a percentage of the Annual Allowable Harvest (AAH).

In Alaska's District 104 purse seine fishery, the Nass and Skeena sockeye salmon run size determines the AAH of these stocks prior to Statistical Week 31. In the District 104 purse seine fishery the agreement specifies a harvest, from the beginning of the season through Statistical Week 30, of 2.45% of the combined AAH of both the Nass and Skeena River runs. The fishery opens the first Sunday in July; in 2012 the initial opening was July 1 (Week 27). The 2012 pre-Week 31 fishing plan for District 104 was based on returns of local Alaskan stocks as well as the Canadian Department of Fisheries and Oceans (DFO) preseason forecast returns of about 446,000 Nass River sockeye salmon and about 1.4 million Skeena River sockeye salmon. The preseason forecasts result in a total projected return of 1.84 million Nass and Skeena sockeye salmon which, minus an escapement goal of 1.1 million, would result in an AAH of about 746,000. Using this forecast, the 2012 pre-week 31 AAH was approximately 18,300 Nass and Skeena sockeye salmon (2012 Northern Boundary Technical Committee Bilateral Report).

In Alaska's District 101 gillnet fishery, the AAH is based solely on the run size of Nass River sockeye salmon. The AAH is calculated as the total run of Nass sockeye salmon minus either the escapement requirement of 200,000 or the actual in-river escapement, whichever is less. In the District 101 (Tree Point) drift gillnet fishery, the agreement specifies a harvest of 13.8 percent of the AAH of the Nass River sockeye salmon run. The return of Nass sockeye salmon was forecast at 446,000 in 2012 which, minus an escapement goal of 200,000, would result in an AAH of about 246,000. Using this forecast the 2012 allowable harvest in the District 101 gillnet fishery was about 34,000 Nass River sockeye salmon (2012 Northern Boundary Technical Committee Bilateral Report).

In 2012 progress in achieving sampling goals, sample quality control, and the quality of record keeping necessary to match stock composition estimates, were monitored on a daily basis by port sampling supervisors in Juneau, Ketchikan and Petersburg and on a weekly basis by the regional data coordinator and project supervisor in Juneau. Representative sampling of the landed catch was assured by: 1) sampling landings in Petersburg, Wrangell, Ketchikan, Juneau, and Yakutat; 2) collecting no more than 40 samples from individual fishing boat deliveries or 200 from individual tender deliveries; 3) placing samplers onboard vessels purchasing fish on the grounds to obtain unmixed sub district specific samples; 4) sampling throughout the duration of each weekly opening; and 5) interviewing vessel personnel and checking fish tickets to assure that all fish onboard were caught in the targeted fishery. Sockeye salmon catches in traditional Alaska

boundary area gillnet and purse seine fisheries, including treaty fisheries, were below average in all areas, except District 102 seine where catches were above average.

Replacement of SPA with an accurate, genetically based, stock identification technique will facilitate: 1) reduced sampling costs since the annual baseline escapement samples needed for scale analysis will no longer be needed; 2) much finer resolution of individual stocks allowing stock specific migratory routing and timing studies; 3) in season stock identification analyses which cannot be done with scale analysis because the baseline samples required cannot be collected until early fall; 4) stock specific spawner-recruit analyses; and 5) providing managers with the ability to shift time and area openings to access surplus stocks or avoid weak stocks.

The negotiated percentages of the annual allowable harvest of Nass and Skeena sockeye that can be taken in Alaska's District 101 gillnet and 104 purse seine fisheries are based on average interception rates in these fisheries estimated by scale pattern analyses between 1985 and 1997. Having matched scale-tissue samples has allowed direct comparison of the two techniques which will allow researchers to determine if any apparent changes in interception rates are real or are due to differences in estimates produced by the two techniques. At this time the comparison of both scale patterns analysis and DNA for years 2004-2008 is complete and digitizing of sockeye scales collected in Southeast Alaska Districts 101-104 will no longer be conducted following the 2009 collection year. Comparative analysis of Districts 106, 108 and 111 Gillnet is on-going.

ACKNOWLEDGMENTS

We would like to particularly thank Jeffrey Rice and Anna Buettner who coordinated the collection of samples from the ports of Petersburg and Ketchikan. We would also like to thank all the ADF&G Port Samplers and staff who assisted in sample collection throughout the region.

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Table 1.–Weekly matched scale-tissue samples collected for stock identification analysis from Alaska's District 101 gillnet fishery July 1, 2012–June 30, 2013.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 7, 2012	27	9,305	260
July 14, 2012	28	7,553	260
July 21, 2012	29	2,475	260
July 28, 2012	30	2,643	260
August 4, 2012	31	2,826	260
August 11, 2012	32	1,517	260
August 18, 2012	33	642	253
August 25, 2012	34	262	168
June 22, 2013	25	9,082	260
June 29, 2013	26	10,056	260
Total		46,361	2,501

Table 2.–Weekly matched scale-tissue samples collected for stock identification analysis from Alaska's District 106 gillnet fishery July 1, 2012–June 30, 2013.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 7, 2012	27	7,341	1,040
July 14, 2012	28	5,767	780
July 21, 2012	29	9,178	800
July 28, 2012	30	9,539	1,040
August 4, 2012	31	2,805	1,010
August 11, 2012	32	1,718	480
August 18, 2012	33	973	207
August 25, 2012	34	340	80
June 22, 2013	25	4,211	250
June 29, 2013	26	3,611	600
Total		47,885	6,287

Table 3.–Weekly matched scale-tissue samples collected for stock identification analysis from Alaska's District 108 gillnet fishery July 1, 2012–June 30, 2013.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 7, 2012	27	4,176	450
July 14, 2012	28	3,866	340
July 21, 2012	29	3,443	420
July 28, 2012	30	3,115	519
August 4, 2012	31	851	300
August 11, 2012	32	307	77
August 18, 2012	33	171	73
August 25, 2012	34	50	36
June 22, 2013	25	3,068	300
June 29, 2013	26	3,775	524
Total		23,049	3,039

Table 4.–Weekly matched scale-tissue samples collected for stock identification analysis from Alaska's District 111 gillnet fishery July 1, 2012–June 30, 2013.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 7, 2012	27	3,257	278
July 14, 2012	28	5,063	410
July 21, 2012	29	19,631	370
July 28, 2012	30	32,799	820
August 4, 2012	31	17,074	718
August 11, 2012	32	31,837	700
August 18, 2012	33	10,689	484
June 22, 2013	25	1,985	285
June 29, 2013	26	8,110	350
Total		130,445	4,415

Table 5.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 101 purse seine fishery July 1, 2012–August 25, 2012.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 7, 2012	27	1,627	77
July 14, 2012	28	402	80
July 21, 2012	29	1,059	181
July 28, 2012	30	5,668	260
August 4, 2012	31	4,968	219
August 11, 2012	32	2,782	200
August 18, 2012	33	1,382	210
August 25, 2012	34	470	40
Total		18,358	1,267

Table 6.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 102 purse seine fishery July 1, 2012 - June 30, 2013.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 7, 2012	27	7,548	261
July 14, 2012	28	5,512	260
July 21, 2012	29	4,821	260
July 28, 2012	30	3,888	60
August 4, 2012	31	9,678	260
August 11, 2012	32	6,272	280
August 18, 2012	33	1,726	140
August 25, 2012	34	527	160
June 22, 2013	25	926	210
June 29, 2013	26	2,451	260
Total		43,349	2,151

Table 7.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 103 purse seine fishery July 1, 2012–August 25, 2012.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
August 11, 2012	32	1,514	40
August 18, 2012	33	1,341	131
August 25, 2012	34	355	85
Total		3,210	256

Table 8.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 104 purse seine fishery July 1, 2012–August 25, 2012.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 14, 2012	28	1,504	80
July 21, 2012	29	8,488	170
July 28, 2012	30	7,936	210
August 4, 2012	31	8,184	250
August 11, 2012	32	26,728	260
August 18, 2012	33	13,946	260
August 25, 2012	34	4,636	130
September 1, 2012	35	599	69
Total		72,393	1,429

Table 9.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 107 purse seine fishery July 1, 2012–August 11, 2012.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 7, 2012	27	91	40
July 14, 2012	28	1,673	35
July 21, 2012	29	501	86
July 28, 2012	30	1,253	106
August 4, 2012	31	599	14
August 11, 2012	32	575	63

Total	4,692	344

Table 10.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 182-30 set gillnet fishery July 1, 2012–June 30, 2013.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 7, 2012	27	4,163	100
July 14, 2012	28	4,755	80
July 21, 2012	29	979	80
July 28, 2012	30	1,082	40
August 4, 2012	31	210	40
August 11, 2012	32	145	10
August 18, 2012	33	259	20
August 25, 2012	34	44	13
June 8, 2013	23	162	72
June 15, 2013	24	671	88
June 22, 2013	25	505	80
June 29, 2013	26	451	100
Total		13,426	723

Table 12.–Age composition of sockeye salmon scale samples collected from July 1, 2012–August 25, 2012 in Southeast Alaska net fisheries.

2012		Age Class														
Gear	District	0.2	0.3	0.4	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.2	3.3	4.2	4.3
Seine	101	3	28		2	323	938	4	5	1,014	581	1	20	2		1
	102	3	9		8	213	766	1	9	453	172		25			
	103				2	60	121		2	23	4					
	104	1	2		5	310	651	4	3	145	55		3	1		
	107	2	2		10	26	51	1	12	118	43					
Gillnet	101	1	16		1	124	573	3	2	774	478	1	15	2		1
	106	3	43			746	2,674	24	2	1,235	971	9	79	14	2	
	108	3	96	1		236	1,179	5		233	146	1	51	7	7	
	111	7	283	1		871	1,889	10		113	79	2				
Set net	182	4	12			70	452	1		8	21	1				

BUDGET SUMMARY

The budget allocation for this project was as follows:

Salary for ADF&G port sampling personnel:		$128,795
Travel; to/from Juneau, Ketchikan, Petersburg, Wrangell		$3,040
Contractual; pay to tenders for onboard samplers, cell phone charges, shipping, etc.		$17,100
Supplies; vials, forms, tags, gloves, etc.		$16,500
Subtotal Direct	$165,435	
ADF&G Overhead: $165,435 x 14%		$23,160
TOTAL		$188,596

Actual direct expenditures for this project were as follows:

Line 100, salaries and benefits		$133,189.43
Line 200, travel		$2,200.30
Line 300 Contractual		$13,696.51
Line 400 Commodities		$15,858.89
Subtotal Direct	$164,945.13	

Total direct project expenditures by Alaska Fish and Game totaled $164,945. All project expenditures by Alaska Fish and Game were for personnel, travel, contractual and commodities related to matched sample collection in Ketchikan, Petersburg, Wrangell, and Juneau as well as project supervision from Juneau. ADF&G personnel coded to this project included: 1) Ricky Riddle, Antonio Florendo and Norm Miller; Juneau port sampling, 2) Lezlie Rice, Marissa and Fulgham; Wrangell port sampling; 3) Jason McGinley, Tyson Hewitt, Stephanie Sanguenetti, Melinda Rogers, Lucas Guenther, and Michael Henrickson, Ketchikan port sampling, 4) Matt Lenhard, James Spignesi, Vera Goudima, Tessa Bergmann, Abbey Jackson, and Iris Tripp; Petersburg port sampling.