Pacific Salmon Commission, Northern Fund Final Report

Northern & Transboundary Sockeye Salmon Matched Scale-Tissue Sampling – Final Report for Northern Fund, NF-2011-I-13; COOP-12-032

by

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July 2012

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 4

(COOP-12-032; NF-2011-I-13)

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July 2012

This investigation was financed by the Pacific Salmon Commission Northern Fund.

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This document should be cited as:
Buettner, A.R., A.M. Reynolds, and G.T. Oliver. 2012. Northern & Transboundary Sockeye Salmon Matched Scale-Tissue Sampling – final report for COOP-12-032; NF-2011-I-13. Alaska Department of Fish and Game, Pacific Salmon Commission, Northern Fund Final Report

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ABSTRACT

To fulfill the Pacific Salmon Treaty harvest-sharing agreements, correct estimates of the Nass, Skeena and Stikine River sockeye salmon contribution to catch in the US must be calculated. Matched sockeye salmon scale and tissue samples for stock identification analyses were collected from the weekly catches in the 2011 Alaska District 101, 106, 108, and 111 drift gillnet, 182 set gillnet, and District 101, 102, 103, 104, 105 and 107 purse seine fisheries. A total of 18,749 matched samples were collected from July 1–August 2011 and 3,535 matched samples were collected from June 10–June 30, 2012. These matched samples will be used to facilitate the transition from scale pattern analysis to genetic analysis making processing thousands of samples more accurate and prompt.

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

INTRODUCTION

Provisions of the 1999 Pacific Salmon Treaty specify abundance-based harvest sharing agreements for Canadian Nass and Skeena River and Transboundary Stikine River sockeye salmon in selected U.S. fisheries. In these fisheries the U.S. is allowed to harvest a fixed percentage of the return of Nass, Skeena and Stikine sockeye stocks over the 1999 to 2008 duration of the agreements. Accurate estimates of the catch of Nass, Skeena and Stikine River sockeye salmon in all U.S. and Canadian commercial fisheries targeting these stocks 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 District 106 and 108 gillnet fisheries the U.S. is allowed to harvest 50% of the annual Total Allowable Catch (TAC) of Stikine River wild and enhanced sockeye salmon. Significant numbers of enhanced sockeye propagated under treaty agreement are caught in the District 106 and 108 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.

Alaskan McDonald Lake sockeye salmon are not subject to treaty agreement but are the largest stock in southern Southeast Alaska and have been below escapement goals recently; time and area specific catch information is required for conservation efforts. McDonald Lake stocks cannot be identified accurately using scale pattern analysis, due to similarities in freshwater growth patterns shared by numerous other Alaskan stocks, so only genetic stock identification techniques are used for these estimates.

Since 1982 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. Scale pattern analysis has also been used since 1982 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 based stock identification analysis of sockeye salmon, based primarily on patterns of freshwater rearing growth, can only identify relatively large groups of stocks; e.g. Alaska, Nass, Skeena, and Stikine. Scale pattern analysis cannot accurately separate McDonald Lake sockeye from the numerous other Southeast Alaskan stocks, nor can the numerous individual sockeye stocks within the Nass, Skeena and Stikine Rivers be separated. Scale analysis is also labor intensive and time consuming and requires annual re-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 in the early years of the Pacific Salmon Treaty resulted in an extensive investigation by the bilateral Northern Boundary Technical Committee of the run reconstruction modeling process currently used. The Committee 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 emerging technology. Various types of genetic stock identification techniques, including mitochondrial and SNP analysis, 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 2003. This method has been used for stock separation of Canadian Nass and Skeena in-river fisheries since 1996. DFO has a long-term plan to use MSA solely in their analysis.

Matched scale-tissue samples will allow side-by-side comparison of GSI and scale pattern based stock identification estimates in Alaskan fisheries which will be useful in indexing new GSI estimates to the scale pattern estimates which go back to 1982 and which were used in calculating the current sharing agreements. As GSI stock identification techniques are developed this powerful tool will supersede much of the current scale pattern based stock identification work. However, historical baseline interception rate estimates, on which many of the current harvest sharing annexes are based, were based on scale analysis estimates and any differences between these and the new GSI estimates will need to be considered prior to switching analytical techniques.

PROJECT DELIVERABLES

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

The objective of this project was to representatively collect matched scale-tissue samples weekly from the Districts 101, 106, 108 and 111 gillnet fisheries; the District 182 set gillnet fishery, and the Districts 101, 102, 103, 104, 105, and 107 purse seine fisheries. The District 101, 106, and 108 gillnet and 104 purse seine fisheries are subject to PST harvest sharing agreements for sockeye salmon.

A total of 22,284 matched scale-tissue samples were collected from July 1, 2011- June 30, 2012(Tables 1-11). Weekly sampling goals were sometimes not achieved due to low catches or

catches from different fisheries being mixed onboard 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-subarea deliveries. Sex was recorded for all fish sampled and mid-eye-to-fork length was recorded for a sub set of all fish sampled. Scales were taken from the preferred area above the lateral line on the left side of the fish on a diagonal downward from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin. Tissue samples consisted of an axial process and/or otoliths.

Table 1.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 101 gillnet fishery July 1, 2011-June 30, 2012.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 9, 2011	28	13,630	260
July 16, 2011	29	12,233	260
July 23, 2011	30	12,324	260
July 30, 2011	31	11,183	260
August 6, 2011	32	18,638	260
August 13, 2011	33	4,596	240
August 20, 2011	34	1,237	260
August 27, 2011	35	608	232
June 23, 2012	25	21,859	260
June 30, 2012	26	13,083	260
Total			2,552

Table 2.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 106 gillnet fishery July 1, 2011-June 30, 2012.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 9, 2011	28	18,465	760
July 16, 2011	29	13,836	900
July 23, 2011	30	11,844	720
July 30, 2011	31	13,290	600
August 6, 2011	32	18,455	940
August 13, 2011	33	17,749	733
August 20, 2011	34	2,061	483
August 27, 2011	35	1,355	200
June 23, 2012	25	3,656	760

June 30, 2012	26	3,989	480
Total			6,576

Table 3.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 108 gillnet fishery July 1, 2010-June 30, 2012.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 9, 2011	28	10,699	520
July 16, 2011	29	4,954	450
July 23, 2011	30	4,279	413
July 30, 2011	31	3,147	519
August 6, 2011	32	1,550	260
August 13, 2011	33	930	114
August 20, 2011	34	249	64
June 23, 2012	25	3,097	420
June 30, 2012	26	2,761	424
Total			3,184

Table 4.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 111 gillnet fishery July 1, 2011-June 2012.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 9, 2011	28	8,487	430
July 16, 2011	29	18,938	495
July 23, 2011	30	9,833	400
July 30, 2011	31	18,132	440
August 6, 2011	32	20,306	450
August 13, 2011	33	13,354	580
August 20, 2011	34	62,781	70
June 23, 2012	25	819	100
June 30, 2012	26	1,373	50
Total			3,015

Table 5.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 101 purse seine fishery July 1, 2011-August 2011.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples

July 2, 2011	27	78	0
July 9, 2011	28	4,619	260
July 16, 2011	29	3,567	40
July 23, 2011	30	7,872	260
July 30, 2011	31	7,618	0
August 6, 2011	32	7,770	260
Total		31,524	820

Table 6.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 102 purse seine fishery July 1, 2010 - June 30, 2012.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 2, 2011	27	4,022	260
July 9, 2011	28	4,360	260
July 16, 2011	29	12,212	260
July 23, 2011	30	8,480	240
July 30, 2011	31	2,379	260
August 6, 2011	32	7,162	260
August 13, 2011	33	111	
August 20, 2011	34	181	73
August 27, 2011	35	708	190
June 23, 2012	25	2,320	80
June 30, 2012	26	1,191	231
Total			2,114

Table 7.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 103 purse seine fishery July 1, 2011-August 2011.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
August 13, 2011	33	6,628	175
August 20, 2011	34	3,528	130
August 27, 2011	35	1,490	47
Total		11,646	352

Table 8.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 104 purse seine fishery July 1, 2011-August 2011.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 16, 2011	29	9287	40
July 23, 2011	30	13,863	80
July 30, 2011	31	37,917	170
August 6, 2011	32	109,375	250
August 13, 2011	33	23,091	130
August 20, 2011	34	2403	40
August 27, 2011	35	2480	40
Total		198,416	750

Table 9.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 105 purse seine fishery August 2011.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
August 6, 2011	32	112	8
August 13, 2011	33	2,186	4
Total		2,298	12

Table 10.–Weekly matched scale-tissue samples collected for scale pattern analysis from Alaska's District 182 set gillnet fishery July 1, 2011-June 30, 2012.

Week Ending	Statistical Week	Sockeye Catch	Matched Scale-Tissue Samples
July 9, 2011	28	21,055	340
July 16, 2011	29	27,087	498
July 23, 2011	30	25,934	716
July 30, 2011	31	14,243	495
August 6, 2011	32	8,973	410
August 13, 2011	33	7,892	210
August 20, 2011	34	1,922	35
September 3, 2011	36	301	1
September 10, 2011	37	150	2

September 17, 2011	38	67	2
June 9, 2012	23	110	69
June 16, 2012	24	1,508	91
June 23, 2012	25	7,915	80
June 30, 2012	26	8,539	100
Total			3,049

Table 12.–Age composition of sockeye salmon scale samples collected from July 1, 2011- August 2011 in Southeast Alaska net fisheries.

2011		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	3.1	3.2	3.3
Seine	101	4	7	1		143	193		1	184	94			2	
	102	1	12		3	260	586	1	5	340	200		1	4	2
	103				2	107	119		4	28	25				
	104		1		2	240	230		1	73	39				
	105					5	4			1					
Gillnet	101	2	31			262	535	3		861	339			8	1
	106	5	27		1	564	3674	3	1	831	1588			48	4
	108	2	42			138	1899	1		199	231			81	2
	111	28	219	1		229	2532	8		32	141				
Setnet	182	5	280		4	288	1538	4	3	91	242	1		4	17

Scales collected in 2012 have been sent to the ADF&G Douglas Scale Aging Laboratory for further processing. Analytical results of the matched sample analyses will be correlated using a unique number assigned to each scale sample. This unique number is listed for each scale in the Alexander database which also lists the numbered vial containing the matching tissue sample. Since all scales cannot be aged this database will be used both to identify which tissues should be analyzed and to compare both individual and pooled stock identification estimates.

DISCUSSION

Progress in achieving sampling goals, sample quality control, and the quality of recordkeeping necessary to match stock composition estimates, were monitored on a daily basis by port sampling supervisors in 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, Craig, 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.

Matched scale-tissue sampling goals were generally met except where low catches and/or mixed deliveries made this impossible. All tissue samples from the 2011 season have been forwarded to the respective genetics laboratories. During the 2011 season scale samples and corresponding data were sent weekly to the ADF&G Scale lab. Staff members of the ADF&G Douglas Scale Ageing Laboratory have processed the raw data and are in the process of assigning an age class to all scale samples that can be aged. Genetic analysis is currently on-going.

In January of 2012 the Northern Boundary Technical Committee of the Pacific Salmon Commission (PSC) presented results of a blind test comparing the accuracy of scale pattern, single-nucleotide polymorphism (SNP), and microsatellite (mSAT) analyses in identifying known-origin sockeye salmon to the Bilateral Northern Panel of the (PSC). The same tissue samples were analyzed by the two genetic techniques and matching scales were digitized and analyzed using linear discriminate function (LDF). The Alaska samples were collected on the spawning grounds at twelve systems in southern Southeast Alaska. Nass River samples were collected at the lower Nass fishwheels. Skeena River samples were taken at the lower river Tyee test fishery and Fraser River samples were taken in the Johnstone Strait and Area 20 test fisheries. A total of 779 known-origin samples were split into two independent mixtures.

Mixture 1, similar to the stock composition in the District 101 gillnet fishery, contained only Alaska, early Nass River returns, and Skeena River samples. Most of the sockeye catch in District 101 occurs in late June and early July. Mixture 2, Similar to the stock composition in the District 104 purse seine fishery, contained samples from Alaska, late Nass River returns, Skeena River, and Fraser samples. Most of the sockeye catch in District 104 occurs in late July and August. Two mixtures were used because the scale pattern analysis has traditionally used a 3-way Alaska, Nass and Skeena model to estimate stock composition in the District 101 gillnet fishery and a 4-way Alaska, Nass, Skeena and Fraser model to estimate stock composition in the District 104 purse seine fishery. The Nass River samples were separated into early and late portions because the 2009 return had two definite peaks, one in late June and one in late July.

The difference in the annual allowable harvest estimates for Districts 101 Gillnet and 104 Purse Seine using the different techniques is very small (Tables 13-14).

Table 13.– Difference in the District 101 Gillnet 2004-2008 Annual Allowable Harvest of sockeye salmon estimates using scales and DNA.

Scale pattern based estimates							Revised estimates using SNP's 2004-2008						
Year	Nass River Total Return	Nass River Esc.	Allowable Nass River AAH	Allowable District 101 Gillnet Harvest (13.8%)	Actual Nass River Alaska Harvest	Cumulative: overage (+) or underage (-)	Year	Nass River Total Return	Nass River Esc.	Allowable Nass River AAH	Allowable District 101 Gillnet Harvest (13.8%)	Actual District 101 Nass River Alaska Harvest	Cumulative: overage (+) or underage (-)
1999	842,806	200,000	642,806	88,707	129,794	41,087	1999	842,806	200,000	642,806	88,707	129,794	41,087
2000	625,983	200,000	425,983	58,786	46,305	28,606	2000	625,983	200,000	425,983	58,786	46,305	28,606
2001	580,616	167,258	413,358	57,043	55,096	26,659	2001	580,616	167,258	413,358	57,043	55,096	26,659
2002	1,403,976	200,000	1,203,976	166,149	90,553	-48,937	2002	1,403,976	200,000	1,203,976	166,149	90,553	-48,937
2003	1,177,472	200,000	977,472	134,891	72,942	-110,886	2003	1,177,472	200,000	977,472	134,891	72,942	-110,886
2004	986,098	200,000	786,098	108,482	110,340	-109,028	**2004**	**890,968**	200,000	**690,968**	95,354	**96,257**	**-109,983**
2005	666,880	200,000	466,880	64,429	55,319	-118,138	**2005**	**661,152**	200,000	**461,152**	63,639	**55,005**	**-118,617**

2006	775,110	200,000	575,110	79,365	47,948	-149,555	**2006**	**727,438**	200,000	**527,438**	72,786	**40,573**	**-150,830**
2007	602,208	164,745	437,463	60,370	46,369	-163,556	**2007**	**440,472**	164,745	**275,727**	38,050	**30,683**	**-158,197**
2008	380,397	200,000	180,397	24,895	24,359	-164,092	**2008**	**368,426**	200,000	**168,426**	23,243	**22,031**	**-159,409**

Table 14.– Difference in the District 104 Purse Seine 2004-2008 Annual Allowable Harvest of sockeye salmon estimates using scales and DNA.

Scale pattern based estimates							Revised estimates using SNP's 2004-2008						
Year	Nass & Skeena River Total Return	Nass & Skeena Esc.	Allowable Nass & Skeena AAH	Allowable District 104 Purse Seine Harvest (2.45%)	Actual Nass &Skeena Harvest in District 104 Purse Seine Fishery	Cumulative: overage (+) or underage (-)	Year	Nass & Skeena River Total Return	Nass & Skeena Esc.	Allowable Nass & Skeena AAH	Allowable District 104 Purse Seine Harvest (2.45%)	Actual Nass &Skeena Harvest in District 104 Purse Seine Fishery	Cumulative: overage (+) or underage (-)
1999	1,771,048	936,705	834,343	20,441	3,232	-17,209	1999	1,771,048	936,705	834,343	20,441	3,232	-17,209
2000	5,318,228	1,100,000	4,218,228	103,347	29,221	-91,335	2000	5,318,228	1,100,000	4,218,228	103,347	29,221	-91,335
2001	4,965,291	1,100,000	3,865,291	94,700	167,854	-18,181	2001	4,965,291	1,100,000	3,865,291	94,700	167,854	-18,181
2002	2,776,502	1,051,533	1,725,169	42,267	18,627	-41,820	2002	2,776,502	1,051,533	1,725,169	42,267	18,627	-41,820
2003	3,306,520	1,100,000	2,206,520	54,060	44,258	-51,622	2003	3,306,520	1,100,000	2,206,520	54,060	44,258	-51,622
2004	2,621,000	1,100,000	1,521,000	37,265	19,233	-69,653	**2004**	**2,571,491**	1,100,000	**1,471,491**	36,052	**17,619**	**-70,055**
2005	1,770,474	1,100,000	770,330	18,873	19,442	-69,085	**2005**	**1,767,767**	1,100,000	**767,623**	18,807	**21,866**	**-66,995**
2006	3,650,525	1,100,000	2,550,525	62,488	68,940	-62,632	**2006**	**3,622,043**	1,100,000	**2,522,043**	61,790	**65,720**	**-63,065**
2007	2,752,074	1,100,000	1,652,074	40,476	75,615	-27,493	**2007**	**2,704,284**	1,100,000	**1,604,284**	39,305	**80,196**	**-22,174**
2008	2,531,701	1,100,000	1,431,701	35,077	4,880	-57,690	**2008**	**2,526,492**	1,100,000	**1,426,492**	34,949	**4,675**	**-52,448**

TANGIBLE BENEFITS

Replacement of scale pattern analysis 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.

In season examination of otoliths collected in the District 106, 108, and 111 gillnet fisheries provides managers with an estimate of the contribution of enhanced stocks and thus the ability to avoid overharvest of wild 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.

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		$130,086.42
Line 200, travel		$1,334.47
Line 300 Contractual		$19,708.48
Line 400 Commodities		$13,556.64
Subtotal Direct	$164,686	

Total direct project expenditures by Alaska Fish and Game totaled $164,686. 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, Jacob Ross, Jon Livermore, Antonio Florendo, Juneau port sampling, 2) Lezlie Rice and Marissa Cummings, Wrangell port sampling; 3) Jason McGinley, Zachary Hamilton, Andy Leitz, Robert Ebery, Ketchikan port sampling, 4) Matt Lenhard, James Spignesi, and Vera Goudima, Petersburg port sampling.