



Fisheries
and Oceans

Pacific Region

Pêches
et Océans

July 24, 2006

Pacific Salmon Commission

Dear Mr. Victor Keong:

*Subject: Final Report of DNA Based Stock Composition of Catch and Release
Chinook Salmon in the 2005 WCVI Troll Fishery*

Fisheries and Oceans Canada would like to thank the Pacific Salmon Endowment Fund Committee for funding this project.

Enclosed are hard and electronic copies of the Chinook DNA Based Stock Composition Final Report and of the raw DNA data.

If there are any questions or if more information is required, please don't hesitate to contact me. Note: If any errata on the enclosed reports should occur in the future, I will forward you the changes.

Sincerely yours,

Karin Mathias
Stock Assessment Biologist – South Coast Area.

Final Report of DNA Stock Composition of Catch and Release Chinook Salmon in the 2005 WCVI Troll Fishery

Background

The DNA analysis provides information to supplement and contrast with CWT data regarding stock group specific impacts of the WCVI troll fishery. In response to domestic conservation requirements the WCVI troll fishery is significantly different than the base period used in the PSC Chinook model. Consequently, the impacts of the WCVI troll fishery, as determined by the PSC Chinook model may not be accurate. The US considers the potential impacts a concern. This project provides an independent means of evaluating the impact of this fishery using DNA methods. In 2004 this work was also conducted with PST Endowment Funding. It is anticipated that several years of combined DNA and CWT based results will be required to conclusively show biases in the model results.

In addition, WCVI troll fishery planning for Chinook requires that management objectives for weak stocks are met using limited CWT and DNA information. This project provides improved information for evaluating current impacts and avoiding future impacts on weak stocks, thereby achieving conservation objectives of the PST while minimizing economic disruption associated with elimination of fisheries.

Project Objectives

In summary the program objectives were to:

- 1) Provide stock composition of 2005 WCVI troll fishery catches using DNA stock identification techniques,
- 2) Provide an improved information base for managing fishery to avoid stocks of concern, and
- 3) Collect the information required to determine the accuracy and precision of harvest rate indices produced by PSC Chinook Model, by comparing model results with DNA based results.

Project Description / Deliverables

DNA sampling was conducted in conjunction with CWT sampling through the existing Mark Recapture Program from each WCVI fishery opening from January to December 2005. In addition, some sampling of the sport fishery was conducted during summer months when the WCVI troll fishery is generally closed. This was done to provide chinook stock composition for the complete year.

Specific details regarding the DNA sampling include:

- a) Chinook catch from each fishery opening was DNA sampled using clustered random sampling to obtain a minimum of 100 DNA samples per stratum (strata are month and SWTR/NWTR catch region), or approximately a 1% sample rate. These samples were collected using the existing Mark Recapture Program. The collection of approximately 2000 samples were anticipated.
- b) DNA samples were collected only from unclipped, non-CWT chinook.
- c) Scales were collected along with DNA samples to allow age determination.
- d) DNA samples were analysed by the genetics lab at PBS for allocation to stock group.
- e) DNA quality control was determined through analysis of known origin samples, including CWT and spawner samples.
- f) Sampling was coordinated and monitored by DFO biologists.

Benefits

This project relates to the harvest rate indices prescribed in the PST for chinook salmon in the WCVI AABM fishery. These are management goals based on base period fishing patterns. Regional planning processes use CWT information related to base period fishing patterns as the basis for planning. In the non-summer fishing period there are few CWT data and so planning process are compromised. The effect of changes in fishing patterns from the base period and impact on harvest rate indices is an issue. DNA information from the fisheries will improve the knowledge base more quickly than using CWT only. Increased conservation and improved fisheries management will provide potential for increased returns of stocks of concern. Increased returns will provide more rapid rebuilding. DNA information will also provide insight into the spatial and temporal distribution of various chinook stock groups, allowing fisheries to be better shaped to avoid stocks of concern.

This project will benefit the chinook stocks, the fishery managers, the fishermen, and the local WCVI communities. Chinook stocks will benefit from increased conservation and more rapid rebuilding of weaker stocks. Fishery managers will benefit through improved fisheries management information, including the ability to avoid weaker stocks. Fishers will benefit from greater fishing opportunities made possible through avoidance of weaker stocks. Rebuilding of weaker stocks will increase TAC in future years. Local WCVI communities will benefit from greater fishing activity in their areas, improving their economic outlook.

Results

A total of 1985 DNA samples were analysed by the Pacific Biological Station DNA lab (Table 1) at a cost of \$30 per fish. DNA samples were randomly collected from 1% of the catch (or a minimum of 100 samples) for each strata (NWVI, SWVI) and month when fishery openings occurred. Samples were also collected from the WCVI sport fishery by creel observers in order to provide stock composition estimates from summer months when the commercial fishery generally does not operate.

Table 1. Number of DNA samples analysed by month and catch region stratum from the 2005 WCVI troll fishery.

Sample	Year	Gear	Area	Mix Date	N	Excluded
1	2005	Troll	SWVI	January	99	3
2	2005	Troll	SWVI	February	99	1
3	2005	Troll	SWVI	early-May	94	10
4	2005	Troll	SWVI	mid-May	100	0
5	2005	Troll	NWVI	February	98	1
6	2005	Troll	NWVI	March	99	2
7	2005	Troll	NWVI	April	94	5
8	2005	Troll	NWVI	early-May	97	1
9	2005	Troll	NWVI	mid-May	68	2
10	2005	sport	SWVI	June	74	1
11	2005	Sport	SWVI	July	87	0
12	2005	Sport	SWVI	Aug	92	2
13	2005	Sport	SWVI	Sept	67	1
14	2005	sport	Area13	June	34	4
15	2005	sport	Area13	July	35	0
16	2005	sport	Area13	Aug	61	1
17	2005	sport	Area20	Jan	43	0
18	2005	sport	Area20	Aug	96	1
19	2005	troll	SWVI	Sept	43	3
20	2005	troll	NWVI	Sept	99	1
21	2005	troll	NWVI	Sept	68	0
22	2005	troll	SWVI	Oct	97	2
23	2005	troll	SWVI	Nov	48	0
24	2005	troll	SWVI	Dec	97	2
25	2005	troll	NWVI	Dec	96	0
Total					1985	

Budget

The total overall allocated Pacific Endowment fund budget was \$71,000 (Canadian funds). The DFO in kind contribution was estimated at \$64,000.

Estimated costs and In-kind contributions are shown below:

Costs

Direct

- onboard samplers, incremental costs of sampling over MRP
(30 days @10/hr day @ \$25/hr) = \$7,500
- DNA lab analysis for 2000 samples, including labour and supplies
(2033 samples x \$30/fish) = \$61,000
- DNA sampling materials = \$1,000
- storage costs, health and safety requirements = \$1,500

- TOTAL = \$71,000

DFO – in kind

- project coordination, management, reporting
(BI-3 @\$266/day and EG-5 @\$231/day) = \$9,000
- MRP sampling WCVI troll fishery including labour and supplies
(GL-ELE @121/day) = \$55,000

- TOTAL = \$64,000

Total costs = *\$135,000*

Actual Pacific Endowment fund expenditures are detailed below:

2005-06 SOUTH COAST BUDGET LEDGER			\$ 63,848.00
Date	Supplier	Item	Cost
	DNA Stock Comp. of Catch & Release Chinook	* Project Title	
11-Jan-06	MAR - SPA - Miscellaneous Accounts - Debit	JV to DNA Lab	\$ 59,448.00
26-Aug-05	Pices (Consultant)	DNA Collection	\$ 4,400.00

Note: Actual expenditures do not include the anticipated 10% hold-back funding.

Appendices

Appendix I. DNA results from the sampling of the West Coast Vancouver Island Chinook troll fishery (chinook05SouthCoastMarine(SEF2005).xls).

Data

DNA results (raw data spreadsheet) are provided in hardcopy as well as on an accompanying CD.

Electronic Files Provided

Cover Letter SEF 2005 CN DNA.doc

SEF 2005 Chinook DNA Final Rpt.doc

chinook05SouthCoastMarine(SEF2005).xls

Appendix I

DNA results from the sampling of the West Coast Vancouver Island Chinook troll fishery
(chinook05SouthCoastMarine(SEF2005).xls)

Inventory

Species = chinook Number of populations = 250 Baseline Description = 05southcoastmarine051506 Number of loci = 13 Max missing loci = 5
 Number of chains = 8 Number of Reps = 20000 Reps Kept = 1000 ***** MEANS REPORTED

Sample	Year	Gear	Area	Mix Date	N	Excluded
1	2005	Troll	SWVI	January	99	3
2	2005	Troll	SWVI	February	99	1
3	2005	Troll	SWVI	early-May	94	10
4	2005	Troll	SWVI	mid-May	100	0
5	2005	Troll	NWVI	February	98	1
6	2005	Troll	NWVI	March	99	2
7	2005	Troll	NWVI	April	94	5
8	2005	Troll	NWVI	early-May	97	1
9	2005	Troll	NWVI	mid-May	68	2
10	2005	sport	SWVI	June	74	1
11	2005	Sport	SWVI	July	87	0
12	2005	Sport	SWVI	Aug	92	2
13	2005	Sport	SWVI	Sept	67	1
14	2005	sport	Area13	June	34	4
15	2005	sport	Area13	July	35	0
16	2005	sport	Area13	Aug	61	1
17	2005	sport	Area20	Jan	43	0
18	2005	sport	Area20	Aug	96	1
19	2005	troll	SWVI	Sept	43	3
20	2005	troll	NWVI	Sept	99	1
21	2005	troll	NWVI	Sept	68	0
22	2005	troll	SWVI	Oct	97	2
23	2005	troll	SWVI	Nov	48	0
24	2005	troll	SWVI	Dec	97	2
25	2005	troll	NWVI	Dec	96	0
Total					1985	

Regional

Species = chinook Number of populations = 250 Baseline Description = 05southcoastmarine051506 Number of loci = 13 Max missing loci = 5
 Number of chains = 8 Number of Reps = 20000 Reps Kept = 1000 ***** MEANS REPORTED

		2005		2005		2005		2005		2005		2005		2005	
		05WCCTDFO		05WCCTDFO		05WCCTDFO		05WCCTDFO		05WCCTDFO		05WCCTDFO		05WCCTDFO	
		Troll		Troll		Troll		Troll		Troll		Troll		Troll	
		SWVI		SWVI		SWVI		SWVI		NWWI		NWWI		NWWI	
		Area23		Area23		Area23		Area23		Area23		Area23		Area23	
		January		February		early-May		mid-May		February		March		April	
		99(3)		99(1)		94(10)		100(0)		98(1)		99(2)		94(5)	
		97(1)													
Code	Region1	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	UPFR	0.1	(0.3)	0.1	(0.3)	0.1	(0.3)	0.3	(0.6)	0.1	(0.3)	0.1	(0.3)	0.5	(1.0)
2	MUFR	0.1	(0.3)	0.1	(0.3)	0.1	(0.3)	0.8	(1.0)	0.1	(0.3)	0.8	(1.1)	1.7	(1.7)
3	LWFR-F	0.0	(0.3)	1.2	(1.3)	2.9	(2.0)	14.5	(3.8)	13.6	(3.6)	12.3	(3.3)	4.2	(2.3)
4	NOTH	0.0	(0.2)	0.0	(0.2)	0.1	(0.3)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	0.3	(0.7)
5	SOTH	0.1	(0.2)	0.1	(0.3)	0.1	(0.2)	0.1	(0.3)	0.1	(0.2)	0.1	(0.2)	3.2	(1.8)
6	LWTH	0.0	(0.2)	0.0	(0.2)	1.1	(1.1)	0.1	(0.3)	0.0	(0.2)	0.0	(0.1)	0.0	(0.2)
7	ECVI	9.5	(3.3)	5.0	(2.5)	7.5	(3.3)	2.9	(2.0)	5.7	(2.6)	4.6	(2.2)	10.5	(3.3)
8	WCVI	0.1	(0.2)	0.1	(0.3)	0.1	(0.3)	0.1	(0.3)	2.1	(1.5)	0.1	(0.3)	1.3	(1.2)
9	SOMN	0.2	(0.6)	0.4	(1.1)	0.1	(0.6)	0.0	(0.2)	0.1	(0.5)	0.1	(0.2)	0.0	(0.2)
10	NOMN	0.1	(0.3)	0.1	(0.3)	1.0	(1.4)	0.7	(1.2)	0.3	(0.8)	0.1	(0.3)	0.1	(0.4)
11	NASS	0.0	(0.2)	0.1	(0.4)	0.1	(0.2)	0.1	(0.2)	0.1	(0.2)	0.1	(0.2)	0.1	(0.2)
12	LWFR-Sp	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)
13	LWFR-Su	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.0)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)
14	QCI	0.0	(0.0)	0.0	(0.1)	0.0	(0.1)	0.0	(0.0)	0.0	(0.1)	0.0	(0.1)	0.0	(0.0)
15	Alaska	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	0.1	(0.4)	0.0	(0.1)	0.0	(0.1)
17	Taku	0.0	(0.2)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	0.1	(0.3)	0.0	(0.2)	0.0	(0.2)
18	Stikine	0.0	(0.1)	0.0	(0.2)	0.1	(0.3)	0.0	(0.1)	0.1	(0.3)	0.0	(0.2)	0.2	(0.7)
19	Skeena Upper	0.0	(0.1)	0.0	(0.1)	0.2	(0.7)	0.0	(0.1)	1.3	(1.8)	0.0	(0.1)	0.2	(0.6)
20	Skeena Babine	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.3	(0.8)
21	Skeena Bulkley	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.0)	0.2	(0.6)
22	Skeena Mid	0.0	(0.1)	0.2	(0.6)	0.0	(0.3)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)
23	Skeena Lower	0.0	(0.1)	0.0	(0.1)	0.0	(0.3)	0.0	(0.1)	0.0	(0.1)	0.1	(0.3)	0.7	(1.5)
24	Alsek	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)
50	Puget Sound	68.2	(5.0)	67.4	(4.8)	17.8	(4.5)	17.3	(4.3)	16.3	(4.1)	14.4	(3.7)	11.4	(3.5)
51	Juan de Fuca	0.1	(0.5)	1.0	(1.0)	0.0	(0.1)	0.0	(0.1)	0.0	(0.0)	0.0	(0.1)	0.0	(0.0)

Regional

Species = chinook Number of populations = 250 Baseline Description = 05southcoastmarine051506 Number of loci = 13 Max missing loci = 5
 Number of chains = 8 Number of Reps = 20000 Reps Kept = 1000 ***** MEANS REPORTED

		2005		2005		2005		2005		2005		2005		2005	
		05WCCTDFO		05WCCTDFO		05WCCTDFO		05WCCTDFO		05WCCTDFO		05WCCTDFO		05WCCTDFO	
		Troll		Troll		Troll		Troll		Troll		Troll		Troll	
		SWVI		SWVI		SWVI		SWVI		NWVI		NWVI		NWVI	
Area23		January		February		early-May		mid-May		February		March		April	
		99(3)		99(1)		94(10)		100(0)		98(1)		99(2)		94(5)	
Code	Region1	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
52	Coastal Wash	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.2)	0.0	(0.1)
53	Low Col	19.9	(4.0)	20.0	(4.1)	47.9	(5.2)	33.5	(4.8)	40.2	(5.1)	38.1	(5.4)	26.0	(4.6)
54	Up Col-Sp	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	1.1	(1.1)
55	Up Col-Su/F	0.9	(1.1)	2.0	(1.4)	2.7	(1.9)	0.6	(1.5)	12.5	(3.5)	9.1	(3.4)	24.9	(5.0)
56	Snake-Sp/Su	0.1	(0.2)	0.1	(0.2)	0.1	(0.3)	0.1	(0.2)	0.1	(0.3)	0.1	(0.3)	0.1	(0.3)
57	Snake-F	0.2	(0.5)	0.0	(0.2)	0.0	(0.1)	7.5	(2.9)	0.0	(0.1)	3.4	(3.1)	2.0	(2.9)
58	North & Central O	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	1.1	(1.1)
59	South Oregon coast	0.0	(0.3)	0.0	(0.2)	0.0	(0.2)	0.0	(0.1)	0.6	(1.2)	0.1	(0.2)	0.0	(0.2)
61	Klamath/Trinity	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.1	(0.5)	0.0	(0.1)
62	Mid Col-Sp	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)
63	Up Willamette	0.0	(0.1)	0.0	(0.2)	5.2	(2.4)	6.3	(2.7)	3.4	(2.0)	7.9	(3.5)	8.2	(3.1)
64	Cent Val-F	0.1	(0.2)	1.5	(1.4)	12.3	(3.4)	14.7	(3.5)	3.1	(1.9)	6.3	(2.7)	1.5	(1.3)
65	Cent Val-Sp	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	1.9	(1.7)	0.0	(0.1)

Regional

Species = chinook Number of po
Number of chains = 8 Number of

2005	2005	2005	2005	2005	2005	2005	2005
05WCCTDFO	05WCVICDFC	WCVICDFO	WCVICDFO	WCVICDFO	05GSCDFO	05GSCDFO	05GSCDFO
Troll	sport	Sport	Sport	Sport	sport	sport	sport
NWVI	SWVI	SWVI	SWVI	SWVI	Area13	Area13	Area13
	Area121-123-	Area123-124	Area123-124	Area123-124			
mid-May	June	July	Aug	Sept	June	July	Aug
68(2)	74(1)	87(0)	92(2)	67(1)	34(4)	35(0)	61(1)

Code	Region1	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
1	UPFR	0.1	(0.4)	4.5	(2.8)	0.1	(0.3)	0.1	(0.3)	0.1	(0.5)	17.0	(7.2)	0.9	(2.0)	0.4	(1.1)
2	MUFR	1.6	(1.6)	1.0	(1.7)	2.3	(1.6)	0.1	(0.4)	0.1	(0.4)	3.5	(5.1)	10.2	(5.6)	0.2	(0.6)
3	LWFR-F	34.0	(5.9)	16.7	(4.6)	18.4	(4.2)	41.7	(5.2)	48.1	(6.0)	14.9	(6.1)	24.7	(7.6)	8.1	(3.5)
4	NOTH	0.0	(0.2)	0.5	(1.1)	0.1	(0.3)	0.0	(0.2)	0.0	(0.3)	0.1	(0.4)	0.1	(0.6)	0.1	(0.6)
5	SOTH	0.1	(0.3)	0.1	(0.3)	0.4	(1.0)	7.9	(2.8)	3.2	(2.3)	9.2	(5.0)	25.3	(7.5)	64.0	(6.2)
6	LWTH	1.4	(1.4)	1.4	(1.4)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.1	(0.6)	2.9	(2.6)	0.1	(0.3)
7	ECVI	5.6	(3.0)	7.5	(3.5)	4.0	(2.6)	3.2	(2.1)	0.1	(0.5)	48.3	(8.7)	27.9	(7.5)	25.6	(5.5)
8	WCVI	0.2	(0.5)	6.0	(3.2)	5.2	(2.5)	5.5	(2.4)	0.1	(0.3)	0.3	(1.0)	0.3	(0.8)	0.1	(0.4)
9	SOMN	0.1	(0.3)	0.2	(0.8)	0.1	(0.4)	0.5	(0.9)	0.0	(0.2)	0.1	(0.7)	5.3	(4.3)	0.1	(0.3)
10	NOMN	0.2	(0.5)	0.1	(0.5)	3.7	(2.4)	0.1	(0.4)	0.1	(0.4)	0.4	(1.1)	0.2	(0.7)	0.2	(0.6)
11	NASS	0.1	(0.5)	0.1	(0.2)	0.1	(0.2)	0.1	(0.2)	0.1	(0.3)	0.1	(0.6)	0.1	(0.5)	0.1	(0.3)
12	LWFR-Sp	0.0	(0.3)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.3)	0.0	(0.2)	0.0	(0.2)
13	LWFR-Su	0.0	(0.1)	0.0	(0.1)	0.0	(0.0)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.3)
14	QCI	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)
15	Alaska	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.3)	0.0	(0.3)	0.0	(0.2)
17	Taku	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.1	(0.4)	0.1	(0.4)	0.0	(0.3)
18	Stikine	0.1	(0.3)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.0	(0.3)	0.1	(0.3)	0.1	(0.4)	0.2	(0.7)
19	Skeena Upper	0.0	(0.2)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.2)	0.0	(0.3)	0.0	(0.2)
20	Skeena Babine	0.0	(0.0)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.0)
21	Skeena Bulkley	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	0.0	(0.2)	0.0	(0.2)	0.0	(0.4)	0.0	(0.1)
22	Skeena Mid	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.3)	0.0	(0.1)	0.0	(0.2)
23	Skeena Lower	0.0	(0.2)	0.0	(0.3)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.1	(0.3)	0.0	(0.2)	0.0	(0.3)
24	Alsek	0.0	(0.2)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)
50	Puget Sound	11.5	(4.3)	20.0	(4.9)	18.4	(4.3)	6.0	(2.7)	13.7	(4.3)	4.9	(4.2)	0.6	(1.7)	0.1	(0.3)
51	Juan de Fuca	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.3)	0.0	(0.2)	0.0	(0.2)

Regional

Species = chinook Number of po
 Number of chains = 8 Number of

2005	2005	2005	2005	2005	2005	2005	2005
05WCCTDFO	05WCVICDFC	WCVICDFO	WCVICDFO	WCVICDFO	05GSCDFO	05GSCDFO	05GSCDFO
Troll	sport	Sport	Sport	Sport	sport	sport	sport
NWVI	SWVI	SWVI	SWVI	SWVI	Area13	Area13	Area13
	Area121-123-	Area123-124	Area123-124	Area123-124			
mid-May	June	July	Aug	Sept	June	July	Aug
68(2)	74(1)	87(0)	92(2)	67(1)	34(4)	35(0)	61(1)

Code	Region1	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
52	Coastal Wash	0.0	(0.2)	1.8	(1.7)	0.2	(0.6)	1.4	(1.4)	0.0	(0.1)	0.1	(0.4)	0.0	(0.4)
53	Low Col	18.8	(4.9)	24.6	(5.2)	11.1	(3.7)	12.9	(3.5)	6.8	(3.4)	0.0	(0.3)	0.0	(0.2)
54	Up Col-Sp	0.1	(0.4)	0.0	(0.3)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.3)
55	Up Col-Su/F	9.5	(3.6)	2.3	(2.2)	9.6	(3.8)	9.6	(3.3)	13.8	(4.9)	0.1	(0.5)	0.4	(1.4)
56	Snake-Sp/Su	0.2	(0.7)	0.1	(0.3)	0.1	(0.4)	0.1	(0.3)	0.2	(0.6)	0.2	(0.6)	0.1	(0.6)
57	Snake-F	0.0	(0.1)	0.0	(0.2)	1.6	(2.8)	0.1	(0.6)	0.5	(1.7)	0.0	(0.2)	0.0	(0.2)
58	North & Central O	3.7	(2.6)	0.0	(0.2)	0.0	(0.2)	4.6	(2.3)	0.0	(0.3)	0.1	(0.5)	0.1	(0.6)
59	South Oregon coast	0.1	(0.5)	0.6	(1.1)	0.1	(0.5)	0.0	(0.2)	0.1	(0.5)	0.1	(0.3)	0.1	(0.3)
61	Klamath/Trinity	0.0	(0.2)	0.8	(1.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.3)	0.1	(0.5)
62	Mid Col-Sp	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.1	(0.6)
63	Up Willamette	5.0	(2.9)	0.0	(0.3)	2.4	(2.2)	0.1	(0.5)	4.8	(3.2)	0.1	(0.5)	0.0	(0.4)
64	Cent Val-F	7.3	(3.4)	8.2	(4.7)	21.7	(4.5)	5.6	(2.4)	7.6	(3.4)	0.1	(0.4)	0.1	(0.5)
65	Cent Val-Sp	0.0	(0.1)	3.2	(4.0)	0.2	(0.7)	0.1	(0.3)	0.0	(0.1)	0.0	(0.4)	0.0	(0.3)

Regional

Species = chinook Number of po
Number of chains = 8 Number of

2005 05GSCDFO sport Area13 Sept 41(1)	2005 05GSCDFO sport Area20 Jan 43(0)	2005 05GSCDFO sport Area20 Aug 96(1)	2005 05WCTDFO troll SWVI Area124 Sept 43(3)	2005 05WCTDFO troll NWVI Area126/127 Sept 99(1)	2005 05WCTDFO troll NWVI Area126-29 Sept 68(0)	2005 05WCTDFO troll SWVI Area123/124 Oct 97(2)	2005 05WCTDFO troll SWVI Area123 Nov 48(0)
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Code	Region1	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	UPFR	0.2	(0.7)	0.2	(0.8)	0.1	(0.3)	0.2	(0.6)	0.1	(0.4)	0.1	(0.4)	0.1	(0.3)	0.2	(0.6)
2	MUFR	0.2	(0.7)	0.2	(0.6)	0.4	(0.8)	1.3	(2.8)	0.9	(1.1)	0.1	(0.4)	0.1	(0.2)	0.2	(0.6)
3	LWFR-F	10.3	(4.9)	0.0	(0.1)	5.2	(2.3)	25.8	(7.0)	15.7	(3.6)	0.2	(0.8)	38.1	(4.9)	10.4	(4.4)
4	NOTH	2.4	(2.4)	0.1	(0.5)	2.4	(1.9)	1.3	(2.2)	0.5	(0.9)	0.1	(0.3)	0.0	(0.1)	0.1	(0.3)
5	SOTH	33.7	(7.3)	0.1	(0.5)	72.6	(4.7)	0.2	(0.9)	0.1	(0.2)	0.1	(0.3)	0.1	(0.2)	0.6	(1.4)
6	LWTH	0.1	(0.3)	0.1	(0.5)	0.0	(0.2)	0.4	(1.4)	0.0	(0.2)	0.1	(0.3)	0.0	(0.1)	0.1	(0.4)
7	ECVI	47.8	(7.9)	14.1	(5.9)	0.1	(0.3)	3.1	(2.8)	7.1	(2.7)	4.8	(3.2)	0.2	(0.6)	2.5	(2.6)
8	WCVI	0.2	(0.6)	0.2	(0.8)	9.9	(3.1)	0.2	(0.7)	0.1	(0.4)	3.0	(2.0)	0.1	(0.3)	0.2	(0.6)
9	SOMN	0.1	(0.4)	0.1	(0.4)	0.0	(0.2)	2.5	(3.3)	0.0	(0.2)	0.1	(0.3)	0.0	(0.2)	0.1	(0.4)
10	NOMN	0.3	(1.1)	0.2	(0.5)	0.1	(0.3)	0.2	(0.7)	1.4	(1.4)	0.1	(0.4)	0.1	(0.3)	0.3	(0.9)
11	NASS	0.5	(1.5)	0.1	(0.5)	0.0	(0.2)	0.1	(0.4)	0.1	(0.3)	0.1	(0.3)	0.1	(0.2)	0.1	(0.4)
12	LWFR-Sp	0.1	(0.5)	0.0	(0.4)	0.0	(0.1)	0.0	(0.2)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)
13	LWFR-Su	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.0)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)
14	QCI	0.0	(0.1)	0.0	(0.1)	0.0	(0.0)	0.0	(0.2)	0.0	(0.0)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)
15	Alaska	0.0	(0.2)	0.0	(0.3)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.3)
17	Taku	0.1	(0.5)	0.1	(0.5)	0.0	(0.1)	0.0	(0.3)	0.0	(0.1)	0.0	(0.2)	0.0	(0.2)	0.1	(0.6)
18	Stikine	0.1	(0.6)	0.1	(0.4)	0.0	(0.2)	0.1	(0.6)	0.0	(0.3)	0.0	(0.2)	0.0	(0.2)	0.2	(0.7)
19	Skeena Upper	0.1	(0.6)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.1	(0.3)	0.0	(0.3)	0.0	(0.1)	0.0	(0.2)
20	Skeena Babine	0.0	(0.0)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)
21	Skeena Bulkley	0.0	(0.4)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)
22	Skeena Mid	0.1	(0.5)	0.0	(0.3)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	0.1	(0.5)	0.0	(0.2)	0.0	(0.2)
23	Skeena Lower	0.1	(0.4)	0.1	(0.4)	0.0	(0.2)	0.1	(0.4)	0.0	(0.1)	0.0	(0.2)	0.0	(0.2)	0.0	(0.3)
24	Alsek	0.0	(0.3)	0.0	(0.3)	0.0	(0.1)	0.0	(0.3)	0.0	(0.1)	0.0	(0.1)	0.0	(0.1)	0.0	(0.2)
50	Puget Sound	0.1	(0.6)	83.5	(6.3)	6.2	(2.5)	19.8	(7.1)	19.1	(4.3)	69.2	(5.9)	20.6	(4.2)	40.9	(7.6)
51	Juan de Fuca	0.0	(0.1)	0.0	(0.3)	0.0	(0.1)	0.0	(0.1)	0.1	(0.5)	0.0	(0.1)	0.0	(0.0)	1.6	(2.0)

Regional

Species = chinook Number of po
 Number of chains = 8 Number of

2005 05GSCDFO sport Area13 Sept 41(1)	2005 05GSCDFO sport Area20 Jan 43(0)	2005 05GSCDFO sport Area20 Aug 96(1)	2005 05WCTDFO troll SWVI Area124 Sept 43(3)	2005 05WCTDFO troll NWVI Area126/127 Sept 99(1)	2005 05WCTDFO troll NWVI Area126-29 Sept 68(0)	2005 05WCTDFO troll SWVI Area123/124 Oct 97(2)	2005 05WCTDFO troll SWVI Area123 Nov 48(0)
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Code	Region1	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
52	Coastal Wash	0.0	(0.2)	0.1	(0.5)	0.0	(0.1)	12.1	(5.1)	1.0	(1.6)	0.0	(0.2)	0.0	(0.1)
53	Low Col	0.0	(0.2)	0.0	(0.3)	2.3	(1.6)	6.6	(3.8)	5.2	(2.3)	5.7	(2.9)	14.2	(3.5)
54	Up Col-Sp	0.0	(0.3)	0.1	(0.7)	0.0	(0.2)	0.1	(0.6)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)
55	Up Col-Su/F	0.1	(0.5)	0.1	(0.3)	0.0	(0.2)	1.8	(2.3)	7.0	(2.8)	12.0	(4.4)	4.6	(2.3)
56	Snake-Sp/Su	0.2	(0.9)	0.1	(0.5)	0.1	(0.3)	0.3	(1.2)	0.5	(0.9)	0.1	(0.5)	0.1	(0.3)
57	Snake-F	0.0	(0.2)	0.0	(0.2)	0.0	(0.1)	0.0	(0.2)	0.0	(0.0)	0.4	(1.2)	0.0	(0.3)
58	North & Central O	0.1	(0.4)	0.1	(0.3)	0.0	(0.2)	1.8	(2.3)	35.6	(4.9)	1.5	(1.5)	5.9	(2.4)
59	South Oregon coast	0.1	(0.7)	0.0	(0.3)	0.0	(0.2)	0.1	(0.4)	2.7	(2.1)	0.1	(0.3)	0.0	(0.2)
61	Klamath/Trinity	0.0	(0.2)	0.0	(0.2)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)	0.0	(0.1)	0.1	(0.4)
62	Mid Col-Sp	0.0	(0.3)	0.0	(0.3)	0.1	(0.3)	0.0	(0.2)	0.0	(0.1)	0.0	(0.2)	0.0	(0.1)
63	Up Willamette	2.5	(2.4)	0.0	(0.4)	0.0	(0.1)	0.0	(0.2)	0.3	(0.7)	0.1	(0.5)	0.0	(0.3)
64	Cent Val-F	0.1	(0.4)	0.1	(0.3)	0.1	(0.2)	21.6	(6.2)	2.0	(1.5)	1.5	(1.6)	15.2	(3.6)
65	Cent Val-Sp	0.0	(0.3)	0.0	(0.2)	0.0	(0.1)	0.1	(0.4)	0.1	(0.3)	0.2	(0.6)	0.0	(0.1)

Regional

Species = chinook Number of po
 Number of chains = 8 Number of

2005	2005
05WCTDFO	05WCTDFO
troll	troll
SWVI	NWVI
Area123	Area126
Dec	Dec
97(2)	96(0)

Code	Region1	Mean	SD	Mean	SD
1	UPFR	0.1	(0.3)	0.1	(0.3)
2	MUFR	0.3	(0.7)	0.1	(0.3)
3	LWFR-F	2.2	(2.1)	12.6	(3.4)
4	NOTH	0.1	(0.3)	0.0	(0.1)
5	SOTH	0.1	(0.2)	0.1	(0.2)
6	LWTH	0.0	(0.2)	0.0	(0.2)
7	ECVI	0.1	(0.4)	0.1	(0.5)
8	WCVI	0.1	(0.3)	0.1	(0.4)
9	SOMN	0.4	(0.9)	0.1	(0.3)
10	NOMN	0.1	(0.3)	0.1	(0.4)
11	NASS	0.1	(0.2)	0.1	(0.2)
12	LWFR-Sp	0.0	(0.1)	0.0	(0.1)
13	LWFR-Su	0.0	(0.0)	0.0	(0.0)
14	QCI	0.0	(0.0)	0.0	(0.1)
15	Alaska	0.0	(0.2)	0.0	(0.1)
17	Taku	0.0	(0.1)	0.0	(0.1)
18	Stikine	0.0	(0.2)	0.0	(0.2)
19	Skeena Upper	0.0	(0.1)	0.0	(0.2)
20	Skeena Babine	0.0	(0.0)	0.0	(0.0)
21	Skeena Bulkley	0.0	(0.1)	0.0	(0.1)
22	Skeena Mid	0.0	(0.1)	0.0	(0.2)
23	Skeena Lower	0.0	(0.1)	0.0	(0.1)
24	Alsek	0.0	(0.1)	0.0	(0.1)
50	Puget Sound	86.7	(3.8)	41.2	(5.3)
51	Juan de Fuca	0.0	(0.2)	0.0	(0.1)

Regional

Species = chinook Number of po
 Number of chains = 8 Number of

2005	2005
05WCTDFO	05WCTDFO
troll	troll
SWVI	NWVI
Area123	Area126
Dec	Dec
97(2)	96(0)

Code	Region1	Mean	SD	Mean	SD
52	Coastal Wash	0.0	(0.2)	0.0	(0.2)
53	Low Col	7.8	(2.8)	16.0	(3.9)
54	Up Col-Sp	0.2	(0.5)	0.0	(0.1)
55	Up Col-Su/F	0.1	(0.4)	15.3	(3.9)
56	Snake-Sp/Su	0.5	(0.9)	0.1	(0.2)
57	Snake-F	0.2	(0.6)	0.0	(0.1)
58	North & Central O	0.0	(0.2)	0.0	(0.2)
59	South Oregon coast	0.0	(0.1)	3.2	(1.9)
61	Klamath/Trinity	0.0	(0.1)	0.0	(0.1)
62	Mid Col-Sp	0.6	(1.1)	0.0	(0.1)
63	Up Willamette	0.0	(0.2)	0.0	(0.2)
64	Cent Val-F	0.0	(0.2)	10.3	(3.3)
65	Cent Val-Sp	0.0	(0.1)	0.2	(0.8)