

# **Stock Composition of Area 3 & 4 Seine Fishery Encounters of Chinook Salmon in 2006**

Shaun Davies

Fisheries & Oceans Canada  
Science Branch, Pacific Region  
417-2<sup>nd</sup> Avenue West  
Prince Rupert, British Columbia  
V8J-1G8

March, 2007

*A project funded by the Northern Boundary and Transboundary Rivers  
Restoration and Enhancement Fund 2006.*

**CONTENTS**

ABSTRACT ..... iii  
LIST OF APPENDICES ..... iv  
INTRODUCTION ..... 5  
METHODS ..... 6  
RESULTS ..... 7  
DISCUSSION ..... 8  
ACKNOWLEDGEMENTS ..... 8  
REFERENCES ..... 9  
TABLES ..... 10  
FIGURES ..... 18

**ABSTRACT**

Cohort specific mortalities of chinook salmon, (*Oncorhynchus tshawytscha*) were determined for the 2006 area 3 and 4 seine fisheries. Due to their location and timing, these fisheries encounter a diverse array of chinook stocks migrating back to their place of origin from Alaska and British Columbia through to California. Mortality rates associated with the capture of chinook via seine nets are high and differ depending on the size of the chinook caught. Knowledge gained from this study can be compared and applied to PST Chinook model parameters, Nisga'a entitlements, and various stock management concerns. By way of on ground sampling via skiff during active seining, sets were monitored to collect matching scale age and genetic tissue samples, and length information from captured chinook. In area 3, 278 sets were monitored and 194 samples were collected. In area 4, 266 sets were monitored and 75 matched sample sets were obtained. 34% of the samples collected were from the Skeena River, of which 83% were large chinook (>71 cm). The BC northern mainland, (NOMN) was the second highest component followed by Puget Sound and the East Coast of Vancouver Island (ECVI). Only 26% of Puget Sound chinook and 14% of ECVI chinook were large. These 2006 results were similar to findings in 2003 and 2004. Future work could include the collection of sexual maturity data to determine its relationship with stock composition and size.

## LIST OF TABLES

Table 1: Estimated Release & Mortality by Region, (2006: Area 3 & 4 Chinook Seine).....	10
Table 2: Estimated % Stock Composition by Region, (2006: Area 3 & 4 Chinook Seine) .....	11
Table 3: Estimated Catch of Origin versus Age, (2006: Area 3 & 4 Chinook Seine) .....	12
Table 4: Encounters by Size from Observer/FOS/SS Data, (2006: Areas 3 to 6 Chinook Seine)13	
Table 5: Catch & Effort Data from FOS Phone-In and SS, (2006: Areas 3 to 6 Chinook Seine)14	
Table 6: Count of Origin versus Age Sampling Results, (2006 Area 3 & 4 Chinook Seine).....	15
Table 7: FOS Effort and Observer Catch Data, (2006: Areas 3 to 6 Chinook Seine) .....	16
Table 8: Observer Sampling Data by Size, (2006: Areas 3 & 4 Chinook Seine) .....	17

## LIST OF FIGURES

Figure 1 Pacific Fishery Management Area 3 & 4 Map .....	18
Figure 2: Scale and Tissue Sample Extraction Locations.....	19
Figure 3: Location of Statistical Areas in Northern British Columbia .....	20
Figure 4: Area 3 & 4 Chinook Seine Age by Length Distribution, (2006) .....	21

## LIST OF APPENDICES

Appendix 1: Area 3 & 4 chinook Seine DNA Baseline, (2006).....	22
Appendix 2: DNA Regional Population Abbreviations.....	24
Appendix 3: Area 3 chinook Seine Sampling Information, (2003 & 2004).....	25
Appendix 4: Area 3 chinook Seine Stock Composition by Region by Size, (2003 & 2004) .....	26

## INTRODUCTION

The purpose of this study was to determine the cohort specific mortalities of chinook salmon encountered during the area 3 and 4 seine fishery by collecting matching scale age, genetic tissue, and length data. To achieve this the objective was to observe 330 seine sets in Area 3 and 150 seine sets in Area 4 (based on an 18 day fishery in Area 3 and an 8 day fishery in Area 4) in order to collect approximately 800 chinook samples.

Seine fisheries within areas 3 and 4 are of interest because of their continued interception and consequent mortality of a diverse number of chinook stocks. Collected chinook data from these fisheries allows for the estimation of these impacts and can be compared and applied to PST Chinook model parameters, Nisga'a entitlements, and various stock management concerns.

In the North Coast from 1985 to 1999 chinook seine stock composition was determined at the fish processing plants from landed coded-wire tagged (CWT) chinook. After 1999, all chinook captured by seine net had to be released, consequently putting an end to this method of determining chinook stock composition. At this time, stock composition of the fishery had also changed as a result of moving it from the outer areas to more terminal locations, (Review Winther 2004, for more information on the history of seine fishing in the North coast and how this has changed the interception of US and Canadian chinook stocks).

In many of today's fisheries, stock composition is determined at sea through the observation and collection of data during active commercial harvesting. Tissue and scale samples are collected to merge stream origin information with age and rearing data to produce detailed stock composition results.

Determining the stream origin of marine mixed stock tissue samples is achieved by comparing the genetic similarity of micro-satellite DNA (deoxyribonucleic acid) loci sites of mixed stock samples with those of baseline tissue samples. Baselines are obtained by collecting in-stream tissue samples from spawning adults. These baseline samples create a unique genetic code that distinguishes one population from another. Micro-satellite DNA analysis of marine mixed chinook stock tissue samples began in 1998 with the Vancouver Island troll fishery using 108 baselines developed by the Department of Fisheries and Oceans, (J. R. Candy, Fisheries & Oceans Canada, pers. comm.). However, it was not applied in the North Coast until 2002 when it was used to determine the in-season stock composition of the Northern British Columbia troll fishery, (Winther and Beacham 2006). New populations and more samples are added to this baseline annually. In 2003 there were 237 chinook populations used in the baseline, 240 in 2004, and 250 in 2006. In all cases the same 13 micro-satellite DNA loci markers are used. See Appendix 1 for the 2006 Baselines, (Approximately 394 populations now occur in the DFO baseline database however populations with less than 50 samples are often excluded and not shown here).

Although today's North Coast seine fisheries target sockeye and pink salmon destined for Nass, Skeena and surrounding watersheds, chinook encounters and their associated mortality rates remain high. In 2001, its seine fleet exceeded the capture of 10,000 chinook when there were 20 and 15 days of seine fishing in Areas 3 and 4 respectively, (Winther 2004). Consequently, the Pacific Salmon Commission's Chinook Technical Committee (CTC, 1997) recommends using a mortality rate of 72% for releases of chinook from seines where all size classes are combined. When size specific data are available the CTC recommends immediate non-retention mortality estimates of 62.8%, 50.5% and 28% and total non-retention mortality estimates of 85.8%, 73.5% and 51.0% for small, medium and large chinook respectively, (CTC 97 and Winther 2004).

In 2001, a short term (24 hr) mortality study on chinook salmon encountered by the seine fishery in Chatham Sound was conducted. Similar to CTC recommendations, this study discovered mortality rates of 72% of chinook < 53 cm, 48% for chinook from 53-71 cm and 21% for chinook > 71cm. During this study it was also found that the small and medium sized chinook made up 77% of chinook encounters, (Winther 2004).

In 2003, chinook DNA results from the area 3 and 4 seine fishery discovered that stocks encountered differed greatly with size. Most of the large chinook (>65 cm) were from the Skeena, Nass and Stikine watersheds. Most of the small chinook (<65 cm) were predominantly from the Puget Sound, the East Coast of Vancouver Island and the Northern Mainland of British Columbia stock groups, (See Appendix 3 and 4 for 2003 and 2004 results).

In 2004 the single largest regional component in the Area 3 seine sample was from the Skeena River followed by the West Coast of Vancouver Island (WCVI). Separation of chinook into large and small size classes also confirmed 2003 results. They showed a distinct difference in stock compositions of small chinook which were predominantly from the East Coast of Vancouver Island (ECVI), the upper Columbia River and Puget Sound, (See appendix 2 for the regional list and their abbreviations).

## METHODS

Historic area 3 and 4 seine fisheries were investigated to develop a 2006 sampling plan for each area. Effort and set information, encounter data, fishing plans, and logistical knowledge was compiled to generate a number of sampling plan scenarios. Fishery observation data from 2000 was also analyzed to determine the least number of sets required per time/area strata needed to accurately represent chinook encounters. Statistical bootstrapping was used to plot coefficients of variation against sample sizes extrapolated from this data. Results indicated estimates of chinook encounters were optimized by observing approximately 70 seine sets per time/area strata, (Winther Unpublished).

From July 16<sup>th</sup> to August 5<sup>th</sup>, 2006, sampling technicians were deployed via skiff to active seine fishing vessels in Area 3 and 4, (see figure 1. Upon arrival, technicians instructed crew members to place all captured chinook into the vessels salmon revival tank for post-set sampling. A fork length measurement, two scales, and one genetic tissue sample was collected for each chinook prior to its release, (see figure 2. Individual 2ml plastic vials of non-denatured 95% ethanol were used to retain all sampling information. To ensure consistent accurate results, scales were collected from an area near the lateral line between the dorsal and anal fins and then examined thoroughly to avoid those that were regenerated, net marked, scarred, and/or torn, (MacLellan 1999). Genetic tissue samples were removed from opercula using a common paper-hole punch, (carefully avoiding the underlying gill area). In the North Coast DFO laboratory scales were removed from their vials, mounted into scale books and forwarded to the scales lab at the Pacific Biological Station (PBS) in Nanaimo for age analysis; Vials were re-filled with fresh ethanol and sent to the Molecular Genetics Laboratory (MGL) at PBS to determine the genetic origin of the remaining contained tissue. During this time all field and laboratory data information was also entered into an excel spreadsheet for future use.

At MGL, the genetic origin of tissue samples were determined by analyzing 13 microsatellite DNA loci and comparing them against 250 DFO chinook population baselines from Southeast Alaska south through Canada and the lower United States of America (Appendices 1& 2). To ensure an accurate determination according to small, medium, and large chinook samples, a non-deterministic Bayesian computer model based on a series of algorithms

(chains) was used to provide the five most probable populations. In addition to final origin results, standard deviations and Gelman-Rubin values were determined. If GR values are greater than 1.2 then the relationship between the sequence of chains is considered poor. (J. R. Candy, Fisheries & Oceans Canada, pers. comm.).

Age and origin results were entered into the corresponding excel spreadsheet withholding the remaining chinook lengths and additional sampling information. Total encounter and mortality estimates for small, medium, and large chinook was determined for each of the 2006 north coast seine fisheries. The average chinook catch per set per size classification, total number of vessel operating per area per day, and the average number of sets per vessel was also calculated.

The average chinook catch per set per size classification was determined from the collected observer data and was modified slightly to account for 53 chinook that were observed but not sampled. Due to the limited number of sets observed within each area and per number of chinook caught per set, no distinct differences justified using more than one set of size per catch proportions. Consequently, identical proportion values were used for the unknowns regardless of area or the number of chinook caught per set. For every unknown caught in each set, a small, medium, and large proportion value of .21, .18, and .61 respectively, was incorporated and in doing so created an estimate of catch values by size for each area.

The total number of vessel operating per area per day and the average number of sets per vessel was estimated using fish slips and FOS Phone-In hail data. The observer data was not used to determine the average number of sets per vessel as too few consecutive sets per vessel were observed and the average on-ground vessel time per day was unknown. The observer data was used primarily to determine the average size proportion of chinook caught per set/area as well as to determine the age and origin of the intercepted stocks from samples collected.

## RESULTS

Statistical areas 3 to 6 were open for seine fishing in 2006. The greatest effort was in area 4 with virtually no fishing activity occurring in areas 5 and 6, (See Figure 3 or the location of these statistical areas).

In area 3, the majority of the fishing effort occurred on the east side of the Maskalyne/Finlayson management area near Port Simpson, (fig. 1. 278 sets were monitored and 184 chinook samples were collected. The total average catch per set equaled 0.83 chinook per set (0.21 = small, 0.20 = medium, and 0.42 for large chinook). A total of 2010 chinook encounters was calculated producing a final mortality estimate of 1276 chinook, (See tables 1 to 8 for more information).

In area 4, the majority of the fishing effort occurred along the western shoreline of Smith Island extending up the coast through the eastern portions of sub-area 4-9 to Big Bay, (fig ). 266 sets were monitored and 78 chinook samples were collected. The total average catch per set was 0.32 chinook per set (0.06 = small, 0.06 = medium, and 0.20 for large chinook). A total of 3815 chinook encounters was calculated producing a final mortality estimate of 2343 chinook.

Overall, 34% of the area 3 and 4 samples collected in 2006 were from the Skeena River and of the Skeena River samples collected 79% of them were large chinook (>71cm). The BC northern mainland, (NOMN) was the second highest component followed by Puget Sound and the East Coast of Vancouver Island (ECVI) with 26% of Puget Sound chinook and 14% of ECVI chinook being large.

## DISCUSSION

The primary objective of this program was to collect approximately 800 matching chinook length/scale/and DNA tissue samples but only 262 were collected. This shortfall was associated with the less than forecasted encounter rate and the sampling plan. 1.5 chinook per set was anticipated but an overall average of 0.57 was observed. Prior to sampling it was anticipated that fulfilling the primary objective would be a challenge due to the number of samples required to represent the fishery and the tight budget and logistical constraints at hand. For future years, to ensure a greater number of monitored sets and samples, an entirely different sampling plan and a larger budget may be required. Logistical constraints for this past year are primarily associated with the number of skiffs operating and their limited capacity to facilitate the transport of observers on and off active fishing vessels. Arrangements could be made with fish plants managers and vessel captains to have samplers board and depart seine boats from the docks in Prince Rupert. This has worked in past years by continuing to inform the fleet of the sampling plan through the fishery notices and by providing meal and accommodation vouchers to vessel captains willing to take a sampler during the entire extent of their fishing trip.

Despite the low number of samples collected and analyzed, results continue to suggest that a large number of stocks contribute to the chinook salmon encounters in the area 3 and 4 seine fishery. Similar to the 2003 and 2004 results, the Skeena River remains to be the major contributor to chinook stock compositions. A higher abundance of the BC northern mainland stocks was observed in 2006 than in 2003 and 2004 and the ECVI and Puget Sound remain as significant contributors to this mix-stock fishery.

Similar to 2003 and 2004, 2006 stock composition results varies considerably with size in all years and small chinook continue to show large components of ECVI and Puget Sound. The collection of sexual maturity data for these fisheries should be considered in the future, as it's probable that size reflects maturity and that the stock differences observed between large and small chinook would be more pronounced if the maturity of the fish had been assessed, (Winther 2004). An arrangement with the North Coast Conservation and Protection Branch of Fisheries and Oceans could be made to have all sampled chinook salmon donated to the Prince Rupert Friendship House or local food bank.

## ACKNOWLEDGEMENTS

Tissue samples were collected by observers from J.O. Thomas and Associates. Scales and DNA samples were analyzed at the Pacific Biological Station in Nanaimo. Funding for this program was provided by the Northern Boundary and Transboundary Rivers Restoration and Enhancement Fund 2006.



**REFERENCES**

- CTC (chinook Technical Committee). 1997. Incidental fishing mortality of chinook salmon: mortality rates applicable to Pacific Salmon Commission fisheries. Pacific Salmon Commission Report TCchinook (97)-1. Vancouver, British Columbia.
- MacLellan, S.E.. 1999. Guide for sampling structure used in age determination of Pacific salmon. PBS, Nanaimo, Fisheries and Oceans. 25 p.
- Winther, I. 2005. Stock composition of area 3 seine fishery encounters of chinook salmon in 2004. Pacific Salmon Commission Report. Vancouver, British Columbia.
- Winther, I. and T.D. Beacham. 2006. The Application of chinook Salmon Stock Composition Data to Management of the Queen Charlotte Islands Troll Fishery, 2002 to 2005. Can. Tech. Rep. Fish. Aquat. Sci 2665.

## TABLES

Table 1: Estimated Release &amp; Mortality by Region, (2006: Area 3 &amp; 4 Chinook Seine)

Area	DNA Regional ID	Estimated Releases				Estimated Mortalities				Standard Deviation			Gelman-Rubin, (Less than 1.2 is Good)					
		Sm Ck Rel.	Md Ck Rel.	Lg Ck Rel.	Total Ck Rel.	Sm Ck Dead (85.8%)	Md Ck Dead (73.5%)	Lg Ck Dead (51.0%)	Total Ck Dead	S.Dev % Sm	S.Dev % Med	S.Dev % Lg	Sm	Sm	Md	Md	Lg	Lg
3 & 4	ECVI	177	260	105	542	152	191	54	396	5.24%	5.76%	1.79%	1.04	1.09	1.01	1.02	1.00	1.00
3 & 4	Low Col	18	0	0	18	15	0	0	15	0.35%	0.16%	1.20%	1.02	1.03	1.02	1.02	1.04	1.06
3 & 4	LWFR-F	53	0	26	79	46	0	13	59	2.69%	2.07%	0.99%	1.00	1.00	1.05	1.09	1.00	1.00
3 & 4	NASS	35	74	211	320	30	55	107	192	3.23%	3.87%	2.63%	1.05	1.10	1.00	1.01	1.01	1.03
3 & 4	NOMN	265	241	527	1033	228	177	269	673	6.23%	6.70%	3.73%	1.06	1.13	1.05	1.10	1.02	1.04
3 & 4	North & Central O	0	0	53	53	0	0	27	27	0.24%	0.34%	1.19%	1.01	1.01	1.06	1.06	1.02	1.04
3 & 4	Puget Sound	318	93	211	622	273	68	107	449	5.75%	3.81%	2.20%	1.00	1.01	1.01	1.03	1.02	1.04
3 & 4	Skeena Bulkley	18	0	316	334	15	0	161	176	1.51%	0.49%	3.02%	1.01	1.02	1.06	1.07	1.00	1.01
3 & 4	Skeena Lower	71	37	1106	1214	61	27	564	652	3.01%	2.36%	4.96%	1.00	1.00	1.00	1.00	1.01	1.03
3 & 4	Skeena Mid	0	0	158	158	0	0	81	81	1.96%	0.83%	3.23%	1.51	2.65	1.08	1.11	1.05	1.10
3 & 4	Skeena Upper	0	148	369	517	0	109	188	297	0.20%	5.35%	3.76%	1.08	1.09	1.01	1.03	1.00	1.01
3 & 4	Skeena Combined	88	186	1949	2223	76	136	994	1206									
3 & 4	SOMN	18	37	0	55	15	27	0	42	0.46%	2.77%	1.85%	1.05	1.10	1.03	1.06	1.02	1.03
3 & 4	SOTH	0	56	132	187	0	41	67	108	0.45%	3.50%	1.77%	1.03	1.04	1.00	1.01	1.00	1.01
3 & 4	South Oregon coas	18	0	0	18	15	0	0	15	1.57%	0.65%	0.12%	1.00	1.00	1.01	1.02	1.01	1.01
3 & 4	Up Col-Su/F	124	56	0	179	106	41	0	147	4.71%	3.33%	0.25%	1.08	1.16	1.03	1.05	1.05	1.05
3 & 4	WCVI	53	74	369	496	46	55	188	288	2.60%	3.45%	2.65%	1.00	1.00	1.01	1.02	1.00	1.00
3 & 4	Grand Total	1167	1076	3582	5825	1001	791	1827	3619									
3	ECVI	65	116	26	208	56	85	13	155									
3	Low Col	9	0	0	9	8	0	0	8									
3	LWFR-F	19	0	13	32	16	0	7	23									
3	NASS	19	36	92	146	16	26	47	89									
3	NOMN	130	98	183	412	112	72	93	278									
3	Puget Sound	112	36	26	174	96	26	13	136									
3	Skeena Bulkley	0	0	92	92	0	0	47	47									
3	Skeena Lower	37	0	392	430	32	0	200	232									
3	Skeena Mid	0	0	13	13	0	0	7	7									
3	Skeena Upper	0	27	131	158	0	20	67	86									
3	Skeena Combined	37	27	628	692	32	20	320	372									
3	SOMN	9	18	0	27	8	13	0	21									
3	SOTH	0	9	39	48	0	7	20	27									
3	Up Col-Su/F	47	27	0	73	40	20	0	60									
3	WCVI	19	27	144	189	16	20	73	109									
3	Grand Total	466	393	1151	2010	400	289	587	1276									
4	ECVI	131	49	101	282	113	36	52	200									
4	LWFR-F	44	0	0	44	38	0	0	38									
4	NASS	0	0	51	51	0	0	26	26									
4	NOMN	44	98	304	445	38	72	155	264									
4	North & Central O	0	0	101	101	0	0	52	52									
4	Puget Sound	263	49	304	616	226	36	155	416									
4	Skeena Bulkley	44	0	253	297	38	0	129	167									
4	Skeena Lower	0	98	608	705	0	72	310	382									
4	Skeena Mid	0	0	253	253	0	0	129	129									
4	Skeena Upper	0	244	203	447	0	179	103	283									
4	Skeena Combined	44	342	1317	1702	38	251	672	960									
4	SOTH	0	98	101	199	0	72	52	123									
4	South Oregon coas	44	0	0	44	38	0	0	38									
4	Up Col-Su/F	88	0	0	88	75	0	0	75									
4	WCVI	44	49	152	245	38	36	77	151									
4	Grand Total	701	683	2431	3815	601	502	1240	2343									

Table 2: Estimated % Stock Composition by Region, (2006: Area 3 &amp; 4 Chinook Seine)

Area	DNA Regional ID	% Small	% Medium	% Large	% of Total	Total Small	Total Medium	Total Large	Grand Total	Small (% of Pop)	Medium (% of Pop)	Large (% of Pop)
3 & 4	ECVI	15%	24%	3%	11%	10	14	4	28	36%	50%	14%
3 & 4	Low Col	2%	0%	0%	0%	1			1		0%	0%
3 & 4	LWFR-F	5%	0%	1%	2%	3		1	4	75%	0%	25%
3 & 4	NASS	3%	7%	6%	5%	2	4	8	14	14%	29%	57%
3 & 4	NOMN North & Central O	23%	22%	15%	18%	15	13	20	48	31%	27%	42%
3 & 4	Puget Sound	27%	9%	6%	12%	18	5	8	31	58%	16%	26%
3 & 4	Skeena Bulkley	2%	0%	9%	5%	1		12	13	8%	0%	92%
3 & 4	Skeena Lower	6%	3%	31%	18%	4	2	42	48	8%	4%	88%
3 & 4	Skeena Mid	0%	0%	4%	2%			6	6	0%	0%	100%
3 & 4	Skeena Upper Skeena	0%	14%	10%	8%		8	14	22	0%	36%	64%
3 & 4	Combined	8%	17%	54%	34%	5	10	74	89	6%	11%	83%
3 & 4	SOMN	2%	3%	0%	1%	1	2		3	33%	67%	0%
3 & 4	SOTH South Oregon coas	0%	5%	4%	3%		3	5	8		38%	63%
3 & 4	Up Col-Su/F	2%	0%	0%	0%	1			1	100%		
3 & 4	WCVI	11%	5%	0%	4%	7	3		10	70%	30%	0%
3 & 4	WCVI	5%	7%	10%	8%	3	4	14	21	14%	19%	67%
3 & 4	Grand Total	66	58	136	260	66	58	136	260			
3	ECVI	14%	30%	2%	12%	7	13	2	22	32%	59%	9%
3	Low Col	2%	0%	0%	1%	1			1		0%	0%
3	LWFR-F	4%	0%	1%	2%	2		1	3	67%	0%	33%
3	NASS	4%	9%	8%	7%	2	4	7	13	15%	31%	54%
3	NOMN	28%	25%	16%	21%	14	11	14	39	36%	28%	36%
3	Puget Sound	24%	9%	2%	10%	12	4	2	18	67%	22%	11%
3	Skeena Bulkley	0%	0%	8%	4%			7	7			100%
3	Skeena Lower	8%	0%	34%	19%	4		30	34	12%	0%	88%
3	Skeena Mid	0%	0%	1%	1%			1	1	0%	0%	
3	Skeena Upper Skeena	0%	7%	11%	7%		3	10	13	0%		77%
3	Combined	8%	7%	55%	30%	4	3	48	55	7%	5%	87%
3	SOMN	2%	5%	0%	2%	1	2		3	33%	67%	
3	SOTH	0%	2%	3%	2%		1	3	4			75%
3	Up Col-Su/F	10%	7%	0%	4%	5	3		8	63%	38%	0%
3	WCVI	4%	7%	13%	9%	2	3	11	16	13%	19%	69%
3	Grand Total	50	44	88	182	50	44	88	182			
4	ECVI	19%	7%	4%	8%	3	1	2	6	50%	17%	33%
4	LWFR-F	6%	0%	0%	1%	1			1	100%		
4	NASS	0%	0%	2%	1%			1	1			100%
4	NOMN North & Central O	6%	14%	13%	12%	1	2	6	9			67%
4	Puget Sound	0%	0%	4%	3%			2	2	0%		100%
4	Puget Sound	38%	7%	13%	17%	6	1	6	13	46%	8%	46%
4	Skeena Bulkley	6%	0%	10%	8%	1		5	6		0%	83%
4	Skeena Lower	0%	14%	25%	18%		2	12	14		14%	86%
4	Skeena Mid	0%	0%	10%	6%			5	5		0%	100%
4	Skeena Upper Skeena	0%	36%	8%	12%		5	4	9		56%	44%
4	Combined	6%	50%	54%	44%	1	7	26	34	3%	21%	76%
4	SOTH South Oregon coas	0%	14%	4%	5%		2	2	4		50%	50%
4	Up Col-Su/F	6%	0%	0%	1%	1			1	100%		
4	Up Col-Su/F	13%	0%	0%	3%	2			2	100%		0%
4	WCVI	6%	7%	6%	6%	1	1	3	5	20%	20%	60%
4	Grand Total	16	14	48	78	16	14	48	78			

Table 3: Estimated Catch of Origin verses Age, (2006: Area 3 & 4 Chinook Seine)

Area	DNA Regional ID	11	21	22	31	32	41	42	43	51	52	62	1M	2M	3M	4M	Unk	Total
3 & 4	ECVI	0	100	0	167	17	50	17	0	0	0	17	50	50	0	0	0	467
3 & 4	Low Col	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	17
3 & 4	LWFR-F	0	50	0	0	0	0	17	0	0	0	0	0	0	0	0	0	67
3 & 4	NASS	0	33	0	17	0	17	33	17	0	50	0	0	17	17	33	0	234
3 & 4	NOMN	0	50	17	100	134	50	150	0	50	33	67	83	50	0	0	17	801
3 & 4	North & Central O	0	0	0	17	0	0	0	0	0	17	0	0	0	0	0	0	33
3 & 4	Puget Sound	33	234	0	50	17	33	0	0	0	0	17	33	67	33	0	0	517
3 & 4	Skeena Bulkley	0	0	0	0	17	0	17	0	0	33	67	0	0	50	17	17	217
3 & 4	Skeena Lower	0	17	0	17	50	67	200	0	50	67	150	0	17	83	50	33	801
3 & 4	Skeena Mid	0	0	0	0	0	0	17	0	17	0	17	0	17	17	17	0	100
3 & 4	Skeena Upper	0	17	0	17	0	0	100	0	33	33	33	17	17	33	33	33	367
3 & 4	Skeena Combined	0	33	0	33	67	67	334	0	100	134	267	17	50	184	117	83	1485
3 & 4	SOMN	0	0	0	0	33	0	17	0	0	0	0	0	0	0	0	0	50
3 & 4	SOTH	0	0	0	17	0	67	17	0	17	0	0	0	0	17	0	0	134
3 & 4	South Oregon coas	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	17
3 & 4	Up Col-Su/F	0	50	0	33	17	0	17	0	0	0	0	33	0	0	0	17	167
3 & 4	WCVI	17	33	0	134	0	50	50	0	50	0	17	0	0	0	0	0	351
3 & 4	Grand Total	50	584	33	567	284	334	651	17	217	234	384	217	234	250	150	134	4340
3	ECVI	0	42	0	68	8	17	8	0	0	0	0	25	17	0	0	0	187
3	Low Col	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8
3	LWFR-F	0	17	0	0	0	0	8	0	0	0	0	0	0	0	0	0	25
3	NASS	0	17	0	8	0	8	8	8	0	25	0	0	8	8	17	0	110
3	NOMN	0	17	8	34	68	17	59	0	25	17	17	34	25	0	0	8	331
3	Puget Sound	17	59	0	25	8	0	0	0	0	8	8	25	0	0	0	0	153
3	Skeena Bulkley	0	0	0	0	0	0	0	0	8	25	0	0	17	8	0	0	59
3	Skeena Lower	0	8	0	0	25	17	76	0	8	17	68	0	8	34	8	17	288
3	Skeena Mid	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	8
3	Skeena Upper	0	0	0	8	0	0	17	0	17	8	17	8	8	8	0	17	110
3	Skeena Combined	0	8	0	8	25	17	93	0	25	34	110	8	17	68	17	34	466
3	SOMN	0	0	0	0	17	0	8	0	0	0	0	0	0	0	0	0	25
3	SOTH	0	0	0	8	0	17	0	0	0	0	0	0	0	8	0	0	34
3	Up Col-Su/F	0	17	0	17	8	0	8	0	0	0	0	17	0	0	0	0	68
3	WCVI	8	8	0	51	0	25	25	0	17	0	0	0	0	0	0	0	136
3	Grand Total	25	187	8	221	136	102	221	8	68	76	136	93	93	85	34	51	1544
4	ECVI	34	0	68	0	34	0	0	0	0	34	0	34	0	0	0	0	204
4	LWFR-F	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34
4	NASS	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	0	34
4	NOMN	34	0	68	0	34	68	0	0	68	34	0	0	0	0	0	0	307
4	North & Central O	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	68
4	Puget Sound	238	0	0	0	68	0	0	0	0	34	34	68	0	0	0	0	443
4	Skeena Bulkley	0	0	0	34	0	34	0	34	34	0	0	34	0	34	0	34	204
4	Skeena Lower	0	0	34	0	68	102	68	68	34	0	0	34	68	0	0	0	477
4	Skeena Mid	0	0	0	0	0	34	34	0	34	0	34	0	34	0	34	0	170
4	Skeena Upper	34	0	0	0	0	136	0	34	0	0	0	34	68	0	0	0	307
4	Skeena Combined	34	0	34	34	68	307	102	136	102	0	34	102	170	34	0	0	1158
4	SOTH	0	0	0	0	68	34	34	0	0	0	0	0	0	0	0	0	136
4	South Oregon coas	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34
4	Up Col-Su/F	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	68
4	WCVI	34	0	68	0	0	0	34	0	34	0	0	0	0	0	0	0	170
4	Grand Total	0	443	34	273	34	273	443	0	170	170	238	68	102	170	170	68	2657

Table 4: Encounters by Size from Observer/FOS/SS Data, (2006: Areas 3 to 6 Chinook Seine)

Area	Date	Small Chinook (Observer catch per set proportion)	Medium Chinook (Observer catch per set proportion)	Large Chinook (Observer catch per set proportion)	Total Chinook (FOS/Saleslip Data)	Small Chinook Total (Observer/FOS/Saleslip)	Medium Chinook Total (Observer/FOS/Saleslip)	Large Chinook Total (Observer/FOS/Saleslip)
3	16-Jul-06	0.24	0.36	0.40	167	40	61	66
3	17-Jul-06	0.10	0.18	0.72	195	19	35	140
3	20-Jul-06	0.11	0.24	0.66	152	17	36	100
3	21-Jul-06	0.25	0.02	0.73	95	23	2	70
3	24-Jul-06	0.33	0.07	0.60	224	73	15	135
3	25-Jul-06	0.11	0.09	0.81	225	24	20	181
3	29-Jul-06	0.30	0.34	0.36	209	63	71	75
3	30-Jul-06	0.18	0.23	0.59	262	48	59	155
3	31-Jul-06	0.15	0.14	0.71	232	35	33	164
3	03-Aug-06	0.50	0.24	0.26	250	125	60	66
3	Average	0.23	0.19	0.58	201	47	39	115
3	Total				2010	466	393	1151
4	16-Jul-06	0.67	0.00	0.33	245	163	0	82
4	17-Jul-06	0.07	0.39	0.54	292	20	115	157
4	20-Jul-06	0.20	0.19	0.60	194	39	38	117
4	21-Jul-06	0.05	0.05	0.90	339	18	15	306
4	24-Jul-06	0.00	0.20	0.80	196	0	39	157
4	25-Jul-06	0.07	0.17	0.76	339	24	58	257
4	29-Jul-06	0.07	0.06	0.87	383	27	23	333
4	30-Jul-06	0.00	0.67	0.33	265	0	177	88
4	31-Jul-06	0.00	0.17	0.83	248	0	41	207
4	03-Aug-06	0.71	0.29	0.00	181	129	52	0
4	04-Aug-06	0.23	0.08	0.69	246	56	21	169
4	05-Aug-06	0.35	0.01	0.64	324	113	4	208
4	08-Aug-06	0.20	0.18	0.62	302	59	54	188
4	17-Aug-06	0.20	0.18	0.62	8	2	1	5
4	18-Aug-06	0.20	0.18	0.62	19	4	3	12
4	20-Aug-06	0.20	0.18	0.62	45	9	8	28
4	21-Aug-06	0.20	0.18	0.62	31	6	6	20
4	22-Aug-06	0.20	0.18	0.62	21	4	4	13
4	23-Aug-06	0.20	0.18	0.62	33	6	6	20
4	24-Aug-06	0.20	0.18	0.62	30	6	5	18
4	25-Aug-06	0.20	0.18	0.62	20	4	4	12
4	26-Aug-06	0.20	0.18	0.62	38	8	7	24
4	02-Sep-06	0.20	0.18	0.62	9	2	2	6
4	03-Sep-06	0.20	0.18	0.62	8	2	1	5
4	Average	0.20	0.18	0.62				
4	Total				3815	701	683	2431
3&4	Summary	0.21	0.18	0.60	5824	1167	1076	3582
5	Summary	0.21	0.18	0.60	12	3	2	7
6	Summary	0.21	0.18	0.60	21	4	4	13

Table 5: Catch &amp; Effort Data from FOS Phone-In and SS, (2006: Areas 3 to 6 Chinook Seine)

Area	Date	# Of Vessels Operating (FOS/Saleslip Data)	FOS Phone-In Avg Set/Day	FOS Phone-In (Ck Lg Catch/Set)	FOS Phone-In (Ck Jk Catch/Set)	Adult Chinook (FOS/Saleslip Data)	Jack Chinook (FOS/Saleslip Data)	Total Chinook (FOS/Saleslip Data)
		A	B	C	D	E = A*B*C	F = A*B*D	G = E + F
3	16-Jul-06	22	9.81	0.59	0.18	128	39	167
3	17-Jul-06	19	8.16	0.81	0.44	126	68	195
3	20-Jul-06	24	9.82	0.41	0.24	97	55	152
3	21-Jul-06	13	12.38	0.39	0.19	64	31	95
3	24-Jul-06	39	10.70	0.37	0.16	156	68	224
3	25-Jul-06	29	11.14	0.44	0.25	143	82	225
3	29-Jul-06	27	11.00	0.48	0.22	144	65	209
3	30-Jul-06	35	10.71	0.45	0.25	170	92	262
3	31-Jul-06	28	10.48	0.46	0.33	135	96	232
3	03-Aug-06	20	10.13	0.60	0.63	122	128	250
3	Average	26	10.43	0.50	0.29	129	72	201
3	Total	256		Lg +Sm =	0.79	1285	725	2010
4	16-Jul-06	38	10.77	0.38	0.21	157	87	245
4	17-Jul-06	43	10.34	0.51	0.15	226	66	292
4	20-Jul-06	49	11.14	0.27	0.09	145	49	194
4	21-Jul-06	59	12.14	0.33	0.15	234	105	339
4	24-Jul-06	34	12.52	0.37	0.09	158	38	196
4	25-Jul-06	47	13.03	0.41	0.14	250	88	339
4	29-Jul-06	47	13.41	0.50	0.11	314	68	383
4	30-Jul-06	37	12.37	0.46	0.12	208	57	265
4	31-Jul-06	37	11.92	0.45	0.11	198	50	248
4	03-Aug-06	45	10.40	0.29	0.10	135	47	181
4	04-Aug-06	65	11.29	0.29	0.04	215	31	246
4	05-Aug-06	65	13.25	0.29	0.08	252	72	324
4	08-Aug-06	42	17.89	0.26	0.14	198	104	302
4	17-Aug-06	7	10.20	0.00	0.11	0	8	8
4	18-Aug-06	7	12.80	0.10	0.10	9	9	19
4	20-Aug-06	7	12.00	0.21	0.32	18	27	45
4	21-Aug-06	7	10.33	0.08	0.36	5	26	31
4	22-Aug-06	8	11.50	0.12	0.11	11	10	21
4	23-Aug-06	8	13.00	0.13	0.19	13	19	33
4	24-Aug-06	8	10.50	0.16	0.19	14	16	30
4	25-Aug-06	9	12.67	0.16	0.02	18	2	20
4	26-Aug-06	7	13.00	0.30	0.12	27	11	38
4	02-Sep-06	5	6.50	0.13	0.17	4	5	9
4	03-Sep-06	5	4.33	0.37	0.00	8	0	8
4	Average	29	11.55	0.27	0.13	117	41	159
4	Total	686		Lg +Sm =	0.41	2819	996	3815
5	Average	0.45	2.30	0.04	0.03	0	0	1
5	Total	10.00		Lg +Sm =	0.07	7	5	12
6	Average	0.93	1.12	0.06	0.07	1	1	1
6	Total	14.00		Lg +Sm =	0.13	12	9	21

Table 6: Count of Origin verses Age Sampling Results, (2006 Area 3 & 4 Chinook Seine)

Area	DNA Regional ID	11	21	22	31	32	41	42	43	51	52	62	1M	2M	3M	4M	Unk	Total
3 & 4	ECVI		8		11	1	3	1				1	4	3				32
3 & 4	Low Col													1	1		1	3
3 & 4	LWFR-F		3		2			1										6
3 & 4	NASS		2				1	2	1			5	1	1	2	1	2	18
3 & 4	NOMN		1	1	3	6	4	6		4	2	5	3	1			2	38
3 & 4	North & Central O				2	1					1							4
3 & 4	NOTH						1											1
3 & 4	Puget Sound	2	14		2	1	1	1				1	2	4	2			30
3 & 4	Skeena Bulkley							4		2	1	3			3		1	14
3 & 4	Skeena Lower				1	5	4	11		2	3	9	1	1	6	3	1	47
3 & 4	Skeena Mid		1		1	1		3						1		1		8
3 & 4	Skeena Upper		2		1			4		2	2	2	1		2	3	2	21
3 & 4	Snake-F												1					1
3 & 4	SOMN					1		1										2
3 & 4	SOTH						3											3
3 & 4	South Oregon coas			1														1
3 & 4	Up Col-Su/F		2		3	1		1						1			1	9
3 & 4	WCVI	1	2		8		3	4		3		1						22
3 & 4	Grand Total	3	35	2	34	17	20	39	1	13	14	23	13	14	15	9	8	260
3	ECVI		6		9	1	2	1					4	2				25
3	Low Col													1	1		1	3
3	LWFR-F		2		2			1										5
3	NASS		2				1	1	1		5		1	2	1	1		15
3	NOMN			1	2	6	2	5		3	2	4	2	1			2	30
3	North & Central O				1													1
3	NOTH						1											1
3	Puget Sound	2	7		2	1		1				1	1	3				18
3	Skeena Bulkley							1				2			2			5
3	Skeena Lower					5	2	8		1	1	7	1	1	5	1	1	33
3	Skeena Mid		1			1												2
3	Skeena Upper		1		1			2		2	1	2	1		1	2	2	15
3	Snake-F												1					1
3	SOMN					1		1										2
3	SOTH						1											1
3	Up Col-Su/F		2		3	1		1						1				8
3	WCVI	1	1		6		3	4		2								17
3	Grand Total	3	22	1	26	16	12	26	1	8	9	16	11	11	10	4	6	182
4	ECVI		2		2		1					1		1				7
4	LWFR-F		1															1
4	NASS							1				1				1		3
4	NOMN		1		1		2	1		1		1	1					8
4	North & Central O				1	1					1							3
4	Puget Sound		7				1						1	1	2			12
4	Skeena Bulkley							3		2	1	1			1		1	9
4	Skeena Lower				1		2	3		1	2	2			1	2		14
4	Skeena Mid				1			3						1		1		6
4	Skeena Upper		1					2			1				1	1		6
4	SOTH						2											2
4	South Oregon coas			1														1
4	Up Col-Su/F																1	1
4	WCVI		1		2					1		1						5
4	Grand Total		13	1	8	1	8	13		5	5	7	2	3	5	5	2	78

Table 7: FOS Effort and Observer Catch Data, (2006: Areas 3 to 6 Chinook Seine)

Area	Date	# Of Vesseles Operating (FOS/Saleslip)	Avg Set/Day (FOS Phone-In)	Small Chinook (Observer Data)	Medium Chinook (Observer Data)	Large Chinook (Observer Data)	Total Chinook (Observer Data)
3	16-Jul	22	9.81	88	132	145	365
3	17-Jul	19	8.16	14	27	106	147
3	20-Jul	24	9.82	16	35	97	147
3	21-Jul	13	12.38	16	1	48	66
3	24-Jul	39	10.70	39	8	72	119
3	25-Jul	29	11.14	16	13	120	149
3	29-Jul	27	11.00	93	106	111	310
3	30-Jul	35	10.71	44	55	143	242
3	31-Jul	28	10.48	29	28	136	192
3	03-Aug	20	10.13	153	74	81	307
3	Average	26	10.43	51	48	106	204
3	Total	256	104	509	478	1058	2044
4	16-Jul	38	10.77	41	0	20	61
4	17-Jul	43	10.34	9	52	72	133
4	20-Jul	49	11.14	37	35	110	182
4	21-Jul	59	12.14	5	4	86	96
4	24-Jul	34	12.52	0	25	100	125
4	25-Jul	47	13.03	29	70	310	408
4	29-Jul	47	13.41	8	7	103	118
4	30-Jul	37	12.37	0	51	25	76
4	31-Jul	37	11.92	0	32	158	189
4	03-Aug	45	10.40	117	47	0	164
4	04-Aug	65	11.29	54	20	160	234
4	05-Aug	65	13.25	155	5	285	445
4	08-Aug	42	17.89	47	43	150	241
4	17-Aug	7	10.20	5	4	14	23
4	18-Aug	7	12.80	6	5	18	29
4	20-Aug	7	12.00	5	5	17	27
4	21-Aug	7	10.33	5	4	14	23
4	22-Aug	8	11.50	6	5	18	29
4	23-Aug	8	13.00	7	6	21	33
4	24-Aug	8	10.50	5	5	17	27
4	25-Aug	9	12.67	7	7	23	37
4	26-Aug	7	13.00	6	5	18	29
4	02-Sep	5	6.50	2	2	6	10
4	03-Sep	5	4.33	1	1	4	7
4	Average	29	12	23	18	73	114
4	Total	686	277	556	441	1751	2747
3&4	Total	942	382	1064	918	2809	4792



Table 8: Observer Sampling Data by Size, (2006: Areas 3 & 4 Chinook Seine)

Area	Date	Sets Obs.	Sm Ck Sampled (s)	Md Ck Sampled (s)	Lg Ck Sampled (s)	Total Ck Sampled (s)	Total Ck Unsampled (us)	Sm Ck Est. Unsam (us) (21%)	Md Ck Est. Unsam (us) (18%)	Lg Ck Est. Unsam (us) (61%)	Sm Ck (s+us)	Md Ck (s+us)	Lg Ck (s+us)	Total Ck (s+us)	Sm Ck Catch/Set (Modified Observed)	Md Ck Catch/Set (Modified Observed)	Lg Ck Catch/Set (Modified Observed)	Total Ck Catch/Set (Modified Observed)
3	16-Jul	29	11	17	17	45	4	1	1	2	12	18	19	49	0.41	0.61	0.67	1.69
3	17-Jul	37	3	6	24	33	2	0	0	1	3	6	25	35	0.09	0.17	0.68	0.95
3	20-Jul	24	1	3	8	12	3	1	1	2	2	4	10	15	0.07	0.15	0.41	0.63
3	21-Jul	22	2	0	6	8	1	0	0	1	2	0	7	9	0.10	0.01	0.30	0.41
3	24-Jul	28	2	0	3	5	3	1	1	2	3	1	5	8	0.09	0.02	0.17	0.29
3	25-Jul	26	0	0	6	6	6	1	1	4	1	1	10	12	0.05	0.04	0.37	0.46
3	29-Jul	23	7	8	8	23	1	0	0	1	7	8	9	24	0.31	0.36	0.37	1.04
3	30-Jul	31	3	4	10	17	3	1	1	2	4	5	12	20	0.12	0.15	0.38	0.65
3	31-Jul	29	2	2	11	15	4	1	1	2	3	3	13	19	0.10	0.09	0.46	0.66
3	03-Aug	29	19	8	3	30	14	3	3	9	22	11	12	44	0.76	0.36	0.40	1.52
3	Avg	28													0.21	0.20	0.42	0.83
3	Total	278	50	48	96	194	41	9	7	25	59	55	121	235				
4	16-Jul	20	2	0	1	3	0	0	0	0	2	0	1	3	0.10	0.00	0.05	0.15
4	17-Jul	10	0	1	1	2	1	0	0	1	0	1	2	3	0.02	0.12	0.16	0.30
4	20-Jul	21	1	1	3	5	2	0	0	1	1	1	4	7	0.07	0.06	0.20	0.33
4	21-Jul	30	0	0	3	3	1	0	0	1	0	0	4	4	0.01	0.01	0.12	0.13
4	24-Jul	17	0	1	4	5	0	0	0	0	0	1	4	5	0.00	0.06	0.24	0.29
4	25-Jul	27	0	2	10	12	6	1	1	4	1	3	14	18	0.05	0.11	0.51	0.67
4	29-Jul	16	0	0	2	2	1	0	0	1	0	0	3	3	0.01	0.01	0.16	0.19
4	30-Jul	18	0	2	1	3	0	0	0	0	0	2	1	3	0.00	0.11	0.06	0.17
4	31-Jul	14	0	1	5	6	0	0	0	0	0	1	5	6	0.00	0.07	0.36	0.43
4	03-Aug	20	5	2	0	7	0	0	0	0	5	2	0	7	0.25	0.10	0.00	0.35
4	04-Aug	44	3	1	9	13	1	0	0	1	3	1	10	14	0.07	0.03	0.22	0.32
4	05-Aug	29	5	0	9	14	1	0	0	1	5	0	10	15	0.18	0.01	0.33	0.52
4	08-Aug	0													0.06	0.06	0.20	0.32
4	17-Aug	0													0.06	0.06	0.20	0.32
4	18-Aug	0													0.06	0.06	0.20	0.32
4	20-Aug	0													0.06	0.06	0.20	0.32
4	21-Aug	0													0.06	0.06	0.20	0.32
4	22-Aug	0													0.06	0.06	0.20	0.32
4	23-Aug	0													0.06	0.06	0.20	0.32
4	24-Aug	0													0.06	0.06	0.20	0.32
4	25-Aug	0													0.06	0.06	0.20	0.32
4	26-Aug	0													0.06	0.06	0.20	0.32
4	02-Sep	0													0.06	0.06	0.20	0.32
4	03-Sep	0													0.06	0.06	0.20	0.32
4	Avg	22.17													0.06	0.06	0.20	0.32
4	Total	266	16	11	48	75	13	3	2	8	19	13	56	88				
3&4	Total	544	66	59	144	269	54	11	10	33	77	69	177	323	0.14	0.13	0.31	0.57

FIGURES

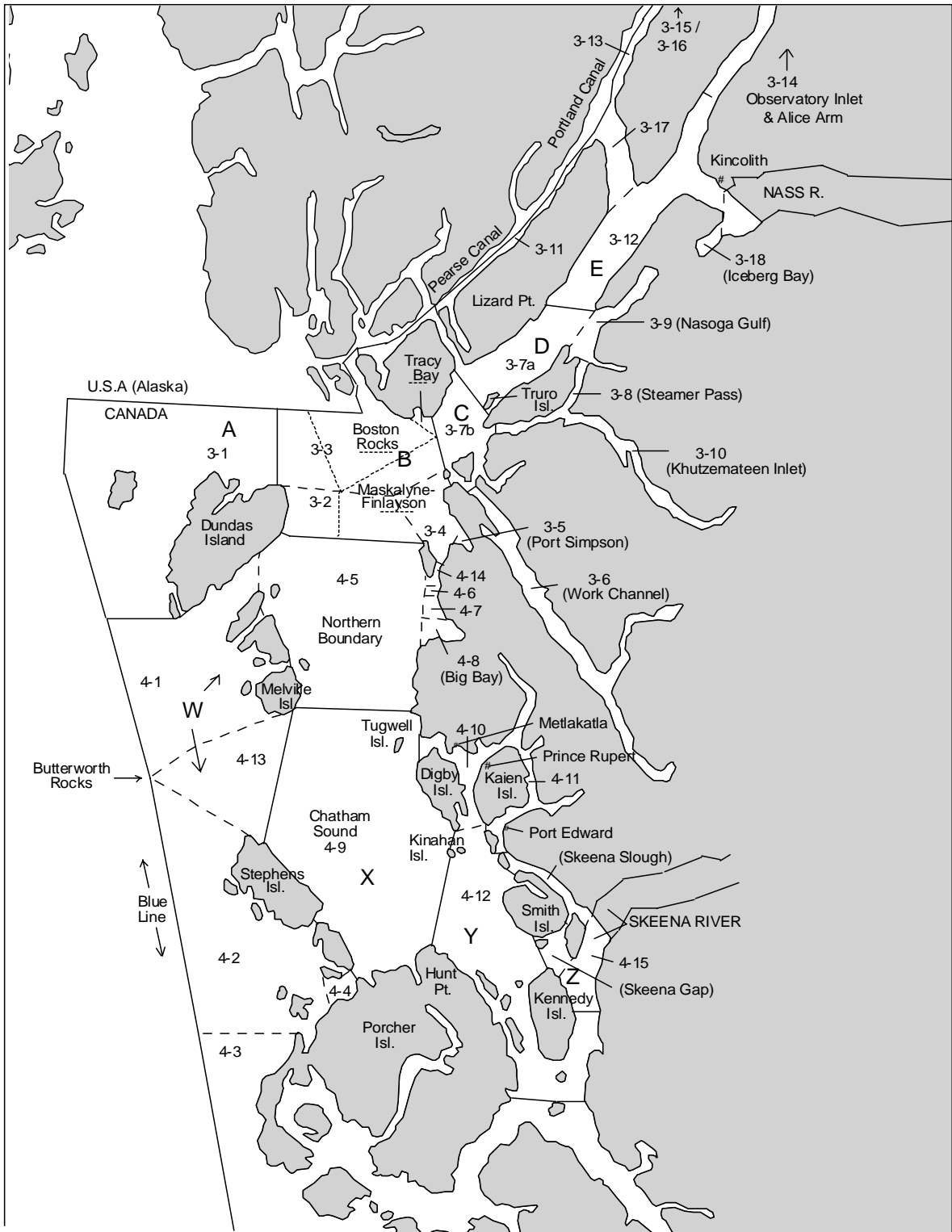


Figure 1: Pacific Fishery Management Area 3 & 4 Map

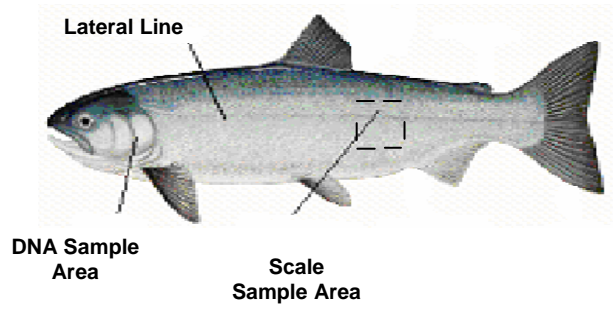


Figure 2: Scale and Tissue Sample Extraction Locations



Figure 3: Location of Statistical Areas in Northern British Columbia

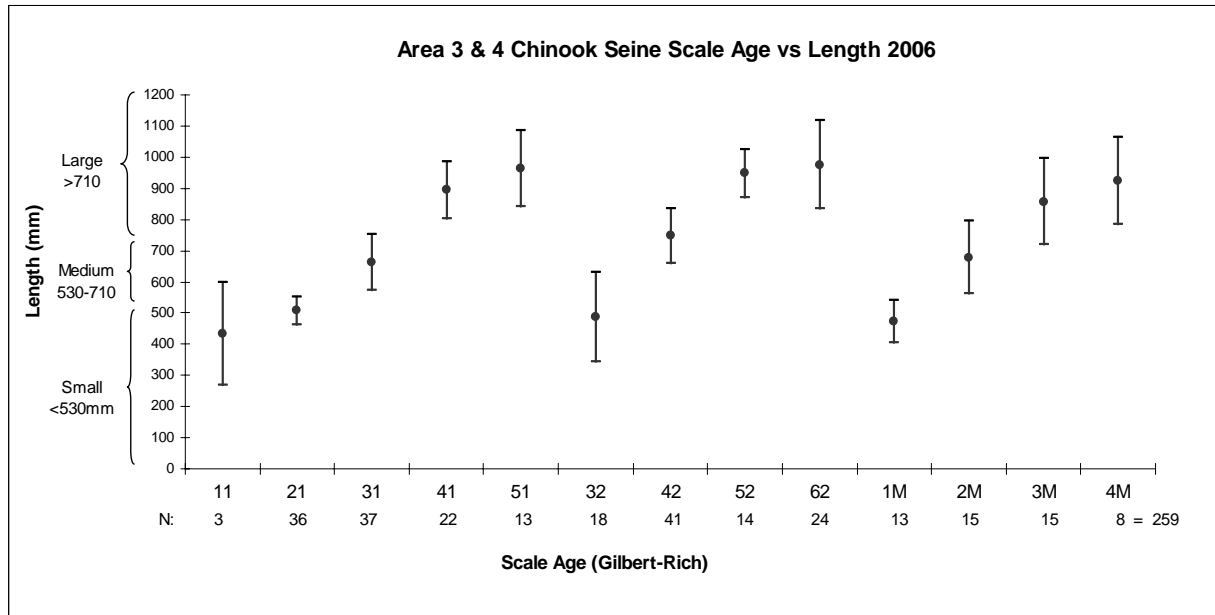


Figure 4: Area 3 & 4 Chinook Seine Age by Length Distribution, (2006)

## APPENDICES

Appendix 1: Area 3 &amp; 4 chinook Seine DNA Baseline, (2006)

Code	Region	Population	N	Code	Region	Population	N
1	UPFR	Bowron	176	5	SOTH	M.Shuswap	376
1	UPFR	Dome	385	5	SOTH	Salmon@SA	214
1	UPFR	Fontoniko	63	5	SOTH	SouthThom	267
1	UPFR	Goat	77	6	LWTH	Bonaparte	308
1	UPFR	Holmes	216	6	LWTH	Coldwater	279
1	UPFR	Horsey	41	6	LWTH	Deadman	299
1	UPFR	Indianpoint	47	6	LWTH	Louis	577
1	UPFR	James	57	6	LWTH	Nicola	468
1	UPFR	KennethCr	78	6	LWTH	Spius	136
1	UPFR	McGregor	126	6	LWTH	U.ColdwatSP	141
1	UPFR	MorkillRiver	208	6	LWTH	U.SpiousSP	128
1	UPFR	RChehalis	127	7	ECVI	BigQualicum	374
1	UPFR	RChilliwack	163	7	ECVI	BigQul@Lang	293
1	UPFR	Salmon@PG	263	7	ECVI	Cowichan	684
1	UPFR	Slim	204	7	ECVI	L.Qualicum	209
1	UPFR	Swift	411	7	ECVI	NanaimoF	546
1	UPFR	TeteJaune	488	7	ECVI	NanaimoSP	99
1	UPFR	TorpyRiver	170	7	ECVI	NanaimoSU	281
1	UPFR	Walker	42	7	ECVI	NanaimoUpper	118
1	UPFR	Willow	85	7	ECVI	Nimpkish	57
1	MUFR	Baezaeko	82	7	ECVI	PuntledgeF	716
1	MUFR	Bridge	425	7	ECVI	PuntledSU	1326
1	MUFR	Chilako	45	7	ECVI	Quatse	38
1	MUFR	Chilcotinmix	47	7	ECVI	Quinsam	457
1	MUFR	Chilko	270	7	ECVI	WossLake	31
1	MUFR	Cottonwood	53	8	WCVI	Burman	273
1	MUFR	Elkin	235	8	WCVI	ColonialCay	58
1	MUFR	Endako	87	8	WCVI	Conuma	456
1	MUFR	Horsefly	58	8	WCVI	GoldR	93
1	MUFR	L.Cariboo	33	8	WCVI	Kennedy	239
1	MUFR	L.Chilcoti	232	8	WCVI	Marble@NVI	507
1	MUFR	Nazko	193	8	WCVI	Nahmint	412
1	MUFR	Nechako	577	8	WCVI	Rob@Gold	224
1	MUFR	Portage	201	8	WCVI	Rob@Muchalat	33
1	MUFR	Quesnel	565	8	WCVI	Robertson	386
1	MUFR	Stuart	555	8	WCVI	SanJuan	196
1	MUFR	Taseko	200	8	WCVI	Sarita	415
1	MUFR	U.Cariboo	171	8	WCVI	Sooke	58
1	MUFR	U.Chilcotin	277	8	WCVI	Stamp	303
1	MUFR	Westroad	39	8	WCVI	Tahsis	310
1	LWFR-F	Chilliwac@Stav	375	8	WCVI	Thornton	518
1	LWFR-F	Harrison	603	8	WCVI	Tlupana	66
1	LWFR-F	WChilliwack	481	8	WCVI	ToquartRiver	87
1	NOTH	Barriere	55	8	WCVI	Zeballos	34
1	NOTH	BlueRiver	51	9	SOMN	Bute	72
1	NOTH	Clearwater	262	9	SOMN	Capilano	126
1	NOTH	Finn	171	9	SOMN	Devereux	329
1	NOTH	LemieuxCreek	98	9	SOMN	Homathko	52
1	NOTH	N.Thom@Main	115	9	SOMN	Klinaklini	448
1	NOTH	Raft	248	9	SOMN	PorteauCove	357
1	SOTH	Bessette	59	9	SOMN	Squamish	157
1	SOTH	DuteauCr	46	10	NOMN	Ashlum	64
1	SOTH	Eagle	42	10	NOMN	Atnarko	275
1	SOTH	L.Adams	208	10	NOMN	Chuckwalla	279
1	SOTH	L.Shuswap	356	10	NOMN	DeanRiver	66
1	SOTH	L.Thompson	173	10	NOMN	Docee	107
1	SOTH	Little	158	10	NOMN	Hirsch	474

## Appendix 1 Cont: Area 3 &amp; 4 chinook Seine DNA Baseline, (2006)

Code	Region	Population	N	Code	Region	Population	N
10	NOMN	Kateen	134	41	Yukon Alaska mid	Tranquil	342
10	NOMN	Kilbella	161	50	Puget Sound	Green@KendalF	50
10	NOMN	Kildala	441	50	Puget Sound	GreenF@Soos	100
10	NOMN	Kitimat	482	50	Puget Sound	LittleCampbell	89
10	NOMN	Kitlope	201	50	Puget Sound	NooksackSP@Ke	100
10	NOMN	Kwinamass	362	50	Puget Sound	Serpentine	46
10	NOMN	Neechanze	57	50	Puget Sound	SkagitSu	282
10	NOMN	Nusatsum	43	50	Puget Sound	SkykomishSu	75
10	NOMN	Saloompt	96	50	Puget Sound	StillaguamishS	87
10	NOMN	TakiaRiver	31	50	Puget Sound	WhiteF	100
10	NOMN	U.Atnarko	155	51	Juan de Fuca	ElwhaF	99
10	NOMN	U.Dean	82	52	Coastal Wash	HohRiverSPS	59
10	NOMN	Wannock	510	52	Coastal Wash	Queets	57
11	NASS	Cranberry	164	52	Coastal Wash	QuinaultF	64
11	NASS	Damdochax	257	52	Coastal Wash	SolducF	98
11	NASS	Ishkheenickh	88	53	Low Col	AbernathyF	100
11	NASS	Kincolith	287	53	Low Col	Coweeman	77
11	NASS	Kwinageese	299	54	Up Col-Sp	ChewuchSP	100
11	NASS	Meziadin	195	54	Up Col-Sp	ChiwawaSP	100
11	NASS	Owegee	220	54	Up Col-Sp	EntiatSp	64
11	NASS	Seaskinnish	99	54	Up Col-Sp	TwispSP	100
11	NASS	Snowbank	54	55	Up Col-Su/F	DeschutesF	100
11	NASS	Tseax	180	55	Up Col-Su/F	HanfordReach	98
12	LWFR-Sp	BigSilver	115	55	Up Col-Su/F	OkanaganR	43
12	LWFR-Sp	Birkenhead	267	55	Up Col-Su/F	SilmilkameenS	195
12	LWFR-Sp	UpperPitt	103	55	Up Col-Su/F	WenatcheeSu	100
13	LWFR-Su	MariaSlough	302	56	Snake-Sp/Su	FrenchmanSP	61
14	QCI	Yakoun	201	56	Snake-Sp/Su	Imnaha	99
15	Alaska	Chickamin	116	56	Snake-Sp/Su	MarshCreek	219
15	Alaska	KingSalmon	57	56	Snake-Sp/Su	McCallHat	41
15	Alaska	Unuk	193	56	Snake-Sp/Su	McCallRiver	32
17	Taku	DudidontuR	103	56	Snake-Sp/Su	RapidSp	80
17	Taku	LittleTatsam.	204	56	Snake-Sp/Su	SalmonE.Fork	53
17	Taku	LittleTrapper	131	56	Snake-Sp/Su	SnakeS	62
17	Taku	Nahlin	116	56	Snake-Sp/Su	TucannonSP	100
17	Taku	Nakina	197	56	Snake-Sp/Su	UpperValley	77
18	Stikine	AndrewCreek	144	56	Snake-Sp/Su	UpSalmonSP	165
18	Stikine	Christina	216	56	Snake-Sp/Su	ValleyCreek	43
18	Stikine	CraigRiver	113	56	Snake-Sp/Su	Wenaha	43
18	Stikine	LittleTahltan	615	57	Snake-F	Lyon'sFerryF	112
18	Stikine	ShakesCreek	170	58	North & Central O	ElkRiver	68
18	Stikine	Verrett	467	58	North & Central O	EucreCreek	57
19	Skeena Upper	Bear	177	58	North & Central O	Nehalem	53
19	Skeena Upper	Slamgeesh	34	58	North & Central O	Siuslaw	37
19	Skeena Upper	Sustut	425	58	North & Central O	TraskhatF	98
20	Skeena Babine	Babine	266	58	North & Central O	TraskhatSP	48
21	Skeena Bulkley	Bulkley	585	58	North & Central O	UmpquaSmith	93
21	Skeena Bulkley	Morice	228	59	South Oregon coas	ColeRiver	49
22	Skeena Mid	Kispiox	167	59	South Oregon coas	HunterCreek	96
22	Skeena Mid	Kitwanga	288	59	South Oregon coas	LobsterCreek	49
22	Skeena Mid	SweetinRiver	44	59	South Oregon coas	PistolRiver	94
23	Skeena Lower	Cedar	116	59	South Oregon coas	Winchuk	80
23	Skeena Lower	Eestall	293	61	Klamath/Trinity	BlueCreek	94
23	Skeena Lower	Gitnadoix	42	61	Klamath/Trinity	TrinityF	100
23	Skeena Lower	L.Kalum	457	61	Klamath/Trinity	TrinitySP	100
23	Skeena Lower	L.Kalum@AC	190	62	Mid Col-Sp	JohnDaymain	36
24	Alsek	Blanchard	376	62	Mid Col-Sp	JohnDaymiddle	40
24	Alsek	Klukshu	432	62	Mid Col-Sp	JohnDaynorth	40
24	Alsek	Takhanne	187	63	Up Willamette	ClackamasNo	79
31	Yukon Teslin	Nisutlin	55	63	Up Willamette	NorthSantiam	97
39	Yukon Alaska uppe	Chemainus	261	63	Up Willamette	Sandy	89

Code	Region	Population	N	Code	Region	Population	N
64	Cent Val-F	AmericanRiver	69	64	Cent Val-F	SacrLF	96
64	Cent Val-F	BattleCreek	40	64	Cent Val-F	Toulumne	34
64	Cent Val-F	ButteF	49	64	Cent Val-F	Yuba	50
64	Cent Val-F	FeatherF	128	65	Cent Val-Sp	ButteSp	43
64	Cent Val-F	Merced	200	65	Cent Val-Sp	FeatherSp	82
64	Cent Val-F	Mokelumne	94	65	Cent Val-Sp	YubaSp	32
64	Cent Val-F	SacrF	136				

## Appendix 2: DNA Regional Population Abbreviations

#	Abbreviation	Region
1	UPFR	Upper Fraser River
2	MUFR	Middle Fraser River
3	LWFR-F	Lower Fraser River Fall
4	NOTH	North Thompson River
5	SOTH	South Thompson River
6	LWTH	Lower Thompson River
7	ECVI	East Coast of Vancouver Island
8	WCVI	West Coast of Vancouver Island
9	SOMN	Southern Mainland BC
10	NOMN	Northern Mainland BC
11	NASS	Nass River
12	LWFR-Sp	Lower Fraser River Spring
13	LWFR-Su	Lower Fraser River Summer
14	QCI	Yakoun River
15	Alaska	Alaska
17	Taku	Taku River
18	Stikine	Stikine River
19	Skeena Upper	Skeena Upper
20	Skeena Babine	Skeena Babine
21	Skeena Bulkley	Skeena Bulkley
22	Skeena Mid	Skeena Mid
23	Skeena Lower	Skeena Lower
19-23	Skeena	Skeena regions combined
24-49	Alsek	Alsek
50	Puget Sound	Puget Sound
51	Juan de Fuca	Juan de Fuca Strait
52	Coastal Wash	Coastal Washington
53	Low Col	Lower Columbia
54	Up Col-Sp	Upper Columbia spring timed
55	Up Col-Su/F	Upper Columbia summer & fall timed
56	Snake-Sp/Su	Snake River spring & summer timed
57	Snake-F	Snake River fall timed
58	Oregon coastal	Oregon coastal
59	S.Oregon/Cal coast	Southern Oregon Coastal and California Coastal
61	Up Klam/Trinity	Upper Klamath & Trinity
62	Mid Col-Sp	Middle Columbia Spring timed
63	Up Willamette	Upper Willamette
64	Cent Val-F	Central Valley fall timed
65-405	Cent Val-Sp	Central Valley spring timed



## Appendix 3: Area 3 chinook Seine Sampling Information, (2003 &amp; 2004)

Day-Month	2003 Samples	2003 Effort	2003 chinook Hail Released	2004 Samples	2004 Effort	2004 chinook Hail Released
12-Jul				22	28	429
13-Jul				19	37	416
14-Jul	25	30	266			
15-Jul	18	31	150	17	55	901
17-Jul	27	15	78			
18-Jul		17	121			
19-Jul				13	32	253
20-Jul				13	58	531
21-Jul	20	25	131			
22-Jul	3	29	280	17	50	626
23-Jul				25	59	716
24-Jul	25	13	145			
25-Jul	8	25	187	19	47	368
27-Jul				18	30	313
28-Jul		21	200			
29-Jul	7	22	219	18	24	163
30-Jul				15	22	211
31-Jul	14	7	46			
01-Aug	10	10	129			
02-Aug				5	20	121
03-Aug				0	22	351
04-Aug		8	21			
05-Aug	3	7	91	6	48	404
07-Aug	8	4	55	12	21	341
08-Aug	2	7	71			
09-Aug				17	41	205
10-Aug				5	27	208
11-Aug		8	21			
12-Aug		6	23	7	29	157
13-Aug				28	21	194
14-Aug	4	8	19			
15-Aug	16	5	29			
18-Aug		10	28			
19-Aug		11	58			
21-Aug		7	24			
22-Aug		2	5			
Total	190	328	2397	276	671	6908

Appendix 4: Area 3 chinook Seine Stock Composition by Region by Size, (2003 &amp; 2004)

Year	2003		2004		
chinook Size	Large (>65 cm)	Small (<65 cm)	All	Large (>65 cm)	Small (<65 cm)
Number sampled	124	66	272	194	78
Alaska	1.70%	0.70%			
Taku River	1.20%	2.30%			
Stikine River	14.60%	7.90%	2.60%	2.60%	2.60%
Nass River	17.50%	1.10%	0.40%	0.50%	0.00%
Skeena River	24.00%	9.90%	30.50%	38.70%	10.30%
Yakoun River, Queen Charlotte Islands	0.00%	1.50%			
Northern Mainland of British Columbia	9.80%	13.60%	8.10%	7.70%	9.00%
West Coast of Vancouver Island	7.30%	9.00%	23.50%	30.40%	6.40%
East Coast of Vancouver Island	11.40%	19.60%	12.90%	8.80%	23.10%
Southern Mainland of British Columbia	0.80%	3.30%	0.70%	0.00%	2.60%
Middle Fraser River			0.40%	0.50%	0.00%
Lower Fraser River	0.00%	1.90%			
Lower Fraser River fall timed			0.40%	0.00%	1.30%
South Thompson River	2.80%	0.00%	4.80%	5.20%	3.80%
Lower Thompson River	0.30%	0.00%			
Puget Sound	0.90%	17.80%	7.40%	3.10%	17.90%
Juan de Fuca Strait	0.00%	3.30%	0.40%	0.00%	1.30%
Coastal Washington	0.90%	0.00%			
Lower Columbia & Willapa Bay	1.50%	2.50%	0.40%	0.00%	1.30%
Upper Columbia summer & fall timed	3.50%	5.60%	7.40%	2.60%	19.20%
Snake River fall timed			0.40%	0.00%	1.30%
Oregon	1.80%	0.00%			