DNA Stock Composition of the Chinook Salmon Catch

in WCVI Troll Fisheries from April 2012 - March 2013,

Report to Southern Endowment Fund: Project #57558

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ABSTRACT

In response to weak stock management the timing of the West Coast Vancouver Island (WCVI) troll fishery has moved away from the predominantly late spring to summer time period to be more evenly distributed throughout the year. However, international management of the WCVI troll fishery uses coded-wire tag (CWT) recoveries from the 1979-1982 base period to estimate current fishery impacts. In order to more accurately characterize the stock composition of the WCVI troll fishery catch throughout the year, genetic (DNA) samples were collected from a target of 4% of the total catch. Samples from a target of 2% of the total catch were analysed using the Genetic Analysis of Pacific Salmon (GAPS) baseline. The primary project objective was met: a total of 6,226 samples were collected from a total commercial troll catch of 65,712 Chinook, with a total of 2,091 samples analysed for stock composition. The project was completed on budget.

ACKNOWLEDGMENTS

Financial support for the project was provided by the Southern Endowment Fund of the Pacific Salmon Commission as well as the Department of Fisheries and Oceans. Sample collection was conducted by J.O. Thomas and Associates Ltd. Samples were analysed by the Pacific Biological Station's Genetics Laboratory. Lee Kearey provided support for sample collection, and data management and analysis.

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INTRODUCTION

DNA can provide information on stock group specific impacts of the West Coast Vancouver Island (WCVI) troll fishery. This is important for managing the WCVI troll fishery since limited coded-wire tag (CWT) information exists for non-summer portions of the year. In response to domestic conservation requirements in recent years, the timing of the WCVI troll fishery has shifted slightly compared to the Pacific Salmon Commission (PSC) Chinook model base period (1979-82). During the base period, fishery impacts occurred mainly from March to October, whereas recently, fishery impacts have shifted away from summer months to avoid weak stocks, and expanded further into the winter months. Additionally, catches are currently considerably lower that they were during the base period. Consequently, the current impacts of the WCVI troll fishery as determined by the PSC Chinook model (using CWT data from the base period) may not be comparable. In addition, the relatively low numbers of CWT recovered by the Mark Recovery Program (MRP) from the lower catch levels may not be sufficient to accurately identify fishery impacts from the smaller catches characteristic of winter fishery openings, especially on the monthly time scale required. The use of DNA methods provides an independent means of evaluating the impact of this fishery on chinook stocks, and is used to supplement CWT information to provide the best available estimate of impact on stocks. 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 Pacific Salmon Treaty (PST) while minimizing economic disruption associated with elimination of fisheries. This report summarizes the fifth year of this study.

The program objectives were to:

1) Determine the stock composition of WCVI troll Chinook fisheries from April 2012 to March 2013 using DNA analysis techniques.
2) Determine stock composition of legal versus sub-legal Chinook from representative and comparative samples taken in September 2013.

METHODS

Fishery Sampling

Legal Chinook from Full Fleet fisheries

The Area G troll fishery catch is sampled through the MRP. The goal of the MRP is to sample 20% of the total Area G troll catch to detect and recover CWTs according to a stratified random design (strata=Pacific Fishery Management Area (PFMA) and statistical week). The MRP contractor was tasked with randomly sub-sampling their 20% MRP sample for DNA, with a minimum objective of 4% of the catch. The DNA sampling protocol is outlined in Appendix 1. In addition to Area G troll fishery sampling, additional AABM Chinook samples were obtained from the T'aaq-wiihak (Aboriginal

Demonstration Fishery which operates in similar time-areas as the Area G fishery) catch monitoring program, and from the WCVI recreational creel program.

Legal versus Sub-legal Chinook

DNA samples from a total of eight time periods have been taken to compare the stock composition of sub-legal sized with legal sized Chinook. These include May/June 1998 and 2002, May, June and September 2008-2011. May/June 1998 and 2002 samples were taken from archived scale samples. In 2008, sublegal Chinook samples were collected by a small number of volunteer trollers. These samples were contrasted against legal Chinook DNA samples collected through the dockside MRP. From 2009 to 2012, an Area G troller was contracted to collect both legal and sublegal Chinook DNA samples from Area 123, troll zones 8, 10, 13, 16, and 15A. All Chinook caught were sampled for DNA by taking a tissue plug with a handheld hole punch from the tail fin. All Chinook caught were released.

Monitoring and Quality Assurance/Quality Control

Sample collection was monitored on a monthly basis. Samples were inventoried and labelled upon receipt, and the vial data corroborated with the data sheets provided. Sampling rates by PFMA were evaluated after each fishery period, and if needed, feedback was provided to the contractor.

Genetic Stock Identification Analysis

Baseline Populations

The baseline survey consisted of microsatellite analysis of chinook salmon from 218 locations from south-east Alaska to California (Table 2). Forty-three regional groupings of populations have been identified based on genetic stock structure and the ability to accurately estimate known mixtures on of these groupings (Seeb et al. 2007). All annual baseline samples available for a specific sample location were combined to estimate population allele frequencies, as was recommended by Waples (1990).

Estimation of Stock Composition

Analysis of fishery samples was conducted with a Bayesian procedure (BAYES) as outlined by Pella and Masuda (2001). Each locus was assumed to be in Hardy-Weinberg equilibrium, and expected genotypic frequencies were determined from the observed allele frequencies and used as model inputs. For BAYES, the initial FORTRAN-based computer program as outlined by Pella and Masuda (2001) required large amounts of computer analytical time when applied to stock identification problems with a baseline as comprehensive as employed in the current study. Given this limitation, a new version of the program was developed by our laboratory as a C-based program which is available from the Molecular Genetics Laboratory website (Neaves et al. 2005). In the analysis, ten 20,000-iteration Monte Carlo Markov chains of estimated stock compositions were produced, with initial starting values for each chain set at 0.90 for a particular population which was different for each chain. Estimated stock compositions were considered to have converged when the shrink factor was < 1.2 for the 10 chains (Pella and Masuda 2001). The last 1,000 iterations from each of the 10

chains were then combined, and for each fish the probability of originating from each population in the baseline was determined. These individual probabilities were summed over all fish in the sample, and divided by the number of fish sampled to provide the point estimate of stock composition. Standard deviations of estimated stock compositions were determined from the last 1,000 iterations from each of the 10 chains incorporated in the analysis.

RESULTS AND DISCUSSION

Fishery Sampling

The project objectives were met as described below:

Objective 1: Stock Composition Estimates of the WCVI Chinook Troll Fishery Catch:

All Area G troll fisheries from April 2012 to March 2013 were sampled for DNA with the exception of small catches (<350 fish) in April-SWVI, October through December-NWVI and February-SWVI (Table 1). Samples collected from the T'aaq-wiihak troll fishery were combined with Area G samples where the fisheries occurred in the same time-area. A total of 5,647 DNA samples were collected from a total Area G/T'aaq-wiihak catch of 65,712 Chinook. An additional 144 sport DNA samples were obtained through the WCVI creel program to provide stock composition data for August (for a total of 6,226 DNA samples). DNA samples were collected from 4.0% to 62.7% of the monthly catch (average of 21.3%) in each stratum (NWVI, SWVI) and month when sampling occurred.

Of samples collected, the goal was to analyse samples from approximately 2% of the total Area G troll catch in each catch region and month (or a minimum of 100 plugs), totalling a projected 3,000 samples for the project duration. DNA samples were analysed from 1.9% to 29.2% of the total catch (average of 7.2%) in each stratum (NWVI, SWVI) and month when sampling occurred. The exception was May 2012 (NWVI) when data were obtained for only 0.7% of total catch due to sample contamination.

Samples were selected to be representative of the catch in each PFMA and then rolled up to the catch region (NWVI, SWVI) level. Of the 6,226 DNA samples collected, 2,091 samples were analysed by the PBS molecular genetics lab at a cost of $17 per fish. In addition, data were obtained from July 2012 (n=389 samples) which were paid for by T'aaq-wiihak fishery catch monitoring funding, for a total of 2,480 samples. Of these 2,480 samples, we obtained data for 2,225 samples. Stock composition results by month and catch region are found in Tables 3 (commercial) and 4 (sport).

Objective 2: Stock Composition Estimates of Legal versus Sub-legal Chinook:

The sampling goal was to collect approximately 200 legal and 200 sub-legal samples. A total of 175 legal and 260 sub-legal samples were collected (Table 1). All fish encountered were sampled. No samples were processed.

Monitoring and Quality Assurance/Quality Control

Objective 1: Stock Composition Estimates of the WCVI Chinook Troll Fishery Catch:

The project met quality standards. Overall, samples were collected according to the protocol, and were representative of the fishery catch by time and area. There was an issue with sample quality during the early part of May (NWVI sample) when vials were returned to the DFO containing a non-ethanol preservative solution which resulted in the complete failure of DNA amplification during analysis. As a result, 300 samples were unusable. This issue was brought to the attention of the contractor, and the issue subsequently satisfactorily addressed by the contractor.

There were no other issues with sample quality. Samples and data sheets were delivered on schedule.

Objective 2: Stock Composition Estimates of Legal versus Sub-legal Chinook:

The objective was not met due to an error was made in the collection of sub-legal/legal Chinook DNA samples. The contracted troller collecting the samples did not keep samples separate by size ((legal/sublegal) as instructed and instead kept samples separate by mark status (clipped/unclipped). As a result, the samples were not analysed.

Sampling protocols were reviewed with the contracted troller at the dock prior to sampling. This was deemed sufficient since the troller had conducted the work previously. However, if this sampling is to be conducted in the future, it is recommended that on-board training by DFO staff at the start of sampling be provided, as it had in the previous three years.

FINANCIAL STATEMENT

The total overall allocated Southern Endowment Fund budget was $87.083 (Canadian funds). The DFO in-kind contribution was estimated at $12,083. Below is a summary of the proposed and actual costs, with a detailed Financial Statement of Expenditures (verified by our financial officer) provided in Appendix 3.

Proposed and actual direct costs and DFO in-kind contributions are as follows:

Direct		Proposed	Actual
▪ DNA sampling (J.O. Thomas and Associates Ltd.)	=	$17,000	$19,408
▪ Area G vessel costs (sublegal sampling)	=	$5,000	$7,075
▪ DNA lab analysis	=	$51,000	$37,500
▪ Data analysis/project oversight	=	$0	$6,788
▪ DNA sampling equipment	=	$700	$0
▪ travel expenses / shipping	=	$1,300	$49
TOTAL PSC	**=**	**$75,000**	**$70,820**

DFO – In Kind

- Project consultation,
  (1 staff @5 days @7.5 hr/day @$45/hr) = $1,688
- Project management
  (1 staff @30 days @7.5 hr/day @$42/hr) = $9,450
- Administrative Coordinator
  (1 staff @3 days @7.5 hr/day @$42/hr) = $945

TOTAL IN-KIND = $12,083

TOTAL ACTUAL COSTS = *$82,903*

DNA sampling costs were approximately as expected. Area G vessel costs for sub-legal Chinook sampling were slightly higher than anticipated as catch rates were lower, requiring an additional sampling day. Area G troll fishery catches were lower than anticipated, resulting in lower numbers of samples analysed and a lower than expected DNA lab analysis cost. A modest portion of the unused DNA lab analysis funds were used to analyse the data and provide some project oversight in the temporary absence of the primary project manager. The DNA sampling materials cost was unused. Travel and shipping costs were lower than proposed since travel was conducted in conjunction with another project. Samples were typically dropped off at a DFO office by JOT staff. In-kind costs were as anticipated.

PROJECT BENEFITS

This project relates to the harvest rate indices prescribed in the PST for chinook salmon in the WCVI Aggregate Abundance Based Management (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 processes 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 may increase TAC in future years. Local WCVI communities will benefit from greater fishing activity in their areas, improving their economic outlook.

LITERATURE CITED AND ADDITIONAL REFERENCES

Banks, M. A., Blouin, M. S., Baldwin, B. A., Rashbrook, V. K., Fitzgerald, H. A., Blankenship, S. M and Hedgecock, D. 1999. Isolation and inheritance of novel microsatellites in chinook salmon (Oncorhynchus tshawytscha). J. Hered. 90: 281-288.

Beacham, T. D., M. Wetklo, C. Wallace, J. B. Olsen, B. G. Flannery, J. K. Wenburg, W. D. Templin, A. Antonovich, and L.. W. Seeb. 2008a. The application of microsatellites for stock identification of Yukon River Chinook salmon. North American Journal of Fisheries Management 28: 283-295.

Beacham, T. D., S. Urawa, K. D. Le, and M. Wetklo 2008b. Population structure and stock identification of chum salmon from Japan determined with microsatellite DNA variation. Fisheries Science 74: 983-994.

Buchholz W.G, S. J. Miller, and W. J. Spearman . 2001. Isolation and characterization of chum salmon microsatellite loci and use across species. Animal Genetics 32: 160-167.

Cairney, M., Taggart, J. B., and Hoyheim, B. 2000. Characterization of microsatellite and minisatellite loci in Atlantic salmon (Salmo salar L.) and cross-species amplification in other salmonids. Mol. Ecol. 9: 2175-2178.

Neaves, P. I., C. G. Wallace, J. R. Candy, and T. D. Beacham. 2005. CBayes: Computer program for mixed stock analysis of allelic data. Version v4.02. Free program distributed by the authors over the internet from http://www.pac.dfo-mpo.gc.ca/sci/mgl/Cbayes_e.htm

Nelson, R. J., and T. D. Beacham. 1999. Isolation and cross species amplification of microsatellite loci useful for study of Pacific salmon. Animal Genetics. 30: 228-229.

Olsen, J. B., S. L. Wilson, E. J. Kretschmer, K. C. Jones, and J. E. Seeb. 2000. Characterization of 14 tetranucleotide microsatellite loci derived from sockeye salmon. Molecular Ecology 9: 2185-2187.

Pella, J. and Masuda, M. 2001. Bayesian methods for analysis of stock mixtures from genetic characters. Fish. Bull. 99: 151-167.

Rexroad, C. E., Coleman, R. L, Martin, A. M., Hershberger, W. K., and Killefer, J. 2001. Thirty-five polymorphic microsatellite markers for rainbow trout (*Oncorhynchus mykiss*). Animal Genetics 32: 283-319

Seeb, L. W., and co-authors. 2007. Development of a standardized DNA database for Chinook salmon. Fisheries 32(11):540-552.

Smith, C. T., Koop, B. F., and Nelson, R. J. 1998. Isolation and characterization of Coho salmon (Oncorhynchus kisutch) microsatellites and their use in other salmonids. Mol. Ecol. 7: 1613-1621.

Spies, I. B., D. J. Brasier, P. T. L. O'Reilly, T. R. Seamons, and P. Bentzen. 2005. Development and characterization of novel tetra-, tri-, and dinucleotide microsatellite markers in rainbow trout (Oncorhynchus mykiss). Molecular Ecology Notes 5: 278-281.

Waples, R. S. 1990. Temporal changes of allele frequency in Pacific salmon: implications for mixed-stock fishery analysis. Canadian Journal of Fisheries and Aquatic Sciences 47(5):968-976.

Williamson, K. S., J. F. Cordes, and B. P. May. 2002. Characterization of microsatellite loci in Chinook salmon (Oncorhynchus tshawytscha) and cross-species amplification in other salmonids. Molecular Ecology Notes 2: 17-19.

Withler, R. E, Le, K. D., Nelson, R. J., Miller, K. M., and Beacham, T. D. 2000. Intact genetic structure and high levels of genetic diversity in bottlenecked sockeye salmon, Oncorhynchus nerka, populations of the Fraser River, British Columbia, Canada. Can. J. Fish. Aquat. Sci. 57: 1985-1998.

TABLES

Table 1. Chinook catch, number of DNA samples collected and analysed, and percent of catch sampled and analysed, by fishery, month and catch region stratum (SWVI, NWVI), April 2012 to March 2013. Note: NWVI = Northwest Vancouver Island; SWVI = Southwest Vancouver Island; TAAQ = T'aaq-wiihak Demonstration Fishery; n/a = not applicable.

Sampling Year	Sampling Month	Fishery Sampled	Sampling Strata	Chinook Catch	Number of DNA Plugs Collected	Actual # Plugs Analysed	Percent of Catch Sampled	Percent of Catch Analysed
2012	April	Area G	SWVI	339	0	0	0.0%	n/a
2012	April	Area G	NWVI	10,154	697	232	6.9%	2.3%
2012	May	Area G	SWVI	2,092	266	100	12.7%	4.8%
2012	May	Area G	NWVI *	20,242	1,296	405	6.4%	2.0%
2012	June	Area G	SWVI	No Fishery				
2012	June	Area G	NWVI	No Fishery				
2012	July	TAAQ	SWVI **	830	316	302	38.1%	36.4%
2012	July	TAAQ	NWVI	294	87	87	29.6%	29.6%
2012	August	Area G/TAAQ	SWVI	5,662	736	110	13.0%	1.9%
2012	August	Area G/TAAQ	NWVI	3,070	520	301	16.9%	9.8%
2012	August	WCVI Sport	SWVI	12,021	83	65	0.7%	0.5%
2012	August	WCVI Sport	NWVI	9,995	61	58	0.6%	0.6%
2012	September	Area G	SWVI	13,143	530	263	4.0%	2.0%
2012	September	Area G	NWVI	4,121	408	185	9.9%	4.5%
2012	September	Area 123 Sublegal	SWVI	260	260	0	n/a	n/a
2012	September	Area123 Legal	SWVI	175	175	0	n/a	n/a
2012	October	Area G	SWVI	3,192	172	80	5.4%	2.5%
2012	October	Area G	NWVI	152	0	0	0.0%	n/a
2012	November	Area G	SWVI	171	62	50	36.3%	29.2%
2012	November	Area G	NWVI	59	0	0	0.0%	n/a
2012	December	Area G	SWVI	252	102	32	40.5%	12.7%
2012	December	Area G	NWVI	60	0	0	0.0%	n/a
2013	January	Area G	SWVI	246	50	0	20.3%	n/a
2013	January	Area G	NWVI	772	110	48	14.2%	n/a
2013	February	Area G	SWVI	17	0	0	0.0%	n/a
2013	February	Area G	NWVI	341	160	79	46.9%	n/a
2013	March	Area G	SWVI	51	32	32	62.7%	n/a
2013	March	Area G	NWVI	452	103	51	22.8%	n/a
			Area G/TAAQ	**65,712**	**5,647**	**1,968**	**21.3%**	**7.2%**
			TAAQ only		**403**	**389**		
			Sport Catch	**22,016**	**144**	**123**	**0.7%**	**0.6%**
			Total	**88,163**	**6,226**	**2,480**	**16.2%**	**9.9%**

* Data were obtained for only 150 of the 405 samples submitted due to sample contamination.

** Analysis was paid for by T'aaq-wiihak funding (n=389 samples).

Table 2. The GAPS baseline of 218 sample sites/populations from north to south by regional genetic groups used to estimate stock composition of Chinook salmon fisheries in southern British Columbia Area G troll and sport 2012-2013.

Regional Genetic Group	Populations
South East Alaska	Chickamin_H, Chickamin_R, Clear_Cr, Cripple_Cr, Keta_R, King_Cr
Alsek R	Blanchard, Klukshu, Takhanne, Goat_Cr, Kudwat_Cr
Taku R	Little_Tatsamenie, Nahlin, Little_Trapper, Nakina, Dudidontu, Tseta, Kowatua, Hackett_r, Tatsamenie, Yeth_Cr
Stikine R	Little_Tahltan, Christina, Verrett, Shakes_Cr, Craig, Johnny_Tashoot, Tahltan_R, Tashoots_Cr
Nass R	Kwinageese, Damdochax, Meziadin, Owegee, Seaskinnish, Tseax, Cranberry, Snowbank, Kincolith, Teigen, Ishkheenickh, Kiteen
Upper Skeena R	Bear, Sustut, Slamgeesh, Kluatantan, Kluayaz_Cr, Squingula_R, Kuldo_C, Otsi_Cr, Sicintine_R
Bulkley/Babine R	Babine, Bulkley_Early, Suskwa, Morice_R
Middle Skeena R	Kitwanga, Kispiox, Sweetin, Shegunia_R, Kitseguecla_R, Nangeese_R
Lower Skeena R	Ecstall, Kitsumkalum_R, Exchamsiks, Cedar_Early, Gitnadoix, Thomas_Cr, Exstew_R, Kasiks_R, Zymogotitz_R, Fiddler_Cr, Khyex_R
Haida Gwaii	Yakoun R
Northern Mainland	Kitimat, Wannock_R, Atnarko, U_Atnarko, Kilbella, Chuckwalla, Kildala, Nusatsum, Ashlulm, U_Dean, Docee, Takia, Dean, Kitlope, Kateen, LowAtnarko
Southern Mainland	Klinaklini, Devereux, Phillips, Capilano, Cheakamus, Cheakamus_F, Cheakamus_Su
Upper Fraser R	Salmon-Prince George, Tete Jaune, Bowron R, Goat R, Holmes Swift, Slim C, Indianpoint, Willow_R, Fontoniko, McGregor Kenneth_Cr, Morkill, Torpy, James Cr
Middle Fraser R	Quesnel, Stuart, Nechako, Chilko, Bridge, Cottonwood, Elkin_R U_Chilcotin, Portage_C, Horsefly, L_Cariboo, L_Chilcotin Westroad, Endako, Taseko, Chilako, Kuzkwa_Cr, U_Cariboo, Nazko, Baezaeko, Baker_Cr
North Thompson R	Raft_R, Finn, Clearwater, Barriere, Blue, Lemieux_Cr, N_Thom@Main
South Thompson R	L_Shuswap, M_Shuswap, Eagle_R, Salmon@SA, L_Adams, South_Thom, Little_R, L_Thompson, Bessette, Duteau_Cr, Seymour@Thomp
Lower Thompson R	Nicola, Coldwater, Spius, Deadman, Bonaparte, Louis, U_Coldwat_SP, U_Spius_SP
Lower Fraser R Falls	Harrison Chilliwack_F, Chilliwac@Stave River
Lower Fraser R Springs	Big_Silver, Birkenhead, Upper_Pitt, Sloquet_Cr. BlueCr@Pitt
Lower Fraser R Summer	Maria_Slough
East Coast Vancouver Island	Big_Qualicum, Quinsam, Nanaimo_SU, Cowichan, Chemainus, Nimpkish, L_Qualicum, Nanaimo_F, Puntledge_Su, Puntledge_F, Nanaimo_SP, NanaimoUpper, Puntledge_BackX

West Coast Vancouver Island	Robertson, Conuma, Nitinat, Kennedy, Thornton, Marble@NVI, Sarita, Nahmint, Tranquil, San_Juan, Burman, Toquart, Gold_R, Zeballos, Tahsis, Tlupana, Sooke, Megin_R, Kaouk_R, Moyeha_R
Juan de Fuca	Dungeness_R
North Puget Sound	L_Sauk_R, L_Skagit_R_Fa, Marblemount_HSp, Marblemount_Hsu, NF_Nooksack_H, Samish_H, Skagit_R, Skykomish_R, Snoqualmie_R, U_Sauk_R, U_Sauk_R_SpSu, U_Skagit_R, U_Skagit_Su
South Puget Sound	Bear_Cr_SuFa, Cedar_R_SuFa, Clear_Cr_H, Grovers_Cr_H, Hupp_Sp_H, S_Prairie_Cr, Soos_H, UW_H_SuFa, Voights_H, White_H
Hood Canal	George_Adams_H, Hamma_Hamma_R, NF_Skokomish_F
Coastal Washington	Forks_Cr_H, Hoh_R, Hoko_H_Fa, Humptulips_H, Makah_H, Queets_R, Quilayute_R, Quinault_H, Sol_Duc_H
Snake R Falls	ClearwaterRFa, Lyons_Ferry_H, Nez_PerceT_H
Snake R Spring-Summers	Bear_Valley_Cr,Big_Cr,Camas_Cr, Capehorn_Cr, Catherine_Cr, Chamberlain_Cr, Crooked_Fk_Cr, Dworshak_H, Imnaha_R, Johnson_Cr, Johnson_H, Lochsa_R, Lolo_Cr, LookingGlass_H, Minam_R, Newsome_Cr, Pahsimeroi_R, Rapid_R_H, Red_R, Sawtooth_H, Secesh_R, Tucannon_H, Tucannon_R
Upper Columbia R Summer-Falls	Hanford_Reach,L_Wh_Sal_H_SF, Marion_Drain_Fa, Methow_R, Priest_Rapid_H, Priest_Rapids_H, Umatilla_H, Umatilla_H_Fa, Wells_H, Wenatchee_R_SF
Upper and Middle Columbia R Springs	American_Sp, Entiat_H, Granite_Cr, John_Day_R, JohnDay_R, LittleNaches_Sp, Methow_R_sp, MF_JohnDay_R, Naches_Sp, NF_JohnDay_R, Shitike_H, Twisp_R_Sp,U_Yakima_H, Warm_Springs_H, Wenatchee_H_sp, Wenatchee_R_sp
Deschutes R	L_Deschutes_R, U_Deschutes_R
Lower Columbia R Springs	Cowlitz_H_sp, Kalama_H_sp, Lewis_H_sp
Lower Columbia R Falls	Abernathy_Cr_Fa, Abernathy_NFH_F, Coweeman_R_Fa, Cowlitz_H_fa, Elochoman_R_Fa, Green_R_Fa, Lewis_R_f, Lewis_R_LSu, Lewis_R_Su, Sandy_R, Washougal_R_Fa
Willamette R	McKenzie_H, N_Santiam_H
North Oregon Coast	Alsea_R, Kilchis_R, Necanicum_H, Nehalem_R, Nestucca_H, Salmon_R_f, Trask_R, Wilson_R, Yaquina_R
Middle Oregon Coast	Coos_H, Coquille_R, Elk_H, Millicoma_R, S_Coos_R, S_Umpqua_H,Sixes_R,Umpqua_H
Northern California/Southern Oregon	Chetco_R
Rogue R	Applegate_Cr, Cole_Rivers_H, Columbia_Rogue
Klamath R	Klamath_R_fa, Trinity_H_sp
California Coast	Eel_R, Russian_R
Central Valley Fall	Battle_Cr, Butte_Cr_f, Feather_H_fa, Stanislaus_R
Central Valley Spring	Butte_Cr_sp, Deer_Cr_sp, Feather_H_sp,Mill_Cr_sp
Central Valley Winter	Sacramento_H

Table 3. WCVI AABM Chinook stock composition and catch by month and catch region in the WCVI commercial troll fisheries, 2012-1013.

	YEAR	2012		2012		2012		2012		2012	
	VIAL CODE	092-121		122-152		122-152		183-213		183-213	
	GEAR	Area G Troll		Area G Troll		Area G Troll		TAAQ Troll		TAAQ Troll	
	REGION	NWVI		SWVI		NWVI		SWVI		NWVI	
	COLLECTION AREA	Area 27,125-127		Area 23,24,123,124		Area 27,125-127		Area 124		Area 125	
	MONTH	April		May		May		July		July	
	SAMPLE SIZE	232 (0)		100 (0)		150 (0)		302 (6)		87 (0)	
	CHINOOK KEPT CATCH	**10,154**		**2,092**		**20,242**		**830**		**294**	
Code	**Region1**	**% Estimate**	**Catch**	**% Estimate**	**Catch**	**% Estimate**	**Catch**	**% Estimate**	**Catch**	**% Estimate**	**Catch**
1	UPFR	0.6	65	0.0	0	0.5	109	0.4	3	0.0	0
2	MUFR	0.7	72	0.0	0	0.2	46	0.7	6	0.6	2
3	LWFR-F	3.6	361	3.0	62	4.7	947	3.2	27	2.1	6
4	NOTH	0.0	0	0.1	2	0.0	6	0.3	2	0.6	2
5	SOTH	6.0	605	0.8	17	5.0	1008	5.1	43	10.1	30
6	LWTH	0.0	0	0.0	0	0.0	10	0.0	0	0.0	0
7	ECVI	3.9	393	3.5	73	5.9	1193	3.2	27	3.6	11
8	WCVI	0.0	0	1.1	23	1.5	310	2.1	18	0.0	0
9	SOMN	0.0	0	0.5	10	1.1	229	0.1	1	0.2	1
10	NOMN	0.2	21	0.0	0	0.1	14	0.0	0	0.5	1
11	NASS	0.9	89	0.0	0	0.0	0	0.0	0	0.0	0
12	LWFR-Sp	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
13	LWFR-Su	0.0	0	0.0	0	0.0	0	0.1	0	0.0	0
14	QCI	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
17	Taku	0.0	0	0.0	0	0.0	2	0.0	0	0.0	0
18	Stikine	0.0	1	0.0	0	0.1	30	0.0	0	0.0	0
19	Skeena Upper	0.0	0	0.0	1	0.0	1	0.0	0	0.1	0
20	Skeena Babine	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
21	Skeena Bulkley	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
22	Skeena Mid	0.0	1	0.0	0	0.0	2	0.0	0	0.8	2
23	Skeena Lower	0.0	2	0.0	0	0.0	1	0.0	0	0.0	0
24	Alsek	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
52	Coastal Wash	0.0	1	0.0	0	0.1	12	3.3	28	0.0	0
58	North & Central Oregon	0.4	37	0.0	0	6.1	1232	1.6	13	8.7	26
5000	California_Coast	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5001	Central_Valley_fa	0.8	82	0.0	0	0.0	0	0.2	2	0.0	0
5002	Central_Valley_sp	0.1	13	0.0	0	0.0	0	0.2	1	0.0	0
5003	Central_Valley_wi	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5004	Deschutes_R_fa	0.0	4	0.0	0	0.1	10	0.0	0	0.0	0
5005	Hood_Canal	3.3	331	4.3	89	6.4	1292	0.2	2	3.0	9
5006	Juan_de_Fuca	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5007	Klamath_R	0.0	0	0.0	0	0.0	1	0.0	0	0.0	0
5008	L_Columbia_R_fa	14.1	1429	30.2	633	17.5	3537	34.0	283	16.4	48
5009	L_Columbia_R_sp	0.0	1	1.1	22	0.0	5	0.0	0	0.0	0
5010	Mid_and_Upper_Columbia_R_sp	0.0	0	1.0	21	0.0	1	0.0	0	0.0	0
5011	Mid_Oregon_Coast	3.9	399	0.2	5	2.0	401	0.1	1	2.7	8
5012	N_California/S_Oregon_Coast	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5013	N_Gulf_Coast_Alsek_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5014	N_Gulf_Coast_Situk_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5015	N_Oregon_Coast	3.7	379	0.1	1	1.3	259	0.7	6	2.0	6
5016	N_Puget_Sound	2.9	291	10.4	218	0.8	165	2.9	24	2.9	8
5017	NSE_Alaska_Chilkat_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5018	NSE_Alaska_King_Salmon_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5019	Rogue_R	0.0	1	0.0	0	0.0	1	0.0	0	0.0	0
5020	S_Puget_Sound	6.5	663	13.8	289	3.4	696	16.5	137	0.5	1
5021	Snake_R_fa	0.0	3	9.7	202	0.1	24	2.2	18	0.0	0
5022	Snake_R_sp/su	0.4	44	0.0	0	0.0	0	0.0	0	0.1	0
5023	SSE_Alaska	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5024	SSE_Alaska_Stikine_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5025	Taku_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5026	U_Columbia_R_su/fa	37.4	3797	13.1	274	28.9	5859	21.6	179	42.2	124
5027	U_Stikine_R	0.0	0	0.0	0	0.0	1	0.0	0	0.0	0
5028	Washington_Coast	4.5	461	2.6	54	2.7	543	0.3	3	2.8	8
5029	Willamette_R	6.0	606	4.5	94	11.3	2295	1.0	9	0.0	0

Table 3 continued.

YEAR	2012		2012		2012		2012		2012		2012	
VIAL CODE	214-244		214-244		245-274		245-274		275-305		306-337	
GEAR	Area G / TAAQ Troll		Area G / TAAQ Troll		Area G Troll		Area G Troll		Area G Troll		Area G Troll	
REGION	SWVI		NWVI		SWVI		NWVI		SWVI		SWVI	
COLLECTION AREA	Area123,124		Area 126,127		Area 123,124		Area 125-127		Area123		Area23,123	
MONTH	August		August		Sept		Sept		October		November	
SAMPLE SIZE	110 (2)		301 (0)		263 (0)		185 (8)		80 (0)		50 (0)	
CHINOOK KEPT CATCH	**5,662**		**3,070**		**13,143**		**4,121**		**3,192**		**171**	
Region1	**% Estimate**	**Catch**	**% Estimate**	**Catch**	**% Estimate**	**Catch**	**% Estimate**	**Catch**	**% Estimate**	**Catch**	**% Estimate**	**Catch**
UPFR	0.0	0	0.2	5	0.0	0	0.0	0	0.0	0	0.0	0
MUFR	0.1	4	0.2	5	0.0	0	0.0	1	0.0	0	0.0	0
LWFR-F	10.3	584	5.1	157	6.2	819	11.2	464	17.4	555	2.5	4
NOTH	0.4	20	0.0	0	0.0	0	0.2	9	0.0	0	0.0	0
SOTH	3.8	218	6.9	211	0.0	2	2.4	98	0.0	1	0.2	0
LWTH	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.7	1
ECVI	6.1	344	0.1	2	2.4	316	0.1	2	0.0	0	0.0	0
WCVI	2.9	162	1.3	40	0.0	0	0.5	22	0.0	1	0.0	0
SOMN	0.0	1	0.0	0	0.6	77	0.2	10	2.9	93	0.0	0
NOMN	1.3	75	0.0	1	0.0	7	0.0	1	6.3	201	0.4	1
NASS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
LWFR-Sp	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
LWFR-Su	0.1	3	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
QCI	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Taku	0.0	1	0.0	0	0.0	1	0.0	0	0.0	1	0.0	0
Stikine	0.0	0	0.0	0	0.0	1	0.0	1	0.0	1	0.0	0
Skeena Upper	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Skeena Babine	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Skeena Bulkley	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Skeena Mid	0.0	0	0.0	0	0.0	1	0.0	1	0.0	0	0.0	0
Skeena Lower	0.0	0	0.1	3	0.0	0	0.0	0	0.0	1	0.0	0
Alsek	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Coastal Wash	0.0	0	1.6	49	0.2	21	0.0	2	0.4	13	0.0	0
North & Central Oregon	0.1	5	4.6	142	0.5	67	7.3	302	0.0	0	0.0	0
California_Coast	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Central_Valley_fa	0.4	22	0.0	0	4.2	548	1.3	53	0.0	0	0.0	0
Central_Valley_sp	0.0	0	0.0	0	0.0	3	0.1	5	0.0	0	0.0	0
Central_Valley_wi	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Deschutes_R_fa	1.5	86	0.0	0	0.0	4	0.1	5	0.1	3	0.0	0
Hood_Canal	9.3	524	3.0	91	7.8	1023	10.3	425	3.5	111	9.1	15
Juan_de_Fuca	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Klamath_R	0.0	2	0.0	0	0.0	1	0.0	0	2.5	79	0.0	0
L_Columbia_R_fa	15.9	899	13.0	399	20.4	2687	15.8	652	24.5	782	2.6	5
L_Columbia_R_sp	0.1	8	0.0	0	0.0	1	0.0	1	0.0	0	0.0	0
Mid_and_Upper_Columbia_R_sp	0.0	1	0.0	0	0.0	1	0.0	0	0.0	0	0.0	0
Mid_Oregon_Coast	4.7	268	4.7	143	2.4	309	2.4	97	0.0	1	0.0	0
N_California/S_Oregon_Coast	0.0	0	0.0	0	0.1	15	0.0	0	0.0	0	0.0	0
N_Gulf_Coast_Alsek_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
N_Gulf_Coast_Situk_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
N_Oregon_Coast	0.0	0	7.6	235	1.3	169	2.3	94	0.0	0	0.0	0
N_Puget_Sound	16.6	938	3.4	105	6.8	892	15.1	623	5.4	173	55.2	94
NSE_Alaska_Chilkat_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
NSE_Alaska_King_Salmon_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Rogue_R	0.9	51	0.2	5	0.3	36	0.0	0	0.0	1	0.0	0
S_Puget_Sound	4.4	249	0.8	26	29.2	3839	2.2	92	16.7	534	26.0	44
Snake_R_fa	16.3	921	0.8	25	10.4	1362	5.9	242	1.5	46	0.0	0
Snake_R_sp/su	0.0	1	0.0	0	0.0	0	0.0	0	0.0	1	0.0	0
SSE_Alaska	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
SSE_Alaska_Stikine_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Taku_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
U_Columbia_R_su/fa	3.6	202	42.0	1290	6.8	898	16.9	697	18.5	592	3.2	5
U_Stikine_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Washington_Coast	1.3	72	4.4	136	0.0	0	5.3	217	0.0	0	0.0	0
Willamette_R	0.0	0	0.0	0	0.3	41	0.1	4	0.0	0	0.0	0

Table 3 continued.

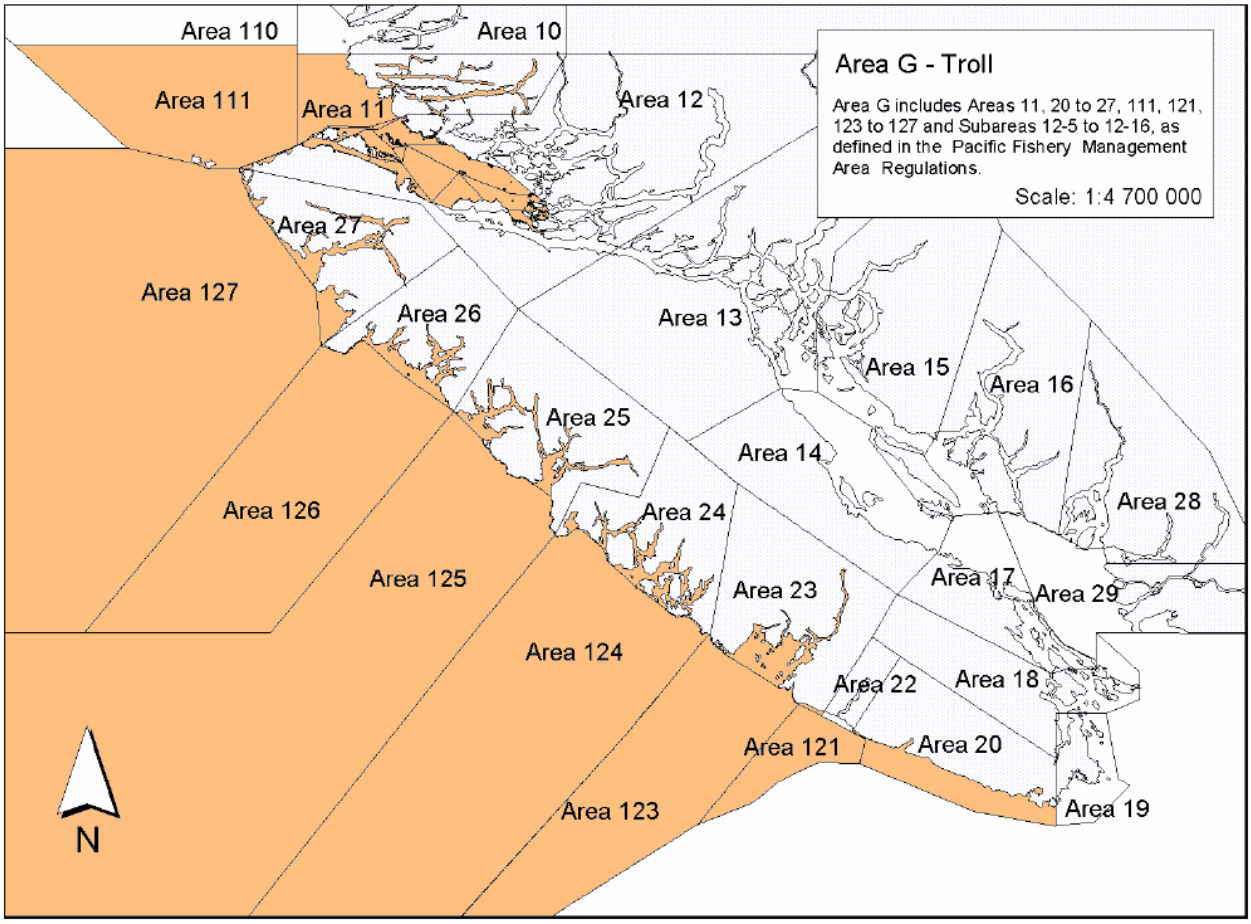
YEAR	2012		2013		2013		2013		2013		**2012**	
VIAL CODE	338-366		17		36-44		70-72		72		**81-27**	
GEAR	Area G Troll		Area G Troll		Area G Troll		Area G Troll		Area G Troll		**Area G / TAAQ Troll**	
REGION	SWVI		NWVI		NWVI		SWVI		NWVI		**NWVI+SWVI**	
COLLECTION AREA	Area23,123		Area126		Area126		Area123		Area126		**All Areas Combined**	
MONTH	December		Jan		Feb		Mar		Mar		**2012 / 2013**	
SAMPLE SIZE	32 (13)		48 (0)		79 (1)		32 (0)		51 (0)		**2102 (30)**	
CHINOOK KEPT CATCH	**252**		**772**		**341**		**51**		**452**		64,839	
Region1	**% Estimate**	**Catch**	**Estimate**	**Catch**	**Estimate**	**Catch**	**Estimate**	**Catch**	**Estimate**	**Catch**	**Total %**	**Catch**
UPFR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.3%**	**183**
MUFR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.2%**	**136**
LWFR-F	0.1	0	0.6	4	8.5	29	0.0	0	0.7	3	**6.2%**	**4,021**
NOTH	0.0	0	0.3	2	0.1	0	0.0	0	2.0	9	**0.1%**	**53**
SOTH	0.0	0	0.1	0	0.4	1	0.0	0	1.3	6	**3.5%**	**2,240**
LWTH	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**11**
ECVI	0.5	1	4.3	33	5.9	20	0.7	0	1.0	5	**3.7%**	**2,421**
WCVI	0.0	0	0.0	0	0.0	0	0.0	0	5.9	27	**0.9%**	**602**
SOMN	0.0	0	13.5	105	5.0	17	10.2	5	1.9	9	**0.9%**	**558**
NOMN	3.1	8	0.1	1	0.0	0	0.0	0	2.0	9	**0.5%**	**341**
NASS	0.0	0	0.1	1	0.0	0	0.0	0	0.0	0	**0.1%**	**91**
LWFR-Sp	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
LWFR-Su	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**4**
QCI	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
Taku	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**5**
Stikine	0.0	0	0.0	0	0.1	0	0.0	0	0.0	0	**0.1%**	**34**
Skeena Upper	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**3**
Skeena Babine	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**1**
Skeena Bulkley	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
Skeena Mid	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**7**
Skeena Lower	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**6**
Alsek	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
Coastal Wash	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.2%**	**125**
North & Central Oregon	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**2.8%**	**1,823**
California_Coast	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
Central_Valley_fa	0.2	0	4.6	36	3.5	12	3.2	2	0.1	0	**1.2%**	**757**
Central_Valley_sp	0.0	0	0.0	0	0.5	2	0.1	0	0.0	0	**0.0%**	**24**
Central_Valley_wi	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
Deschutes_R_fa	0.1	0	0.0	0	0.5	2	0.0	0	0.0	0	**0.2%**	**116**
Hood_Canal	0.1	0	26.8	207	4.4	15	3.1	2	19.2	87	**6.5%**	**4,222**
Juan_de_Fuca	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**1**
Klamath_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.1%**	**82**
L_Columbia_R_fa	2.4	6	29.9	231	15.5	53	31.0	16	6.6	30	**18.0%**	**11,689**
L_Columbia_R_sp	0.0	0	0.4	3	0.0	0	0.0	0	0.0	0	**0.1%**	**41**
Mid_and_Upper_Columbia_R_sp	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**24**
Mid_Oregon_Coast	0.0	0	0.0	0	0.1	0	0.0	0	3.1	14	**2.5%**	**1,646**
N_California/S_Oregon_Coast	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**15**
N_Gulf_Coast_Alsek_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
N_Gulf_Coast_Situk_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
N_Oregon_Coast	0.0	0	0.0	0	0.0	0	0.0	0	0.8	4	**1.8%**	**1,152**
N_Puget_Sound	19.6	49	2.2	17	2.3	8	29.3	15	18.5	84	**5.7%**	**3,707**
NSE_Alaska_Chilkat_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
NSE_Alaska_King_Salmon_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
Rogue_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.1%**	**94**
S_Puget_Sound	70.6	178	10.9	84	8.1	28	19.7	10	0.3	2	**10.6%**	**6,872**
Snake_R_fa	2.6	7	0.0	0	0.1	0	0.0	0	0.0	0	**4.4%**	**2,849**
Snake_R_sp/su	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.1%**	**46**
SSE_Alaska	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**2**
SSE_Alaska_Stikine_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**0**
Taku_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**1**
U_Columbia_R_su/fa	0.7	2	6.3	49	40.4	138	0.6	0	23.1	105	**21.9%**	**14,210**
U_Stikine_R	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	**0.0%**	**1**
Washington_Coast	0.0	0	0.0	0	0.0	0	0.2	0	0.0	0	**2.3%**	**1,495**
Willamette_R	0.0	0	0.0	0	4.6	16	1.9	1	13.2	60	**4.8%**	**3,125**

Table 4. WCVI AABM Chinook stock composition by month and catch region in the SWVI and NWVI August sport fisheries, 2012.

		2012 August sport SWVI Area123 2012 65(0)		2012 August sport NWVI Area125 2012 58(0)	
Code	Region1	Estimate	SD	Estimate	SD
1	UPFR	0.0	(0.3)	0.0	(0.4)
2	MUFR	0.1	(0.7)	0.0	(0.5)
3	LWFR-F	13.5	(4.7)	6.3	(3.5)
4	NOTH	0.0	(0.2)	0.0	(0.4)
5	SOTH	8.1	(3.4)	13.9	(4.5)
6	LWTH	0.0	(0.2)	0.0	(0.3)
7	ECVI	0.0	(0.4)	1.2	(1.6)
8	WCVI	3.2	(2.2)	20.9	(5.2)
9	SOMN	4.8	(3.4)	0.2	(0.9)
10	NOMN	0.0	(0.5)	0.5	(1.4)
11	NASS	0.0	(0.3)	0.0	(0.3)
12	LWFR-Sp	0.0	(0.2)	0.0	(0.2)
13	LWFR-Su	0.0	(0.1)	0.0	(0.1)
14	QCI	0.0	(0.0)	0.0	(0.1)
17	Taku	0.1	(0.5)	0.0	(0.4)
18	Stikine	0.4	(1.2)	0.0	(0.3)
19	Skeena Upper	0.2	(0.7)	0.1	(0.7)
20	Skeena Babine	0.0	(0.2)	0.0	(0.2)
21	Skeena Bulkley	0.0	(0.2)	0.0	(0.2)
22	Skeena Mid	0.0	(0.3)	0.0	(0.3)
23	Skeena Lower	0.0	(0.4)	0.0	(0.3)
24	Alsek	0.0	(0.2)	0.0	(0.2)
52	Coastal Wash	0.4	(1.3)	0.0	(0.3)
58	North & Central Oregon	0.0	(0.4)	24.4	(5.9)
5000	California_Coast	0.1	(0.4)	0.0	(0.2)
5001	Central_Valley_fa	0.0	(0.2)	0.0	(0.2)
5002	Central_Valley_sp	0.0	(0.1)	0.0	(0.2)
5003	Central_Valley_wi	0.0	(0.1)	0.0	(0.1)
5004	Deschutes_R_fa	0.0	(0.1)	0.0	(0.2)
5005	Hood_Canal	1.7	(3.9)	0.1	(0.8)
5006	Juan_de_Fuca	0.0	(0.1)	0.0	(0.1)
5007	Klamath_R	0.0	(0.1)	0.0	(0.1)
5008	L_Columbia_R_fa	13.0	(4.7)	0.0	(0.4)
5009	L_Columbia_R_sp	2.7	(3.9)	0.0	(0.1)
5010	Mid_and_Upper_Columbia_R_sp	0.0	(0.4)	0.1	(0.7)
5011	Mid_Oregon_Coast	0.0	(0.3)	8.6	(4.2)
5012	N_California/S_Oregon_Coast	0.0	(0.1)	0.0	(0.1)
5013	N_Gulf_Coast_Alsek_R	0.0	(0.1)	0.0	(0.1)
5014	N_Gulf_Coast_Situk_R	0.0	(0.1)	0.0	(0.1)
5015	N_Oregon_Coast	0.0	(0.3)	2.2	(2.2)
5016	N_Puget_Sound	18.9	(5.8)	2.1	(2.0)
5017	NSE_Alaska_Chilkat_R	0.0	(0.1)	0.0	(0.1)
5018	NSE_Alaska_King_Salmon_R	0.0	(0.1)	0.0	(0.1)
5019	Rogue_R	0.0	(0.2)	0.1	(0.5)
5020	S_Puget_Sound	12.8	(5.5)	1.9	(2.0)
5021	Snake_R_fa	0.1	(0.9)	0.3	(1.4)
5022	Snake_R_sp/su	0.0	(0.4)	0.0	(0.5)
5023	SSE_Alaska	0.0	(0.2)	0.0	(0.3)
5024	SSE_Alaska_Stikine_R	0.0	(0.2)	0.0	(0.3)
5025	Taku_R	0.0	(0.2)	0.0	(0.3)
5026	U_Columbia_R_su/fa	18.3	(5.1)	15.4	(4.9)
5027	U_Stikine_R	0.0	(0.1)	0.0	(0.2)
5028	Washington_Coast	0.0	(0.3)	1.4	(2.4)
5029	Willamette_R	1.5	(1.7)	0.0	(0.2)

FIGURES

Figure 1. Map of Statistical Areas for Area G troll fisheries on the west coast of Vancouver Island.



APPENDIX 1

WCVI Troll Chinook DNA Sampling Protocol
For Dockside MRP Sampling from April 2012 to March 2013

Objective:

- To collect a sample of chinook DNA from each WCVI troll catch region that is representative of catch in that catch region (NWVI is 25/125-27/127, SWVI is 21/121-24/124)
- The temporal stratum is a month (samples should represent the catch over the whole length of a fishery opening within a month).
- Sample Size: objective is 4% of the catch by month and catch region (the larger the catch, the greater the number of samples). A minimum of 200 plugs should be collected for each catch region (NWVI and SWVI) barring very small catches. The exception is April through June when a minimum of 500 plugs should be collected. If any questions or concerns arise regarding any aspect of sampling, please contact **Karin Mathias, (250) 756-7290 or (250) 714-4304**.

DNA Sampling Approach:

- No more than 50 samples are to be put into each vial. Over packing vials has resulted in the loss of some samples. (Need 2/3 ethanol to 1/3 samples.) If it is necessary to temporarily store more than 50 in one vial, at the earliest opportunity the samples should be split into separate, labelled (1 of 2 and 2 of 2) vials.
- Samples and inventory/data sheets are to be submitted monthly.
- The approximate number of DNA samples to be collected from each offload is summarized in Table 1 below.
- DNA sample collection should be spread out over the length of the month as much as possible (although collect more plugs than needed at the start of the fishery opening in case of unforeseen closures and difficulties sampling small catches).
- DNA sample collection should be taken from single vessel samples (unmixed samples) and single (unmixed) areas as priorities wherever possible. Sample the entire catch from a vessel (or vessels if the catch was graded and combined over PFMA).
- DNA sample collection should be taken from as many vessels as possible.
- Whether fish are graded or ungraded, the sample should be taken so as to be random and representative of the catch, regardless of mark.
- DNA samples should be kept separate by mark (1 bulk vial for each of adipose-on fish and adipose-off fish). Collect samples from the tail fin rather than operculum. This is due to high rates of delamination of operculum punches in some samples, resulting in duplication of sample analysis.
- Where fish caught on more than one vessel have been mixed as a result of grading (i.e. 2 boats' fish in 1 tote), these fish can be sampled as long as the boats have fished in the same catch region (NWVI or SWVI) and the areas fished are known.

Table 1. DNA sampling requirements for different chinook catch levels in the WCVI troll fishery.

Number of Offloaded Chinook	DNA Sample To be Taken From:
<35	Every fish
36-75	Every 2nd fish
76-125	Every 3rd fish
126-750	Every 5th fish
751 or greater	Every 10th fish

Data Recording Requirements on each vial and on Sample Collection Inventory datasheet:

- Sampling Date and Location
- Sampler Name
- Vessel Name (s)
- PFMA Fished
- Mark Type (adipose-on, adipose-off)
- DNA Vial #
- # plugs in each vial

Table 2. Sample and Data Delivery Schedule

Sampling Month	Sample and Data Delivery Deadline
April	15-May-2011
May	15-June-2011
June	15-July-2011
July	15-August-2011
August	15-Sep-2011
September	15-Oct-2011
October	15-Nov-2011
November	15-Dec-2011
December	15-Jan-2012
January	15-Feb-2012
February	15-Mar-2012
March	15-April-2012

Return all samples and data to:

Karin Mathias
Fisheries & Oceans Canada
3225 Stephenson Point Road
Nanaimo, B.C. V9T 1K3
(250) 756-7290 (office) or (250) 714-4304 (cell)
Karin.Mathias@dfo-mpo.gc.ca

APPENDIX 2

Financial Statement of Expenditures
(Detailed Transactions provided by Financial Officer)