

## Canadian Salmon Catch and Enhanced Salmon Production in 2013 and 2014

Arlene Tompkins, Shelee Hamilton and Joan Bateman

Fisheries and Oceans Canada  
3190 Hammond Bay Rd  
Nanaimo, British Columbia V9T 6N7

submitted to the

**NORTH PACIFIC ANADROMOUS FISH COMMISSION**

by

Canada

May 2015

**THIS PAPER MAY BE CITED IN THE FOLLOWING MANNER:**

Tompkins, A., S. Hamilton, and J. Bateman. 2015. Canadian salmon catch and enhanced salmon production in 2013 and 2014. NPAFC Doc. 1606. 7pp. Fisheries and Oceans Canada (Available at <http://www.npafc.org>).

**Keywords:** Salmon, catch, enhancement, British Columbia

## **ABSTRACT**

This document reports final catch estimates for 2013 and preliminary catch estimates for 2014 for the five major salmon species in British Columbia (BC) and Yukon fisheries. Catch is reported for commercial fisheries (numbers and total weight) in tidal waters and recreational (numbers only) and aboriginal fisheries (numbers only) in tidal and non-tidal waters. Catches include non-Canadian origin fish caught in B.C. and exclude Canadian origin fish caught in fisheries outside B.C. This document also summarizes release information for salmon from Fisheries and Oceans Canada (DFO) enhancement facilities in BC in 2013 and 2014.

## **INTRODUCTION**

The six species of salmon native to BC contribute to commercial, recreational, and aboriginal fisheries. Commercial net fisheries tend to focus on sockeye (*Oncorhynchus nerka*), chum (*O. keta*), and pink (*O. gorbuscha*) salmon, while recreational harvesters catch mostly Chinook (*O. tshawytscha*), coho (*O. kisutch*), and steelhead (*O. mykiss*). All species of salmon are valued by aboriginal fisheries, which typically occur in terminal areas within freshwater. Steelhead constitute a relatively minor component of the catch.

This document reports final catch estimates for 2013 and preliminary catch estimates for 2014 of salmon in BC and Yukon fisheries. Estimates are reported for retained commercial catch (numbers and total weight) in tidal waters and recreational (numbers only) and aboriginal catch (numbers only) in tidal and non-tidal waters by species. Catches include non-Canadian origin fish caught in B.C. and exclude Canadian origin fish caught outside B.C.

The objectives of the DFO Salmonid Enhancement Program (SEP) are to rebuild stocks and increase catch through the expanded use of enhancement technology. The program produces chinook, coho, chum, pink, and sockeye salmon, as well as small numbers of steelhead and cutthroat trout (*O. clarki*). Steelhead and cutthroat enhancement takes place at SEP facilities under a cooperative arrangement with the Government of B.C. Projects include hatcheries, fishways, spawning and rearing channels, and small classroom incubators, releases ranging in size from nearly 100 million juveniles annually from spawning channels, to less than one hundred from school classroom projects.

## **CATCH ESTIMATES**

A brief description of the data and sources of information for the 3 major fishery types follows:

### *Commercial Catch Estimates*

The Fisheries Operating System (FOS) is the official salmon commercial fishery catch database for Fisheries and Oceans Canada (DFO) Pacific Region. FOS maintains various fisher-produced data (e.g. sale slips, logbooks, at-sea interviews) and fisher-independent data (e.g. on-board observers and dockside monitors). The final commercial catch estimates reported here for 2013 and 2014 are manager determined estimates based on resolution of all data sources.

Commercial catch estimates for 2013 and 2014 are presented as numbers and weights (Table 1) of fish retained by commercial salmon vessels (salmon gill net, salmon seine net and salmon troll). Weights are based on sale slip data and are given as round (i.e., whole fish) equivalents. Sale slips record gear type, area of catch, date of landing, and landed weight and value by species. Since the value of the landing and resulting payments are based primarily on the landed weight, weight estimates are considered reasonably accurate (Sandher et al. 2012).

Piece estimates recorded on sale slips are usually estimated by applying an estimated average weight to the landed weight, particularly for high volume net landings (i.e., net landings of sockeye, pink and/or chum salmon). The average weight estimates are obtained by weighing counted samples of landed catch during offloading. Sampling for average weights is conducted to allow relatively accurate and precise, species-, area-, time- and gear-specific estimates of average weights to be generated. Such estimates have been widely available for Chinook and coho salmon since the early 1980s and for sockeye, chum and pink salmon since 1994.

#### *Recreational Catch Estimates*

Recreational salmon catches for 2013 and 2014 are reported in pieces (Table 2). Creel surveys are the primary source of recreational catch data, resulting in estimates by DFO Pacific Fishery Management Area (PFMA) and month. Creel surveys generally cover the times and areas with relatively large effort and catch, but typically not times and areas where fishing is open with relatively low effort and/or catch rates. Catch from sport fishing lodges are based on logbook programs where they are in use. Catch from lodges not reporting via logbooks is incorporated in creel survey based estimates. Further, the numbers provided here are the unexpanded estimates from the creel and logbook programs; they do not include estimates for catch from times and areas not surveyed. Consequently, recreational catches reported here underestimate total catch.

#### *Aboriginal Catch Estimates*

Aboriginal (subsistence) catch represents retained catch, and is reported in pieces (Table 3). Aboriginal catch statistics can usually be resolved to PFMA and year, but areas may be grouped in some cases. A variety of approaches have been used to generate estimates. While aboriginal catch estimation programs cover many of the largest aboriginal fisheries, coverage is incomplete both temporally and spatially. Similar to recreational catch, aboriginal catch estimates presented here do not include catch from times and areas not covered by catch estimation programs, and therefore underestimate total catch.

### **ENHANCED PRODUCTION**

Annual egg and juvenile stock production targets for hatcheries are set pre-season, in consultation with project managers, stock assessment biologists and harvest management biologists. Production objectives include conservation or rebuilding, harvest and/or assessment. Other considerations include potential species and stock interactions, effects on natural stocks, harvest concerns, habitat capacity and project capacity. The production plan is finalized after review by industry, the public and other interested groups in the Integrated Fisheries Management Planning process.

Depending on the species and enhancement approach, juvenile fish are released at various life stages. Chum and pink salmon are released either immediately after emergence as unfed fry or after one

month of feeding (fed fry). Coho are released as fry, either at emergence or after 3 to 5 months of rearing, or as smolts after one year of rearing. In BC sockeye enhancement is typically conducted using spawning and rearing channels rather than hatcheries, and juveniles emigrate volitionally soon after emergence. Sockeye are also enhanced through lake fertilization programs, and most migrate to sea after one year of lake rearing. Coastal ocean-type chinook stocks are released after three to four months of rearing. Interior stream-type stocks are frequently reared for one year, and generally constitute a very small component of the total numbers of chinook released. Releases from hatcheries are usually estimated by subtracting known egg and fry mortalities from egg numbers. Releases from rearing channels are estimated by sampling outmigrants.

Release information for salmon from DFO enhancement facilities in BC in 2013 (final) and 2014 (preliminary) is summarized in Table 4. Approximately 291.3 and 239.9 million salmon were released, in 2013 and 2014 respectively. In both years sockeye and chum releases account for 70% of the enhanced production.

It is not possible to assess each enhancement project and release strategy. Consequently, certain stocks are used as indicators, their production is marked annually and rigorous fishery and escapement sampling and estimation programs are conducted. Survival and exploitation estimates are used for time series analyses of both wild and enhanced populations. Enhanced contributions and survivals of chinook, coho, and chum salmon are normally estimated by applying a tag and /or external mark to a portion of the fish released and subsequently recovering these marked fish in fisheries and the escapement. Marking occurs prior to release, and recovery takes place through sampling programs in the fisheries and on the spawning grounds and enhancement sites. Marks are chiefly the removal of the adipose fin, with some chinook and coho stocks also receiving a coded wire tag to enable identification of stock and release year. Beginning in 1996, most enhanced coho from southern BC have been marked with a fin clip to enable the prosecution of mark-selective fisheries. Some species and stocks are given a thermal otolith mark to estimate enhanced contributions to terminal areas. Thermal marking is coordinated with the DFO Salmon Assessment Section.

## **REFERENCES CITED**

Sandher, J., C. Lynch, D. Willis, R. Cook and J. R. Irvine. 2012. Canadian enhanced salmonid production during 1977-2011 (1976-2010 brood years). NPAFC Doc. 1420. 10 pp. Fisheries and Oceans Canada. (Available at <http://www.npafc.org>).

Table 1. Canadian commercial catch estimates of Pacific salmon for 2013 and 2014 presented in numbers (000's) and weights (MT).

Reporting Area	Year	Commercial Catch Number (000's)						Commercial Catch Round Wt (MT)					
		Pink	Chum	Sockeye	Coho	Chinook	Total	Pink	Chum	Sockeye	Coho	Chinook	Total
Taku / Stikine	2013	-	-	53.76	18.36	3.09	75.22	-	-	151.61	67.49	20.39	239.49
	2014	-	-	51.35	20.22	3.30	74.86	-	-	144.81	74.29	21.77	240.86
Haida Gwaii	2013	94.79	0.30	0.00	242.06	69.54	406.68	166.82	1.36		837.52	422.82	1,428.52
	2014	638.83	0.12	41.30	139.32	172.22	991.79	983.80	0.55	108.61	381.73	1,085.00	2,559.70
North Coast	2013	8,872.02	239.97	152.67	203.21	2.68	9,470.53	15,614.76	1,099.06	363.35	646.22	17.12	17,740.51
	2014	2,971.81	233.17	658.41	76.97	3.20	3,943.56	4,606.31	1,172.84	1692.10	217.83	21.40	7,710.47
Central Coast	2013	489.70	361.68	2.32	0.00	5.31	859.01	719.86	2,148.38	6.71	0.00	41.90	2,916.84
	2014	41.62	27.73	2.53	0.07	2.23	74.19	70.75	154.20	6.76	0.20	16.02	247.93
South Coast	2013	991.53	685.04	63.96	2.42	0.07	1,743.02	1,398.05	2,740.16	152.23	7.37	0.29	4,298.10
	2014	586.70	377.86	5,063.95	1.99	0.43	6,030.93	932.85	1,889.32	13318.19	5.67	2.71	16,148.73
West Coast Vancouver Island	2013	0.03	17.28	29.88	7.31	42.55	97.04	0.04	69.13	71.10	22.28	171.90	334.46
	2014	0.11	1.18	424.95	35.56	126.74	588.53	0.18	5.03	1126.11	100.27	769.31	2,000.89
Fraser River	2013	1,743.36	117.27	11.54	0.51	2.98	1,875.66	2,458.14	469.08	27.45	1.57	12.04	2,968.28
	2014	0.09	76.75	3,045.91	0.24	9.79	3,132.78	0.12	408.30	8315.34	0.56	64.83	8,789.15
Whole Country	2013	12,191.42	1,421.54	314.12	473.86	126.22	14,527.16	20,357.67	6,527.17	772.46	1582.44	686.46	29,926.20
	2014	4,239.16	716.81	9,288.39	274.36	317.92	14,836.64	6,594.01	3,630.23	24711.92	780.55	1,981.03	37,697.75

Table 2. Canadian recreational catch estimates of Pacific salmon for 2013 and 2014 presented in numbers (000's).

<b>Reporting Area</b>	<b>Year</b>	<b>Recreational Catch Numbers (000's)</b>					<b>Total</b>
		<b>Pink</b>	<b>Chum</b>	<b>Sockeye</b>	<b>Coho</b>	<b>Chinook</b>	
South Coast	<b>2013</b>	148.46	9.13	2.23	70.36	77.00	307.18
	<b>2014</b>	23.50	3.96	359.63	59.12	89.75	535.95
West Coast Vancouver Island	<b>2013</b>	5.02	0.06	18.15	68.17	87.27	178.67
	<b>2014</b>	0.52	0.08	24.06	45.47	84.34	154.47
North Coast	<b>2013</b>	2.31	0.79	0.05	63.15	16.74	83.04
	<b>2014</b>	3.92	0.18	24.30	54.21	20.79	103.40
Haida Gwaii	<b>2013</b>	0.85	1.15	0.09	41.10	46.65	89.84
	<b>2014</b>	0.64	0.27	0.30	31.24	44.90	77.35
Whole country	<b>2013</b>	156.65	11.14	20.52	242.77	227.67	658.73
	<b>2014</b>	28.58	4.48	408.29	190.03	239.78	871.17

Table 3. Canadian subsistence catch estimates of Pacific salmon for 2013 and 2014 presented in numbers (000's).

Reporting Area	Year	Subsistence Numbers (000's)						Total
		Pink	Chum	Sockeye	Coho	Chinook	Steelhead	
South Coast	2013	191.10	18.73	119.53	1.02	0.80	0.00	331.19
	2014	310.37	11.26	325.18	2.26	1.72	0.00	650.79
West Coast Vancouver Island	2013	0.00	4.90	28.55	9.67	14.25	0.06	57.43
	2014	0.68	0.65	47.05	12.56	5.38	0.07	66.38
Yukon and Northern BC	2013	5.64	3.05	129.50	9.68	12.38	1.95	162.19
	2014	10.84	5.01	208.17	15.78	14.00	0.00	253.81
Whole Country	2013	196.74	26.68	277.59	20.37	27.42	2.01	550.81
	2014	321.89	16.92	580.40	30.59	21.10	0.07	970.98

Table 4. DFO Salmon Enhancement Program enhanced salmon releases in 2013 and 2014 presented in numbers (000's).

Reporting Area	Release Year	Enhanced Salmon Releases (000's)						Total
		Pink	Chum	Sockeye	Coho	Chinook	Steelhead	
BC Interior	2,013			10,540	367	1,103		12,010
	2014			11,200	262	1,122		12,584
Fraser River	2,013		15,543	3,783	2,562	2,299	37	24,225
	2014	8,341	11,968	37,685	2,441	2,138	186	62,760
South Coast	2,013	13,826	50,419	856	5,470	14,903	124	85,598
	2014	13,901	40,933	320	5,834	12,322	98	73,408
West Coast Vancouver Island	2,013		17,721		1,337	17,447	100	36,606
	2014		14,234		1,109	16,016		31,359
Central Coast	2,013		7,999	150	145	2,053		10,347
	2014	33	9,658	249	83	2,454		12,478
North Coast	2,013		1,779	118,116	866	1,238	64	122,063
	2014		1,710	42,653	900	1,743	50	47,056
Haida Gwaii	2,013		132		155	128		415
	2014				82	135		217
Whole Country	2,013	13,826	93,593	133,446	10,903	39,171	325	291,263
	2014	22,275	78,504	92,107	10,712	35,930	334	239,862