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**Incidental Catches of Salmonids by U.S. Groundfish
Fisheries in the Bering Sea/Aleutian Islands
and the Gulf of Alaska, 1990–2016**

by

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**INCIDENTAL CATCHES OF SALMONIDS
BY U.S. GROUND FISH FISHERIES
IN THE BERING SEA/ALEUTIAN ISLANDS
AND THE GULF OF ALASKA, 1990-2016**

Keywords: Alaskan groundfish, Chinook, Chum, incidental salmon catch, Pacific salmon

ABSTRACT

This report presents the estimated incidental catches and average weights of Pacific salmonids in U.S. groundfish fisheries off Alaska from 1977 through 2016. Estimated annual incidental salmon catches (all species combined) in 2016, were 379,699 salmon in the Bering Sea/Aleutian Islands (BSAI) and 24,855 salmon in the Gulf of Alaska (GOA).

Annual estimated numbers of Chinook salmon (*Oncorhynchus tshawytscha*) incidentally caught in the U.S. groundfish fisheries in the BSAI, have ranged from 8,223 (year 2000) to 129,568 (year 2007) and the annual average weight has ranged from 2.44 kg in 2016 to 5.21 kg in 1995. Annual estimated numbers of non-Chinook salmon have ranged from 14,423 in 2010 to 709,388 in 2005. Chum salmon (*O. keta*) typically account for over 95% of the non-Chinook salmon catch with an annual average chum salmon weight ranging from 2.07 kg in 1993 to 3.43 kg in 1995.

In the U.S. groundfish fisheries in the GOA, annual estimated numbers of Chinook salmon incidentally caught have ranged from 8,475 in 2009 to 54,607 in 2010 and the annual average weight has ranged from 1.89 kg in 2016 to 4.60 kg in 1991. Annual estimated numbers of non-Chinook salmon have ranged from 1,274 in 2012 to 64,792 in 1995. Chum salmon typically account for over 95% of the non-Chinook salmon catch where the annual average chum salmon weight has ranged from 2.16 kg in 1993 to 4.87 kg in 1999.

Incidental catches of Pacific salmonids in foreign and joint venture groundfish fisheries off Alaska are presented for 1977-1990. The last joint venture operation took place in 1990 in the BSAI, with an incidental catch of 152 salmon.

INTRODUCTION

Groundfish fisheries in Alaskan waters are conducted primarily by the use of trawl gear that occasionally encounters and catches Pacific salmonids. Other gear used to harvest groundfish, longline and pot, generally do not catch many salmonids. The incidental catches of salmonids are monitored by the U.S. National Marine Fisheries Service (NMFS). Estimates are calculated by the NMFS Alaska Regional Office from observer data. Total groundfish catch estimates are derived from multiple sources including landing reports, observer reports, and production reports.

Historically, the observer program coverage for the groundfish trawl fisheries off Alaska had been 100% for the large-sized vessel fleet (greater than 125 ft. length overall) and 30% for the medium-sized vessel fleet (60-125 ft. length overall). On January 1, 2013, NMFS restructured the observer program and the deployment of observers when it issued regulations to implement Amendment 86 to the BSAI Fishery Management Plan (FMP) and Amendment 76 to the GOA FMP. Observer coverage and deployment are no longer based on vessel length and processing capacity; rather, NMFS now has the flexibility to decide when and where to deploy observers based on a scientifically defensible sampling design. The design of the new program serves

to reduce sources of bias that jeopardized the statistical reliability of catch and bycatch data collected by the North Pacific Groundfish and Halibut Observer Program. The final text of the regulations can be found at <https://alaskafisheries.noaa.gov/sites/default/files/finalrules/77fr70062.pdf>.

In 2010, NMFS issued regulations to implement Amendment 91 to the BSAI FMP. Amendment 91 was implemented in January 2011. The text of Amendment 91 can be found at:

<https://alaskafisheries.noaa.gov/sites/default/files/finalrules/75fr53026.pdf>.

These regulations were intended to minimize the Chinook salmon (*O. tshawytscha*) bycatch in the Bering Sea (BS) pollock fishery while maintaining potential for full harvest of the catch by establishing a cap on Chinook salmon bycatch in the fishery. These regulations increased salmon monitoring requirements to ensure that all catches of BS pollock are monitored and required a substantial change in the observer sampling protocol for salmon to support the estimation of Chinook salmon bycatch and the collection of samples for genetic stock of origin analyses.

All salmon, as well as king and tanner crab, herring, and halibut are classified as prohibited species in the groundfish fishery off Alaska and prohibited species catch (PSC) of these species must be avoided. Prior to January 2011, regulations required all PSC to be returned to the sea as soon as practicable after an observer had collected any required data from the species. With the implementation of Amendment 91 in January 2011, bycatch of all salmon species in the BS pollock fishery must be retained. Furthermore, the operator of a vessel and the manager of a shoreside processor or stationary floating processor (SFP) must not discard any salmon or transfer or process any salmon under the Prohibited Species Donation Program until the total number of salmon by species has been determined by the observer and the observer's collection of any scientific data or biological samples from the salmon has been completed.

In July 2011, the North Pacific Fisheries Management Council (NPFMC) addressed the concern of Chinook salmon PSC taken incidentally in the GOA pollock fisheries. Chinook salmon historically account for the greatest proportion of Chinook salmon taken in GOA groundfish fisheries. As a result, NMFS published regulations to implement Amendment 93 to the GOA Groundfish FMP. These regulations applied exclusively to the directed pollock trawl fisheries in the Central and Western Reporting Areas of the GOA (Central and Western GOA). Amendment 93 established separate PSC limits in the Central and Western GOA for Chinook salmon, which would cause NMFS to close the directed pollock fishery in the Central and Western GOA, if the applicable limit were to be reached. This action required full retention of all salmon in pollock trawl fisheries. It also provided direction for NMFS to work with the processors to evaluate and address the quality of sorting at the plants to assist improvements in observer salmon retention counts. The final rule for Amendment 93 can be found at:

<https://alaskafisheries.noaa.gov/sites/default/files/finalrules/77fr42629.pdf>.

This report presents the estimated incidental catches and average weights of Pacific salmonids in the U.S. groundfish fisheries in the BSAI and GOA from 1977 to 2016.

RESULTS

A summary of the groundfish catch and estimated bycatch of salmonids reported by NMFS by region (BSAI and GOA) from 1990 through 2016 can be found in Table 1. The U.S. groundfish catch in the BSAI has ranged from 1,335,057 mt in 2009 to 2,154,903 mt in 1991. In 2016, the U.S. groundfish catch in the BSAI was 1,953,401 mt. From 1990 – 2016, the incidental catch of Chinook salmon has ranged from 8,222 in 2000 to 130,000 in 2007; while the incidental catch of non-Chinook salmon has ranged from 14,423 in 2010 to 709,388 in 2005. In 2016 the incidental catch of Chinook salmon was 32,560 and the incidental catch of non-Chinook salmon was 347,139.

The U.S. groundfish catch in the GOA has ranged from 165,664 mt in 2002 to 299,687 mt in 2014 (Table 1). The incidental catch of Chinook salmon from 1990 – 2016 ranged from 8,475 in 2009 to 54,607 in 2010; while the incidental catch of non-Chinook salmon has ranged from 1,274 in 2012 to 64,792 in 1995. In 2016 the incidental catch of Chinook salmon in the GOA was 22,280 and the incidental catch of non-Chinook salmon was 2,775.

The annual Chinook salmon average weight found in the BSAI incidental catch in 2016 was 2.44 kg compared to the 1990-2016 annual average weight range of 2.44 kg in 2016 to 5.21 kg in 1995 (Table 2). The annual average weight of Chinook salmon in the GOA incidental catch in 2016 was 1.89 kg (Table 3). The 1990-2016 annual average weights of GOA Chinook salmon ranged from 1.89 kg in 2016 to 4.60 kg in 1991.

The annual average weights of chum salmon found in the BSAI incidental catch ranges from 2.07 kg in 1993 to 3.43 kg in 1995 (Table 4). In 2016, in the BSAI, the average weight chum salmon was 2.32 kg. The annual average weight of chum salmon in the GOA incidental catch ranged from 2.16 kg in 1993 to 4.87 kg in 1999 while the 2016 the chum average weight was 3.07 kg (Table 5).

The last year of joint venture operations occurred in the BSAI in 1990, with a groundfish catch of 133,438 mt and an incidental catch of 147 Chinook salmon, 2 Chum salmon (*O. keta*), and 3 Coho salmon (*O. kisutch*) (Table 6). Table 7 provides the estimated incidental catches of Pacific salmonids in the foreign and joint venture groundfish fisheries off Alaska for 1977-1989.

Table 1. Total groundfish catch (mt) and estimated bycatch of Chinook and other Pacific salmon in U.S. groundfish fisheries, 1990-2016.

Year	Region	Domestic Catch Groundfish (mt)	Estimated numbers of salmon bycatch					Total
			Chinook ⁴	Chum	Coho	Sockeye	Pink	
1990	BSAI	1,706,379	14,085	16,202	153	30	31	30,501
1991	BSAI	2,154,903	48,880	28,270	656	1,310	26	79,142
1992	BSAI	2,057,849	41,954	40,090	1,266	14	80	83,405
1993	BSAI	1,854,216	46,013	242,916	324	22	8	289,284
1994	BSAI	1,958,788	43,821	94,107	228	20	193	138,369
1995	BSAI	1,928,073	23,436	20,983	871	0	21	45,311
1996	BSAI	1,847,631	63,204	77,819	234	5	2	141,265
1997	BSAI	1,824,188	50,530	66,816	109	3	66	117,524
1998 ¹	BSAI	1,615,685	60,548			65,697		121,128
1999	BSAI	1,424,752	14,599			47,132		61,731
2000	BSAI	1,607,549	8,222			59,327		67,550
2001	BSAI	1,813,924	40,547			60,731		101,278
2002	BSAI	1,934,957	39,683			82,483		122,167
2003	BSAI	1,791,040	53,661			191,150		244,721
2004	BSAI	1,979,754	60,038			450,541		510,505
2005	BSAI	1,981,117	75,084			709,388		783,654
2006	BSAI	1,978,836	87,114			325,183		412,267
2007	BSAI	1,856,273	130,000			97,348		226,916
2008	BSAI	1,541,369	23,914			16,877		40,982
2009	BSAI	1,335,057	14,171			47,130		60,926
2010	BSAI	1,350,754	12,401			14,423		26,806
2011	BSAI	1,817,659	26,609			192,901		219,510
2012	BSAI	1,852,753	12,930			24,317		37,250
2013	BSAI	1,909,745	16,007			126,980		142,992
2014	BSAI	1,916,114	18,096			224,127		242,224
2015	BSAI	1,905,886	25,253			243,394		268,675
2016 ²	BSAI	1,953,401 ³	32,560 ⁴			347,139 ⁵		379,699

Table 1. (Continued)

Year	Region	Domestic Catch Groundfish (mt)	Estimated numbers of salmon bycatch ¹					Total
			Chinook ⁷	Chum	Coho	Sockeye	Pink	
1990	GOA	244,397	16,913	2,541	1,482	85	64	21,085
1991	GOA	269,616	38,894	13,711	1,133	46	64	53,848
1992	GOA	269,797	16,794	11,140	55	21	0	28,010
1993	GOA	255,434	24,465	55,268	306	15	799	80,853
1994	GOA	239,503	13,613	36,782	42	96	306	50,839
1995	GOA	216,585	14,647	64,067	668	41	16	79,439
1996	GOA	202,054	15,761	3,969	194	2	11	19,937
1997	GOA	230,448	15,119	3,349	41	7	23	18,539
1998 ¹	GOA	245,516	16,984			13,544		30,528
1999	GOA	227,614	30,600			7,529		38,129
2000	GOA	204,398	26,729			10,995		37,724
2001	GOA	182,011	15,104			6,063		21,167
2002	GOA	165,664	12,920			3,219		16,139
2003	GOA	177,597	15,367			9,287		24,654
2004	GOA	172,624	17,778			6,269		24,047
2005	GOA	185,998	31,271			7,011		38,282
2006	GOA	197,365	18,768			4,505		23,273
2007	GOA	177,716	40,616			3,880		44,496
2008	GOA	185,323	16,264			3,251		19,515
2009	GOA	169,771	8,475			2,704		11,179
2010	GOA	216,438	54,607			2,063		56,670
2011	GOA	226,722	21,466			3,220		24,686
2012	GOA	233,773	21,008			1,274		22,282
2013	GOA	228,687	23,332			6,008		29,340
2014	GOA	299,687	15,752			3,089		18,841
2015	GOA	294,106	18,973			1,692		20,665
2016 ²	GOA	297,192 ⁶	22,080 ⁷			2,775 ⁸		24,855

¹ For 1998 – 2016, the estimates of non-Chinook salmon are not separated by species and are thus listed as a single value.

² Data presented for 2016 are based on preliminary numbers.

³ https://alaskafisheries.noaa.gov/sites/default/files/reports/car110_bsai_with_cdq2016.pdf

⁴ https://alaskafisheries.noaa.gov/sites/default/files/reports/chinook_salmon_mortality2017.pdf

⁵ https://alaskafisheries.noaa.gov/sites/default/files/reports/chum_salmon_mortality2017.pdf

⁶ https://alaskafisheries.noaa.gov/sites/default/files/reports/car110_goa2016.pdf

⁷ <https://alaskafisheries.noaa.gov/sites/default/files/reports/goasalmonmort2017.pdf>

⁸ https://alaskafisheries.noaa.gov/sites/default/files/reports/car142_goa_salmon2016.pdf

Table 2. Average body weight of Chinook salmon incidentally caught in the Bering Sea/Aleutian Islands groundfish fisheries, 1990-2016.

Year	Region	Average Body Weight (kg)			
		Male	Female	Unsexed	Combined
1990	BSAI	3.73	3.71	3.56	3.70
1991	BSAI	2.82	3.47	3.03	3.10
1992	BSAI	3.03	3.65	4.23	3.54
1993	BSAI	3.78	4.11	4.74	4.01
1994	BSAI	4.37	4.29	4.11	4.30
1995	BSAI	4.95	5.43	5.19	5.21
1996	BSAI	3.67	3.89	3.39	3.75
1997	BSAI	4.02	4.17	4.41	4.14
1998	BSAI	2.91	3.30	2.40	3.02
1999	BSAI	3.53	3.73	3.91	3.64
2000	BSAI	3.67	3.87	4.12	3.78
2001	BSAI	2.94	3.32	1.50	3.04
2002	BSAI	3.79	4.15	3.07	3.89
2003 ¹	BSAI	--	--	--	3.44
2004	BSAI	--	--	--	3.50
2005	BSAI	--	--	--	3.29
2006	BSAI	--	--	--	3.01
2007	BSAI	2.81	2.95	2.40	2.82
2008	BSAI	3.67	3.53	4.98	3.62
2009	BSAI	3.58	3.93	4.02	3.80
2010	BSAI	4.09	4.08	3.4	4.08
2011	BSAI	2.58	2.8	1.48	2.60
2012	BSAI	3.53	3.40	3.11	3.47
2013	BSAI	2.62	3.13	2.1	2.82
2014	BSAI	2.86	2.59	3.02	2.74
2015	BSAI	2.40	3.04	2.83	2.74
2016	BSAI	2.28	2.59	2.82	2.44

¹ For years 2003 - 2006, only the combined average weight is shown because observers were combining sexes prior to weighing the salmon.

Table 3. Average body weight of Chinook salmon incidentally caught in the Gulf of Alaska groundfish fisheries, 1990-2016.

Year	Region	Average Body Weight (kg)			
		Male	Female	Unsexed	Combined
1990	GOA	3.94	4.29	3.91	4.10
1991	GOA	3.05	5.10	4.08	4.60
1992	GOA	4.46	4.11	3.58	4.14
1993	GOA	2.83	2.76	3.40	2.90
1994	GOA	3.72	3.69	2.85	3.63
1995	GOA	4.48	3.31	3.00	3.67
1996	GOA	2.71	2.97	2.80	2.83
1997	GOA	4.28	4.08	5.08	4.49
1998	GOA	3.00	3.07	3.47	3.08
1999	GOA	2.69	3.16	2.49	2.82
2000	GOA	3.34	3.21	3.45	3.32
2001	GOA	3.36	3.08	2.95	3.20
2002	GOA	2.76	2.59	3.38	2.73
2003 ¹	GOA	--	--	--	2.84
2004	GOA	--	--	--	2.47
2005	GOA	--	--	--	2.46
2006	GOA	--	--	--	3.41
2007	GOA	2.84	3.35	2.75	2.99
2008	GOA	4.55	2.67	2.58	3.44
2009	GOA	3.74	2.96	4.31	3.37
2010	GOA	2.20	2.36	2.25	2.28
2011	GOA	2.27	2.43	1.95	2.14
2012	GOA	2.04	2.24	2.37	2.28
2013	GOA	2.24	2.53	2.01	2.26
2014	GOA	2.13	2.26	2.56	2.31
2015	GOA	2.11	2.39	1.86	2.06
2016	GOA	2.35	2.25	1.82	1.89

¹ For years 2003 - 2006, only the combined average weight is shown because observers were combining sexes prior to weighing the salmon.

Table 4. Average body weight of Chum salmon incidentally caught in the Bering Sea/Aleutian Islands groundfish fisheries, 1990-2016.

Year	Region	Average Body Weight (kg)			
		Male	Female	Unsexed	Combined
1990	BSAI	2.27	2.26	2.45	2.32
1991	BSAI	2.76	2.41	2.91	2.66
1992	BSAI	2.54	2.48	2.61	2.56
1993	BSAI	2.16	1.96	2.07	2.07
1994	BSAI	2.72	2.65	2.62	2.66
1995	BSAI	3.46	3.17	3.83	3.43
1996	BSAI	2.47	2.23	2.1	2.31
1997	BSAI	2.35	2.24	1.98	2.25
1998	BSAI	2.88	2.5	3.02	2.86
1999	BSAI	2.97	2.82	3.1	2.96
2000	BSAI	2.97	2.79	2.64	2.77
2001	BSAI	2.7	2.47	2.56	2.61
2002	BSAI	2.97	2.71	3.04	2.91
2003 ¹	BSAI	--	--	--	2.52
2004	BSAI	--	--	--	2.41
2005	BSAI	--	--	--	2.15
2006	BSAI	--	--	--	2.77
2007	BSAI	2.4	2.19	2.12	2.26
2008	BSAI	3.48	3.03	2.69	3.26
2009	BSAI	2.6	2.34	2.33	2.45
2010	BSAI	2.75	2.57	2.22	2.67
2011	BSAI	2.76	2.52	2.65	2.65
2012	BSAI	2.75	2.56	2.92	2.67
2013	BSAI	2.63	2.45	2.64	2.55
2014	BSAI	2.24	2.13	2.40	2.20
2015	BSAI	2.25	2.21	2.11	2.23
2016	BSAI	2.36	2.26	2.44	2.32

¹ For years 2003 - 2006, only the combined average weight is shown because observers were combining sexes prior to weighing the salmon.

Table 5. Average body weight of Chum salmon incidentally caught in the Gulf of Alaska groundfish fisheries, 1990-2016.

Year	Region	Average Body Weight (kg)			
		Male	Female	Unsexed	Combined
1990	GOA	3.22	3.16	2.94	3.12
1991	GOA	3.27	2.9	3.11	3.11
1992	GOA	3.09	3.02	2.44	2.88
1993	GOA	2.4	2.27	1.93	2.16
1994	GOA	3.4	3.2	2.92	3.10
1995	GOA	3.14	3.12	2.97	3.02
1996	GOA	3.1	2.42	2.5	2.61
1997	GOA	5.28	4.09	3.94	4.37
1998	GOA	3.84	3.77	3.75	3.80
1999	GOA	4.33	5.45	3.84	4.87
2000	GOA	4.16	4.26	4.17	4.20
2001	GOA	2.83	2.9	3.16	2.91
2002	GOA	3.61	3.53	3.39	3.51
2003 ¹	GOA	--	--	--	3.18
2004	GOA	--	--	--	3.68
2005	GOA	--	--	--	4.61
2006	GOA	--	--	--	3.77
2007	GOA	3.26	2.99	3.01	3.10
2008	GOA	3.58	2.70	1.24	2.58
2009	GOA	3.34	3.55	3.26	3.41
2010	GOA	3.05	3.96	2.43	3.31
2011	GOA	2.96	2.97	3.44	3.04
2012	GOA	2.89	3.57	4.67	3.50
2013	GOA	3.28	2.90	2.44	3.02
2014	GOA	3.99	3.91	3.44	3.02
2015	GOA	3.01	2.43	2.93	2.76
2016	GOA	3.46	3.07	2.92	3.07

¹ For years 2003 - 2006, only the combined average weight is shown because observers were combining sexes prior to weighing the salmon.

Table 6. Estimated incidental catches of Pacific salmonids in the Bering Sea/Aleutian Islands and the Gulf of Alaska.

Year	Region	Catch Groundfish (mt)	Estimated numbers of salmon bycatch					Total
			Chinook	Chum	Coho	Sockeye	Pink	
			Joint Venture					
1990	BSAI	133,438	147	2	3	0	0	152
1990	GOA	0	0	0	0	0	0	0

Table 7. Estimated incidental catches of Pacific salmonids previously reported to the International North Pacific Fisheries Commission, 1977-1989.

Year	Bering Sea/ Aleutian Islands ¹	Gulf of Alaska ²
1977	47,840	5,222
1978	44,548	45,603
1979	107,706	21,460
1980	122,002	36,069
1981	43,191	30,860
1982	23,623	6,967
1983	42,666	13,874
1984	84,138	75,846
1985	20,423	14,102
1986	20,983	20,820
1987	14,234	1,221
1988	9,380	147
1989	14,153	0

¹ Reported in INPFC Doc. 3588, October 1990

² Reported in INPFC Doc. 3417, September 1989.