

**2018 PRESEASON FORECAST PACKET
FOR HOOD CANAL
SALMON RUNS'**

PRESEASON FORECAST PACKET PREPARED BY:

SKOKOMISH TRIBE

SALMON FORECASTS AGREED TO BY:

LOWERELWHA TRIBE

PNPTC (FOR JAMESTOWN & PORT GAMBLE)

SKOKOMISH TRIBE

WDFW

FINAL 16FEB18

SUMMARY OF 2018 HOOD CANAL FORECASTS and Forecasting Methods

Species (Ref.#)	Origin	Type	Number	Mass Marked	Number Type	Model Designation
Chinook (A-1)	Mixed	Secondary	3,890		TRS	Natural
	Hatchery	Primary	57,558		TRS	Hatchery
Summer Chum (A-2)	Natural (supplemented)	Secondary	17,034		Total Recruits	
Coho (A-3)¹	Natural	Primary	79,372		Total DA2 ¹ Recruits	Natural
	Natural	Secondary	2,098		Total DA2 ¹ Recruits	Hatchery
	Hatchery	Secondary	110,632	94,905	Total DA2 ¹ Recruits	Hatchery
Fall Chum (A-4)	Natural		192,945		WA Run	Natural
	Hatchery		304,455			Hatchery

¹ See overleaf for Coho FRAM model inputs (DA2 = December Age 2; OA3 = Ocean Age 3).

NOTES: Summer Chum salmon, although classified as “secondary”, are under rehabilitation.
Forecasts for individual Hood Canal Management Units (MU) are:

Mainstem Hood Canal MU	7,044
SE Hood Canal MU	2,483
Quilcene MU	7,506

Natural Chinook salmon, although classified as “secondary”, are under rehabilitation.
Forecasts for individual Hood Canal Management Units (MU) are:

Mid Hood Canal MU	359
Skokomish MU	
(Natural)	3,338
(Hatchery)	31,250
Hoodsport MU	26,308
Miscell.	193

Coho FRAM Model Inputs:

Stock Name	DA2	nuFRAM Stock	nuFRAM OA3 = DA2/1.333	Marked nuFRAM	Marked %
Port Gamble Net Pens	16,906	ptgamh	12,680	12,524	98.77%
Port Gamble Bay Natural	772	ptgamw	579		
Area 12/12B Natural	36,924	ar12bw	27,693		
Quilcene Bay Net Pens	0	qlcnbh	0	0	99.08%
Quilcene Hatchery	66,140	qlcenh	49,605	40,964	82.58%
Area 12A Natural	1,326	ar12aw	995		
Hoodspport Hatchery	n/a	hoodsh	0		
Area 12C/12D Natural	40,670	ar12dw	30,503		
George Adams Hatchery	27,586	gadamh	20,690	17,692	85.51%
Skokomish River Natural	1,778	skokr	1,334		

A. Pre-season Forecasting Methods

A-1. Summer/Fall Chinook Salmon

The 2018 forecasted terminal run size of summer-run Hood Canal Chinook salmon is the product of brood 2013 fingerling lbs released from WDFW facilities in 2015, multiplied by the average of post-season estimated terminal area return rates (total terminal run / hatchery fingerling lbs released 3 yrs previous) for the last five return years (2013-2017), (Table A-1-a). The data series used this year was intended to estimate a terminal return to net fisheries, freshwater sport and escapements. It does not include other run components or contributions. The historical data series was recently reconciled from the 2010 through 2017 return years (2017 remains preliminary), to include this information for 2018 forecasting purposes (Tables A-1-a and A-1-b). The resulting terminal area run forecast is 61,448 Chinook salmon. The forecast was apportioned to 57,558 chinook expected to return to hatcheries and 3,890 fish expected to return to natural spawning areas (Table A-1-d), based on the Hood Canal terminal runs' relative contribution of the individual Hood Canal management units in the most recent brood cycle, comprised of the 2013-2017 return years (Table A-1-c). These estimates will be used as inputs to generate ocean recruit forecasts during pre-season simulation modeling.

**Table A-1-a. Hood Canal Summer/Fall Chinook Releases
at WDFW Hatcheries and Run Sizes.**

Return Year (RY)	0+ Lbs. Released in RY-3	Return/Lb	Terminal Run
1984	39,232	0.42295	16,593
1985	40,098	0.50574	20,279
1986	55,499	0.39329	21,827
1987	50,811	0.51412	26,123
1988	55,967	0.50753	28,405
1989	65,510	0.38222	25,039
1990	54,674	0.23280	12,728
1991	100,366	0.18881	18,950
1992	101,102	0.02929	2,961
1993	89,517	0.05293	4,738
1994	78,335	0.04785	3,748
1995	82,895	0.11068	9,175
1996	73,472	0.11065	8,130
1997	32,571	0.23963	7,805
1998	58,652	0.27658	16,222
1999	89,149	0.33894	30,216
2000	87,306	0.23917	20,881
2001	101,591	0.29913	30,389
2002	89,837	0.38332	34,436
2003	106,363	0.36476	38,797
2004	95,282	0.38720	36,893
2005	92,989	0.63831	59,356
2006	76,769	0.61204	46,986
2007	89,952	0.43716	39,323
2008	95,368	0.42885	40,899
2009	88,634	0.49692	44,044
2010	90,491	0.48344	43,747
2011	89,269	0.78651	70,211
2012	89,877	1.08488	97,506
2013	90,075	0.85407	76,930
2014	86,661	0.31241	27,074
2015	89,017	0.40406	35,968
2016	85,353	0.77516	66,162
2017*	86,209	1.21818	105,018
Average 2013-2017		0.71277	
2018 Forecast			61,448

(*) 2017 return data are preliminary and subject to revision, following reconciliation of records.

Table A-1-b. Hood Canal Summer/Fall Chinook Terminal Runs

Year	12A	12/12B	12C	12D	Skokomish	G.A. Hatchery	Hoodsport Hatchery	Total
1984	0	758	0	440	5,302	5,537	4,183	16,220
1985	0	1,908	0	1,040	8,297	5,739	3,044	20,028
1986	0	21	0	169	8,690	10,628	2,221	21,729
1987	0	112	0	64	8,064	12,743	4,311	25,294
1988	0	150	0	79	7,078	13,086	6,888	27,281
1989	0	129	0	158	6,133	13,023	5,175	24,618
1990	0	47	0	49	2,484	8,454	1,577	12,611
1991	0	88	0	73	5,461	9,746	3,514	18,882
1992	0	96	0	20	1,373	490	965	2,944
1993	29	143	0	46	1,385	883	2,242	4,728
1994	4	384	1	30	809	609	1,889	3,726
1995	7	103	2	491	1,398	5,196	1,978	9,175
1996	8	24	1	1	995	3,100	4,001	8,130
1997	27	6	15	7	452	1,887	5,411	7,805
1998	0	288	0	177	1,187	5,630	8,940	16,222
1999	0	876	86	249	2,123	10,332	16,550	30,216
2000	0	439	262	194	1,203	5,238	13,545	20,881
2001	0	326	605	204	3,247	14,965	11,042	30,389
2002	0	95	38	114	2,273	14,439	17,477	34,436
2003	0	194	93	107	1,928	17,175	19,300	38,797
2004	0	129	1,094	95	3,677	18,824	13,074	36,893
2005	0	45	623	109	3,579	28,226	26,774	59,356
2006	0	30	292	34	2,537	25,930	18,163	46,986
2007	0	73	40	22	959	29,664	8,565	39,323
2008	0	275	10	26	2,416	29,172	9,000	40,899
2009	0	130	20	31	2,199	27,271	14,393	44,044
2010	0	84	32	15	2,800	30,191	10,625	43,747
2011	0	290	21	4	2,377	46,320	21,199	70,211
2012	0	431	21	32	3,193	55,161	38,667	97,506
2013	3	674	49	96	2,805	39,358	33,945	76,930
2014	0	141	1	63	1,564	13,912	11,392	27,074
2015	0	259	221	29	1,014	17,384	17,061	35,968
2016	0	292	98	84	2,100	34,538	29,052	66,162
2017*	0	375	100	86	12,334	53,772	38,350	105,018

*Note: Values for years prior to 1998 DO NOT include freshwater recreational catch and the 2017 run reconstruction is preliminary and subject to revision.

Table A-1-c. Proportional Distribution of Hood Canal Summer/Fall Chinook Returns

Year	12A	12B	12C	12D	Skokomish	G.Adams	Hoodspport
2013	0.00004	0.00876	0.00064	0.00124	0.03646	0.51161	0.44125
2014	0.00000	0.00522	0.00004	0.00234	0.05777	0.51385	0.42077
2015	0.00000	0.00720	0.00614	0.00080	0.02819	0.48333	0.47435
2016	0.00000	0.00441	0.00148	0.00127	0.03173	0.52202	0.43910
2017	0.00000	0.00357	0.00095	0.00082	0.11745	0.51203	0.36518
2013-17 Mean	0.00001	0.00583	0.00185	0.00129	0.05432	0.50857	0.42813

Table A-1-d. Apportionment of the Hood Canal Summer/Fall Chinook Forecast

Hood Canal Production Unit	Terminal Run Forecast	Proportion
12A	0.48	0.00001
12B	358	0.00583
12C	114	0.00185
12D	79	0.00129
Skokomish	3,338	0.05432
Natural Subtotal	3,890	0.06331
George Adams	31,250	0.50857
Hoodspport	26,308	0.42813
Hatchery Subtotal	57,558	0.93670
Total	61,448	1.0

Note: The forecasted proportions are derived from the 2013-2017 mean distribution.

A-2. Summer Chum Salmon

A-2.1 Natural Summer Chum Runs

The 2018 pre-season forecast of the Hood Canal summer chum salmon returns using Ocean Environmental Variables (PDO, NPGO, ONI, & MEI) for the Mainstem Hood Canal, Quilcene/Dabob, and Southeast Hood Canal Management Units (Mus) are shown in Table A-2-a. Please note that this methodology is currently accepted by the co-managers for use during the 2018 forecasting purposes, with application beyond 2018 dependent on further data review.

The 2018 forecasted returns are 7,044 summer chum to the Mainstem Hood Canal MU, 7,506 summer chum to the Quilcene/Dabob Bays MU, and 2,483 summer chum to the SE Hood Canal MU. The total forecasted return is 17,034 summer chum to Hood Canal in 2018 (Table A-2-a).

The Summer Chum Salmon Conservation Initiative (SCSCI) defines interim Critical and Recovery abundance thresholds for each MU. The interim abundance thresholds are 1,260 (Critical) and 4,570 (Recovery) for the Quilcene/Dabob MU, 2,980 (Critical) and 15,740 (Recovery) for the Mainstem Hood Canal MU, and 340 (Critical) and 550 (Recovery) for the SE Hood Canal MU.

The 2018 forecasted returns of summer chum exceed the interim Critical threshold for each Hood Canal Management Unit and exceed the interim Recovery threshold for the Quilcene/Dabob MU and SE Hood Canal MU.

Table A-2-a. Hood Canal Summer Chum Salmon Natural and Supplementation Origin Recruits.

Year	Mainstem Hood Canal	Quilcene / Dabob	SE Hood Canal
2018 Forecast	7,044	7,506	2,483
2018 Total Hood Canal Forecast			17,034

The Co-managers have agreed to monitor the incidental harvest of summer chum in all scheduled fisheries and to monitor the in-season abundance of summer chum in the Quilcene / Dabob Bays MU. As in 2010 - 2017, the Co-managers agree that no gillnet fisheries will occur in 2018 until spawner escapement exceeds 1,500 summer chum in the Big and Little Quilcene rivers.

The Co-managers will conduct annual post-season abundance assessments comparing the forecasts to actual returns for each MU. All of the above actions are consistent with the requirements and provisions of the SCSCI.

A-3. Coho Salmon

A-3.1 Coho Salmon Natural Runs

The forecasted recruitment of 2018 Hood Canal natural coho salmon runs was based on a linear regression model that related the return of tagged natural jack coho at Big Beef Creek (BBC) to Hood Canal December Age 2 (DA2) recruits in the subsequent run year. This model used recruit data from brood years 1983-1998 and 2002-2013 (Table A-3-a). Recruit data from brood years 1999-2001 were excluded because of their unusually high recruit per tagged jack ratio, which is not expected to occur this year. The final form of the regression is shown below:

$$\text{Hood Canal Recruitment} = 34303.346 + (397.726 * (\text{BBC Tagged Jacks}))$$

Relevant statistics of the model used to derive the 2018 forecast are shown below.

Using Brood Years 1983-1998, 2002-2013		Scaled by Jackknife MPE -18.7
Multiple R	0.79522	NA
R ²	0.63237	NA
Adj. R ²	0.61823	NA
Std Error of Estimate	34303.346	NA
N	28	NA
Intercept	32197.288	NA
Slope	397.726	NA
2017 Jacks	171	NA
2017 Forecast	100,208	81,469

For 2018 as was done in 2016/17, the co-managers have agreed to apply a bias correction to the current accepted methodology described above) for forecasting natural coho in Hood Canal. The co-managers felt that this was a conservative approach in order to address concerns of possible poor ocean survival, accounting for and encompasses the same range of error in the regression parameters that would adjust for the known tendency of the BBC jack model to overestimate the recruitment of Hood Canal natural DA2's.

This bias correction factor was calculated by applying the Mean Percent Error (MPE) to the 2018 primary DA2 forecast, as calculated through the Jackknife analysis. The percent error in the MPE, in this case, is an indication of the overestimation of the regression. The subsequent application of the MPE value -18.7 reduces the forecast on the primary DA2 from 100,208 to 81,469. The forecasted recruits were subsequently apportioned to primary and secondary units on the basis of the distribution of their parent brood escapement.

The total adjusted forecast of 81,469 natural DA2 recruits was thus apportioned into 79,342 primary and 2,098 from secondary units, on the basis of their parent brood spawner distribution (Table A-3-b).

Table A-3-a. 2018 Hood Canal Natural Coho Forecast Data

Brood Year	Big Beef Creek Total Smolts	Big Beef Total Natural Jacks	Big Beef Tagged Natural Jacks	Hood Canal Total Dec Age-2 Recruits
1975	35,025			
1976	17,619		36	
1977	45,634		452	
1978	20,715		265	
1979	41,054		398	
1980	25,225			
1981	25,333		210	
1982	36,636		554	
1983	26,062	427	346	211,127
1984	23,994	445	350	232,860
1985	11,510	201	121	40,236
1986	26,534	314	208	117,460
1987	17,594	336	234	118,316
1988	<i>19,739</i>	173	122	<i>81,147</i>
1989	<i>23,646</i>	167	144	<i>66,306</i>
1990	<i>18,677</i>	273	202	<i>67,729</i>
1991	<i>13,071</i>	206	149	<i>140,612</i>
1992	<i>18,431</i>	188	157	<i>95,144</i>
1993	<i>16,574</i>	224	185	<i>73,734</i>
1994	<i>25,820</i>	410	298	<i>149,823</i>
1995	<i>40,828</i>	610	510	<i>180,517</i>
1996	<i>22,222</i>	60	45	<i>23,437</i>
1997	<i>20,967</i>	96	85	<i>55,909</i>
1998	<i>47,088</i>	189	179	<i>165,500</i>
1999	<i>21,803</i>	120	111	<i>107,024</i>
2000	<i>24,352</i>	80	70	<i>268,753</i>
2001	<i>36,060</i>	339	254	<i>298,347</i>
2002	25,060	294	235	76,798
2003	32,949	61	33	57,206
2004	38,579	161	86	111,437
2005	29,911	47	39	39,674
2006	27,416	111	95	96,089
2007	45,399	32	26	18,994
2008	24,396	197	177	102,243
2009	51,932	212	178	154,318
2010	18,732	90	70	53,757
2011	24,028	124	84	82,550
2012	56,389	172	127	56,214
2013	8,115	91	69	45,746
2014	23,912	511	408	
2015	23,912	218	171	

*Data italicized denotes methodology currently under review and agreed to for forecasting purposes only.

Table A-3-b. Apportionment of the 2018 Hood Canal Natural Coho Forecast

Area	Escapement Capacity	Escapement BY 2015	Management Unit Type	Proportion of Brood Escapement	December Age-2 Recruits	Scaled by Jack-knife MPE -17.5
12 / 12B	28.88%	12,252	Primary	45.32%	45,417	36,924
12C / 12D	31.66%	13,495	Primary	49.92%	50,025	40,670
Skokomish	29.01%	590	Primary	2.18%	2,187	1,778
9A	1.25%	256	Secondary	0.95%	949	772
12A	9.20%	440	Secondary	1.63%	1,631	1,326
Primary Subtotal	89.55%	26,337		97.43%	97,628	79,372
Secondary Subtotal	10.45%	696		2.57%	2,580	2,098
Grand Total	100.00%	27,033		100.00%	100,208	81,469

**Table A-3-c. Escapement of Coho Salmon to
Primary Natural Spawning Areas of Hood Canal**

Year	North (12-12B)	South (12C-12D)	Skokomish	Total
1986	17,865	19,679	3,432	40,976
1987	7,286	8,026	3,510	18,822
1988	4,523	4,983	1,948	11,454
1989	6,488	7,148	934	14,570
1990	2,518	2,774	1,281	6,573
1991	5,118	5,638	1,541	12,297
1992	8,026	8,842	2,179	19,047
1993	9,800	10,795	1,327	21,922
1994	20,847	22,965	12,128	55,940
1995	16,340	18,000	5,560	39,900
1996	18,428	20,300	4,008	42,736
1997	37,016	40,777	17,568	95,361
1998	40,323	44,420	14,957	99,700
1999	6,854	7,550	1,847	16,251
2000	8,724	9,610	8,288	26,622
2001	35,134	38,703	20,601	94,438
2002	26,170	28,829	13,647	68,646
2003	60,546	66,697	44,757	172,000
2004	39,439	43,445	62,995	145,879
2005	14,854	16,363	6,286	37,503
2006	5,554	6,118	1,597	13,269
2007	19,017	20,949	6,381	46,347
2008	5,082	5,598	836	11,516
2009	12,330	13,583	1,048	26,961
2010	1,906	2,099	192	4,197
2011	9,106	10,030	5,252	24,388
2012	22,400	24,673	4,709	51,782
2013	6,779	7,467	1,798	16,044
2014	8,319	9,163	4,647	22,129
2015	12,252	13,495	590	26,337
2016	6,587	7,255	5,235	19,078

A-3.2 Coho Salmon Hatchery Runs

The 2018 forecast utilized survival rates for two complete brood cycles, or six brood years (Table A-3-d). Historic marine survival rates were estimated from CWT-based cohort reconstruction of December Age-2 recruits, as were those of natural coho. Because there are several enhancement facilities in Hood Canal, and tag data were not available for all facilities for all years, marine survival rates were estimated from reconstructed cohorts, using the assumption that untagged releases contributed to preterminal fisheries in a way that maintained the same ratio to tagged releases, as estimated by RRTERM to have entered the Hood Canal terminal area (Table A-3-d).

The 2018 forecast of 110,632 hatchery reared December Age-2 coho recruits (Table A-3-d) was predicted from the brood year 2015 smolt releases multiplied by the average estimated marine survival rate for smolts from the six most recent available brood years for all facilities (Table A-3-d). In 2017 (BY2015) coho pre-smolts destined for the Quilcene Bay Net Pens did not take place due to harmful algal blooms, these fish were held and reared at QNFH and released in April 2017 resulting in a grand total releases of 623,342 smolts. Also, in the winter of 2012-2013 a storm damaged the Quilcene Bay Net Pens, as a result BY12 fish destined for the net pens were held and released on station at the Quilcene National Fish Hatchery.

Table A-3-d. Hood Canal Hatchery and Net Pen Smolt to Dec-2 Recruit Survival

Brood Year	George Adams Hatchery			Port Gamble Net Pens			Quilcene NFH			Quilcene Bay Net Pens		
	Smolts	Recruits	R/Sm	Smolts	Recruits	R/Sm	Smolts	Recruits	R/Sm	Smolts	Recruits	R/Sm
1979	1,406,424			682,900			502,189					
1980	322,580			454,000			498,166					
1981	351,474			400,000			352,298					
1982	364,000			394,000			271,035					
1983	310,100	106,593	0.34374	586,400	89,105	0.15195	223,128					
1984	312,800	52,163	0.16676	394,400	73,890	0.18735	542,480			247,221	40,095	0.16218
1985	355,400	20,960	0.05898	351,900	9,450	0.02685	617,231			85,575	<i>4,363</i>	<i>0.05098</i>
1986	337,700	32,908	0.09745	429,141	29,183	0.06800	574,171	<i>98,188</i>	<i>0.17101</i>	193,522	<i>16,075</i>	<i>0.08307</i>
1987	298,000	28,068	0.09419	407,600	157,116	0.38547	753,390	75,121	0.09971	146,000	30,269	0.20732
1988	310,700	14,698	0.04731	383,629	74,033	0.19298	491,303	64,066	0.13040	311,327	21,484	0.06901
1989	300,300	7,106	0.02366	298,944	53,439	0.17876	352,556	9,874	0.02801	266,193	7,834	0.02943
1990	307,300	7,894	0.02569	403,600	32,220	0.07983	501,254	27,662	0.05519	353,263	18,203	0.05153
1991	304,197	20,054	0.06592	383,419	63,120	0.16462	397,701	49,061	0.12336	337,800	<i>24,903</i>	<i>0.07372</i>
1992	301,019	15,688	0.05212	361,553	13,281	0.03673	400,700	34,709	0.08662	287,187	<i>8,379</i>	<i>0.02918</i>
1993	303,054	31,320	0.10335	414,844	4,672	0.01126	425,334	29,577	0.06954	216,737	1,864	0.00860
1994	396,084	17,542	0.04429	378,686	8,741	0.02308	625,700	40,118	0.06412	0		
1995	434,140	6,963	0.01604	342,828	8,450	0.02465	425,971	17,650	0.04143	220,000	5,756	0.02616
1996	527,317	11,878	0.02253	441,656	17,564	0.03977	452,203	9,322	0.02061	225,269	3,421	0.01234
1997	534,554	22,621	0.04232	420,482	3,830	0.00911	437,222	22,091	0.05053	189,951	10,872	0.05724
1998	502,266	38,971	0.07759	391,765	7,196	0.01837	368,399	23,966	0.06505	208,000	9,780	0.04702
1999	493,992	46,008	0.09314	432,847	4,931	0.01139	428,995	33,187	0.07736	0		
2000	587,937	36,351	0.06183	432,161	6,521	0.01509	411,674	27,053	0.06571	210,627	12,982	0.06164
2001	336,886	44,572	0.13231	409,221	4,803	0.01174	388,212	42,242	0.10881	90,000	2,272	0.02524
2002	501,031	55,380	0.11053	423,746	16,270	0.03840	404,582	51,373	0.12698	200,835	15,035	0.07486
2003	309,179	28,359	0.09172	437,306	14,502	0.03316	361,891	<i>25,250</i>	<i>0.06977</i>	179,711	<i>8,165</i>	<i>0.04543</i>
2004	290,570	<i>20,739</i>	<i>0.09150</i>	540,000	<i>13,871</i>	<i>0.02569</i>	488,080	<i>41,686</i>	<i>0.08541</i>	215,731	<i>2,817</i>	<i>0.01306</i>
2005	245,608	<i>26,842</i>	<i>0.10929</i>	247,500	<i>5,081</i>	<i>0.02053</i>	273,099	<i>23,247</i>	<i>0.08512</i>	124,813	<i>8,331</i>	<i>0.06675</i>
2006	294,151	31,150	0.10590	415,000	16,421	0.03957	358,131	57,903	0.16168	193,808	<i>4,945</i>	<i>0.02551</i>
2007	296,474	23,275	0.07851	412,208	4,929	0.01196	357,967	32,815	0.09167	162,381	<i>3,384</i>	<i>0.02084</i>
2008	292,529	27,729	0.09479	423,584	23,035	0.05438	441,117	68,719	0.15578	200,499	<i>3,586</i>	<i>0.01789</i>
2009	306,329	29,754	0.09713	223,210	28,708	0.12861	345,604	68,639	0.19861	179,587	<i>6,025</i>	<i>0.03355</i>
2010	239,228	43,553	0.182056	397,581	15,470	0.03891	393,654	38,934	0.09890	204,578	<i>3,204</i>	<i>0.01566</i>
2011	289,734	15,845	0.05469	397,442	5,667	0.01426	426,115	10,279	0.02412	199,195	<i>2,012</i>	<i>0.01010</i>
2012	301,569	14,428	0.04784	414,013	1,505	0.00364	627,039	20,395	0.03253	0		
2013	314,174	22,779	0.07250	394,424	29,586	0.07501	441,446	55,926	0.12669	199,552	28	<i>0.00014</i>
2014	318,458			382,615			443,838			196,706		
2015	298,219			322,219			623,342			0		
Average (2008-13)			0.09250	0.05247			0.10611			0.01547		
2018 Forecast:		27,586		16,906			66,140			0		

Note: Values in italics indicate values agreed to for pre-season forecasting only. Values in boldface were excluded from the analysis

A-4. Fall Chum Salmon

The 2018 forecast of the Hood Canal fall chum salmon run was estimated separately for natural production units, off-station augmented production in natural rearing areas, and individual hatchery production units. The following descriptions of methods and source data are intended to provide documentation of the methods and approaches used.

A-4.1.1 Natural Run Forecasts (Tribal)

The 2018 return of Hood Canal natural fall-timed chum salmon of each returning age group (3, 4, and 5 year olds) was forecast using the available mean return-per-spawner-at-age rates for the brood years 2004-11. The mean recruit-per-spawner return rates were 1.27340, 1.56974, and .93833, for 3, 4, and 5 year-olds respectively (Table A-4-a). These adjusted rates of return were multiplied with the 2015, 2014, and 2013 brood escapements (60,691, 51,216, and 61,172; respectively) to estimate the total 2018 forecast of 215,079 Hood Canal natural fall chum returning to Puget Sound, before the addition of anticipated returns from in-stream supplementation projects. The Hood Canal natural run forecast was further apportioned to individual production units (Tables A-4-d and A-4-e), on the basis of relative proportion attributable to each production unit's spawners (brood year escapements), for each returning age group.

The grand total return of 215,239 to each natural production unit was estimated by adding the estimated 159 return from in-stream enhancement and supplementation efforts. The forecast of this latter component is described under "Hatchery runs" (Section A-4.2).

A-4.1.2 Natural Run Forecasts (WDFW)

Natural fall chum forecasts were calculated using the Puget Sound-wide recruit/spawner (R/S) method, with the regional (Hood Canal) forecast, and terminal forecasts within Hood Canal, allocated according to parent escapement and terminal forecasts allocated by escapement goal.

The WDFW natural fall chum salmon forecast was estimated for Puget Sound using the recruit/spawner method. Escapement of parent broods of 2013, 2014, and 2015 and age composition were used to estimate 2018 returns of Age 3, Age 4, and Age 5 natural fall chum. The 2018 forecast of natural fall chum to Puget Sound is 61,831 Age 3, 683,438 Age 4, and 282,813 Age 5 fish for a total run size of 1,028,082 natural fall chum (Table A-4b).

The apportionment of 1,028,082 Puget Sound natural fall chum to Hood Canal was determined by applying the Hood Canal parent escapement proportion to each age class. The Hood Canal forecast by age is 64,230 Age 3, 92,944 Age 4, and 13,318 Age 5 fish for a total Hood Canal forecast of 170,493 natural fall chum (Table A-4c).

The Hood Canal natural run forecast was further apportioned to individual production units (Tables A-4-d and A-4-e), on the basis of relative proportion attributable to each production unit's spawners (brood year escapements), for each returning age group. The forecasted return of each age group to Puget Sound was apportioned to Hood Canal using the proportions of the parent escapement of each brood (Table A-4-f).

A-4.1.3 Joint 2018 Hood Canal Natural Fall Chum Salmon Forecast

For preliminary preseason planning, we agreed to use a forecast of 192,945 natural fall chum, the average of the Tribal and WDFW results. The total forecast was then apportioned to individual production units on the basis of the age specific brood escapement distribution (Table A-4-g).

Table A-4-a. Hood Canal Natural Fall Chum Returns-at-Age per Spawner

Brood Year	Brood Escape	3's	4's	5's	Total
1968	47,802	0.58849	1.63839	0.09531	2.32219
1969	30,070	0.55346	1.14771	0.09264	1.79381
1970	41,698	0.55975	1.58101	0.01314	2.15390
1971	41,139	0.58683	0.41252	0.33535	1.33470
1972	41,602	0.26600	1.27781	0.00000	1.54381
1973	27,870	1.77432	2.60438	0.07441	4.45311
1974	52,224	0.81057	4.42759	0.07083	5.30899
1975	16,266	7.39080	0.05030	0.00000	7.44110
1976	48,078	0.53107	0.20951	0.03284	0.77342
1977	26,074	2.63782	2.75187	0.13638	5.52607
1978	79,156	0.00000	0.60521	0.05628	0.66149
1979	14,323	1.90574	2.12510	0.00000	4.03084
1980	21,672	0.51985	2.14281	0.23020	2.89286
1981	14,311	3.49591	12.57517	0.62961	16.70069
1982	12,134	2.88354	7.08386	0.94399	10.91139
1983	7,121	9.05912	24.36310	1.13297	34.55519
1984	22,751	1.29322	5.88289	0.37653	7.55264
1985	50,910	0.47585	2.67119	0.33941	3.48645
1986	29,549	0.00000	3.15515	0.44356	3.59871
1987	24,481	0.00000	3.54568	1.04655	4.59223
1988	30,704	1.51411	8.58958	1.42974	11.53343
1989	24,873	0.11184	6.46342	5.71902	12.29428
1990	20,811	1.48264	8.26697	0.69326	10.44287
1991	44,745	0.59753	1.58643	0.12973	2.31369
1992	96,382	2.21238	4.21549	0.20013	6.62800
1993	67,770	1.07479	1.38931	0.10130	2.56540
1994	151,821	0.30984	0.88726	0.03062	1.22772
1995	119,344	0.58343	0.40133	0.01270	0.99746
1996	251,803	0.01977	0.20395	0.00000	0.22372
1997	53,492	0.52960	2.05414	0.40225	2.98599
1998	101,631	1.54720	2.17750	0.01927	3.74398
1999	33,924	2.88881	8.36176	1.46228	12.71284
2000	37,131	2.95919	12.40288	0.25103	15.61310
2001	103,713	1.92253	0.71772	0.08583	2.72608
2002	173,037	0.36398	1.62283	0.09993	2.08674
2003	148,512	0.21273	1.32788	0.21269	1.75329
2004	168,126	0.15014	0.91883	0.05347	1.12244
2005	47,598	1.76695	1.02192	0.00000	2.78887
2006	97,104	0.17061	0.44776	0.05885	0.67722
2007	78,218	0.70884	2.44524	0.67400	3.82808
2008	38,512	0.00000	1.52348	0.25191	1.77540
2009	13,961	6.98370	19.92078	2.21071	29.11519
2010	17,221	0.00000	12.48167	2.92980	15.41147
2011	48,446	0.40696	3.06123	1.32787	4.79606
2012	40,460	1.37228	1.98083		
2013	61,172	0.00000			
2014	51,216	0.00000			
2015	60,691	0.00000			
Mean: Brood Years 1968-15 (exclusive of outliers, in bold)					
All Odd Years	48,293	1.75406	2.32311	0.73299	4.96447
All Even Years	69,693	0.85020	2.70752	0.37640	4.24042
Years 2004-11*	63,648	1.27340	1.56974	0.93833	1.99088
		3's	4's	5's	
2018 Tribal Forecast*		77,284	80,396	57,399	215,079

* 2009 & 2010 outliers in 4 year old only exclusion

Table A-4-b. 2018 WDFW Puget Sound Natural Fall Chum Salmon Forecast

Parent Brood	Age	Parent Escapement	Mean R/S ¹	Adjusted R/S	Estimated R/S (all ages)	Mean Age Composition ¹	Natural Forecast
2013	5	283,997	3.00	3.00	853,148	0.0724736	61,831
2014	4	376,600	2.38	2.38	896,591	0.7622629	683,438
2015	3	267,232	3.00	3.00	802,785	0.3522899	282,813
						Total	1,028,082

Note: Uses odd or even brood year average, depending on brood year

Table A-4-c. 2018 WDFW Hood Canal Natural Fall Chum Salmon Forecasts

	Puget Sound Forecast	HC Parent Escapement Proportion	HC Forecast by Age
Age 3 (2015 Brood) Forecast	282,813	0.2271114	64,230
Age 4 (2014 Brood) Forecast	683,438	0.1359954	92,944
Age 5 (2013 Brood) Forecast	61,831	0.2153977	13,318
Total WDFW Forecast	1,028,082		170,493

Table A-4-d. 2018 Hood Canal Natural Fall Chum Salmon Parent Brood Escapement Distribution

Area	2013	2014	2015
9A	0.00%	0.00%	0.00%
12	2.47%	2.41%	2.42%
12A	2.34%	8.06%	4.59%
12B	20.29%	40.25%	28.78%
12C	17.51%	19.68%	22.39%
82G	35.83%	22.53%	24.40%
12D	21.55%	7.07%	17.41%

Table A-4-e. Apportionment of the 2018 Tribal Hood Canal Natural Fall Chum Salmon Forecast

Area	3's	4's	5's	Total
9A	0	0	0	0
12	1,871	1,935	1,420	5,225
12A	3,548	6,479	1,346	11,373
12B	22,246	32,360	11,647	66,252
12C	17,308	15,824	10,052	43,183
82G	18,856	18,113	20,565	57,534
12D	13,455	5,686	12,371	31,512
Total	77,284	80,396	57,399	215,079

Table A-4-f. Apportionment of the 2018 WDFW Hood Canal Natural Fall Chum Salmon Forecast

Area	3's	4's	5's	Total
9A	0	0	0	0
12	1,555	2,237	329	4,121
12A	2,949	7,490	312	10,751
12B	18,488	37,411	2,702	58,601
12C	14,384	18,294	2,332	35,010
82G	15,671	20,940	4,772	41,383
12D	11,183	6,573	2,870	20,626
Total	64,230	92,944	13,318	170,493

Table A-4-g. Apportionment of the 2018 Joint Hood Canal Natural Fall Chum Salmon Forecast

Area	Tribal Forecast	WDFW Forecast	Joint Forecast
9A	0	0	0
12	5,225	4,121	4,673
12A	11,373	10,751	11,062
12B	66,252	58,601	62,426
12C	43,183	35,010	39,097
82G (Skokomish)	57,534	41,383	49,458
12D	31,512	20,626	26,069
12D Off-Station	159		159
Total	215,238	170,493	192,945

A-4.2 Hatchery Runs (Tribal)

The 2018 hatchery-origin returns of fall-timed chum salmon were generally forecasted using average returns-at-age-per-pound of fingerlings released, to Puget Sound net fisheries and escapements, using historical run sizes from the fall chum database, historical releases from each facility, and applying them to releases from brood years 2013, 2014, and 2015. In estimating the returns, the following information was used for each facility. The problems with recent years’ terminal area run reconstruction, may have introduced significant positive bias to the estimates of Skokomish River hatchery runs, introducing a negative bias to Hoodspport hatchery runs. Off-station production, resulting from instream augmentation programs was estimated separately and was then added to the forecasted return to natural spawning areas.

The effects of changes to the Hood Canal hatchery chum programs will continue to be seen in 2018, including Area 9A Little Boston Hatchery production increases coupled with the return of Area 12A production unit to natural production, since the last release from the Quilcene National Fish Hatchery occurred with the 2002 brood. Also, the 2004 brood was the first year of reduced production at the Hoodspport and George Adams / McKernan facilities, which first affected age-5 returns in 2009 and subsequent years.

A-4.2.1 Forecasts of Instream Augmentation (Tribal)

Egg box and fry-augmented runs to streams of areas 12, 12B, 12C, 12D, 82G: The Tribal forecast applied one half of the mean return rates of age 3, age 4, and age 5 fish per pound planted at Hoodspport Hatchery (2004-2011 broods) (Tables A-4-h and A-4-i). The resulting forecast for 2018 is 159 fish. This forecast was apportioned to each area, according to the volume released from each brood year and the resulting estimates were added to the corresponding natural run components.

Table A-4-h. Tribal Hood Canal Fall Chum 2018, Off-Station Lbs. Planted

Area	BY 2015	BY 2014	BY 2013
	Lbs	Lbs	Lbs
9A	0	0	0
12	31	17	17
12B	0		
12A	0		
12C	0		
Skokomish	1	1	1
12D	118	113	251
Total	150	131	269

Table A-4-i. Apportionment of the 2018 Tribal Hood Canal Fall Chum Off-Station Forecast

Area	3's	4's	5's	Total
9A	0.00	0.00	0.00	0
12	9.16	12.06	1.21	22
12B	0.00	0.00	0.00	0
12A	0.00	0.00	0.00	0
12C	0.00	0.00	0.00	0
82G	0.27	0.66	0.07	1
12D	34.77	82.82	18.39	136
Total	44	96	20	159

A-4.2.2 Fall Chum Hatchery On-Station Forecasts (Tribal)

Hoodsport Hatchery: Mean return rate of age 3, 4, and 5 fish per pound planted at Finch Creek (2004-2011 broods) (Table A-4-j). The resulting forecast for 2018 is 60,055. Run reconstruction problems have biased this run low.

George Adams/McKernan Hatcheries: Mean return rate of age 3, age 4, and age 5 fish per pound released (2004-2011 broods) (Table A-4-k). The resulting forecast for 2018 is 236,401.

Little Boston Hatchery: Mean return rate of age 3, age 4 and age 5 fish per pound planted at Hoodsport Hatchery (2004-2011 broods) (Table A-4-j). The resulting forecast for 2018 is based on the fingerling releases of 1,428 lbs (BY15), 3,069 lbs. (BY14), and 2,703 lbs. (BY2013), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of 5,726 (Table A-4-n).

Enetai Hatchery: Mean return rates of age 3, age 4 and age 5 fish per pound planted (2004-2011 broods). (Table A-4-l). The resulting forecast for 2018 is based on the fingerling releases of 7,611 lbs (BY15), 9,705 lbs. (BY14), and 7,976 lbs. (BY2013), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of 45,758.

The Tribal forecasts of hatchery returns are summarized in Table A-4-n and indicate a total forecast of on-station hatchery-origin fall chum of 347,940.

A-4.2.3 Fall Chum Hatchery Forecasts (WDFW)

The 2018 return of hatchery-origin fall chum was forecast by multiplying pounds released from each facility by long-term even/odd brood year specific average return rates for that facility. For example, 3-year-old returns were forecast by multiplying pounds released of 2014 brood year chum by the long-term, odd-year brood Age 3 return rate for that hatchery. The age 4 and 5 returns were forecast by the same method. For off-station releases (volunteer/cooperative projects), return rates were based on rates for a corresponding hatchery, which in some instances were reduced by a factor of 4 to compensate for smaller size at release and whether the fry were fed prior to release. A summary of the WDFW forecasts by age is shown for Hood Canal hatcheries in Table A4-m. The WDFW Hood Canal hatchery fall chum forecast is 260,664 on-station and 307 off-station for total forecast of 260,471 returns in 2018.

A-4.2.4 Joint 2018 Hood Canal Hatchery Fall Chum Salmon Forecast

For preliminary preseason planning, we agreed to use a forecast of 304,455 hatchery fall chum, the average of the Tribal and WDFW forecasting methods' results, apportioned to individual hatchery facilities (Table A-4-o).

**Table A-4-j. Fall Chum Returns-per-Pound,
by Age at Return from Hoodspout Hatchery Releases**

Brood Year	Release Lbs.	3's	4's	5's	Total
1965	888	0.80208	2.35750	0.01558	3.17516
1966	1,771	0.92010	2.66721	0.02299	3.61030
1967	2,301	0.93776	1.15006	0.11132	2.19914
1968	4,373	0.54928	1.56195	0.19686	2.30809
1969	2,424	0.59879	2.69040	0.26275	3.55194
1970	3,036	1.45276	4.96486	0.00000	6.41762
1971	3,794	1.45488	1.48756	0.02969	2.97213
1972	4,126	0.55870	7.49948	0.82970	8.88788
1973	9,202	0.70599	3.60727	0.16357	4.47683
1974	27,368	0.89570	5.68814	0.03343	6.61727
1975	22,776	2.54895	2.78624	0.05244	5.38763
1976	24,490	0.76752	1.80998	0.04155	2.61905
1977	21,883	3.98451	2.02120	0.02757	6.03328
1978	33,256	1.00278	2.34466	0.24428	3.59172
1979	24,238	2.98678	2.89652	0.21504	6.09834
1980	44,336	0.48636	2.23768	0.04039	2.76443
1981	23,589	3.18480	4.51989	0.36118	8.06587
1982	32,058	1.69592	4.43338	0.15862	6.28792
1983	34,748	1.23151	4.91046	0.44689	6.58886
1984	60,763	1.76204	2.85909	0.09411	4.71524

Continued ...

**Table A-4-j (cont'd). Fall Chum Returns-per-Pound,
by Age at Return from Hoodspout Hatchery Releases**

1985	39,279	2.92389	5.00571	0.20595	8.13555
1986	33,036	0.53259	2.21872	0.20579	2.95710
1987	40,323	0.42814	3.70929	0.14736	4.28479
1988	36,877	3.13411	7.17034	0.29712	10.60157
1989	35,149	0.71847	1.79583	0.50845	3.02275
1990	38,422	4.27142	7.01940	0.37401	11.66483
1991	39,379	3.01183	1.98098	0.07460	5.06741
1992	33,678	2.33155	3.93700	0.12497	6.39352
1993	33,920	1.77835	4.03487	0.17676	5.98998
1994	37,075	0.73558	1.96470	0.03943	2.73971
1995	37,583	1.29662	0.93342	0.01997	2.25001
1996	25,374	0.35104	1.66305	0.05572	2.06981
1997	30,276	0.34889	2.52394	0.09089	2.96372
1998	37,534	2.62754	3.21934	0.03818	5.88506
1999	33,196	3.81337	2.85193	0.30443	6.96973
2000	34,067	0.18327	1.12001	0.06995	1.37323
2001	35,033	1.16696	0.88571	0.04609	2.09876
2002	35,574	0.48600	0.98579	0.00808	1.47987
2003	33,231	0.83763	0.63987	0.04794	1.52544
2004	31,410	0.33036	0.56328	0.01959	0.91323
2005	29,031	0.77693	1.52074	0.16253	2.46020
2006	29,958	0.08529	1.31603	0.02103	1.42236
2007	25,523	1.40372	2.16346	0.21276	3.77993
2008	28,653	0.02999	0.29356	0.01520	0.33875
2009	30,092	1.30740	1.65037	0.21783	3.17560
2010	27,262	0.15984	3.06169	0.35500	3.57653
2011	30,171	0.63369	1.12614	0.16702	1.92685
2012	31,246	1.55504	3.22000		
2013	30,347	2.02580			
2014	29,497				
2015	21,140				
All Odd Years	25,751	1.63631	2.46872	0.16953	4.35970
All Even Years	29,010	1.12103	3.07581	0.11165	4.34812
All Years	27,348	1.38393	2.77226	0.14185	4.35404
All Years 65-73	3,546	0.88670	3.10959	0.10035	4.17768
All Years 74-11	32,911	1.48030	2.68059	0.15058	4.39813
All Years 04-11*	29,013	0.59090	1.46191	0.14637	2.14900
2018 Tribal Forecast*		12,491	43,122	4,442	60,055

**Table A-4-k. Fall Chum Returns-per-Pound, by Age at Return
from George Adams/McKernan Hatchery Releases**

Brood Year	Release Lbs.	3's	4's	5's	Total
1978	18,717	0.11901	0.85327	0.15188	1.12416
1979	40,273	0.36752	0.61002	0.06715	1.04469
1980	24,418	0.30902	2.10810	0.05751	2.47463
1981	12,028	3.24075	4.43634	0.36758	8.04467
1982	26,780	1.03328	3.20556	0.20036	4.43920
1983	25,917	1.25574	8.01500	0.44456	9.71530
1984	28,601	1.49188	1.18815	0.05936	2.73939
1985	24,500	0.78202	1.85405	0.20669	2.84276
1986	36,329	0.12036	1.56008	0.24038	1.92082
1987	30,566	0.10195	1.44458	0.20499	1.75152
1988	31,083	1.45527	4.69637	0.54805	6.69969
1989	32,315	0.52929	2.25103	0.20309	2.98341
1990	17,032	0.47710	5.81499	0.43246	6.72455
1991	30,024	1.45064	1.33176	0.05341	2.83581
1992	25,235	1.59492	2.86789	0.09179	4.55460
1993	27,016	1.21873	2.78823	0.32053	4.32749
1994	27,723	0.54142	3.79484	0.03621	4.37247
1995	22,624	3.11094	1.06483	0.00880	4.18457
1996	23,138	0.27842	0.47256	0.11599	0.86697
1997	27,884	0.06412	5.23332	0.21356	5.51100
1998	33,440	5.59772	3.99864	0.27753	9.87389
1999	27,365	4.78742	22.40721	2.17993	29.37456
2000	8,486	4.76506	15.87349	0.72806	21.36661
2001	31,946	3.95554	2.51829	0.00000	6.47383
2002	30,996	1.44617	4.05078	0.09009	5.58704
2003	32,631	5.01811	6.81432	0.32729	12.15972
2004	23,127	5.35825	3.32306	0.06471	8.74602
2005	22,768	5.35290	12.04153	0.75741	18.15184
2006	24,833	0.95216	3.67314	0.08015	4.70544
2007	21,035	5.61999	14.76001	0.80514	21.18514
2008	22,371	0.86000	2.69175	0.09309	3.64483
2009	22,482	13.30859	35.85918	0.97884	50.14661
2010	22,855	10.16291	9.15311	1.05806	20.37408
2011	33,674	1.20190	4.58588	0.17237	5.96015
2012	24,781	9.89512	9.04131		
2013	25,878	6.05612			
2014	29,061				
2015	27,066				
Average Return Brood Years (1978-11) excluding outliers in bold.					
Odd Years	27,263	2.59492	3.30367	0.43008	6.14191
Even Years	25,211	2.13501	3.67609	0.22485	4.56491
All Years	26,237	2.36497	3.51471	0.28658	5.86090
Years 04-11*	24,143	3.22420	4.68539	0.50122	8.24166
2018 Tribal Forecast*		87,268	136,162	12,971	236,401

Table A-4-I. Fall Chum Returns-per-Pound, by Age at Return for Enetai Hatchery Releases

Brood Year	Release Lbs.	3's	4's	5's	Total
1976	3,696	0.18155	0.75214	0.00000	0.93369
1977	5,785	1.53198	3.31116		
1978	6,514	1.40297		0.01172	
1979	2,666		0.62223	0.09213	
1980	3,053	0.43328	1.81825	0.10249	2.35402
1981	4,985	2.12202	2.89871	0.10103	5.12176
1982	6,130	2.23198	2.83908	0.05719	5.12825
1983	2,727	3.66295	4.00346	0.12399	7.79040
1984	5,855	2.34790	1.46902	0.02738	3.84430
1985	5,485	2.22696	2.49188	0.03179	4.75063
1986	5,495	1.13061	1.07304	0.09600	2.29965
1987	4,455	1.07889	1.44217		
1988	4,493	1.46308		0.08704	
1989	4,191		1.67962	0.06531	
1990	3,294	3.14615	6.08997		
1991	2,936	6.39302		0.06815	
1992	2,095		3.07692	0.10468	
1993	4,297	1.77956	2.41267	0.08406	4.27629
1994	6,809	1.37618	3.03970	0.00296	4.41884
1995	3,456	4.32699	0.34679	0.00621	4.67999
1996	2,302	0.41883	0.65893	0.07013	1.14789
1997	4,068	0.20813	1.79254	0.13066	2.13133
1998	3,270	1.82332	3.93045		5.75377
1999	1,542	3.21144		0.36481	3.57625
2000	195		1.77961	1.69690	3.47651
2001	4,326	4.12338	2.11684	0.19163	6.43185
2002	7,081	1.58006	6.80996	0.05611	8.44613
2003	3,264	3.10357	2.25885	0.41600	5.77842
2004	6,613	5.50110	1.07494	0.07300	6.64904
2005	6,603	2.70151	3.15335	0.01853	5.87339
2006	6,895	0.38965	0.41699	0.02931	0.83596
2007	6,469	0.88754	3.41262	0.05968	4.35984
2008	3,951	0.05116	0.70356	0.10902	0.86374
2009	4,700	7.54088	5.64889	0.39302	13.58280
2010	5,531	2.19477	5.51053	0.40200	8.10731
2011	6,301	0.50739	1.39891	0.00000	1.90630
2012	9,637	2.97468	1.70130		
2013	7,976	1.79858			
2014	9,705				
2015	7,611				
Average (Brood Years 1976-11).					
Odd Years	4,692	2.77675	2.62063	0.13419	5.40456
Even Years	5,131	1.68513	2.51438	0.18284	3.87562
All Years	4,911	2.23094	2.47682	0.15852	4.61177
Years 04-11*	5,883	2.47175	2.66497	0.13551	5.27224
2018 Tribal Forecast*		18,813	25,863	1,081	45,758

Note: Because of incomplete reconstruction, and lack of rack sampling, return rates after 2005 were not available

Table A-4-m. Summary of 2018 WDFW Hood Canal Hatchery Fall Chum Forecasts

Facility	Age 3	Age 4	Age 5	Total
Little Boston Hatchery	1,428	2,944	247	4,619
Hoodsport Hatchery	55,136	25,620	6,843	87,599
G. Adams / McKernan Hatchery	64,440	57,905	8,259	130,604
Enetai Hatchery	20,386	16,308	1,148	37,842
12D Streams - Augmentation	73	187	47	307
Total	141,463	102,964	16,544	260,971

Table A-4-n. Summary of 2018 Tribal Hood Canal Hatchery Fall Chum Forecasts

Facility	Age 3	Age 4	Age 5	Total
Little Boston Hatchery	844	4,487	396	5,726
Hoodsport Hatchery	12,491	43,122	4,442	60,055
G. Adams / McKernan Hatchery	87,268	136,162	12,971	236,401
Enetai Hatchery	18,813	25,863	1,081	45,758
Total	119,416	209,634	18,889	347,940

Table A-4-o. Apportionment of the 2018 Joint Hood Canal Hatchery Fall Chum Salmon Forecasts

Facility	Tribal Forecast	WDFW Forecast	Joint Forecast
Little Boston Hatchery	5,726	4,619	5,173
Hoodsport Hatchery	60,055	87,599	73,827
G. Adams / McKernan Hatchery	236,401	130,604	183,503
Enetai Hatchery	45,758	37,842	41,800
12D Streams - Augmentation		307	
Total	347,940	260,971	304,455