

**2013 PRESEASON FORECAST PACKET  
FOR HOOD CANAL  
SALMON RUNS'**

**PRESEASON FORECAST PACKET PREPARED BY:**

**SKOKOMISH TRIBE**

**SALMON FORECASTS AGREED TO BY:**

**LOWER ELWHA TRIBE**

**PNPTC (FOR JAMESTOWN & PORT GAMBLE)**

**SKOKOMISH TRIBE**

**WDFW**

**FINAL 22FEB2013**

## SUMMARY OF 2013 HOOD CANAL FORECASTS and Forecasting Methods

Species (Ref.#)	Origin	Type	Number	Mass Marked	Number Type	Model Designation
<b>Chinook (A-1)</b>	Mixed	Secondary	3,350		TRS	Natural
	Hatchery	Primary	65,708		TRS	Hatchery
<b>Summer Chum (A-2)</b>	Natural (supplemented)	Secondary	19,798		Total Recruits	
<b>Coho (A-3)<sup>1</sup></b>	Natural	Primary	55,128		Total DA2 <sup>1</sup> Recruits	Natural
	Natural	Secondary	2,321		Total DA2 <sup>1</sup> Recruits	Hatchery
	Hatchery	Secondary	83,100	73,185	Total DA2 <sup>1</sup> Recruits	Hatchery
<b>Fall Chum (A-4)</b>	Natural		51,422		WA Run	Natural
	Hatchery		272,175			Hatchery
<b>Pink (A-5)</b>	Natural		51,647		WA Run	Natural
	Hatchery		3,667			Hatchery

<sup>1</sup> See overleaf for Coho FRAM model inputs.

NOTES: Summer Chum salmon, although secondary, are under rehabilitation.

Forecasts for individual Hood Canal Management Units are:

Mainstem Hood Canal MU	10,026
SE Hood Canal MU	2,834
Quilcene MU	6,938

Natural Chinook salmon, although classified as “secondary”, are under rehabilitation.

Forecasts for individual Hood Canal Management Units are:

Mid Hood Canal MU	246
Skokomish MU (Nat.)	3,057
(Hat.)	43,997
Hoodsport MU	21,712
Miscell.	47

**Coho FRAM Model Inputs:**

<b>Stock Name</b>	<b>DA2</b>	<b>nuFRAM Stock</b>	<b>nuFRAM Age 3</b>	<b>Marked nuFRAM</b>	<b>Marked %</b>
Port Gamble Net Pens	12,302	ptgamh	11,367	11,363	99.96%
Port Gamble Bay Natural	523	ptgamw	484		
Area 12/12B Natural	25,211	ar12bw	23,295		
Quilcene Bay Net Pens	6,554	qlcnbh	6,056	6,046	99.84%
Quilcene Hatchery	42,776	qlcenh	39,525	33,494	84.74%
Area 12A Natural	1,797	ar12aw	1,661		
Hoodspport Hatchery	n/a	hoodsh	0		
Area 12C/12D Natural	27,773	ar12dw	25,663		
George Adams Hatchery	21,467	gadamh	19,836	16,720	84.29%
Skokomish River Natural	2,143	skokrw	1,980		

## A. Pre-season Forecasting Methods

### A-1. Summer/Fall Chinook Salmon

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

<b>Return Year (RY)</b>	<b>0+ Lbs. Released in RY-3</b>	<b>Return/Lb</b>	<b>Terminal Run</b>
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	0.76687	68,458
2012*	89,877	1.05480	94,802
<b>Average 2010-2012</b>		0.76837	
<b>2013 Forecast</b>			69,059

(\*) 2012 return data are preliminary and subject to revision, following reconciliation of records.

The 2013 forecasted terminal run size of summer-run Hood Canal Chinook salmon is the product of brood 2009 fingerling lbs released from WDFW facilities in 2010, 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 three return years (2010-2012), (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 2009 through 2012 return years, to include this information for 2013 forecasting purposes (Tables A-1-a and A-1-b). The resulting terminal area run forecast is 69,059 Chinook salmon. The forecast was apportioned to 65,708 chinook expected to return to hatcheries and 3,351 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 2010-2012 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-b. Hood Canal Summer/Fall Chinook Terminal Runs**

Year	12A	12/12B	12C	12D	Skokomish	G.A. Hatchery	Hoodspport 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	2,385	46,465	19,293	68,458
2012	0	431	22	33	3,222	51,421	39,673	94,802

Note: Values for years prior to 1998 DO NOT include freshwater recreational catch

Note: The 2010-2012 run reconstruction is preliminary and subject to revision.

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

<b>Year</b>	<b>12A</b>	<b>12B</b>	<b>12C</b>	<b>12D</b>	<b>Skokomish</b>	<b>G.Adams</b>	<b>Hoodsport</b>
2010	0.00000	0.00192	0.00073	0.00034	0.06400	0.69013	0.24287
2011	0.00000	0.00424	0.00031	0.00007	0.03484	0.67874	0.28182
2012	0.00000	0.0045	0.00023	0.00035	0.03399	0.54240	0.41848
<b>2010-12 Mean</b>	0.00000	0.00357	0.00042	0.00025	0.04427	0.63709	0.31439

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

<b>Hood Canal Production Unit</b>	<b>Terminal Run Forecast</b>	<b>Proportion</b>
12B	246	0.00357
12C	29	0.00042
12D	18	0.00025
Skokomish	3,057	0.04427
<b>Natural Subtotal</b>	3,350	0.04851
George Adams	43,997	0.63709
Hoodsport	21,712	0.31439
<b>Hatchery Subtotal</b>	65,708	0.95148
<b>Total</b>	69,059	1.00000

Note: The forecasted proportions are derived from the 2010-2012 mean distribution.

## ***A-2. Summer Chum Salmon***

### *A-2.1 Natural Runs*

The 2013 pre-season forecast of the Hood Canal summer chum salmon returns was forecast as total recruitment to all fisheries and escapements for the Mainstem Hood Canal, Quilcene/Dabob, and SE Hood Canal Management Units (MUs).

Abundance for each MU was forecast as the mean of the 2009 through 2012 returns and the mean was then adjusted by the ratio of actual abundance to forecast abundance during 2009-2012. The actual to forecast ratios were 1.311 for the Mainstem Hood Canal MU, 1.583 for the Quilcene/Dabob MU, and 1.499 for the SE Hood Canal MU.

For the Mainstem Hood Canal MU, forecasted returns of summer chum were based on total (NORs + SORs) returns. For the Quilcene/Dabob MU, the returns of summer chum were forecast based on NORs. The return to the SE Hood Canal MU was forecast as the mean of the NORs to Union River plus the mean of the total (NORs + SORs) recruits to Tahuya River.

Estimates of the number of natural-origin recruits and supplementation-origin recruits returning to each MU each year from 2000 through 2012 and associated forecasts for 2013 are shown in Table A-2-a.

The 2013 forecasted returns are 10,026 summer chum to the Mainstem Hood Canal MU, 6,938 summer chum to the Quilcene/Dabob Bays MU, and 2,834 summer chum to the SE Hood Canal MU. The total forecasted return is 19,798 summer chum to Hood Canal in 2013 (Table A-2-a).

Summer chum returns declined in 2009 through 2011 compared to 2008 and then increased during 2012. The 2013 forecast method takes this into account and is a better measure of the 2013 anticipated return than just the mean of the 2009 through 2012 returns.

Supplementation and reintroduction projects were implemented in the Big Quilcene River from 1992 through 2003 (Quilcene/Dabob MU); in the Union River from 2000 through 2003 and in the Tahuya River from 2003 through the present (SE Hood Canal MU). In the Mainstem Hood Canal MU, supplementation and reintroduction projects were implemented in Lilliwaup Creek from 1992 through the present, in Big Beef Creek from 1996 through 2004 and in the Hamma Hamma River from 1997 through 2008. Summer chum fry from each project were marked and natural-origin recruits (NORs) can be distinguished from supplementation-origin recruits (SORs) upon return as adults. Fry released from each project have contributed substantially to the summer chum adult recruitment and escapements.

The supplementation projects in Lilliwaup Creek, the Hamma Hamma River, and the Tahuya River are each expected to contribute supplementation-origin recruits (SORs) during 2013. The projects in the Quilcene River, Big Beef Creek, and the Union River were terminated and no SORs are expected to return from those projects in 2013.

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 2013 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	
	NOR	SOR	NOR	SOR	NOR	SOR
2000	2,035		6,704		757	0
2001	2,696	1,552	3,632	3,964	1,517	0
2002	2,832	3,388	4,330	1,720	890	0
2003	8,748	2,394	10,850	2,013	<b>7,974</b>	<b>4,045</b>
2004	<b>20,905</b>	<b>4,984</b>	<b>59,333</b>	<b>3,833</b>	3,611	2,386
2005	4,767	2,360	6,231	792	709	1,293
2006	8,928	2,497	13,093	1,198	1,747	1,883
2007	5,964		3,887	75	2,070	768
2008	9,857		5,701	0	1,174	798
2009	4,911		2,385	0	615	383
2010	8,543		2,115		1,160	969
2011	3,684		2,836		624	
2012	14,287		12,520		3,759	
<b>2013 Forecast a/</b>	<b>10,026</b>		<b>6,938</b>		<b>2,834</b>	
<b>2013 Total Hood Canal Forecast</b>					<b>19,798</b>	

a/ 2009-12 mean return adjusted by ratio of actual abundance to forecast abundance during 2009 through 2012; see text.

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, 2011 and 2012, the Co-managers agree that no gillnet fisheries will occur 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 Natural Runs**

The forecasted recruitment of 2013 Hood Canal natural runs was based on a linear regression model that related the return of tagged natural jack coho at BBC to Hood Canal December Age 2 recruits in the subsequent run year. This model used recruit data from brood years 1983-1998 and 2002-2008 (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:

$$\text{Hood Canal Recruitment} = 32418.185 + (391.099 * (\text{BBC Tagged Jacks}))$$

Relevant statistics of the model used to derive the 2013 forecast are shown below.

<b>Using Brood Years 1983-1998, 2002-2008</b>	
Multiple R	0.79704
R <sup>2</sup>	0.63528
Adj. R <sup>2</sup>	0.61791
Std Error of Estimate	35660.548
N	23
Intercept	32418.185
Slope	391.099
2012 Jacks (X)	64
2013 Forecast (Y)	57,449

The forecasted recruits were subsequently apportioned to primary and secondary units on the basis of the distribution of their parent brood escapement. The total forecast of 57,449 natural DA2 recruits was thus apportioned into 55,128 from primary and 2,321 from secondary units, on the basis of their parent brood spawner distribution (Table A-3-b).

**Table A-3-a. 2013 Hood Canal Natural Coho Forecast Data**

<b>Brood Year</b>	<b>Big Beef Creek Total Smolts</b>	<b>Big Beef Total Natural Jacks</b>	<b>Big Beef Tagged Natural Jacks</b>	<b>Hood Canal Total Dec Age-2 Recruits</b>
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	<i>76,798</i>
2003	32,949	61	33	<i>57,206</i>
2004	38,579	161	86	<i>111,437</i>
2005	29,911	47	39	<i>39,674</i>
2006	27,416	111	95	96,089
2007	45,399	32	26	18,994
2008	24,396	197	177	102,243
2009	57,271	212	178	
2010	20,815	83	64	

\*Data Italicized Denotes Methodology Currently Under Review and agreed to for forecasting purposes only

**Table A-3-b. Apportionment of the 2013 Hood Canal Natural Coho Forecast**

<b>Area</b>	<b>Escapement Capacity</b>	<b>Escapement BY 2009</b>	<b>Management Unit Type</b>	<b>Proportion of Brood Escapement</b>	<b>December Age-2 Recruits</b>
12 / 12B	28.88%	12,330	Primary	43.89%	25,211
12C / 12D	31.66%	13,583	Primary	48.35%	27,773
Skokomish	29.01%	1,048	Primary	3.73%	2,143
9A	1.25%	256	Secondary	0.91%	523
12A	9.20%	879	Secondary	3.13%	1,797
<b>Primary Subtotal</b>	89.55%	26,961		95.96%	55,128
<b>Secondary Subtotal</b>	10.45%	1,135		4.04%	2,321
<b>Grand Total</b>	100.00%	28,096		100.00%	57,449

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

<b>Year</b>	<b>North (12-12B)</b>	<b>South (12C-12D)</b>	<b>Skokomish</b>	<b>Total</b>
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

**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
1976	30,171						397,562					
1977	1,816,704						490,611					
1978	1,042,520						377,098					
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	<b>0.34374</b>	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	4,363	0.05098
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	16,075	0.08307
1987	298,000	28,068	0.09419	407,600	157,116	<b>0.38547</b>	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	24,903	0.07372
1992	301,019	15,688	0.05212	361,553	13,281	0.03673	400,700	34,709	0.08662	287,187	8,379	0.02918
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	8,165	0.04543
2004	290,570	<i>20,739</i>	<i>0.07137</i>	540,000	<i>13,871</i>	<i>0.02569</i>	488,080	<i>41,686</i>	<i>0.08541</i>	215,731	2,817	0.01306
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	8,331	0.06675
2006	294,151	31,150	0.10590	415,000	16,421	0.03957	358,131	57,903	0.16168	193,808	4,945	0.02551
2007	296,474	23,275	0.07851	412,208	4,929	0.01196	357,967	32,815	0.09167	162,381	3,384	0.02084
2008	292,529	23,878	0.08163	423,584	23,193	0.05475	441,117	69,842	0.15833	200,499	4,137	0.02063
2009	306,329			395,362			345,604			180,673		
2010	239,228			397,581			393,654			204,578		
<b>Average (2003-08)</b>			0.08974	0.03094			0.10866			0.03204		
<b>2013 Forecast:</b>		21,467		12,302			42,776			6,554		

Note: DEC Age-2 Recruits have been recalculated for BY95 - BY2001 and are therefore NOT comparable to those from earlier years. Earlier broods are in the process of being recalculated as well. Note: Values in italics indicate values agreed to for preseason forecasting only. Values in boldface were excluded from the analysis

### *A-3.2 Hatchery Runs*

The 2013 forecast utilized survival rates the two 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 2013 forecast of 83,100 hatchery reared December Age-2 coho recruits (Table A-3-d) was predicted from the brood year 2010 smolt releases multiplied by the average estimated marine survival rate for each facility's smolts from the six latest available brood years. (Table A-3-d).

#### ***A-4. Fall Chum Salmon***

The 2013 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 2013 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 all available broods, from 1968 to the present, excluding estimates from the 1983 brood (ages 3 and 4) and the 1989 brood (age 5) return. The mean recruit-per-spawner return rates were 1.21539, 2.60574, and 0.29719, for 3, 4, and 5 year-olds respectively (Table A-4-a). These adjusted rates of return were multiplied with the 2010, 2009, and 2008 brood escapements (17, 221, 13,961, and 38,512; respectively) to estimate the total 2013 forecast of 68,754 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 69,096 to each natural production unit was estimated by adding the estimated 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 2008, 2009, and 2010 and age composition were used to estimate 2013 returns of Age 3, Age 4, and Age 5 natural fall chum. The 2013 forecast of natural fall chum to Puget Sound is 92,251 Age 3, 380,874 Age 4 and 4,293 Age 5 fish for a total run size of 499,818 (Table A-4b).

The apportionment of 499,818 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 5,806 Age 3, 23,649 Age 4, and 4,293 Age 5 fish for a total Hood Canal forecast of 33,748 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 2013 Hood Canal Natural Fall Chum Salmon Forecast

For preliminary preseason planning, we agreed to use a forecast of 51,422 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**

<b>Brood Year</b>	<b>Brood Escapement</b>	<b>3's</b>	<b>4's</b>	<b>5's</b>	<b>Total</b>
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	<b>12.57517</b>	0.62961	16.70069
1982	12,134	2.88354	7.08386	0.94399	10.91139
1983	7,121	<b>9.05912</b>	<b>24.36310</b>	1.13297	<b>34.55519</b>
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	<b>5.71902</b>	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	<b>12.40288</b>	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		
2008	38,512				
2009	13,961				
2010	17,221				
<b>Mean: Brood Years 1968-09 (exclusive of outliers, in bold)</b>					
<b>All Odd Years</b>	47,082	1.53778	2.28211	0.34412	5.02761
<b>All Even Years</b>	71,861	0.90912	2.91234	0.25495	4.55093
<b>All Years *</b>	59,760	1.21539	2.60574	0.29719	4.88752
		<b>3's</b>	<b>4's</b>	<b>5's</b>	
<b>2013 Tribal Forecast*</b>		20,930	36,379	11,445	68,754



**Table A-4-b. 2013 WDFW Puget Sound Natural Fall Chum Salmon Forecast**

Parent Brood	Age	Parent Escapement	Mean R/S <sup>1</sup>	Adjusted R/S	Estimated R/S (all ages)	Mean Age Composition <sup>1</sup>	Natural Forecast
2008	5	239,485	2.34	2.34	559,857	0.0480000	26,694
2009	4	224,841	3.02	3.02	678,881	0.5610000	380,874
2010	3	273,621	2.34	1.75	479,743	0.1920000	92,251
						Total	499,818

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

**Table A-4-c. 2013 WDFW Hood Canal Natural Fall Chum Salmon Forecasts**

	Puget Sound Forecast	HC Parent Escapement Proportion	HC Forecast by Age
Age 3 (2009 Brood) Forecast	92,251	0.0630000	5,806
Age 4 (2008 Brood) Forecast	380,874	0.0620000	23,649
Age 5 (2007 Brood) Forecast	26,694	0.1610000	4,293
<b>Total WDFW Forecast</b>	499,819		33,748

**Table A-4-d. 2013 Hood Canal Natural Fall Chum Salmon Parent Brood Escapement Distribution**

Area	2008	2009	2010
9A	0.00%	0.00%	0.00%
12	1.89%	7.49%	6.28%
12A	0.12%	0.19%	0.80%
12B	18.42%	21.80%	27.88%
12C	10.09%	11.33%	36.19%
82G	43.79%	21.62%	12.22%
12D	25.69%	37.33%	16.65%

**Table A-4-e. Apportionment of the 2013 Tribal Hood Canal Natural Fall Chum Salmon Forecast**

Area	3's	4's	5's	Total
9A	0	0	0	0
12	1,314	2,726	217	4,256
12A	167	68	14	248
12B	5,835	7,932	2,109	15,876
12C	7,574	4,122	1,155	12,851
82G	2,557	7,867	5,012	15,436
12D	3,486	13,581	2,940	20,007
<b>Total</b>	<b>20,930</b>	<b>36,379</b>	<b>11,445</b>	<b>68,754</b>

**Table A-4-f. Apportionment of the 2013 WDFW Hood Canal Natural Fall Chum Salmon Forecast**

Area	3's	4's	5's	Total
9A	0	0	0	0
12	364	1,776	81	2,221
12A	46	45	5	96
12B	1,619	5,168	791	7,578
12C	2,101	2,686	433	5,220
82G	709	5,126	1,880	7,715
12D	967	8,849	1,103	10,919
<b>Total</b>	<b>5,806</b>	<b>23,649</b>	<b>4,293</b>	<b>33,748</b>

**Table A-4-g. Apportionment of the 2013 Joint Hood Canal Natural Fall Chum Salmon Forecast**

Area	Tribal Forecast	WDFW Forecast	Joint Forecast
9A	0	0	0
12	4,256	2,221	3,239
12A	248	96	172
12B	15,876	7,578	11,727
12C	12,851	5,220	9,036
82G (Skokomish)	15,436	7,715	11,575
12D	20,007	10,919	15,463
12D Off-Station	342		
<b>Total</b>	<b>69,096</b>	<b>33,748</b>	<b>51,422</b>

A-4.2 Hatchery Runs (Tribal)

The 2013 hatchery-origin returns (including in-stream augmentation) 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 2008, 2009, and 2010. 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 2013, including 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 (1965-71 broods) (Tables A-4-h and A-4-i). The resulting forecast for 2013 is 342 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 2013, Off-Station Lbs. Planted**

Area	BY 2010		BY 2009		BY 2008	
	Lbs	%	Lbs	%	Lbs	%
9A	0	0.0%	0	0.0%	0	0.0%
12	0	0.0%	0	0.0%	0	0.0%
12B	0	0.0%	0	0.0%	0	0.0%
12A	0	0.0%	0	0.0%	0	0.0%
12C	0	0.0%	0	0.0%	0	0.0%
Skokomish	0	0.0%	0	0.0%	0	0.0%
12D	712	0.0%	0	0.0%	0	0.0%
<b>Total</b>	712	0.0%	0	0.0%	0	0.0%

**Table A-4-i. Apportionment of the 2013 Tribal Hood Canal Fall Chum Off-Station Forecast**

Area	3's	4's	5's	Total
9A	0	0	0	0
12	0	0	0	0
12B	0	0	0	0
12A	0	0	0	0
12C	0	0	0	0
82G	0	0	0	0
12D	342	0	0	342
<b>Total</b>	342	0	0	342

A-4.2.2 Hatchery On-Station Forecasts (Tribal)

Hoodsport Hatchery: Mean return rate of age 3, 4, and 5 fish per pound planted at Finch Creek (1997-2006 broods) (Table A-4-j). The resulting forecast for 2013 is 78,392. Run reconstruction problems may have biased this run low.

George Adams/McKernan Hatcheries: Mean return rate of age 3, age 4, and age 5 fish per pound released (1997-2006 broods), excluding BY 1999 (ages 4 and 5) and BY 2000 (age 4) (Table A-4-k). The resulting forecast for 2013 is 186,658.

Little Boston Hatchery: Mean return rate of age 3, age 4 and age 5 fish per pound planted at Hoodsport Hatchery (1997-2006 broods) (Table A-4-j). The resulting forecast for 2013 is based on the fingerling releases of 1,324 lbs (BY 2010), 1,087 lbs (BY 2009), and 1,865 lbs (BY 2008), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of 3,260 (Table A-4-n).

Enetai Hatchery: Mean return rates of age 3, age 4 and age 5 fish per pound planted (1997-2006 broods). (Table A-4-l). The resulting forecast for 2013 is based on the fingerling releases of 5,531 lbs. (BY 2010), 4,700 lbs (BY2009), and 3,951 lbs. (BY 2008), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of 27,407.

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 295,717.

A-4.2.3 Hatchery Forecasts (WDFW)

The 2013 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 2009 brood year chum by the long-term, even-year brood age 3 return rate for that hatchery. Age 4 and age 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, reduced by a factor of 2 or 4 to compensate for smaller size at release. A summary of the WDFW forecasts by age are shown for Hood Canal hatcheries in Table A-4-m. The 2013

WDFW Hood Canal hatchery fall chum forecast is 247,931 on-station and 702 off-station for a total forecast of 248,633.

#### A-4.2.4 Joint 2013 Hood Canal Hatchery Fall Chum Salmon Forecast

For preliminary preseason planning, we agreed to use a forecast of 272,175 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**

<b>Brood Year</b>	<b>Release Lbs.</b>	<b>3's</b>	<b>4's</b>	<b>5's</b>	<b>Total</b>
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	<b>0.82970</b>	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		
2008	28,653	0.02999			
2009	30,092				
2010	27,262				
All Odd Years	25,559	1.67913	2.56695	0.16529	4.44369
All Even Years	28,891	1.14500	3.20210	0.10430	4.53904
All Years	27,225	1.41206	2.87714	0.13554	4.49136
All Years 65-71	2,655	0.95938	2.41136	0.09131	3.46205
All Years 72-06	32,064	1.49889	2.90948	0.14464	4.69723
All Years 97-06*	32,931	1.06562	1.56266	0.08087	2.70916
<b>2013 Tribal Forecast*</b>		29,051	47,024	2,317	78,392

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

<b>Brood Year</b>	<b>Release Lbs.</b>	<b>3's</b>	<b>4's</b>	<b>5's</b>	<b>Total</b>
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	<b>22.40721</b>	<b>2.17993</b>	<b>29.37456</b>
2000	8,486	4.76506	<b>15.87349</b>	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	<b>12.04153</b>	0.75741	18.15184
2006	24,833	0.95216	3.67314	0.08015	4.70544
2007	21,035	5.61999	<b>14.76001</b>		
2008	22,371	0.86000			
2009	22,482				
2010	22,855				
<b>Average Return Brood Years (1978-06) excluding outliers in bold.</b>					
Odd Years	26,961	2.45704	3.19681	0.24424	6.15589
Even Years	25,010	1.65000	2.97196	0.17475	4.63063
All Years	25,956	2.04051	3.07574	0.22677	5.93650
<b>Years 97-06*</b>	26,348	3.72975	4.23022	0.28209	10.28615
<b>2013 Tribal Forecast*</b>		85,243	95,104	6,311	186,658



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

<b>Brood Year</b>	<b>Release Lbs.</b>	<b>3's</b>	<b>4's</b>	<b>5's</b>	<b>Total</b>
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		
2008	3,951	0.05116			
2009	4,700				
2010	5,531				
<b>Average (Brood Years 1976-10).</b>					
Odd Years	4,233	2.66842	2.28163	0.13033	5.04103
Even Years	4,626	1.56519	2.48779	0.17249	3.77400
All Years	4,435	2.09779	2.38471	0.15219	4.34993
<b>Years 97-06*</b>	4,386	2.51580	2.59261	0.33077	4.89526
<b>2013 Tribal Forecast*</b>		13,915	12,185	1,307	27,407

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

**Table A-4-m. Summary of 2013 WDFW Hood Canal Hatchery Fall Chum Forecasts**

<b>Facility</b>	<b>Age 3</b>	<b>Age 4</b>	<b>Age 5</b>	<b>Total</b>
Little Boston Hatchery	1,299	2,095	137	3,531
Hoodsport Hatchery	33,680	82,526	3,349	119,555
G. Adams / McKernan Hatchery	36,742	62,093	4,946	103,781
Enetai Hatchery	9,889	10,319	856	21,064
12D Streams - Augmentation	702	0	0	702
<b>Total</b>	<b>82,312</b>	<b>157,033</b>	<b>9,288</b>	<b>248,633</b>

**Table A-4-n. Summary of 2013 Tribal Hood Canal Hatchery Fall Chum Forecasts**

<b>Facility</b>	<b>Age 3</b>	<b>Age 4</b>	<b>Age 5</b>	<b>Total</b>
Little Boston Hatchery	1,411	1,699	151	3,260
Hoodsport Hatchery	29,051	47,024	2,317	78,392
G. Adams / McKernan Hatchery	85,243	95,104	6,311	186,658
Enetai Hatchery	13,915	12,185	1,307	27,407
<b>Total</b>	<b>129,620</b>	<b>156,011</b>	<b>10,085</b>	<b>295,717</b>

**Table A-4-o. Apportionment of the 2013 Joint Hood Canal Hatchery Fall Chum Salmon Forecasts**

<b>Facility</b>	<b>Tribal Forecast</b>	<b>WDFW Forecast</b>	<b>Joint Forecast</b>
Little Boston Hatchery	3,260	3,531	3,396
Hoodsport Hatchery	78,392	119,555	98,973
G. Adams / McKernan Hatchery	186,658	103,781	145,219
Enetai Hatchery	27,407	21,064	24,236
12D Streams - Augmentation		702	
<b>Total</b>	<b>295,717</b>	<b>248,633</b>	<b>272,175</b>

**A-5. Pink Salmon.**

*A-5.1 Natural Runs*

Tribal Forecast:

The 2013 return of naturally reared Hood Canal pink salmon was forecast as recruitment to all fisheries (Canadian and domestic) and escapement, using the product of the 2011 brood year estimated escapement (15,256) (Table A-5-a) multiplied by the average estimated "Cycle 3" return rate of (3.130902908) for a forecast of 56,713 natural pink salmon total recruits (Table A-5-b).

**Table A-5-a. Corrected Pink Salmon Natural Run Reconstruction for Hood Canal**

<b>Return Year (RY)</b>	<b>Brood Year (BY)</b>	<b>Hood Canal Parent (BY) Natural Escapement</b>	<b>Hood Canal Natural 4B Run (RY)</b>	<b>Hood Canal Total Natural Recruits (RY) (4B+CDN)</b>	<b>Hoodsport Hatchery Recruits (RY)</b>	<b>Hood Canal Total Recruits (RY)</b>
1961	1959	30,600	37,863	44,388	3,560	47,948
1963	1961	36,900	629,272	901,536	11,893	913,429
1965	1963	503,200	167,326	217,872	586	218,458
1967	1965	160,500	294,136	465,405	3,869	469,274
1969	1967	269,400	42,957	58,604	3,146	61,750
1971	1969	42,100	106,788	138,686	3,188	141,874
1973	1971	104,100	48,991	70,592	2,291	72,883
1975	1973	47,100	13,194	18,402	3,457	21,859
1977	1975	12,600	45,643	79,795	10,530	90,325
1979	1977	44,300	42,243	74,371	8,710	83,081
1981	1979	37,300	7,652	12,013	3,044	15,057
1983	1981	6,550	25,803	29,222	626	29,848
1985	1983	25,200	66,602	91,738	2,196	93,934
1987	1985	64,100	68,988	77,341	11,117	88,458
1989	1987	62,200	87,472	114,943	4,047	118,990
1991	1989	60,970	131,677	166,259	4,683	170,942
1993	1991	118,450	37,225	38,695	12,599	51,294
1995	1993	35,647	32,280	36,148	29,373	65,521
1997	1995	31,306	9,202	9,477	23,969	33,446
1999	1997	8,363	12,673	12,673	7,635	20,308
2001	1999	12,667	98,962	99,061	72,167	171,228
2003	2001	98,338	38,242	38,242	25,681	63,923
2005	2003	37,531	17,585	17,603	14,228	31,831
2007	2005	17,481	29,505	29,564	4,416	33,980
2009	2007	29,001	11,501	11,501	25,613	37,114
2009	2011	10,797	15,256	15,256	17,791	33,047

**Table A-5-b. Hood Canal Natural Pink Salmon Returns per Spawner**

Cycle 1 BY	Cycle 1 R/S	Cycle 2 BY	Cycle 2 R/S	Cycle 3 BY	Cycle 3 R/S
1959	1.455	1961	<b>24.498</b>	1963	<b>0.433</b>
1965	2.909	1967	0.218	1969	3.302
1971	0.679	1973	0.396	1975	6.384
1977	1.690	1979	0.324	1981	4.531
1983	3.670	1985	1.212	1987	1.851
1989	2.735	1991	0.327	1993	1.023
1995	0.303	1997	1.527	1999	7.823
2001	0.389	2003	0.470	2005	1.695
2007	0.397	2009	0.639	2011	3.131
<b>Average:</b>	1.581		0.639		3.717
<b>Std. Dev.</b>	1.263		0.475		2.390
<b>2013 Tribal Forecast</b>					56,713
<b>2013 WDFW Forecast</b>					46,581
<b>2013 Joint Forecast</b>					51,647

WDFW Forecast:

The WDFW provided a separate forecast of 46,581 recruits, using SaSI stock escapement values, multiplied by a Cycle 3 return rate of 2.096 recruits per spawner. The difference in State and Tribal forecasts arises from the treatment of various outliers in the Cycle 3 dataset.

Joint 2013 Hood Canal Natural Pink Salmon Forecast:

Given the relatively small difference between methodology, the agreed to forecast for 2013 is 51,647 natural pink salmon recruits, the mean of the Tribal and WDFW forecasts.

*A-5.2 Hatchery runs.*

Tribal Forecast:

The 2013 return of hatchery reared Hood Canal pink salmon was forecast as recruitment to all fisheries and escapement, using the product of the 2011 brood year fingerling pounds released from the Hoodsport Hatchery (1,584), multiplied by the long term average recruits per pound rate estimated for the Hoodsport Hatchery (2.5349). The resulting recruit forecast is 4,015 pink salmon recruits (Table A-5-c).

WDFW Forecast:

For hatchery returns, The WDFW provided a separate forecast of 3,318 hatchery recruits using the same SaSI stock escapement values, multiplied by a Cycle 3 average return rate of 3.131 recruits per spawner, excluding the 1999 outlier. The difference in State and Tribal forecasts is based on the different averaging methods.

Joint 2013 Hood Canal Hatchery Pink Salmon Forecast:

For 2013, again given the relatively small difference between methodology the agreed to forecast is 3,667 hatchery pink salmon recruits, the mean of the Tribal and WDFW forecasts (Table A-5-c).

**Table A-5-c. Hoodspout Hatchery Pink Salmon Return Rates.**

<b>Brood Year</b>	<b>Lbs. Released</b>	<b>Total Recruits</b>	<b>Recruits/Lb</b>
1959	2,515	3,560	1.4155
1961	492	11,893	<b>24.1728</b>
1963	1,209	586	0.4847
1965	1,283	3,869	3.0156
1967	1,416	3,146	2.2218
1969	2,399	3,188	1.3289
1971	3,071	2,291	0.7460
1973	2,104	3,457	1.6431
1975	3,477	10,530	3.0285
1977	3,496	8,710	2.4914
1979	2,253	3,044	1.3511
1981	1,748	626	0.3581
1983	655	2,196	3.3527
1985	2,152	11,117	5.1659
1987	5,625	4,047	0.7195
1989	1,913	4,683	2.4480
1991	4,453	12,599	2.8293
1993	6,532	29,373	4.4968
1995	7,623	23,969	3.1443
1997	7,851	7,635	0.9725
1999	3,117	72,167	<b>23.1527</b>
2001	3,244	25,681	7.9165
2003	3,563	14,228	3.9933
2005	1,670	4,416	2.6443
2007	1,267	25,613	<b>20.2155</b>
2009	1,600	17,791	<b>11.1194</b>
2011	1,584		
<b>BY 1959-07 Average</b>			2.5349
<b>TRIBAL 2013 Forecast</b>		4,015	
<b>WDFW 2013 Forecast</b>		3,318	
<b>2013 Joint Forecast</b>			3,667

Note: Values in boldface were excluded from both forecast methods.