Skokomish River Chinook salmon data response to NOAA concerns from meeting 02 APRIL 2018 at NOF2

Estimates of NOR escapement have evolved since adipose-clip mass-marking of George Adams Hatchery (GAH) Chinook salmon. Previous estimates of pHOS had been based on expansions on few CWT recoveries. Since 2010 all age classes of Chinook returns came from GAH releases that were mass marked. Consequently, it is possible to more accurately estimate pHOS by dividing the mark rate from Chinook carcass surveys in the Skokomish River basin by the weighted mark rate at GAH. The mean pHOS from 2010 to 2017 was 87.3% with a standard deviation of 6.6%. These modern pHOS estimates were inconsistent with the previous and much more variable pHOS estimates from CWTs. Therefore, the Skokomish Chinook run reconstruction has been re-done using adipose-clip based pHOS estimates (Table 1) and applying the mean pHOS from 2010-2017 to years prior to 2010 (Figure 1). The 5 year mean NOR escapement has increased by 123% from 2008 to 2017 (Table 1). Although this was driven by high NOR spawning escapement in 2017, it bears noting that last years NOR escapement of 886 Chinook is the highest on the recent record (since 1988).

The current fishing footprint in the Skokomish River is reduced dramatically from the 2011-2014 period which was used to generate NOAA's proposed buffer on the Chinook FRAM ER. In 2016 and 2017, several adjustments were made to the treaty fishery schedule and structure to provide greater certainty of meeting the harvest management objectives. The treaty net-fishery from the mouth of the Skokomish River to the Hwy 106 Bridge was not scheduled to open during the Chinook management period and the coho fishery opening was scheduled for the week beginning Oct. 9th (Table 2). This schedule lead to zero treaty fisheries for the Skokomish River over a period of six continuous weeks (wb~ 8/21- wb 10/6); the last three to four weeks of the Chinook management period through the first three to four weeks of the coho management period(weeks are approximate due to the yearly calendar day shifts). Therefore, Chinook impacts in the Skokomish River are expected to only occur over the nine/twelve days of the Chinook fishery, with zero to minimal impacts (e.g. single digit catch) during the coho fishery starting the second week of October. While this restructure is partially intended to provide escapement of later returning Chinook in support of late-timed recovery efforts, it is also intended to provide increased certainty of meeting harvest objectives. Additional schedule changes in the 12C Chinook fishery have also been implemented to minimize impacts on late-timed Skokomish River Chinook. Marine area 12C is now closed to commercial fishing in September. Taken together, these actions are expected to provide greater certainty of meeting pre-season harvest estimates.

Preliminary ER estimates for 2015 to 2017 (using pre-terminal ERs from preseason Chinook FRAM estimates, and terminal ERs taken from co-manager run reconstructions) indicate that the above measures have been effective at keeping total ER below 50% (Table 3) in 2016 and 2017. The ER overage in 2015 is less likely moving forward for two major reasons. The fishing foot-print has been further reduced from 33 to 26 days open in the Skokomish River, and the 2015 Skokomish Chinook return came in well under forecast (Skokomish Chinook pre-season TRS estimate of 39,770 versus run reconstruction TRS estimate of 18,398).

 The continued inability to accurately forecast Chinook runs and the variability in the annual run timing distribution of adults returning to the Skokomish River hinders the capabilities of any harvest model accuracy. It would be more appropriate to look at the accuracy/performance of the forecasting methodology versus the harvest tool that is generating rates based on that forecast. The recent poor

marine survival conditions have also hampered forecast accuracy especially for Hood Canal Chinook stocks, both hatchery and natural origin fish. In 2018, the co-managers will continue to pursue different run size forecasting methodologies for Skokomish River Chinook in order to improve overall performance accuracy in fishery modeling and reduce risk in overages in the exploitation rate.

The greatest risk of missing harvest management objectives may be associated with a return coming in well below forecast. This year WDFW distributed a prototype sibling-based forecast model which has demonstrated strong relationships between Age 2 returns and Age 3 returns (r^2 = 0.845, p< 0.00005), and Age 3 returns and Age 4 returns (r^2 = 0.723, p < 0.005). The WDFW prototype model predicts the 2018 Hood Canal Chinook TRS to be 69,726, greater than the official 2018 pre-season forecast generated with the current model of 61,488. The official forecast used for modeling is relatively conservative compared to the independent prototype forecast, and therefore less likely to contribute to over harvest in the terminal area (Table 4).

Table 1. The Skokomish River Chinook run reconstruction has been updated with adipose-clip based pHOS estimates. For years prior to 2010, the 2010-2017 mean pHOS of 87.3% was applied.

Year	Non-selective FW catch	Mark-selective FW catch	GAH escapement	Spawning escapement (HOR +NOR)	NOR escapement	pHOS	HOR ETRS	NOR ETRS
1988	9,237	-	4,439	2,666	346	87%	15,547	795
1989	9,938	-	2,523	1,204	156	87%	13,093	572
1990	5,977	-	2,186	642	83	87%	8,546	259
1991	6,458	-	3,068	1,719	223	87%	10,722	523
1992	549	-	294	825	107	87%	1,509	159
1993	521	-	612	960	124	87%	1,927	166
1994	275	-	495	657	85	87%	1,322	105
1995	-	-	5,447	1,398	181	87%	6,664	181
1996	-	-	3,100	995	129	87%	3,966	129
1997	4	-	1,885	452	59	87%	2,282	59
1998	13	-	5,584	1,177	153	87%	6,621	153
1999	2,340	-	8,235	1,692	219	87%	11,996	271
2000	1,081	-	4,032	926	120	87%	5,893	146
2001	6,549	-	8,816	1,913	248	87%	16,879	399
2002	5,674	-	9,395	1,479	192	87%	16,256	292
2003	7,315	-	10,034	1,125	146	87%	18,233	241
2004	6,811	-	12,278	2,398	311	87%	21,032	455
2005	12,259	-	16,018	2,032	263	87%	29,867	442
2006	13,493	-	12,356	1,209	157	87%	26,745	313
2007	15,364	-	13,270	429	56	87%	28,945	118
2008	13,267	-	13,695	1,134	147	87%	27,817	279
2009	12,041	-	13,220	1,066	138	87%	26,072	255
2010	9,654	6,336	12,891	1,214	174	86%	29,802	293
2011	11,761	5,784	24,581	1,321	55	96%	43,367	80
2012	15,434	12,261	22,869	1,533	142	91%	51,865	232
2013	8,894	5,458	21,452	1,722	171	90%	37,290	236
2014	3,680	2,167	6,227	849	109	87%	12,758	165
2015	6,313	3,297	6,032	432	117	73%	15,843	231
2016	10,314	-	22,076	1,342	177	87%	33,477	255
2017	16,515	-	35,129	8,058	886	89%	58,477	1,225
5 year Mean								
2013-2017	9,143	2,184	18,183	2,481	292	85%	31,569	423
2008-2012	12,431	4,876	17,451	1,254	131	89%	35,785	227
% increase	-26%	-55%	4%	98%	123%	-5%	-12%	86%

Figure 1. Skokomish River Chinook PHOS, Spawning escapement (HOR + NOR), and NOR contribution to Spawning escapement updated using adipose-clip based estimates of pHOS.
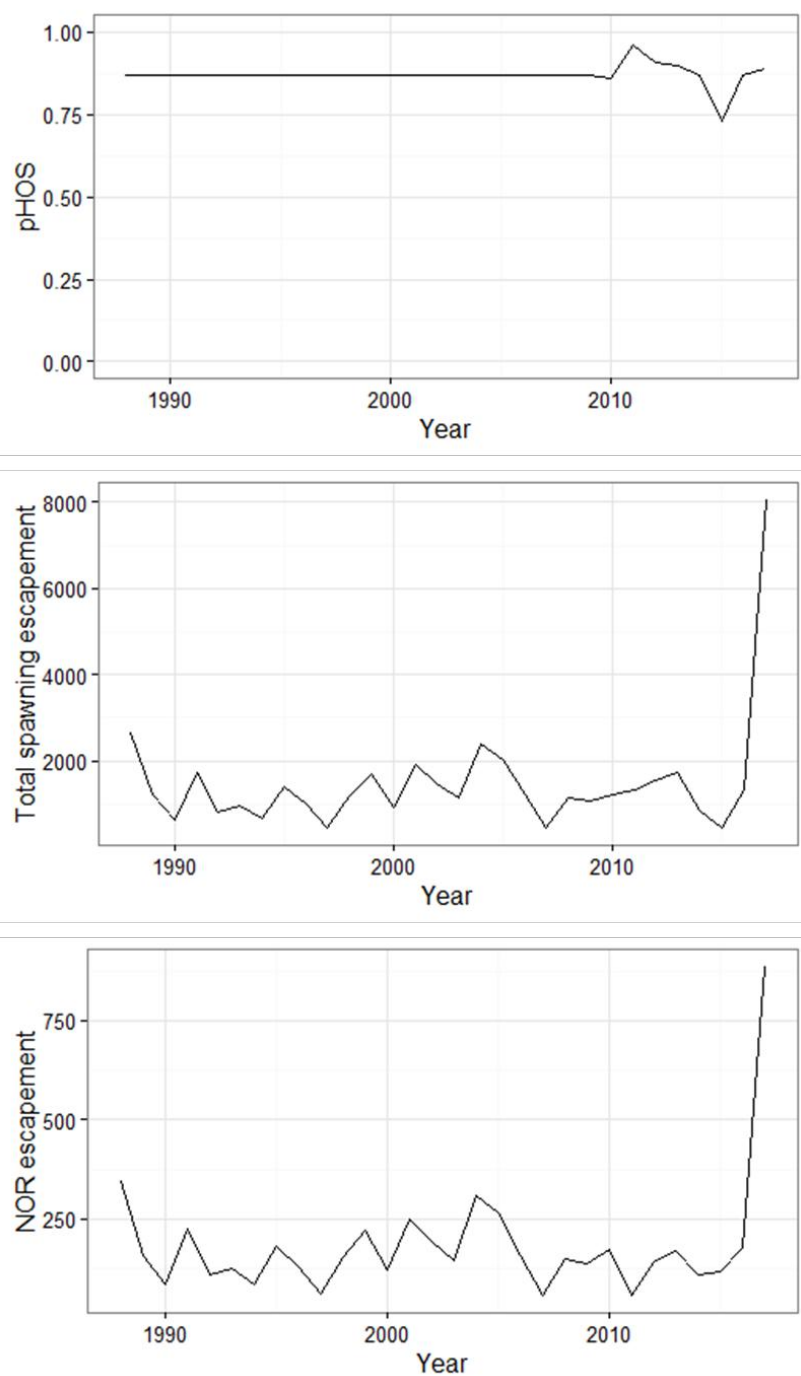
Table 2. Summary of the tribal commercial Chinook fishery schedule in the Skokomish River, 2010-2017.

*******	2010	2011	2012	2013	2014 Hwy 106-Hwy101	2014 Mouth - Hwy 106	2015 Hwy 106-Hwy101	2015 Mouth - Hwy 106	2016 Hwy 106-Hwy101	2016 Mouth - Hwy 106	2017 Hwy 106-Hwy101	2017 Mouth - Hwy 106	2018 (Proposed) Hwy 106-Hwy101	2018 (Proposed) Mouth - Hwy 106	MGMT PERIOD
7/13-7/19					Closed	3	Closed	3	Closed	Closed	Closed	Closed	Closed	Closed	CHINOOK
7/20-7/26					Closed	3	Closed	3	Closed	Closed	Closed	Closed	Closed	Closed	CHINOOK
7/27-8/2		3	2		Closed	3	Closed	3	Closed	Closed	Closed	Closed	Closed	Closed	CHINOOK
8/3-8/9	4	3	3	3	3	Closed	3	Closed	3	Closed	3	Closed	3	Closed	CHINOOK
8/10-8/16	4	4	4	3	4	Closed	3	Closed	3	Closed	3	Closed	3	Closed	CHINOOK
8/17-8/23	4	4	4	3	4	Closed	3	Closed	3	Closed	3	Closed	3	Closed	CHINOOK
8/24-8/30 (Peak Run)	4	4	3	3	Closed	Closed	Closed	Closed	Closed	Closed	3	Closed	3	Closed	CHINOOK
8/31-9/6 (Peak Run)	4	3	3	2	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	CHINOOK
9/7-9/13 (Peak Run)	4	3	3	3	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	CHINOOK
9/14-9/20	4	3	4	3	2	Closed	2	Closed	Closed	Closed	Closed	Closed	Closed	Closed	COHO
9/21-9/27	7	6	4	3	2	Closed	2	Closed	Closed	Closed	Closed	Closed	Closed	Closed	COHO
9/28-10/4	7	7	7	3	2	2	2	2	Closed	Closed	Closed	Closed	Closed	Closed	COHO
10/5-10/11	7	7	7	3	2	2	2	2	7	7	7	7	7	7	COHO
10/12-10/18	7	7	7	6	7	7	7	7	7	7	7	7	7	7	COHO
Total Days Open	56	54	51	35	35		33		23		26		26		

********* WEEK APPROXIMATE DUE TO YEARLY CALENDAR DAY SHIFTS

Table 3. ER estimates for 2015 to 2017 used pre-terminal ERs from preseason Chinook FRAM estimates, and terminal ERs were taken from co-manager run reconstructions.

Year	ER estimate
2015	67.1%
2016	49.8%
2017	49.1%

Table 4. Comparison of the 2018 pre-season Hood Canal Chinook forecast with that of the sibling-based model currently under development by the co-managers.

	Sibling-Based Forecast prototype				Agreed-to 2018 Forecast
age	3	4	5	Total	
Chinook abundance	31,940	36,902	884	**69,726**	**61,448**