

**Washington Department of Fish and Wildlife  
Puget Sound Treaty Indian Tribes**

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# **Puget Sound Chinook Comprehensive Harvest Management Plan**

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Annual Report  
The 2017-2018 Fishing Season

November 2018

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## Executive Summary

This annual report on the Puget Sound Chinook Comprehensive Harvest Management Plan summarizes harvest information about commercial salmon fisheries occurring between May 1, 2017 and April 30, 2018, and Chinook spawning escapement in 2017. It also includes harvest information relevant to the 2016-2017 non-treaty sport fishing season and a review of the coded wire tag sampling rates in fisheries during calendar year (January-December) 2016.

Commercial Chinook catch in Puget Sound pre-terminal fisheries was substantially lower than projected pre-season. Commercial catches in some terminal areas were above expectations, primarily in fisheries targeting higher than anticipated terminal hatchery runs (i.e. Bernie Kai-Kai, Gorst Creek, and Hoodport Hatcheries).

Marine and freshwater landed recreational Chinook catch, based on catch record cards, in the 2016-2017 season was estimated at 40,118 and was higher than the pre-season projection of 35,035. Creel survey-based estimates of catch in 2017-2018 mark-selective recreational fisheries in Areas 5, 7, 9, 10, and 11 are included in this report. Total encounter estimates for the 2016-17 marine area selective fisheries are presented and compared to pre-season projections for these areas.

Escapement for Skagit summer/falls was the only management unit where the escapement estimate was lower than the preseason estimate as a result of the Upper Skagit summer estimate being below the preseason estimate. All other stock escapements were higher than preseason projections.

Coded-wire tag sampling rates for calendar year 2016 commercial fisheries exceeded 20% in most areas except for Nooksack terminal areas, Tulalip Bay, MCA 10, Carr Inlet, Hood Canal terminal areas, and Strait of JDF troll fishery. Sampling rates for marine recreational fisheries achieved the 10% objectives.

# 1 Introduction

The Puget Sound Chinook Harvest Management Plan mandates annual reporting of the performance of Chinook harvest management relative to the standards and guidelines of the plan (PSIT and WDFW 2010). This report partially fulfills that requirement and that of the Terms and Conditions in the 2017 Harvest Biological Opinion (F/WCR-2017-6766) by assessing the performance and effectiveness of treaty and non-treaty commercial fishery management actions adopted for the most recent management year, May 2017 through April 2018. Included in this report are:

- Management objectives for the 2017-2018 management year (May 1, 2017 through April 30, 2018)
- Projected and actual commercial landed catch in Puget Sound and descriptions of fisheries for the 2017-2018 management year
- Projected and actual landed catch for 2017 Puget Sound recreational fisheries where creel surveys were conducted and for all 2016 Puget Sound recreational sport fisheries
- Estimates of total encounters for mark-selective fisheries and non-landed mortality for commercial fisheries with Chinook non-retention where data are available
- Projected and actual spawning escapement for all Puget Sound Chinook populations in 2017 with details on estimation methods and surveys.
- Summaries of biological sampling of spawning escapement, and estimates of contributions of hatchery- and natural-origin spawners where available
- Coded-wire tag sampling rates for commercial and recreational fisheries in calendar year 2016 (January to December, 2016).

## 1.1 Management Objectives

General management objectives for Puget Sound Chinook populations, including Exploitation Rate Ceilings (ERCs), Critical Exploitation Rate Ceilings (CERC's), Upper Management Thresholds (UMTs), and Low Abundance Thresholds (LATs) were implemented in 2017 (Table 1-1). The final pre-season FRAM model run (Chin2017) highlighted the rates that were used as the ceilings for each Management Unit (MU) in 2017, and the projected exploitation rates and escapements for each unit (Table 1-2).

Pre-season fishery planning for 2017-2018 fisheries projected that natural spawning escapement would fall below the Low Abundance Thresholds (LAT) for the Nooksack early, Stillaguamish, Snohomish, Dungeness, and Mid-Hood Canal MUs, so CERC's were implemented for those units. Escapement projections for other MUs exceeded their LAT's.

Table 1-1. 2017 Puget Sound Chinook Harvest Management Objectives.

Management Unit	ER Ceiling	Critical ER Ceiling	Upper Management Threshold	Low Abundance Threshold
Nooksack		10.0% SUS	4,000	
North Fork			2,000	1,000
South Fork			2,000	1,000
Skagit summer / fall	50%	17% SUS	14,500	4,800
Upper Skagit summer				2,200
Sauk summer				400
Lower Skagit fall				900
Skagit spring	38%	18% SUS	2,000	576
Upper Sauk				130
Cascade				170
Suiattle				170
Stillaguamish	25%	15% SUS	900	700
North Fork summer			600	500
South Fork & MS fall			300	200
Snohomish	21%	15% SUS	4,600	2,800
Skykomish			3,600	1,745
Snoqualmie			1,000	521
Lake Washington	20% SUS	10% PTSUS		
Cedar River			1,680	200
Green	15% PTSUS	12% PTSUS	5,800	1,800
White River spring	22% SUS	15% SUS	1,000	200
Puyallup fall	50%	12% PTSUS		500
South Prairie Creek			500	
Nisqually	47%	50% Reduction of SUS ER		700
Skokomish	50%	12% PTSUS	3,650 aggregate; 1,650 natural	1,300 aggregate; 800 natural
Mid-Hood Canal	15% PTSUS	12% PTSUS	750	400
Dungeness	10% SUS	6% SUS	925	500
Elwha	10% SUS	6% SUS	2,900	1,000
Western SJDF	10% SUS	6% SUS	850	500

Table 1-2. Management guidelines implemented and projected exploitation rates and escapements for Puget Sound Chinook Management Units from 2017 – 2018 pre-season planning (FRAM Chin2017).

Management Unit	ERC or CERC implemented	Projected ER	Projected Escapement	UMT	LAT
Nooksack	10% SUS	10.0% SUS	227	4,000	2,000
Skagit summer fall	50%	36.3%	14,998	14,500	4,800
Skagit spring	38%	22.9%	2,388	2,000	576
Stillaguamish	15% SUS	11.9% SUS	221	900	700
Snohomish	15% SUS	7.0% SUS	3,308	4,600	2,800
L. Washington (Cedar)	20% SUS	20% SUS	1,080	1,680	200
Green	15% PT SUS	9.9% PTSUS	5,487	5,800	1,800
White	22% SUS	17.7%	1,489	1,000	200
Puyallup	50%	49.5%	1,092	500 South Prairie	500
Nisqually	47%	47.0%	1,128		700
Skokomish <sup>1</sup>	50%	47.5%	1,330	3,650 aggregate, 1,650 natural	1,300 aggregate, 800 natural
Mid Hood Canal	12% PT SUS	11.1% PT SUS	330	750	400
Dungeness	6% SUS	6% SUS	364	925	500
Elwha	10% SUS	6.3% SUS	2,621	2,900	1,000
Western SJDF	10% SUS	1.9% SUS	1,246	850	500

<sup>1</sup> Skokomish UMT and LAT aggregate is the combined total returns to spawning grounds and George Adams Hatchery. The UMT and LAT natural abundance is the total return to spawning grounds regardless of origin (hatchery and natural origin).

## 2 Commercial Harvest

This chapter provides post-season estimates of Chinook catch for Puget Sound commercial fisheries, catch from tribal ceremonial and subsistence (C&S) fisheries, and test or research fisheries. Catch is projected pre-season through modeling of the fishery regime, which is developed and agreed upon in the Pacific Fisheries Management Council (PFMC) and North of Cape Falcon (NOF) forums, using the Fishery Regulation Assessment Model (FRAM). The 2017–18 List of Agreed Fisheries (Appendix A) describes all salmon fisheries for all areas of Puget Sound and ocean fisheries off the Washington coast. The final pre-season projections of catch under this regime were made in FRAM run number Chin2017.

Commercial, ceremonial and subsistence, and test fishery catch is accounted for on fish tickets, i.e., receipts from transactions between fishers and buyers. Fish ticket data are stored in joint databases maintained by WDFW and the Puget Sound Tribes. In some commercial fisheries with Chinook non-retention, particularly non-treaty purse seine fisheries, estimates of non-landed mortality are also available for comparison to pre-season expectations (Table 2-8 and Table 2-9). WDFW conducts on-the-water observations of by-catch in commercial fisheries, concentrating on areas and gears where Chinook retention is not allowed.

Non-treaty troll, treaty troll, and recreational catches in Washington coastal fisheries north of Cape Falcon were less than their expected quotas (Table 2-1). Comparisons of projected and actual Puget Sound catch are provided for two pre-terminal areas (Strait of Juan de Fuca and San Juan Islands), and six regional terminal fisheries (Nooksack/Samish, Skagit, Stillaguamish/Snohomish, South Puget Sound, Hood Canal, and Strait of Juan de Fuca). General information is presented for the 2017–18 fisheries,

including in-season management actions that deviated from the pre-season plan, and explanations for differences in projected and actual catch.

Table 2-1. Projected and actual Chinook catch in waters of the Washington coast and Puget Sound fisheries in 2017.

Fishery	Projected	Actual
Washington ocean non-treaty troll	45,000	35,560
Washington ocean recreational	45,000	21,945
Washington ocean treaty troll	40,000	25,818
Puget Sound pre-terminal net & troll total		
Strait of Juan de Fuca troll	5,582	991
Strait of Juan de Fuca net	321	54
San Juan Islands net <sup>a</sup>	9,215	2,562
Nooksack-Samish terminal net	14,686	19,953
Skagit terminal net	3,305	2,358
Stillaguamish-Snohomish net	4,955	11,797
South Puget Sound terminal net	25,088	45,940
Hood Canal terminal net	33,335	54,929
Strait Tributaries terminal net	5	1

<sup>a</sup> includes non-retention mortality in NT purse seine fishery.

## 2.1 Strait of Juan de Fuca and San Juan Islands

Treaty net fisheries in the Strait of Juan de Fuca and the San Juan Islands caught 54 and 2,562 Chinook, respectively. Catch in the Strait of Juan de Fuca occurred primarily during the Chinook directed fishery during the summer while the majority of catch in the San Juan Islands occurred during Fraser Panel fisheries from late-August to late-September.

Non-treaty fisheries targeting Fraser sockeye in Areas 7 and 7A landed one Chinook. Because purse seines are required to release all Chinook, release mortality estimates are calculated using available data from on-water by-catch monitoring. Post-season analysis combined with landed catch estimated nine Chinook mortalities in the Sockeye fishery and 29 Chinook in the Chum fishery.

The Treaty troll fishery in the Strait of Juan de Fuca, exclusive of catch in Area 4B when it was managed under PFMC quotas, caught 991 Chinook.

## 2.2 Nooksack/Samish Terminal Area

### Treaty Spring Chinook Ceremonial and Subsistence Fishery

The Lummi Nation conducted fishing with tangle-net gear on 22 days from April 3 to June 13, 2017. Total landed catch was 150 hatchery-origin Chinook and one natural-origin Chinook with an additional 25 natural-origin and eight hatchery-origin Chinook released. Genetic results for

the released NORs and one retained NOR indicated 22 of the NORs were assigned to South Fork origin and four were North Fork origin NORs. Applying the expected release mortality rate of 40% to the 25 NOR encounters results in 11 estimated mortalities. The total encounter rate of NORs (n=26) was lower than the pre-season projection of 29 fish.

In 2017, the Nooksack Tribe conducted a limited traditional Ceremonial fishery May 6<sup>th</sup> with a single Chinook caught by that fisher. A permit only, subsistence fishery was opened on May 11<sup>th</sup>, May 15<sup>th</sup>, and May 26<sup>th</sup>. A total of 39 Chinook were caught in the combined traditional C&S fisheries and all were sampled. Thirty-five of the 39 chinook were clipped indicating Kendall hatchery origin. Otolith results confirm that one of the four unmarked fish was also Kendall Hatchery Origin. The remaining three fish did not have adipose fin clips or coded wire tags detected and were natural origin based on otolith results. Genetic results for these three fish are still pending. No Skookum hatchery origin fish were caught.

The Tribes 2017 total NOR mortality is estimated to be 14 NORs.

Table 2-2. Expected and observed Chinook catches in the Nooksack/Samish terminal area, 2017.

Area	Management Period	Projected	Actual
7B, 7C, 7D, Treaty net <sup>1</sup>	Chinook, coho, chum	8,509	11,467
7B, 7C Non-treaty net	Chinook, coho, chum	4,306	5,107
Nooksack River Treaty net	Early Chinook, May-Jun	726	201
	Fall Chinook, Aug-Oct	1,145	3,218

<sup>1</sup> Includes 7A on reservation catch.

#### Fall Chinook, Coho, and Chum Fisheries

The tribal fall Chinook fishery in Bellingham Bay (Area 7B), and Lummi Bay (7D) operated as planned from August 1<sup>st</sup> through September 2<sup>nd</sup> and in Samish Bay (7C) from August 1<sup>st</sup> through September 16<sup>th</sup>, with a catch of 7,864 Chinook. The coho fishery operated as planned from September 10<sup>th</sup> through October 11<sup>th</sup>, with an incidental harvest of 3,602 Chinook. One Chinook was harvested incidentally during the chum fishery which operated from October 22<sup>nd</sup> to December 13<sup>th</sup>. The total fall Chinook catch of 11,467 for Areas 7B, 7C and 7D was greater than the preseason projection of 8,509 (Table 2-2).

The non-treaty fishery in Area 7B and 7C landed 5,107 Chinook from July through September, greater than the pre-season projection of 4,306.

Fisheries for fall Chinook, coho, and chum in the Nooksack River occurred as planned from August 1 – September 2, Sept. 3 – October 21, and October 22 – December 13, respectively. The total Chinook catch was 3,218, exceeding the projected catch of 1,145 fish; 1,031 were caught during the Chinook period and 2,187 during the coho fishery. No Chinook were harvested during the chum period.

## **2.3 Skagit Bay/Skagit River Terminal Areas**

### **Skagit Terminal Area Treaty Fisheries – 2017**

**Spring Chinook Fisheries:** Treaty commercial fisheries in the Skagit terminal area directed at hatchery spring Chinook were conducted in 2017 as scheduled preseason, with some adjustments in timing. Incidental catch of spring Chinook also occurred during week 27 and 28

of the directed sockeye fishery, as Skagit River sub-areas 78D-2, 78D-3, 78D-4 were still in the spring management period during some or all of that time. A total of 221 wild and 848 hatchery spring Chinook were caught in these fisheries, compared to 332 wild and 728 hatchery spring Chinook expected pre-season based on Chinook FRAM 2017. An additional five wild and seven hatchery spring Chinook were harvested for ceremonial purposes, compared to 14 wild and 11 hatchery expected.

**Summer/Fall Chinook Fisheries:** No treaty commercial fisheries directed at summer/fall Chinook were scheduled in the Skagit terminal area for 2017. However, as anticipated, incidental catch of summer/fall Chinook occurred in the sockeye fishery. The sockeye fishery was adjusted from the preseason schedule as noted in Table 2-3 due to in-season management needs and intertribal sharing agreements. Total summer/fall Chinook mortality in these fisheries was 671 fish, compared to the pre-season expectation of 645 based on Chinook FRAM 2017. An additional 99 summer/fall Chinook were harvested for ceremonial purposes, which was less than the pre-season modeled value of 925.

**Terminal Area Test Fisheries:** A suite of Skagit terminal area test fisheries targeting Chinook, sockeye, coho, and chum were conducted by the Skagit tribes in 2017. Some weeks of these fisheries were adjusted or cancelled, as noted in Table 2-3, in response to weather, flow concerns, or staffing issues. A total of 44 wild spring Chinook, 32 hatchery spring Chinook, and 420 summer/fall Chinook were caught in these fisheries. The pre-season expectation of mortalities in the test fisheries was 62 wild spring Chinook, 32 hatchery spring Chinook, and 604 summer/fall Chinook.

**Summary:** Overall, a total of 272 wild spring Chinook, 885 hatchery spring Chinook, and 1,190 summer/fall Chinook were killed in treaty commercial, C&S, and test fisheries. The preseason expectation based on FRAM Chin2017 was 408 wild springs, 771 hatchery springs, and 2,174 summer/falls.

Table 2-3. Skagit terminal area projected and actual Chinook catches for treaty fisheries in 2017. Weekly projections were made by plugging the FRAM Chin2017 run sizes into the Skagit weekly harvest rate model, so totals may differ slightly from FRAM.

Fishery	Preseason Projected			Post-season Observed/Estimated			Difference	
	Schedule	Encounters	Mortality	Schedule	Encounters	Mortality	Encounters	Mortality
Test:								
Chinook	1 site, wks 19-35	204	204	No week 21, 22, 28, 29	108	108	-96	-96
Sockeye	2 sites: Area 3 wks 23-30, Blakes wks 24-29	95	95	Area 3 Same, No Blakes weeks 26-29	69	69	-26	-26
Coho	3 sites: Blakes wks 34 - 45, Area 3 wks 35-44, Spudhouse wks 34-44	399	399	Blakes no wk 45, Area 3 no wks 38-40 and 44, Spudhouse no wk 42	319	319	-80	-80
Chum	3 sites, wks 44-45	0	0	No Jetty/Blakes week 45	0	0	0	0
Area 8/78C Spring Chinook Fishery Swinomish and Sauk-Suiattle Tribes:								
Week 19	3 days	116	116	2.667 days	97	97	-19	-19
Week 20	3 days	166	166	3.333 days	79	79	-87	-87
Week 21	3 days	125	125	Same	113	113	-12	-12
Area 78C/78D Spring Chinook Fishery Upper Skagit Tribe:								
Week 19	0.583 day	155	155	1.1667 day	357	357	202	202
Week 20	0.667 day	275	275	0.5 day	233	233	-42	-42
Week 21	0.667 day	215	215	None	0	0	-215	-215
Area 8/78C/78D Chinook C&S Fishery Swinomish, Sauk-Suiattle, Upper Skagit Tribes:								
Sum/Fall-Spring Chin.	As needed	950	950	As needed	111	111	-839	-839
Areas 8/78C Sockeye Fishery Swinomish and Sauk-Suiattle Tribes:								
Week 25	None	0	0	2.667 days	31	31	31	31
Week 26	3 days	42	42	5.333 days	102	102	60	60
Week 27	5 days	55	55	Same	74	74	19	19
Week 28	5 days	111	111	6.667 days	236	236	125	125
Week 29	5 days	328	328	2.333 days	85	85	-243	-243
Week 30	None	0	0	None	0	0	0	0
Area 78D/78O Sockeye Fishery Swinomish Tribe:								
Week 28	1 day	4	4	None	0	0	-4	-4
Week 29	1 day	4	4	None	0	0	-4	-4
Areas 78C/78D/78O Sockeye Fishery Upper Skagit Tribe (wks 27-30 Chinook non-retention):								
Week 26	2 days	34	34	1.625 days	177	177	143	143
Week 27	0.5 days	6	6	0.583 days	37	37	31	31

	Preseason Projected			Post-season Observed/Estimated			Difference	
Week 28	0.5 days	31	31	1.333 days	119	119	88	88
Week 29	0.5 days	39	39	None	0	0	-39	-39
Week 30	None	0	0	None	0	0	0	0
<b>Areas 8/78C Coho Fishery Swinomish and Sauk-Suiattle Tribes:</b>								
Week 40	None	0	0	Same	0	0	0	0
Week 41	None	0	0	Same	0	0	0	0
<b>Areas 78C/78D Coho Fishery Upper Skagit Tribe: (wks 40-43 Chinook non-retention)</b>								
Week 41	None	0	0	same	0	0	0	0
Week 42	None	0	0	same	0	0	0	0
<b>Areas 8/78C Chum Fishery Swinomish and Sauk-Suiattle Tribes:</b>								
Week 46	None	0	0	None	0	0	0	0
<b>Total Skagit Terminal Area:</b>		<b>3,354</b>	<b>3,354</b>		<b>2,347</b>	<b>2,347</b>	<b>-1,007</b>	<b>-1,007</b>

## 2.4 Stillaguamish/Snohomish Terminal Area

The tribal net fishery in Area 8A was closed during the 2017/2018 fishing season, except for C&S fishing and a one-month commercial coho fishery. While zero Chinook were anticipated to be caught during the coho fishery, two Chinook were harvested in the first week of the fishery. Zero Chinook were harvested for C&S purposes (Table 2-4). Non-treaty commercial fishing in Area 8A was closed during the 2017/2018 fishing season.

Tribal Chinook catch in Area 8D occurred from May through late-September, with most of the catch occurring during mid-July. Total 8D catch was 11,783, including 57 for ceremonial or subsistence purposes (Table 2-4). Chinook catch was greater than projected in area 8D, however this terminal fishery primarily harvests hatchery fish.

Non-treaty Chinook catch in Area 8D was zero Chinook during the Coho fishery.

The Stillaguamish Tribes harvested no Chinook for ceremonial and subsistence purposes from the Stillaguamish River in 2017 (Table 2-4).

Table 2-4. Projected (FRAM Chin2017) and actual Chinook net fishery harvest in the Stillaguamish - Snohomish terminal area in 2017.

Area		Projected	Actual
8A Commercial	Treaty	0	2
	Treaty C&S	Up to 100	0
	Ntrty	closed	-
8A Test		0	0
8D Commercial	Treaty	4,805	11,726
	Treaty C&S		57
	Ntrty	0	0
Stillaguamish R. Net	Treaty C&S	50	0

## 2.5 South Puget Sound Terminal Areas

Table 2-5. Projected and actual Chinook catch in 2017 South Puget Sound net fisheries.

Area	Management Period	Projected	Actual
Area 9/10/11	Coho (A10 - Test)	21	0
	Chum (A9 - Test)	217	68
	A9 (Trty. C&S + chum)	511	13
	Trty coho/chum (A10/11)	244	3
	NT Pink (A10)	400 <sup>a</sup>	0 <sup>a</sup>
	NT chum (A10/11)	269 <sup>b</sup>	134 <sup>b</sup>
Area 10E	Treaty Chinook/coho/chum	4,551	5,811
Area 10A	Chinook (test)	377	344
	Coho/chum	462	463
Duwamish River	Coho/chum	3,211	5,725
	Coho (Test/C&S)		131
L Washington/Ship Canal	Sockeye/coho/ C&S Test/Research	495	310
Lake Sammamish	Chinook	0	0
Puyallup River	Spring/Fall C&S	484	265
	Chinook/Coho	1,458	3,080
White River	Spring C&S	-- <sup>c</sup>	302
Areas 13, 13D-K	Chinook/Coho/Chum	2,816	9,950
Area 13A	Chinook/Coho/Chum	1,834	3,485
Areas 13C/Chambers	Chinook	1,170	519
Nisqually River	Chinook/coho	6,570	16,357

<sup>a</sup> Fishery was non-retention for chinook and values reported as release mortalities

<sup>b</sup> Values include landed catch and release mortalities

<sup>c</sup> White River C&S Projected harvest is incorporated in the Puyallup River Spring/Fall C&S catch of 455 fish.

### Marine Areas 9, 10 & 11

The coho test fishery in area 10 was not implemented in 2017. The chum test fishery at Apple Cove Point (Area 9) incidentally caught a total of 68 Chinook (Table 2-5), well below the estimated 217.

The non-treaty chum-directed fishery in Area 10 and 11 incidentally harvested zero Chinook. The treaty coho fishery in Area 10 harvested two Chinook, while harvesting one Chinook during the chum fishery. Fisheries directed at Chinook and coho in Area 10E harvested 5,811 Chinook (Table 2-5). No Chinook were harvested during the chum fishery in area 10E.

Thirteen Chinook were harvested in Area 9 for C&S purposes, while no Chinook were harvested during the chum fishery.

### Lake Washington

There were no Chinook directed fisheries in Lake Washington, the Ship Canal, or North Lake Washington. Sockeye returns to Lake Washington were insufficient to allow any directed

fisheries. The Suquamish tribe conducted C&S fisheries in the Lake Ship Canal targeting sockeye, with a total by-catch of seven Chinook. Neither, the Muckleshoot Tribe nor Suquamish Tribe conducted any C&S fishery on Chinook in the ship canal (fish ladder). Incidental Chinook catch during the coho fishery in Lake Union, and the upper and lower Ship Canal harvested 295 Chinook, which was less than expected. The Muckleshoot Tribe conducted a coho directed commercial fishery in North Lake Washington with a total by-catch of eight Chinook. There were no coho directed fisheries in Lake Sammamish.

### **Elliott Bay/Duwamish River**

The Muckleshoot Tribe did not conduct any C&S fisheries in Elliot Bay or the Duwamish River in 2017. The Chinook test fishery in Area 10A harvested 344 Chinook in 2017. A one-day Chinook-directed commercial fishery occurred in Area 10A and the Duwamish River on August 9<sup>th</sup>, harvesting 356 and 4,668 Chinook salmon, respectively. In 10A, there were 107 Chinook caught in September during the coho directed fishery. In the Duwamish River, 131 Chinook were caught during the coho test fishery to determine Chinook clearance. During the coho directed fishery, 1,056 Chinook were caught incidentally and one during the chum fishery.

### **Puyallup River and White Rivers**

Ceremonial and subsistence fisheries in the Puyallup River caught 265 Chinook salmon during management weeks 21 – 26. Based on fisheries sampling data, approximately 13 of those fish are assumed to be fall-run based on ad-clip marks. The Muckleshoot Tribe had an additional C&S fishery in the White River which caught 302 Chinook. The pre-season projected C&S catch was 495.

Fall Chinook catch was 1,599 during the 12-hour Chinook fishery. The coho fishery occurred from management 36 (September 3) to management week 42 (October 15) and incidentally harvested 1,481 Chinook salmon, mostly during early September. Except for the estimated 13 fall Chinook captured during the spring Chinook C&S fishery, no directed fall Chinook C&S fisheries occurred (Table 2-5).

### **Marine area 13 & sub areas (Deep South Sound)**

The Chinook fishery in Carr Inlet (13A) caught 3,279 Chinook (Table 2-5), in August and early September (weeks 32 – 36). Pre-season projected catch was 1,834. This fishery targets Minter Creek Hatchery Chinook returns where no natural origin fish are returning to spawn. The coho fishery in 13A incidentally harvested 206 Chinook from late-September through mid-October.

The Chinook fishery at Chambers Bay (13C) occurred in weeks 31 – 36 with 519 Chinook harvested (Table 2-5). The pre-season catch projection was 1,170.

Chinook directed fisheries in 13D and Budd Inlet (13F) occurred from mid-July through early-September; total catch was 9,870. Chinook caught incidentally during the coho fishery in (Week 38-45) 13D totaled 80 fish. Zero Chinook were caught during the Fox Island (Area 13) coho fishery. The total pre-season catch projection for both areas was 2,814.

### **Nisqually River**

The treaty commercial fishery in the Nisqually River harvested an estimated 16,357 Chinook, excluding jacks, but including fish for Ceremonial and Subsistence purposes, with a pre-season projected commercial catch, excluding jacks, of 6,570 (Table 2-5). Based on preliminary terminal runsize to the Nisqually River, the estimated terminal net harvest rate is 44.6 percent, which is greater than the expected pre-season harvest rate of 28.6 percent.

## 2.6 Hood Canal

Treaty Chinook directed fishing in 12C occurred as planned from July 23 thru August 31 (weeks 31 – 36) with a catch of 9,870. During the Coho fisheries, 16 Chinook were landed in early-October in 12C while two Chinook were landed in 12D. No Chinook were harvested during coho fisheries in area 12 or 12B. Catch exceeded pre-season expectations due to the higher than expected returns.

Chinook harvest in the Hoodsport Hatchery Zone (12H) was 24,276 and occurred as planned from July 9 through September 16. Catch exceeded the preseason expectation of 16,688.

Chinook harvest in the Skokomish River occurred as planned from August 6 through August 31 landing 16,515 fish. Chinook harvest also occurred in Purdy Creek (tributary of Skokomish River that feeds the George Adams Hatchery) to access Chinook returning to George Adams Hatchery each Saturday from July 10 through August 6 landing 5,875 fish.

In Port Gamble (Area 9A), 251 Chinook were harvested, primarily in mid-August to mid-September during coho fisheries.

Non-treaty commercial fisheries in the Hoodsport Zone (12C) harvested 6,955 Chinook salmon (Table 2-6). There were no Chinook landed in other non-treaty fisheries in Hood Canal in 2017, and 27 estimated mortalities based on observer data (Tables 2-6 and 2-9).

Table 2-6. Pre-season projected and observed catch of Chinook in Hood Canal terminal area net fisheries in 2017.

Area	Target Species	Projected	Actual
(12, 12B-12D, 9A) (T)	Chin, coho, chum	6,002	10,139
(12-12C, 9A) (NT)	chum, coho	76	27 <sup>a</sup>
12A Net (T)	Coho	54	0
12H Net (T)	Chinook, chum	16,688	24,276
12H Net (NT)	Chinook, chum	5,000	6,955
Skokomish River (82G) (T)	Chin, coho, chum	5,508	16,515
(82J) (T)	<i>Chinook</i>		<i>5,875</i>
Total		33,328	57,885 <sup>b</sup>

<sup>a</sup> Values reported are release mortalities.

<sup>b</sup> Total does not include catch from area 82J.

## 2.7 Strait of Juan de Fuca

Due to the continued depressed status of Chinook populations, terminal fisheries in the Dungeness River and Elwha River were closed or provided very limited fishing opportunity, with no Chinook harvested in either terminal area in 2017. One Chinook was harvested in the Hoko River in early December (Table 2-7).

Table 2-7. Projected and actual catches of Chinook in Strait of Juan de Fuca terminal net fisheries in 2017.

Terminal Area	Projected	Actual
Area 6D & Dungeness River Treaty	0	0
Area 6D Non-Treaty	1	NA
Elwha River Treaty (C&S)	4	0
Hoko River Treaty	0	1

<sup>a</sup> NT fisheries were non-retention for Chinook and values are reported as release mortalities.

## 2.8 Non-Treaty Commercial Monitoring and Total Mortality

Because non-treaty vessels are required to release non-target species in many fisheries, WDFW conducts on-water monitoring to provide data on encounters of non-target species. Summaries of observer data for 2017 are presented in Table 2-8. Expanded estimates of total mortality, where available, were presented above in the summaries for individual fisheries, and are summarized and compared to pre-season expectations below in Table 2-9.

Table 2-8. Commercial fishery observation data for 2017 Puget Sound non-treaty salmon net fisheries.

Area	Gear type	# sets observed	Chinook	Coho	Sockeye	Pink	Chum	Steelhead
7A	PS	37	8	59	3	4	1,137	1
7	PS	43	7	46	0	1	836	0
10	PS	36	27	19	0	21	2,741	0
11	PS	48	13	19	0	0	7,344	0
12	PS	37	2	99	0	0	6,638	0
12B	PS	32	2	79	0	0	4,650	0
12C	PS	18	0	5	0	0	1,456	0
7	GN	3	0	1	0	0	25	1
7A	GN	0	NA	NA	NA	NA	NA	NA

Table 2-9. Total pre-season projected and post-season estimated Chinook mortality (landed + released) in Puget Sound non-treaty commercial salmon fisheries in 2017.

Area	Total Mortality	
	Projected	Actual
6D	1	N/A (0 landed)
7/7A	4,393	38
8	N/A	Closed
8A	N/A	Closed
10/11	669	134
12/12B	68	27
12C		
Hoodsport	5,000	6,955
9A/12A	8	N/A (0 landed)

### 3 Recreational Harvest

This chapter summarizes expected recreational catch in Puget Sound marine waters and freshwater tributaries for the 2017-2018 management year, and presents catch estimates available from creel studies for that period. Due to the cycle of recovery and analysis of Catch Record Cards (CRCs) used by recreational anglers, complete catch estimates for all areas are not yet available. Since complete catch estimates were not available for all areas in the annual report covering the previous management cycle, projected and actual recreational catches for the 2016-2017 management year are also included here.

#### 3.1 2016-2017 Recreational Catch

Total Recreational Chinook harvest in 2016-2017, estimated from preliminary Catch Record Card (CRC) data and creel estimates where available, was 40,118, compared to a preseason projection of 35,035. The CRC estimates are preliminary and subject to revision. Projected and actual catches for individual fisheries are shown in Table 3-1. Updated estimates of total mortality in mark-selective fisheries, for those fisheries where estimates are available, are presented in final reports available at <http://wdfw.wa.gov/publications/search.php?Cat=Fishing/Shellfishing>.

Table 3-1. Projected (FRAM 2916) and actual (preliminary, where available) Chinook catches in Puget Sound recreational fisheries during the 2016-2017 season.

Area/Fishery	Projected	Actual
Area 5-6		
Area 5 Summer MSF	6,166	3,345
Area 5 Winter MSF	222	440
Area 6 Summer MSF	3,408	5,216
Area 6 Winter MSF	1,314	2,250
Other		
Strait Tributaries		
Area 7		
Non MSF	1,299	2,772
MSF (December-April)	4,018	5,076
Nooksack/Samish FW	7,201	
Area 8-1 & 8-2		
MSF	825	1,319
Skagit River		
Spring MSF	307	10
Area 8D SAF	151	326
Stillaguamish River	0	0
Snohomish River		
Skyokomish MSF	562	432
Area 9		
Summer MSF	3,056	2,981
Winter MSF	1,052	2,865
Area 10		
Summer MSF	1,395	1,085
Winter MSF	173	230
Area 11		
Summer MSF	1,506	1,480
Winter MSF	99	81
Area 10E SAF	82	198
Lake Sammamish	0	0
Area 10A SAF	0	0
Green River	0	0
Puyallup River		
Carbon R MSF	139	580
Puyallup R MSF	0	0
Area 13		
Summer MSF	366	1,232
Winter MSF	43	92
Chambers Cr	73	0
Nisqually	308	1,318
Deschutes	4	24
Area 12		
Summer MSF	765	1,232
Winter MSF	501	92
Skokomish River	0	NA

\*Estimate through 3/31/2017

### **3.2 2017-2018 Recreational Catch**

Projected Chinook catches for 2017-2018 recreational fisheries are listed in Table 3-2. The recreational fishing regime included mark selective fisheries (MSF) for portions of the year in Marine Areas 5 through 13 and in a number of rivers. WDFW conducted intensive sampling and monitoring of MSFs in Marine Areas 5, 7, 9, 10 and 11, which provided the estimates in Table 3-2. Brief summaries of Chinook catch and encounters resulting from these sampling programs are included below. The analysis of 2017 summer fisheries is still in draft. When complete, this analysis will be made available on the WDFW website:

[http://wdfw.wa.gov/publications/search.php?Cat=Fishing / Shellfishing](http://wdfw.wa.gov/publications/search.php?Cat=Fishing/Shellfishing).

For fisheries without intensive sampling and/or creel data available, catch will be estimated using CRC data and data from baseline dockside sampling of marine fisheries. Baseline sampling provides data on catch per unit effort (CPUE), species composition, as well as CWT and biological sampling data. For freshwater fisheries, catch estimates are made using CRC data, unless creel studies were conducted and harvest estimates are available. For marine fisheries, species-specific catch estimates are made using CRC estimates of total catch, combined with species composition data obtained from the baseline sampling program. These estimates will be included in the 2018 annual report.

Table 3-2. Projected (FRAM 2017) and actual (preliminary, where available) Chinook catches in Puget Sound recreational fisheries during the 2017-2018 season.

Area/Fishery	Projected	Actual
Area 5-6		
Area 5 Summer MSF	4,427	2,316
Area 5 Winter MSF	365	
Area 6 Summer MSF	3,445	
Area 6 Winter MSF	871	1,119*
Other		
Strait Tributaries		
Area 7		
Summer (July MSF)	950	3,637
Winter MSF	3,512	2,228*
Nooksack/Samish FW	3,276	
Area 8-1 & 8-2		
MSF	965	489*
Skagit River		
Spring MSF	328	
Area 8D SAF	219	
Stillaguamish River	0	
Snohomish River		
Skykomish MSF	556	
Area 9		
Summer MSF	5,599	5,458
Winter MSF	2,625	2,684*
Area 10		
Summer MSF	2,166	2,226
Winter MSF	415	317*
Area 11		
Summer MSF	5,325	3,597
Winter MSF	350	
Area 10E SAF	0	
Lake Sammamish	21	
Area 10A SAF	414	
Green River	234	
Puyallup River		
Carbon R MSF	138	
Puyallup R MSF	597	
Area 13		
Summer MSF	952	
Winter MSF	50	
Chambers Cr	57	
Nisqually	2,440	
Deschutes	103	
Area 12		
Summer MSF	1,013	
Winter MSF	246	
Skokomish River		

\*Preliminary MSF catch estimate.

### 3.2.1 Marine Area 5 Summer MSF

2017 was the 15<sup>th</sup> year of summer mark-selective Chinook fishing in Marine Area 5. The 2017 fishery was open for a set season, from July 1 through August 15.

WDFW conducted comprehensive fishery monitoring activities during the Area 5 MSF. Sampling activities included dockside creel sampling and intensive efforts to distribute and collect voluntary trip reports (VTRs) from the angling public. An enhanced Salmon Trip Report (STR) program was used to obtain estimates of Chinook encounter rates by size class (legal or sub-legal) and mark status (ad-marked or unmarked), similar to the approach used successfully during summer 2009. Detailed descriptions of the sampling program and results are available in WDFW (2017).

For Area 5, WDFW estimates that 2,316 Chinook were landed, compared to preseason projections of 4,427 (Table 3-3).

Table 3-3. Comparison of modeled (FRAM 2017) and estimated total Chinook encounters for the 2017 Area 5 summer Chinook MSF.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	9,420	2,885	6,535	29
	AD	11,703	5,055	6,648	4,398
	Total	21,123	7,940	13,183	4,427
	% Marked	55	64	50	99
Estimated (Creel) Encounters	UM	5,949	1,603	4,346	7
	AD	11,180	2,531	8,649	2,309
	Total	17,129	4,135	12,995	2,316
	% Marked	65	61	67	100

### 3.2.2 Marine Area 7 Summer MSF

2017 was the second year of summer mark-selective Chinook fishing in Marine Area 7. The 2017 fishery was open from July 1 through July 30, 2017.

WDFW conducted comprehensive fishery monitoring activities during the Area 7 MSF. Sampling activities included intensive dockside creel sampling, on-the-water effort surveys, test fishing and collection of voluntary trip reports (VTRs) from the angling public. Detailed descriptions of the sampling program and results are available in WDFW (2017).

For Area 7, WDFW estimates that 3,637 Chinook were landed, compared to preseason projections of 950 (Table 3-4).

Table 3-4. Comparison of modeled (FRAM 2017) and estimated total Chinook encounters for the 2017 Area 7 summer Chinook MSF.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	2,064	1,157	907	12
	AD	2,116	1,079	1,037	938
	Total	4,180	2,236	1,944	950
	% Marked	51	48	53	99
Estimated (Creel) Encounters	UM	5,332	2,962	2,370	22
	AD	8,294	4,147	4,147	3,615
	Total	13,627	7,110	6,517	3,637
	% Marked	61	58	64	99

### 3.2.3 Marine Area 9 Summer MSF

In 2017, a recreational MSF occurred for the eleventh consecutive summer in Marine Area 9. This fishery was scheduled to open from July 16 through August 15, 2017, but due to achieving the harvest quota early, in-season action was taken and the fishery was closed July 30, 2017. As in previous years, WDFW's Puget Sound Sampling Unit (PSSU) implemented an intensive monitoring program in Area 9 during the summer season to collect the data needed to provide in-season catch estimates and to estimate key parameters characterizing the fishery and its impacts on unmarked salmon. Detailed descriptions of the sampling program and results are available in WDFW (2017).

An estimated 5,458 Chinook were landed in Area 9, compared to preseason projections of 5,599 (Table 3-5).

Table 3-5. Comparison of modeled (FRAM 2017) and estimated Chinook encounters for the 2017 Area 9 summer Chinook MSF.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	2,931	1,258	1,673	25
	AD	10,510	6,407	4,103	5,574
	Total	13,441	7,665	5,776	5,599
	% Marked	78	84	71	100
Estimated (Creel) Encounters	UM	3,529	1,261	2,269	3
	AD	15,630	6,050	9,580	5,455
	Total	19,160	7,311	11,849	5,458
	% Marked	82	83	81	100

### 3.2.4 Marine Area 10 Summer MSF

In 2017, a summer recreational MSF was implemented in Area 10 for the tenth consecutive year, running from July 16 through August 15, 2017. WDFW's Puget Sound Sampling Unit (PSSU) implemented an intensive monitoring program in Area 10 throughout the season in order

to collect the data needed to estimate key parameters characterizing the fishery and its impacts on unmarked salmon. An estimated total of 2,226 Chinook were landed during this fishery, compared to the pre-season projection of 2,166 (Table 3-6). Unmarked legal and sublegal encounters were greater than pre-season projections.

Table 3-6. Comparison of modeled (FRAM 2017) and estimated Chinook encounters for the 2017 Area 10 summer Chinook MSF

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	1,322	600	722	12
	AD	5,343	2,476	2,867	2,154
	Total	6,665	3,076	3,589	2,166
	% Marked	80	80	80	99
Estimated (Creel) Encounters	UM	1,853	741	1,112	0
	AD	6,669	2,382	4,287	2,226
	Total	8,522	3,123	5,399	2,226
	% Marked	78	76	79	100

### 3.2.5 Marine Area 11 Summer MSF

In 2017, a summer recreational MSF was implemented in Area 11 for the eleventh consecutive year, running from June 1 through September 30. WDFW's Puget Sound Sampling Unit (PSSU) implemented an intensive monitoring program in Area 11 to collect the data needed to provide in-season catch estimates and to estimate key parameters characterizing the fishery and its impacts on unmarked salmon. An estimated total of 3,597 Chinook were landed during this fishery, compared to the pre-season projection of 5,325 (Table 3-7.). Unmarked legal and sublegal encounters were greater than pre-season projections.

Table 3-7. Comparison of modeled (FRAM 2017) and estimated Chinook encounters for the 2017 Area 11 summer Chinook MSF.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	2,655	1,013	1,642	22
	AD	10,093	6,096	3,997	5,303
	Total	12,748	7,109	5,639	5,325
	% Marked	79	86	71	100
Estimated (Creel) Encounters	UM	2,797	1,076	1,721	56
	AD	6,992	3,765	3,227	3,541
	Total	9,789	4,841	4,948	3,597
	% Marked	71	78	65	98

## 4 Spawning escapement

This section compares natural Chinook escapement estimates for 2017 with pre-season escapement projections, and management thresholds.

In general, FRAM projects natural escapement of unmarked adult (age-3 to age-5) Chinook. For some MUs where hatchery-origin adults contribute to natural spawning, the FRAM projections of escapement include adult natural-origin recruits (NOR) and adult hatchery-origin recruits (HOR) that spawn naturally. This includes projections for the Skagit, Cedar, Green, Puyallup, Skokomish, Mid-Hood Canal, Dungeness, and Elwha. For the White MU, the projection includes adult fish of natural origin and adult fish originating from the acclimation pond program. Natural-origin adults that are used for hatchery broodstock may be included in the projections of natural escapement.

FRAM projects adult natural-origin escapement for the Nooksack, Skagit spring, Stillaguamish, and Snohomish populations, so hatchery-origin fish must be subtracted from total escapement, and the number of natural-origin fish used for broodstock added, to obtain an estimate comparable to the FRAM projections.

Escapements for available spring-run Chinook management units were all above projected estimates.

For summer/fall populations, escapement was greater than projected for most management units, except Skagit River summer/falls were below forecasted abundance.

Table 4-1. Preseason projections and estimates of Puget Sound Chinook natural spawning escapement in 2017.

Management Unit		NOR	HOR	Total	Projected (FRAM 2017)
Nooksack	NF			N/A	177 <sup>1</sup>
	SF			N/A	49 <sup>1</sup>
Skagit spring	Suiattle			898	653 <sup>1</sup>
	Cascade			232	346 <sup>1</sup>
	Sauk			1,630	1,389 <sup>1</sup>
	Total spring			2,851	2,388 <sup>1</sup>
Skagit summer/fall	Sauk summer			1,001	666 <sup>1</sup>
	Upper Skagit summer			7,792	11,440 <sup>1</sup>
	Lower Skagit fall			3,638	2,506 <sup>1</sup>
	Total summer/fall			12,431	14,998 <sup>2</sup>
Stillaguamish	NF	626	578	1,204	176 <sup>1</sup>
	SF	73	67	140	45 <sup>1</sup>
	Total	699	645	1,486 <sup>3</sup>	221 <sup>1</sup>
Snohomish	Skykomish	2,783	1,591	4,374	2,689 <sup>1</sup>
	Snoqualmie	1,401	344	1,745	619 <sup>1</sup>
	Total	4,184	1,935	6,119	3,308 <sup>1</sup>
Lake Washington	Cedar	1,557	491	2,048	1,080
Green		2,011	6,346	8,357	5,847
Puyallup		840	1,079	1,919	1,092
White		630	2,994	3,624 <sup>4</sup>	1,489 <sup>4</sup>
Nisqually		1,049	1,991 <sup>5</sup>	3,040 <sup>6</sup>	1,128
Skokomish				8,058	1,330
Mid Hood Canal	Dosewallips	1	6	7	
	Duckabush	0	2	2	
	Hamma Hamma	38	327	365	
	Total	39	335	374	330
Dungeness		192	513	705 <sup>7</sup>	364
Elwha		142	2,958	3,100 <sup>8</sup>	2,621
Hoko				1,225	1,246

1. Natural-origin only.

2. Skagit Su/Fa projection total includes NOR and HOR escapement to the spawning grounds.

3. Includes additional 66 HORs and 76 NORs collected for broodstock from the North Fork which are part of the FRAM Projection.

4. Includes only adult NORs and adult vent-clipped acclimation pond fish trucked and released upstream of Mud Mountain,

5. Includes 1,862 adult (Age 3-5) HORs from Clear Creek Hatchery trucked, released upstream, and remaining on the spawning grounds and 129 adult HORs volitionally straying to the spawning grounds. A total of 2,060 Chinook, including jacks and adults, were trucked and released with 152 returning to the hatchery.

6. Change-in-ratio (CIR) estimate will be revised with actual sport-catch data when available. Total is adult (Age 3-5) escapement.

7. Includes 100 fish (26 NORs and 74 HORs) removed from the river for use as broodstock.

8. Estimate does not include jacks.

## 4.1 Nooksack River Early Chinook

### 2017 Preliminary Spawning Survey Data Summary

Nooksack River 2017 Chinook escapement estimates are not available at this time, but in preparation, pending additional data and genetic laboratory analyses. The following is a summary of the North Fork, Middle Fork and South Fork Nooksack surveys and carcasses for the 2017 season.

The Washington Department of Fish and Wildlife and the Lummi Nation surveyed the North Fork and Middle Fork sub-basins for North Fork/Middle Fork early-timed Chinook. Surveys in the North Fork sub-basin began during the first week of July and continued through the end of October. A total of 482 carcasses were enumerated in Kendall Creek (downstream of the hatchery rack) and Kendall Slough. An additional 323 Chinook carcasses were recovered in the remainder of the North Fork sub-basin. In 2017, 2,252 adults and 49 jacks recruited to Kendall Hatchery (WDFW). In the Middle Fork, surveys were conducted from mid-August through early October and resulted in the recovery of 376 carcasses, with 321 of those being from Peat Bog and Bear Creeks.

Surveys on the South Fork Nooksack were conducted by the three co-managers (Washington Department of Fish and Wildlife, Lummi Nation and Nooksack Tribe) from late July through October. The Lummi Tribe recovered 615 carcasses between Saxon Road and Larson's Bridge and counted 235 redds (RM 12.9 – 20.7); the Nooksack Tribe enumerated 226 carcasses and 204 redds from the North Fork confluence to the Saxon Road bridge (RM 0.0 – 12.9) and WDFW recovered 35 carcasses and documented 59 redds between Larson's Bridge (RM 20.7) and RM 25.3. Low discharge resulted in very little tributary spawning in 2017.

A total of 1,695 Chinook (adults and jacks) recruited to the Skookum Creek Hatchery (Lummi Nation) on the South Fork Nooksack in 2017; of those, 747 (604 males including adults and jacks, and 143 females) were marked and released back into the South Fork. At this time, the number of hatchery turnbacks that spawned and/or were sampled on the spawning grounds is unknown. Final estimates will be determined soon after laboratory results are completed, and are anticipated this fall/winter.

### 2016 Spawning Escapement Estimate

The co-managers (Washington Department of Fish and Wildlife, Lummi Nation, and Nooksack Tribe) surveyed the spawning areas in all three forks of the Nooksack River (North Fork, Middle Fork, and South Fork) and their tributaries. Methodologies used to determine the escapement estimates were the same as in recent years, including 2015 (see Dapp and James 2017 for overview).

Surveys in the North Fork sub-basin began during the first week of July and continued into October. A total of 173 carcasses were enumerated in the mainstem North Fork and its tributaries, excluding Kendall Creek and Kendall Slough. Of these 173 carcasses, 106 were successfully sampled for origin and 78.3% were hatchery origin (HORs) from Kendall Hatchery releases and 21.7% were natural origin (NORs). Expanding the 173 enumerated carcasses by 3.48 carcasses per carcass sampled results in a total estimate of 602 spawners in the North Fork excluding the area near Kendall Hatchery, with a breakdown of 471 HORs and 131 NORs. In Kendall Creek and Kendall Slough, a total of 147 carcasses were enumerated and 120 of these were sampled for origin. Sampling results indicate 91.7% were HORs and 8.33% were NORs. The total carcass count in

Kendall Creek and Kendall Slough were not expanded, and based on sampling results the total estimate from this area is 135 HORs and 12 NORs.

For the entire Middle Fork basin of the North/Middle Fork chinook escapement estimate, a total of 114 carcasses were enumerated and 89 of these were successfully sampled for origin. Sixty-five carcasses were enumerated in the mainstem Middle Fork, and 48 of these were successfully sampled for origin. Of these, 64.6% were HORs and 35.4% were NORs. Expanding the 65 carcasses by 1.91 carcasses per carcass sampled results in a total estimate from the mainstem Middle Fork of 124 chinook spawners, with 80 of these being HORs and 44 were NORs. Peat Bog and Bear Creek carcass counts are not expanded, and a total of 49 carcasses were enumerated in these creeks, with 41 successfully sampled as to origin. All 41 were HORs so the total estimate from these two creeks is 49 HORs. Combining the estimates from the respective geographic areas results in a total 2016 North/Middle Fork population escapement estimate of 922 chinook, with 735 being HORs and 187 NORs. There were five additional carcasses that were South Fork NORs (by DNA) in the North (n=4) and Middle (n=1) forks, which expand to be 15 South Fork NORs, that are not included above. Similarly, there was one fall chinook NOR carcass in the North Fork and one in the Middle Fork (by DNA), which expand to an estimated 5 fall chinook NORs in the North/Middle Forks which are not considered in the above NOR estimate. The North/Middle Fork HOR numbers are lower than in recent years and potentially attributable to the rebuilt adult pond and hatchery ladder at Kendall Hatchery which likely led to fewer hatchery origin fish spawning downstream of the hatchery in Kendall Creek and Kendall Slough. A total of 1,690 adult Chinook and 116 jacks recruited to Kendall Hatchery.

Surveys on the South Fork Nooksack were conducted between mid-August and late October. A total of 383 chinook redds were enumerated through September 30<sup>th</sup>. Expanding the 383 chinook redds by 2.5 chinook per redd results in a total estimate of 958 total spawning chinook. A total of 149 spawning carcasses were successfully sampled through October 7 with five determined to be North/Middle Fork HORs (3.36%), six were fall chinook HORs (4.03%), 13 were fall chinook NORs (9.02%), 28 were North/Middle Fork NORs (18.74%), 47 were South Fork HORs from Skookum Hatchery (31.54%), and 50 were South Fork NORs (33.31%). Applying these percentages to the estimated total spawning chinook results in South Fork Nooksack chinook population estimates of 319 NORs and 302 HORs. Both estimates are appreciably higher than in recent years. An additional 179 North/Middle Fork NORs are estimated to have spawned in the South Fork as well as 86 fall chinook NORs. Additionally there were an estimated 32 North/Middle Fork chinook HORs and 39 fall chinook HORs estimated to have spawned in the South Fork. A total of 20 carcasses of various origin were determined to be prespawn mortalities and are excluded from the above totals, as well as a small number of carcasses with ambiguous or unknown results. The total South Fork 2016 population escapement estimate is 621, with 319 being NORs and 302 being HORs. A total of 1,661 Chinook recruited to Skookum Creek Hatchery in 2016, including jacks.

The total number of NORs that spawned for the Nooksack early management unit is 700 spring and summer chinook.

Discharge conditions were relatively consistent during the North/Middle fork spawn survey period, while the South Fork had fairly consistent conditions, with a modest spike in mid-September and a much larger spike October 9<sup>th</sup> and again mid-October.

## 4.2 Skagit River

### Background

Six recognized Chinook populations spawn in the tributaries and mainstems of the Skagit River watershed. The Sauk River, Suiattle River, Baker River, and the Cascade River are major tributaries to the Skagit River, but there are also numerous smaller, anadromous fish bearing tributaries flowing both into the major tributaries and also into the Skagit River directly. Five hydroelectric projects are in the basin, two on the Baker River at river miles (RM) 1.6 and 9.3, and three on the Skagit River at RM 96.6, 100.9, and 105.1.

Escapements were calculated using various methodologies dependent on population and based on either total new redd counts, total visible redd counts, linear regression predictions, or a combination of methods. During spawning ground surveys, Chinook carcasses were sampled for fork length, sex, scales, and presence or absence of a hatchery mark. We also electronically sampled Chinook carcasses for coded wire tags (CWT) and collected CWT present snouts.

Surveys were performed on foot, by pontoon boat, jet boat, or by helicopter. Escapements estimates for Skagit hatchery spring Chinook, Upper Cascade spring Chinook, and Suiattle spring Chinook were calculated by multiplying total redd counts by 2.5 fish per redd. Upper Sauk spring Chinook, Skagit summer and Skagit fall Chinook, and Sauk River summer Chinook spawning escapement estimates were calculated by summing total redds observed during ground based surveys with area under the curve (AUC) calculated redds from aerial surveys, and multiplying the sum by 2.5 fish per redd.

Additional personnel from the Skagit Fisheries Enhancement Group (SFEG), Skagit River System Cooperative (SRSC, the management body for the Sauk-Suiattle and Swinomish Indian tribes), the Upper Skagit Indian Tribe (USIT), Seattle City Light, and Puget Sound Energy, also performed work and contributed data necessary to complete the escapement estimates and predictions for the Skagit River Basin Chinook salmon runs.

### Methods and Results

#### Suiattle River Spring Chinook

Suiattle River spring Chinook spawn in the clear, large tributaries draining into the turbid mainstem of the Suiattle River. Some redds are found at tributary confluences with the mainstem and within the tributary's clear water lens in the mainstem created by unmixed tributary and mainstem water. Redds found within the tributary lenses are included in the tributary counts. Historically, limited spawning activity has been documented in the glacially influenced, high turbidity mainstem with the exception of spawning in the tributary clear water lenses. The only recorded exception to date was in 2011, when an unusual combination of environmental variables reduced turbidity in the mainstem and resulted in conditions the Chinook apparently deemed suitable for spawning.

Suiattle spring Chinook spawning Surveys were conducted from 2 August 2017 through 12 October 2017 by WDFW and USIT surveyors. Tributary indexes were surveyed for new redds every seven days to attempt to ensure redds were enumerated before redd visibility life had expired. The indexes included all known spawning habitat for each tributary. Tributary spawning surveys were conducted on foot. Encountered Chinook carcasses were sampled for scales, measured for fork length, and checked for presence of coded wire tags. Redds were marked with survey flagging to prevent double counting

during subsequent surveys. The total redd count was multiplied by 2.5 fish per redd to estimate escapement.

The logjam that had been a passage barrier on Buck Creek in previous years (approximately river mile 1.2) remained in 2017 and appeared about the same size as observed in 2016. The pool habitat behind the jam had further filled with cobble and smaller substrate and was forcing the creek through a couple interstitial spaces on the left bank side of the jam. The Buck Creek logjam continued to be a total fish passage barrier and was preventing sediment from moving downstream.

A total of 157 Suiattle spring Chinook carcasses were observed in 2017 and 144 were collected and sampled. There were 143 wild unmarked and no CWT Suiattle spring Chinook and one carcass that was unknown adipose clip and no CWT. The season total redd count was 359 redds (Table 4-2).

Table 4-2. Suiattle River spring Chinook 2017 spawning ground survey redd counts.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>1</sup>	Redds
Big Creek	3.0723	Foot	0.0-0.6	7.8	15
Tenas Creek	3.0761	Foot	0.0-0.5	9.6	1
Straight Creek	3.0797	Foot	0.0-0.1	15.1	0
Buck Creek	3.0813	Foot	0.0-1.7	18.1	24
Circle Creek	3.0892	Foot	0.0-0.2	18.4	0
Lime Creek	3.0897	Foot	0.0-0.5	20.8	3
Downey Creek	3.0919	Foot	0.0-2.1	24.4	243
Sulfur Creek	3.0973	Foot	0.0-0.9	26.3	46
Milk Creek	3.1022	Foot	0.0-0.1	28.6	27
Total redds					359

<sup>1</sup>Location refers to river mile location of tributary mouth on a mainstem, or lower river mile terminus of a mainstem index.

The preliminary 2017 Suiattle River Spring Chinook escapement estimate was 898 fish (rounded). All data and estimates of escapement were preliminary at the time of reporting and remain subject to further review and agreement by the Skagit comanagers before finalization.

### Upper Cascade River Spring Chinook

Cascade River spring Chinook spawn in the mainstem Cascade River and accessible tributaries from river mile 8.1 (just upstream of a high gradient canyon) up to and including the forks at RM 18.6. Spawning has also been documented in the North and South Fork Cascade Rivers, from the mouth of each fork upstream at varying distances (less than one river mile) dependent upon stream flow and available spawning habitat.

Cascade spring Chinook surveys occurred from 16 August 2017 through 05 October 2017. The surveys included all known spawning habitat. Mainstem surveys were conducted by foot or pontoon boat by WDFW and USIT personnel. The survey protocol was to survey each index every seven days. In previous years the protocol had been to survey every 10 to 14 days, but the interval was shortened in 2016 in an effort to recover more carcasses and enumerate more redds before redd life had expired. All new redds were marked with survey flagging to ensure they were only counted once. The total redd count was multiplied by 2.5 fish per redd to estimate escapement. All recoverable carcasses were sampled for scales, measured for fork length, and electronically checked for coded wire tags.

With the weekly survey interval 38 upper Cascade spring Chinook carcasses were observed in 2017. Of the located carcasses, 15 were unable to be collected and 23 were

collected and sampled. One sampled carcass was adipose present and coded wire tagged, and the remaining 22 were wild adipose present (unmarked) and no coded wire tag (no beep). A total of 129 redds were located and marked in 2017 (Table 4-3).

The 2017 upper Cascade River spring Chinook spawning escapement estimate was 323 fish. All data and estimates of escapement were preliminary at the time of reporting and remain subject to further review and agreement by the Skagit comanagers before finalization.

Table 4-3. 2017 Cascade River spring Chinook redd counts.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>1</sup>	Redds
Cascade River	3.1411	Foot	8.1-9.0	8.1	3
Marble Creek	3.1451	Foot	0.0-0.3	8.6	3
Cascade River	3.1411	Foot/Raft	9.0-12.4	9.0	45
Cascade River	3.1411	Foot	12.4-15.8	12.4	37
Cascade River	3.1411	Foot	15.8-18.6	15.8	39
Kindy Creek	3.1528	Foot	0.0-0.5	16.2	2
North Fork Cascade River	3.1605	Foot	0.0-0.1	18.6	0
South Fork Cascade River	3.1411	Foot	0.0-0.5	18.6	0
<b>Total redds:</b>					<b>129</b>

<sup>1</sup>Location refers to river mile location of tributary mouth on mainstem, or lower river mile terminus of a mainstem index.

### Upper Sauk River Spring Chinook

Upper Sauk River spring Chinook spawn in the mainstem Sauk River and in the North and South Fork Sauk Rivers. Mainstem Sauk River spawning has been documented between RM 31.0 to the forks at RM 39.7. Sauk spring Chinook spawn in the North Fork Sauk to the falls at river mile 41.3 and in the South Fork Sauk from the forks upstream as high as river mile 5.0 on a high water year. A high gradient section of the Sauk River beginning 0.9 river miles downstream of the White Chuck River acts as an assumed barrier to Sauk summer Chinook and serves as the lowest point of spawning of upper Sauk River spring Chinook.

Sauk River spring Chinook spawning areas were surveyed from 21 August 2017 through 16 October 2017. Surveys were conducted by foot or pontoon boat on indexes upstream of the White Chuck River at an attempted survey interval goal of every seven days. The survey goal for the index below the White Chuck River was every two weeks by helicopter due to the section being too treacherous to raft or walk. Recovered carcasses were sampled for scales, fork length, and presence of coded wire tags. Redds located during foot or pontoon boat surveys were counted and marked with survey flagging.

A total of 341 Sauk spring Chinook carcasses were observed in 2017 and 165 of the carcasses were able to be recovered and sampled. Of the sampled carcasses 164 were wild unmarked and untagged fish, and one fish was adipose present but the head had been scavenged so no CWT scan could be performed.

There were 634 redds located upstream of the White Chuck River by ground based surveys and 18 redds observed downstream of the White Chuck River in the section surveyed by helicopter (Table 4-4). Total redds from ground based counts and the flown section were summed and multiplied by 2.5 fish per redd to estimate escapement. The 2017 upper Sauk River spring Chinook escapement estimate was 1,630 fish (Table 4-1). All data and estimates of escapement were preliminary at the time of reporting and remained subject to further review and agreement by the Skagit comanagers before finalization.

Table 4-4. Upper Sauk River spring Chinook redd counts from 2017 spawning ground surveys.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>1</sup>	Redds
Sauk River	3.0673	Flight	31.0-31.9	31.0	18
Sauk River	3.0673	Foot/Float	31.9-34.5	31.9	198
Sauk River	3.0673	Foot/Float	34.5-37.8	34.5	305
Falls Creek	3.1182	Foot	0.0-0.2	34.9	1
Sauk River	3.0673	Foot/Float	37.8-39.7	37.8	21
South Fork Sauk River	3.1204	Foot	0.0-2.9	0.0	55
South Fork Sauk River	3.1204	Foot	4.4-5.0	4.4	0
North Fork Sauk River	3.0673	Foot	39.7-40.1	39.7	19
North Fork Sauk River	3.0673	Foot	40.1-41.3	40.1	35
Total redds (rounded):					652

<sup>1</sup>Location refers to river mile location of tributary mouth on mainstem, or lower river mile terminus of a mainstem index.

### Skagit Summer Chinook

Skagit River summer Chinook spawn in the mainstem of the Skagit River from the mouth of the Sauk River at RM 67.2 to the Seattle City Light Powerhouse at Newhalem at RM 94.3. Spawning also occurs in tributary streams with suitable flow and spawning habitat. Tributaries were surveyed by foot or pontoon boat at an interval of every seven days to ensure all redds were enumerated before redd life expired. Tributary surveys covered most of the known spawning area with the exception of some limited spawning known to occur above the tributary index areas in years of high abundance, and in some other tributaries that have infrequent spawning activity. Time constraints due to limited personnel resources prevented us from surveying all known spawning habitat. The mainstem of the Skagit River was surveyed by helicopter.

Carcass recovery and sampling occurred incidentally during tributary surveys, and actively during mainstem carcass recovery surveys conducted on jet boats. Mainstem carcass surveys of approximately 22.3 river miles were attempted weekly. Recovered carcasses were sampled for scales, measured for fork length, and checked for presence of tags and marks. Not all carcasses encountered could be sampled; carcasses were often observed in deep pools beyond the reach of gaff hooks, or were badly decomposed and disintegrated upon disturbance. All new redds located during tributary surveys were counted and marked with survey flagging. The protocol for mainstem aerial redd surveys was to count all visible redds including redds that were recognizable from previous flight surveys.

Skagit summer Chinook tributary spawning surveys occurred regularly from 7 September 2017 through 30 October 2017 (Table 4-5). A total of 941 Skagit summer Chinook carcasses were observed in 2017 and 855 carcasses were recovered and sampled. A total of 804 carcasses were unmarked and untagged wild Skagit summer Chinook, 25 carcasses were adipose clipped only (no cwt), 24 carcasses were adipose clipped and coded wire tagged, and 2 carcasses were coded wire tagged only (adipose present).

Table 4-5. Skagit summer Chinook redd counts from 2017 spawning ground surveys.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>1</sup>	Redds
Goodell Creek	3.1867	Foot	0.0-1.3	92.9	7
Falls Creek <sup>3</sup>	3.1780	Foot	0.0-0.4	4.0	2
Bacon Creek	3.1774	Foot	0.0-4.2	82.9	171
Diobsud Creek	3.1750	Foot	0.0-1.3	80.7	5
Cascade River	3.1411	Foot/Float	0.0-4.2	78.1	80
Illabot Creek	3.1346	Foot	0.0-2.6	71.6	6
Total redds:					271

<sup>1</sup>Location refers to river mile location of tributary mouth on mainstem, or lower river mile terminus of a mainstem index.

<sup>2</sup>Falls Creek WRIA 03.1780 is a tributary of Bacon Creek. The mouth is located at river mile 4.0 of Bacon Creek on the right bank.

We observed 271 summer Chinook redds in the tributaries (Table 4-5). Stream flows were low during most of Skagit summer Chinook spawning and upstream passage into tributaries was likely hampered. Four redd survey flights were successfully completed in 2017. Using the AUC methodology 2,846 Skagit summer Chinook redds were estimated in the mainstem Skagit River. The 2017 escapement estimate of Skagit River summer Chinook was 7,792 fish (rounded). All data and estimates of escapement were preliminary at the time of reporting and remained subject to further review and agreement by the Skagit comanagers before finalization (Table 4-1).

#### Lower Sauk River Summer Chinook

Lower Sauk River summer Chinook spawn from the mouth of the Sauk River to approximately RM 31.0 (0.9 RM downstream of the White Chuck River). The only documented tributary spawning occurs in Dan Creek (WRIA 3.1079) but due to frequent low flows during spawning, summer Chinook use of Dan Creek has been intermittent. Any carcasses located in Dan Creek were sampled for scales, measured for fork length, and checked for presence of tags and marks. The lower Sauk River is too wide, braided, and spawning too sparsely distributed to be effectively surveyed by foot or pontoon boat, so mainstem Sauk River summer Chinook spawning was surveyed by helicopter.

The Sauk Suiattle Indian Tribe (SSIT) conducted carcass collection surveys for Sauk summer Chinook carcasses in the mainstem of the Sauk River in 2017. A total of 39 carcasses were located and sampled. There were 20 carcasses that were unmarked and no beep (no CWT) wild fish. Two recovered carcasses were adipose clipped only and one carcass was no beep but the adipose status was unable to be determined.

Dan Creek did not have Chinook passable stream flows through most of 2017 Sauk summer Chinook spawning. Surveys of Dan Creek began 12 September and continued through 13 November. In 2017 seven Sauk summer Chinook redds were observed within the Dan Creek index (Table 4-6).

Three redd flights were completed on all three lower Sauk River summer Chinook mainstem reaches and one reach was able to be surveyed 4 times. Mainstem Sauk summer Chinook spawning is difficult to monitor due to turbidity inputs from the Suiattle River and the White Chuck River.

Table 4-6. Lower Sauk River summer Chinook redd counts from 2017.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>*1</sup>	Redds by method		
					Foot surveys	AUC	Linear regression
					Actual	Estimated	Predicted
Sauk River	3.0673	Flight	0.0-13.2	0.0		36	N/A
Sauk River	3.0673	Flight	13.2-21.1	13.2		220	
Dan Creek	3.1079	Foot	0.0-0.8	16.8	7		
Sauk River	3.0673	Flight	21.1-31.0	21.1		49	
Grand total redds from all methods (rounded):						401	

<sup>\*1</sup>Location refers to river mile location of tributary mouth on mainstem, or lower river mile terminus of a mainstem index.

The 2017 escapement estimate of lower Sauk River summer Chinook was 1,001 fish (rounded). All data and estimates of escapement were preliminary at the time of reporting and remained subject to further review and agreement by the Skagit comanagers before finalization.

### Lower Skagit River Fall Chinook

Skagit fall Chinook spawn in the mainstem Skagit River from the vicinity of RM 24.5 to the mouth of the Sauk River (RM 67.2). They have also been documented spawning in a variable number of large and small tributary streams depending on flow conditions. Tributary surveys were conducted by foot every seven to fourteen days. Encountered carcasses were sampled for scales, measured for fork length, and checked for coded wire tags. Tributary redds were counted and marked with flagging to prevent repeated counting.

We surveyed most of the known spawning areas from 20 September 2017 through 7 November 2017 (Table 4-7). In general, weather and stream flow conditions were favorable and did not hamper survey intervals throughout the spawning period. Finney Creek again turned turbid quickly with rainfall in 2017, but by watching forecasts and stream flows carefully we were able to plan our surveys around poor conditions.

We observed 41 fall Chinook carcasses in 2017 and were able to collect and sample 24 carcasses. Most carcasses (21) were unmarked and no beep (no CWT) wild fish. Of the remaining carcasses, two were adipose clipped only, and one was no beep but adipose status was unknown due to decomposition or scavenging.

Three State funded aerial surveys of the mainstem Skagit River fall Chinook spawning zone were completed in 2017. Usually river conditions are extremely poor that time of year so we were pleased to be able to complete what we would consider to be a nearly complete set of flights during the 2017 fall Chinook spawning period. From the flight data we estimated 1,317 redds were in the mainstem section from the Highway 9 Bridge to the Sauk River (Table 4-7). The preliminary 2017 Skagit fall Chinook escapement estimate was 3,638 fish. The final escapement number is dependent on comanager review and agreement, which had not yet occurred at publication.

Table 4-7. Lower Skagit River fall Chinook redd counts from 2017 spawning ground surveys. Redd counts were provided from Grandy Creek and part of Finney Creek by the Upper Skagit Tribe. The East Fork Nookachamps Creek index was not surveyed in 2017 due to an access issue.

Stream	WRIA	Survey method	Reach (RM)	Redds
Skagit River	3.0176	Flight	24.5-56.5	889
Skagit River	3.0176	Flight	56.5-67.2	1,324
Hansen Creek	3.0265	Foot	3.0-4.3	0
Day Creek	3.0299	Foot	0.0-2.2	25
Jones Creek	3.0332	Foot	0.0-1.3	1
Grandy Creek	3.0337	Foot	0.0-1.1	19
Alder Creek	3.0359	Foot	0.0-1.6	2
O'Toole Creek	3.0365	Foot	0.0-0.2	4
Pressentin Creek	3.0385	Foot	0.0-0.4	5
Finney Creek	3.0392	Foot	0.0-6.0	82
Jackman Creek	3.0626	Foot	0.0-0.7	0
EF Nookachamps	3.0230	Foot	3.5-5.1	DNS
<b>Total redds:</b>				<b>2,351</b>

### 4.3 Stillaguamish River

The Stillaguamish River basin has two populations of Chinook distinguished by genetic characteristics: summers and falls. These two populations overlap in spawn timing and distribution with both populations spawning in both forks of the Stillaguamish River. The summer stock is a composite of natural and hatchery-origin supplemental production with the majority of spawning occurring in the North Fork Stillaguamish and its major tributaries, including Boulder River and Deer, Grant, French, and Squire Creeks. The fall stock is a composite of natural and hatchery-origin supplemental production with the majority of spawning primarily in the mainstem and South Fork Stillaguamish Rivers, in Pilchuck, Jim, and Canyon Creeks, and in the North Fork Stillaguamish River. Escapement is currently estimated for North Fork and South Fork Stillaguamish Rivers rather than summer and fall populations of Chinook.

Escapement estimates for Stillaguamish Chinook were calculated by multiplying the cumulative redd count by 2.5 and by the genetic mark recapture (GMR) correction factor. This is an annual provisional estimate. The GMR correction factor is a multiplier resulting from regression analysis of redd-based escapements compared to GMR-based escapement estimate results from the years 2008 through 2016. GMR based escapement estimates are considered more accurate than redd-based estimates and can be produced with statistical confidence intervals (whereas redd-based estimates cannot), but are not available until the following year. GMR escapement estimates require genetic sampling of adult fish in the Fall and juvenile fish in the following Spring. When the final GMR escapement estimate is completed, it then replaces the initial redd-based GMR corrected (provisional) result.. Since 2008, Chinook redds found in the North and South Forks have been individually counted during periodic foot or raft surveys using the marked redd census method. Previous to 2008, redd counts in the North and South Forks were estimated using area under the curve methodology based on aerial surveys of North and South Fork mainstem reaches as well as

ground-based surveys of tributary streams. Aerial surveys continue to provide redd count data for the Lower Mainstem and upper South Fork. Since 2008, the Stillaguamish Tribe Department of Natural Resources has provided ground coverage of the North Fork Stillaguamish River from its mouth to river mile (RM) 30.0. WDFW staff surveyed the remaining known Chinook spawning areas in the Stillaguamish basin.

Surveys were conducted from mid-August to mid-November to encompass the spawn timing of both stocks. All known spawning habitat was surveyed either by foot or raft on a seven to fourteen day cycle, or by helicopter every fourteen to twenty-one days. All ground-counted redds were flagged, enumerated and recorded with a GPS waypoint. Helicopter surveys counted total visible redds during each flight and total redds were estimated using area-under-the-curve methods. Carcasses encountered were sampled for scales, DNA, CWT, and adipose fin mark status.

### North Fork Stillaguamish summer and fall Chinook

North Fork Stillaguamish Chinook spawning surveys covered the entire known distribution. Surveyed areas were the North Fork from RM 0.0 to 34.4 and North Fork tributaries including Squire, Segelson, French, Brooks, and Grant creeks, and Boulder River. Escapement was estimated using expansion of cumulative redd counts (2.5 fish per redd) from raft and foot surveys, and multiplying by the GMR correction factor. Survey conditions for counting Chinook in the North Fork Stillaguamish were generally good during the spawning period until mid-October rains pulsed flows and impeded the survey schedule. The first redd was detected August 29th in the North Fork, and last one was detected December 5<sup>th</sup> in Siberia Creek of the South Fork. A total of 384 Chinook redds were counted on the North Fork of the Stillaguamish in 2017 (Table 4-8). The redd-based escapement estimate was 963 fish (Table 4-8 and Table 4-10). An additional 141 fish (76 NOR, 65 HOR) were taken for hatchery brood stock and were not included in the escapement estimate. Total NOR North Fork Stillaguamish River escapement (natural spawning + broodstock collection) was 592 Chinook.

Table 4-8. North Fork Stillaguamish summer and fall Chinook redd counts in 2017.

Stream	WRIA	Method	Reach (RM)	Redds	Escapement
North Fork	5.0135	Foot/Float	0.0-14.3	33	83
North Fork	5.0135	Foot/Float	14.3-30.0	241	603
North Fork	5.0135	Foot/Float	30.0-34.4	75	188
Grant Creek	5.0156	Foot	0.0-0.4	1	3
Deer Creek	5.0173	Foot	0.0-6.0	0	0
Brooks Creek	5.0215	Foot	0.0-0.1	0	0
Boulder River	5.0229	Foot	0.0-2.9	13	33
French Creek	5.0246	Foot	0.0-3.0	3	8
Squire Creek	5.026	Foot	0.0-4.0	0	0
Brown Creek	5.0265	Foot	0.0-1.0	18	0
<b>Total Redds</b>				<b>384</b>	
<b>Redd-based Escapement Estimate</b>					<b>963</b>
<b>GMR adjusted EE (provisional)</b>					<b>1,204</b>

## South Fork and Mainstem Stillaguamish summer and fall Chinook

South Fork and Mainstem Stillaguamish summer and fall Chinook escapement in 2017 was estimated using expansion of cumulative redd counts (2.5 fish per redd) from aerial, foot, and raft surveys. Areas surveyed were the Mainstem between the juvenile trap (near the town of Sylvana and the confluence at Arlington (river miles 6.0 to 17.8)), the South Fork from the confluence to Granite Falls (river miles 17.8 to 34.7), and Canyon, Jim, Siberia, and Pilchuck Creeks. River mile 34.7 to 55.1 include Granite Falls and Robe Canyon and are neither surveyable nor good Chinook spawning habitat.

The mainstem aerial index reach, from the juvenile trap (RM 6.0) to the forks (RM 17.8) was flown twice in 2017, September 14, and October 4. Rain generated flow pulses in late October and November reduced visibility and precluded further survey efforts.

A total of 44 Chinook redds were found in the Mainstem Stillaguamish and South Fork Stillaguamish River and tributaries in 2017 (Table 4-9). The red-based escapement estimate was 112 adult fish, which expanded to 140 adult fish with the application of the GMR correction factor (73 NOR and 67 HOR; Table 4-10).

Table 4-9. South Fork and Mainstem Stillaguamish summer and fall Chinook redd counts in 2017.

Stream Reach	WRIA	Method	Reach (RM)	Redds	Escapement
Mainstem	5.0001	Flight	6.0-17.8	10	25
South Fork	5.0001	Foot/Float	17.8-34.7	25	63
South Fork (upper)	5.0001	Foot	34.7-65.0	0	0
Pilchuck Creek	5.0062	Foot/Float	0.0-6.2	1	3
Jim Creek	5.0322	Foot/Float	0.0-4.1	3	8
Siberia Creek	5.0324	Foot	0.0-0.4	1	3
Canyon Creek	5.0359	Foot	0.0-0.5	4	10
<b>Total Redds</b>				<b>44</b>	
<b>Redd-based Escapement Estimate</b>					<b>112</b>
<b>GMR adjusted EE (provisional)</b>					<b>140</b>

## Carcass sampling and escapement composition

WDFW and Stillaguamish Tribe Natural Resources staff conducted spawning ground survey work and carcass sampling in the North and South Forks of the Stillaguamish River and their tributaries. Tribal staff focused their Chinook carcass sampling efforts in the North Fork between the mouth and Swede Heaven Bridge (RM 0.0 to 30.0) and WDFW staff focused on the remaining spawning grounds. In total, 254 complete carcasses (status of both adipose fin and CWT was determined) were sampled in the Stillaguamish River; 239 in the North Fork reaches and 15 in the South Fork reaches. An additional 6 sampled carcasses were categorized as “unknown” because either the adipose status or the CWT status was undetermined. The sampling rates of Chinook carcasses, not including those with unknown mark dispositions, was 19.8% for North Fork reaches and 10.7% for South Fork reaches. These rates were calculated by dividing the number of carcasses sampled by the escapement estimate for each population.

Escapement of Chinook by origin (hatchery or natural) was determined by applying ratios of hatchery marked carcasses and unmarked carcasses to the escapement estimate by reach groupings. Grouping reaches into subsets of the populations allows the calculation of hatchery origin recruits (HOR) and natural origin recruits (NOR) for escapement reaches where sample sizes were small or no carcasses were sampled.

Table 4-10. Stillaguamish Chinook sample proportions and HOR:NOR composition in 2017

	Sampled	Sampled Hatchery	Sampled Natural	% Hatchery	% Natural	GMR Esc EST	% Sampled
North Fork and Tributaries	239	118	121	49.4%	50.6%	1204	19.8%
South Fork and Tributaries	15	6	9	40.0%	60.0%	140	10.7%
Broodstock (NF)	142	66	76	46.5%	53.5%	142	100%
<b>Stillaguamish Totals</b>	<b>396</b>	<b>190</b>	<b>206</b>	<b>48.0%</b>	<b>52.0%</b>		

Table 4-11. Stillaguamish Chinook escapement estimate (GMR provisional) HOR:NOR composition, 2017.

	GMR Escapement Est.	% Hatchery	% Natural	Esc Est. HOR	Esc. Est. NOR
North Fork and Tributaries	1,204	48.0%	52.0%	578	626
South Fork and Tributaries	140	48.0%	52.0%	67	73
<b>Stillaguamish Totals</b>	<b>1,344</b>			<b>645</b>	<b>699</b>

#### 4.4 Snohomish River

There are two populations of Chinook in the Snohomish River basin: Skykomish summer/fall Chinook and Snoqualmie fall Chinook. The Skykomish stock spawns in the mainstem of the Skykomish River and its tributaries, including the Wallace and Sultan Rivers, Bridal Veil Creek, the South Fork Skykomish River (between RM 49.6 and RM 51.1 and above Sunset Falls) and the North Fork Skykomish River (occasionally above Bear Falls at RM 13.1). The Snoqualmie stock spawns in the Snoqualmie River and its tributaries, including the Tolt and Raging Rivers, and Tokul Creek.

Escapement estimates of naturally spawning Chinook salmon returning to the Snohomish watershed are calculated from cumulative redd counts made from physical surveys of their spawning grounds, and from counts of adult fish passed at Sunset Falls. Additionally, redd estimates for unsurveyed reaches on Raging River, North Fork Tolt River and Cherry Creek were expanded based on redds per mile of adjacent surveyed reaches. Survey methods included ground based walking, raft, and jet sled surveys, as well as aerial surveys conducted from a helicopter. Ground counted redds were monitored using marked-redd-census methodology. Ground surveys were done at a frequency of seven to ten days so as to not miss new redds. Redds in ground-surveyed reaches were enumerated, marked with a GPS waypoint, and flagged to prevent re-counting on subsequent surveys. Aerial surveys were conducted on the Snohomish, Skykomish and North Fork Skykomish Rivers at target intervals of two weeks. Aerial surveys provided total visible redd counts per survey flight and were plotted against survey date for the area-under-curve (AUC) method yielding total redd days. Total redd days were then divided by the assumed standard 21-day redd life to yield the estimated cumulative redds from aerial surveyed reaches. The cumulative redd count was then expanded by 2.5 (fish per redd) to estimate escapement. Additionally, a count of Chinook passed above the trap at Sunset Falls on the South Fork of the Skykomish was made. Carcasses encountered were sampled for scales, DNA, CWT, adipose fin mark status, and otoliths.

##### Skykomish summer/fall Chinook

Spawning ground surveys were conducted throughout the known spawning distribution of Skykomish summer/fall Chinook. Survey reaches were the mainstem Snohomish and

Skykomish Rivers, Pilchuck, Sultan, and Wallace Rivers, Woods, Elwell, Bridal Veil, Olney, and Proctor Creeks, and in the North and South forks of the Skykomish River.

Survey conditions were good for most of the spawning season. High flows mid-October made survey conditions difficult. Survey intervals were kept to seven to ten days except for when rain-fed flow pulses in mid-October and November caused survey delays. Three aerial surveys were flown on the Mainstem Snohomish, Skykomish and North and South Fork Skykomish Rivers on September 25 and October 10, and November 2.

A total of 1,629 Chinook redds were found in the Skykomish River and its tributaries, and Pilchuck River in 2017 (Table 4-12). The spawning escapement estimate (including Sunset Falls trap counts) was 4,374 adult fish (2,783 NOR, 1,591 HOR; Table 4-14). An additional 7,159 adult hatchery origin fish (including 494 jacks) and 58 natural origin fish (including 3 jacks) recruited to Wallace Hatchery and were not included in this escapement estimate. Total NOR Skykomish escapement (natural spawning + broodstock collection) was 2,841 Chinook.

Table 4-12. Skykomish summer/fall Chinook redd counts and escapement, 2017.

Stream Reach	WRIA	Method	Reach (RM)	Redds	Escapement
Snoh-Sky (Mainstems)	7.0012	Float/Flight	20.5-51.5	885	2,213
NF Skykomish	7.0982	Foot/Flight	0.0-13.5	171	428
SF Sky (Sunset Falls)	7.0012	Trap/Haul	51.5-up	*	213
Pilchuck River	7.0125	Foot/Float	2.0-26.5	84	210
Woods Creek	7.0826	Foot/Float	0.0-3.5	1	3
Elwell Creek	7.0865	Foot	0.0-1.0	4	10
Sultan River	7.0881	Foot/Float	0.0-9.7	183	457
Wallace River (lower)	7.094	Foot/Float	0.0-4.4	136	340
Wallace River(upper)	7.094	Foot/Float	4.4-7.3	155	388
Olney Creek	7.0946	Foot	0.0-0.6	6	15
Proctor Creek	7.097	Foot	0.0-0.4	4	10
Bridal Veil Creek	7.1248	Foot	0.0-0.4	0	87
<b>Total Redds</b>				1,629	
<b>Escapement</b>					4,374

### Snoqualmie summer/fall Chinook

The escapement estimates for Snoqualmie summer/fall Chinook were made using cumulative redd counts from boat, foot, and aerial surveys of known spawning habitat. Surveyed reaches were the Snoqualmie River and its tributaries, including the Tolt and Raging Rivers and Cherry and Tokul Creeks. Chinook redds were observed from early September to mid-November.

Survey conditions were good for monitoring chinook spawning until mid-October when Fall rainstorms significantly increased stream flows, delaying or preventing some surveys.

In 2017, 1,745 Chinook are estimated to have escaped to the Snoqualmie Basin, based on a total count of 670.5 redds (Table 4-13). Based on carcass sampling results, the escapement estimate is composed of 1,401 NORs and 344 HORs (Table 4-14).

Table 4-13. Snoqualmie fall Chinook redd counts and escapement by reach, 2017.

<b>Stream Reach</b>	<b>WRIA</b>	<b>Method</b>	<b>Reach (RM)</b>	<b>Redds</b>	<b>Escapement</b>
Snoqualmie River (Lower)	7.0219	Float	20.5-24.9	112	280
Snoqualmie River (Upper)	7.0219	Float	32.9-39.6	170	425
Cherry Creek	7.0240	Foot	1.8-3.5	2	5
Tolt River (Lower)	7.0291	Foot/Float	0.0-6.0	142	355
Tolt River (Upper)	7.0291	Foot/Float	6.0-8.9	43	108
NF Tolt River	7.0291	Foot	8.9-11.3	36	90
SF Tolt River	7.0302	Foot	0.0-2.3	17	43
Raging River	7.0384	Foot	0.0-4.6	49	123
Raging River (Upper)	7.0384	Foot	4.6-13.2	44.5	111
Tokul Creek (Lower)	7.044	Foot	0.0-0.3	49	190
Tokul Creek (Upper)	7.044	Foot	0.3-0.6	6	15
<b>Total Redds</b>				<b>670.5</b>	
<b>Escapement Estimate</b>					<b>1,745</b>

#### **Sampling and HOR:NOR summary**

Field staff sampled 1,233 complete Chinook carcasses (status of CWT, otolith mark, and adipose fin mark are known) within the Snohomish basin. Additionally, adipose fin and CWT status was determined for 128 live Chinook passed at Sunset Falls. In total, the Chinook carcass sampling rate on the spawning grounds and at Sunset Falls was 22.2% (Table 4-14). This was calculated by dividing the number of carcasses and live fish sampled by the escapement estimate.

Escapement of Chinook by origin (hatchery or natural) was determined by applying ratios of hatchery marked carcasses and unmarked carcasses (and live fish sampled at Sunset Falls) to the escapement estimate by reach groupings (Table 4-14). Grouping reaches into subsets of the populations allows the calculation of hatchery origin recruits (HOR) and natural origin recruits (NOR) for escapement reaches where sample sizes were small or no carcasses were sampled.

These escapement by origin (hatchery origin and natural origin) numbers are preliminary pending co-manager agreement.

Table 4-14. Snohomish Chinook carcass sampling and escapement composition in 2017.

Stratum	Escapement	No. Hatchery	No. Natural	% Hatchery	% Natural	Number Sampled	Percent Sampled
Skykomish	2,251	623	1,628	27.67%	72.33%	347	15.4%
Bridal Veil	515	214	301	41.53%	58.47%	183	35.5%
SF Sky *	213	38	175	17.84%	82.16%	128	60.1%
Pilchuck River	210	44	166	21.05%	78.95%	19	9.0%
Sultan River	457	67	390	14.71%	85.29%	34	7.4%
Wallace River	728	605	123	83.05%	16.95%	118	16.2%
<b>Skykomish Population</b>	<b>4,374</b>	<b>1,591</b>	<b>2,783</b>	<b>36.37%</b>	<b>63.63%</b>	<b>829</b>	<b>19.0%</b>
Snoqualmie	1,540	253	1287	16.41%	83.59%	329	21.4%
Tokul	205	91	114	44.33%	55.67%	203	99.0%
<b>Snoqualmie Population</b>	<b>1,745</b>	<b>344</b>	<b>1,401</b>	<b>19.69%</b>	<b>80.30%</b>	<b>532</b>	<b>30.5%</b>
<b>Snohomish Total</b>	<b>6,119</b>	<b>1,934</b>	<b>4,185</b>	<b>31.61%</b>	<b>68.39%</b>	<b>1,361</b>	<b>22.2%</b>

\*Sunset Falls sample: A sub-sample of Chinook passed upstream were sampled for cwt wire and adipose mark.

**Key for Grouped Stratum and Populations:**

**Skykomish Population:**

Bridal Veil: Bridal Veil Creek, NF Skykomish River, SF Sky (Sunset Falls)

Sultan: Sultan River

Skykomish: Snoh-Sky (Mainstems), Elwell Creek, Olney Creek, Woods Creek, Proctor Creek

Pilchuck: Pilchuck River

Wallace: Wallace River (Upper and Lower)

**Snoqualmie Population:**

Snoqualmie: Snoqualmie River (Lower and Upper), Raging River, Tolt River (Lower and Upper), SF

Tokul: Tokul Creek (Lower), Tokul Creek (Upper)

## 4.5 Cedar River

Prior to 1999, live counts and Area Under the Curve (AUC) methods were used to estimate Chinook spawning abundance in the Cedar River. Since 1999, Chinook redds have been enumerated and mapped in the Cedar River via floating surveys, and escapement estimated by expanding the redd count by 2.5. Cedar River redd surveys are considered to be a complete census of the mainstem river, where every Chinook redd in the Cedar system is counted. Redd surveys are conducted between RM 4.2 and RM 21.8 (Landsburg Dam) 2-3 times per week for the duration of the Chinook spawning period. The portion of the river upstream from the Landsburg Dam to the Cedar Falls powerhouse (RM 34.5), and the lower 4.2 miles of the Cedar mainstem are each surveyed once per week. Due to the overlap with sockeye spawning timing, Chinook redds are only included in the count if a female Chinook is present and actively attending to a redd.

In 2017, a total of 819 Chinook redds were observed in the Cedar River during the spawning season (including the surveyed area upstream from Landsburg Dam and including all small tributaries). Of the 819 Chinook redds, 813 were observed in the Cedar River mainstem (766 below Landsburg Dam and 47 above), and 6 were observed in Taylor Creek, a small tributaries to the Cedar River. Expansion by 2.5 fish per redd resulted in the estimated escapement of 2,048 Chinook (Table 4-1). A total of 292 adult Cedar River Chinook were aged based on scale

samples. For those carcasses where age was determined, 76% of the were natural origin fish (unclipped) and 24% were hatchery origin (clipped) fish.

#### **4.6 Sammamish River/North Lake Washington Tributaries**

The Sammamish Chinook population is composed of naturally spawning Chinook in the Big Bear/Cottage Lake Creek watershed and in the Issaquah Creek watershed downstream of Issaquah Hatchery. Chinook natural escapement to the Sammamish River/ North Lake Washington tributaries in 2017 was estimated at 1,673 fish (Table 4-1).

##### **Big Bear/Cottage Lake Creeks**

Escapement estimation to Big Bear Creek and Cottage Lake Creek involves weekly surveys of all known Chinook spawning areas to enumerate live Chinook. Total spawning escapement is estimated using the AUC method, where live fish counts and a 10-day stream life estimate are used to calculate escapement.

The Bear Creek/Cottage Creek index area was surveyed weekly during the 2016 spawning season. The escapement estimate was 583 fish. Of these, 120 fish were counted in the Bear Creek mainstem, and 463 fish were counted in the Upper and Lower Cottage Creek Indexes. A total of 108 Chinook were determined for age based on scale samples in 2017. Of those aged fish, 21% were natural origin fish (unclipped) and 79% were hatchery origin fish.

##### **Issaquah Creek System**

Issaquah Creek is surveyed weekly from the Issaquah Hatchery (located at river mile 3.0), downstream to its confluence with Lake Sammamish to count Chinook carcasses. All Chinook carcasses are assumed to have spawned, and the cumulative carcass count is used as the escapement estimate for this reach of Issaquah Creek. East Fork Issaquah Creek is also surveyed weekly from its confluence with the Issaquah Creek mainstem, upstream to the High Point Trail crossing at approximately RM 3.0. Similar to the Issaquah Creek mainstem, the cumulative carcass count is used as the escapement estimate for the East Fork.

The Issaquah Creek system was surveyed weekly during the 2016 spawning season, and total escapement was estimated at 1,090. This estimate includes 923 fish in the mainstem below the hatchery, and 167 fish from the East Fork. A total of 190 adult Chinook from the Issaquah Creek system were determined for age based on scale samples in 2017. Of this sample, indicated that 11% were natural origin fish (unclipped) and 89% were hatchery origin fish.

Chinook escapement to Issaquah Hatchery in 2016 was 3,420 (3,321 adults and 99 jacks); of which 1,067 (1,020 adults and 47 jacks) were intentionally released upstream to spawn in upper Issaquah Creek. 2017 was the fourth year with no Chinook returns to the University of Washington hatchery; the program has been discontinued.

#### **4.7 Green River**

Beginning in 2009, Muckleshoot (MIT) and WDFW Biologists agreed to attempt weekly counts of new Chinook redds in all survey-able reaches of the Green River and Newaukum Creek during Chinook spawning ground surveys, reasoning that so few redds were being dug, it was possible to count all redds in all reaches. This estimation methodology uses season total redd counts, without adjustment, in four of the six sections of the mainstem Green River. At the conclusion of the spawning season, the observed number of redds in these sections of the river is known, and the variance is zero. There may be observational error in these sections or

spawning outside these sections. However these factors operate in all sampling programs and are not included in any variance estimates.

New Chinook redds were counted weekly over three days by boat and twice during the season from aerial surveys in the mainstem river between River Mile (RM) 25.4 to 48.5 (Lower River (aerial only), Middle River, and Lower Gorge) and 59.2 to 61.0 (Headworks). Using two, one-man pontoon boats or two, two-man boats, crews worked in tandem to count redds left and right of the center of the river. Foot surveys of Chinook naturally spawning in Newaukum Creek were conducted weekly by WDFW crews from the creek mouth to river mile 3.9. Redds in the Metzler Side Channel (MSC) were counted opportunistically when adequate water filled the side channel, in a similar manner. Only those redds that could reasonably be presumed to be Chinook redds were counted, based on the presence of a female observed digging or guarding the redd, or when redd size and substrate size were unambiguous.

A rigorous surveying schedule began on September 5 and continued through November 3. Surveys were suspended during the week of October 22 when high flows prohibited safe conduct of surveys. Redd counts from Metzler Side Channel were conducted on October 4 and 16. These counts were added to the weekly counts for the Middle River. The weekly number of redds counted in each section, was summed, without adjustment, to produce the season total redd count by section.

On October 4 and 31, a count of visible redds in each reach was made by helicopter in all 6 sections, encompassing the entire "spawnable area" of the mainstem river between RM 25.4 and approximately RM 60.4. Pending amenable weather conditions, flights were timed to coincide with the historical peak of natural Chinook spawning activity which typically occurs the first or second week in October. Flight scheduling was limited by availability of the helicopter and weather and river conditions.

Escapement was calculated for the sections of the river not surveyed by boat: "Gorge", RM 48.5 to 56.2; "Lower River", RM 26.7 to 33.8; and "Hwy 167 to Transfer Shack", RM 25.4 to 26.7, the lowermost reach in the Lower River. The season total redd count from the section just below the Gorge; Lower Gorge section: RM 44.3 to 48.5, was divided by the number of redds in the Lower Gorge section counted on the flight, resulting in the "Ground to Air Ratio" (G/A). The G/A was then applied to the number of redds observed in the Gorge on the day of the flight. For the Lower River (104 redds) and Hwy 167 to Transfer Shack (5 redds) reaches, the sum of redds observed during the two aerial surveys was used to estimate a combined season total of 109 redds.

Season total redd counts from boat and foot surveys of the mainstem Green River and Newaukum Creek and calculated values from the aerial sections of the Green River, were multiplied by 2.5 fish per redd to estimate total Chinook spawning naturally in the Green River basin. This multiplier is intended to account for the number of males and females and is derived from the sex ratio of 1.5 males for every female.

Post season analysis of the season totals indicates that peak spawning activity varied by section, but was generally highest during the week of October 1 for the mainstem and the week prior for Newaukum Creek (Table 4-15 and Table 4-16). By the end of surveys the week of October 15, 98.6% of the redds (2,698 of 2,737) observed during boat and foot spawning ground surveys were complete.

Table 4-15. Chinook redd counts from foot and boat surveys of the Green River in 2017.

Section	Week									Total
	3-Sep	10-Sep	17-Sep	24-Sep	1-Oct	8-Oct	15-Oct	22-Oct	29-Oct	
Headworks	0	7	71	309	278	136	94	-	-	895
Lower Gorge	0	0	3	21	64	58	34	-	1	181
Middle River	0	0	19	192	490	294	197	-	6	1,198
Lower River <sup>1</sup>	-	-	-	-	-	-	-	-	-	-
Newaukum Creek	0	1	47	183	96	104	-	29	3	463
Total	0	8	140	705	928	592	325	29	10	2,737

<sup>1</sup>Aerial surveys on October 4 and 31 were used to estimate 11 redds in the Hwy 167 to transfer shack reach.

Table 4-16. Aerial survey counts of Chinook redds in the Green River, 2017.

Section	Week <sup>1</sup>									Total
	3-Sep	10-Sep	17-Sep	24-Sep	1-Oct	8-Oct	15-Oct	22-Oct	29-Oct	
Headworks	-	-	-	-	356	-	-	-	2	358
Gorge	-	-	-	-	253	-	-	-	6	259
Lower Gorge	-	-	-	-	92	-	-	-	4	96
Middle River	-	-	-	-	554	-	-	-	21	575
Lower River	-	-	-	-	98	-	-	-	6 <sup>2</sup>	104
Hwy 167- Transfer Shack	-	-	-	-	5	-	-	-	0	5
Total	-	-	-	-	1,358	-	-	-	39	1,397

<sup>1</sup>Aerial counts can include redds still visible from prior weeks and thus exceed boat counts for the same week.

<sup>2</sup>Visibility in the lower river down to Highway 167 was limited on the October 31 survey.

The season total redds from the Middle River was 2,823 redds plus 58 from MSC, 181 from the Lower Gorge, 895 from the Headworks, and 104 in the Lower River plus 5 in the Hwy 167-Transfer Shack reach. The G/A ratio for the Lower Gorge was 1.97 (181/92) resulting in a calculated 498 redds for the "Gorge". A total of 3,343 redds were counted or calculated in the mainstem Green River, including MSC, by census. In Newaukum Creek, the season total redds for the section "400<sup>th</sup> to Whitney Hill Bridge" was 312 and for the section "Whitney Hill Bridge" to mouth" was 150, totaling 462 redds in Newaukum Creek.

Applying the constant 2.5 fish/redd (1.5 males:1.0 female), an estimate of 8,357 naturally spawning Chinook was generated for the Green River Basin (Table 4-1).

During the season, 850 adults and 138 jacks that returned to the Soos Creek and Keta Creek hatcheries were tagged by the Muckleshoot Indian Tribe, hauled upstream, and released in the mainstem. Although duration of survival and spawning success of these fish may be variable, any redds created by these fish would have been counted during surveys, meaning that they are included in the natural spawning escapement estimate.

River flows during the 2017 Chinook spawning season were moderate through the peak of spawning in mid-October after which flows increased substantially (Table 4-17). This resulted in surveys being suspended during the week of October 22 followed by reduced visibility in the final week of the survey season.

Table 4-17. Average weekly discharge (cfs) at three locations on the Green River (Palmer USGS Gage 12106700, Auburn USGS Gage 12113000, and Newaukum Creek USGS Gage 12108500) in 2017. Weekly discharges are 7-day averages of mean daily discharge beginning with the day listed.

USGS Gauge	Week								
	3-Sep	10-Sep	17-Sep	24-Sep	1-Oct	8-Oct	15-Oct	22-Oct	29-Oct
Palmer	186	192	243	330	356	395	1,200	2,883	725
Auburn	340	341	408	501	535	598	1,333	3,364	1,047
Newaukum Creek	17	17	19	18	18	23	35	67	26

### Carcass sampling

Naturally spawning Chinook carcasses (clipped and unclipped) were sampled opportunistically during spawning ground surveys in the mainstem and Newaukum Creek. Biological data were collected from these carcasses, and a “Percent Egg Retention” variable was determined. The “Percent Egg Retention” variable was determined by inspection of the gonads of all female carcasses. The proportion of eggs estimated to have been retained was noted for carcasses where eggs remained in the body cavity. A carcass noted as having 25% egg retention was estimated to have expelled 75% of her total eggs. Additionally, tagged fish from re-released hatchery returns were noted for all sampled carcasses.

A total of 936 carcasses were sampled for standard biological data by Green River crews in 2017; 710 (27 DIT+ 23 CWT&AD + 281 AD + 379 thermal marked with no adipose fin and no CWT) or 75.9% were of hatchery origin as indicated by the presence of an adipose fin, CWT tag, or hatchery thermal mark (Table 4-18).

Table 4-18. Summary of Chinook biological sampling in the Green River, 2017.

Section	Biological Samples	Adipose Clipped	Thermal Marks	MIT Tags <sup>1</sup>	Acoustic MIT Tags <sup>2</sup>	CWT <sup>3</sup> & Ad-Clipped	DIT <sup>3</sup>
Headworks	372	47	241	0	4	4	12
Lower Gorge	74	25	33	2	0	1	0
Middle River	303	141	54	19	0	13	7
Lower River	-	-	-	-	-	-	-
Metzler Side Channel	0	0	0	0	0	0	0
<b>SubTotal: River</b>	<b>749</b>	<b>213</b>	<b>328</b>	<b>21</b>	<b>4</b>	<b>18</b>	<b>19</b>
Newaukum: 400th to Whitney Hill Br	96	40	39	3	2	2	3
Newaukum: Whitney Hill Br to Mouth	91	51	25	1	1	3	5
<b>SubTotal: Newaukum</b>	<b>187</b>	<b>91</b>	<b>64</b>	<b>4</b>	<b>3</b>	<b>5</b>	<b>8</b>
<b>Grand Total:</b>	<b>936</b>	<b>304</b>	<b>392</b>	<b>25</b>	<b>7</b>	<b>23</b>	<b>27</b>

<sup>1</sup>“MIT tags”; the number of sampled fish with MIT tags, or those otherwise identified as hatchery re-release.

<sup>2</sup>Acoustic MIT Tags: the number of carcasses retrieved with MIT acoustic tags (MIT supplemental study)

<sup>3</sup> CWT: Coded wire tag present (unconfirmed) DIT = (Double Index Tag) Adipose fin present, coded wire tag present.

Table 4-19. Coded wire tag sampling, thermal mark analysis of otoliths<sup>1</sup>, and origin of natural Chinook spawners<sup>2</sup> in the Green River, 2017.

	Sampled						NM with no Thermal Mark		AD or NM with Thermal Mark		Unknown Origin <sup>3</sup>	
	Number	NOS	HOS	Unknown Origin <sup>3</sup>	CWT	No CWT	DIT	No CWT	CWT	No CWT	CWT	No CWT
Green River	749	194	551	4	37	712	10	194	27	514	0	4
Newaukum Creek	187	27	159	1	13	174	4	27	9	146	0	1
Green River Basin Total	936	221	710	5	50	886	14	221	36	660	0	5

<sup>1</sup>Since 2014, Chinook released from the Palmer Hatchery have been thermal marked but not adipose fin clipped.

<sup>2</sup>NOS= Natural origin spawner; HOS= Hatchery origin spanwer; NM = Adipose fin present; AD = Adipose fin clipped; CWT = Coded wire tag present (unconfirmed); DIT = Double Index Tag; Adipose fin present, coded wire tag present; TM = Thermal Marked.

<sup>3</sup>Unknown Origin

## 4.8 White River

By definition, the escapement estimate for White River Spring Chinook is derived from trap counts at the Army Corps of Engineers' Buckley Diversion Dam fish trap (Buckley Trap) and hatchery returns to the White River Hatchery (WRH). The WRH and Buckley Trap are on opposite sides of a diversion dam on the White River. Off-site propagation of White River Spring Chinook also occurs at the Minter Creek/Hupp Springs Hatchery, and returns to that facility are recorded separately. Under ideal conditions, the Buckley Trap allows sampling and enumeration of all fish transported to the upper White River watershed. During odd years when pink salmon return and during years of relatively high Coho returns (2003-2012), sampling at the Buckley trap is limited, particularly during the latter part of the Chinook run. As a consequence, the proportions of hatchery and natural-origin spring and fall Chinook transported above the dam are uncertain. Records of trap and haul operations conducted in the absence of state or tribal fisheries managers are a subject of ongoing concern. In 2016, complete sampling occurred through August 12<sup>th</sup>, but 8,888 Chinook (3,404 adults and 5,484 jacks) of unknown origin were transported upstream after this date.

The number of adult fish sampled at the WRH and at the Buckley Trap prior to the termination of sampling was 4,058. Of these, 1,928 were natural-origin (NOR) and acclimation pond (AP) recruits. NORs are assumed to be primarily spring Chinook although based on DNA analysis, fall-run Chinook and potential hybrids have been passed. NORs made up 11% and APs made up 37% of the sampled Chinook. At the Buckley Trap, the ratios of coded wire tagged to non-coded wire tagged fish, as well as vent clipped to non-vent clipped fish among sampled adults and jacks, were applied to un-sampled adults and jacks passed upstream after August 12<sup>th</sup>. In addition, 77 of the adult NORs were collected at, or taken to, the White River Hatchery for use as broodstock.

Table 4-20. Estimated number NOR and Acclimation Pond Chinook salmon hauled upstream of Mud Mountain Dam in 2017. Results are a combination of returns sampled White River Hatchery and sampled and un-sampled fish at Buckley Trap.

Origin	Adults	Jacks	Totals
Wild (NOR)	825	190	1,015
Acclimation Pond	2,749	5,672	8,421
<b>Totals</b>	<b>3,574</b>	<b>5,862</b>	<b>9,436</b>

There are two hatchery programs for White River spring Chinook: the Minter Creek/Hupp Springs program and the White River Hatchery. The Minter Creek/Hupp Springs program was initiated in the mid-1970's in response to steep declines in population abundance. The spring Chinook program was subsequently expanded following completion of the Muckleshoot Tribe's White River Hatchery in 1989. In 2017, escapement to the Minter Creek/Hupp Springs hatchery was 1,744 adults. None of these fish nor their gametes were taken to the White River Hatchery. Escapement to the White River Hatchery in 2017 was 1,821 adults and 890 jacks. These fish were either collected at the Buckley fish trap on the south side of the diversion dam, or volunteered to the WRH trap on the north side of the diversion dam.

## **4.9 Puyallup River**

The Puyallup Tribal Fisheries (PTF) and Washington Department of Fish and Wildlife (WDFW) staff agree that the ability to quantify fall Chinook escapement in the Puyallup River during odd years is difficult due to abundant pink salmon spawning in the system simultaneously. Due to these challenges, the co-managers agreed to use an adjusted AUC-based methodology to estimate escapement for Chinook in the Puyallup River basin during odd years.

### **South Prairie Creek**

Odd-year estimates for SPC are based on live count AUC adjusted by the mean South Prairie redd-based estimate/AUC-based estimate ratio. This adjustment is necessary because pink returns in odd years often preclude objective Chinook redd accounting and historic live count-based estimates have been very conservative when compared to redd-based estimates in this system. The South Prairie Creek (SPC) sub-basin spawning escapement estimate for 2017 is 259 spawners. This escapement is made up of 123 NORs and 136 HORs. The 2017 SPC redd estimate/AUC estimate ratio was 2.20, based on even-year data from 1994 to 2016. The 2017 AUC spawner curve yielded an escapement estimate of 262 spawners for SPC. Expanding the SPC AUC-based escapement (262 X 2.20) yielded a South Prairie escapement of 577. Wilkeson Creek contributed 4 Chinook to the escapement estimate.

### **Carbon River**

Because conditions in the Carbon River seldom allow accurate Chinook escapement surveys, estimates are based on the relationship between SPC and Carbon River escapement in 1999, when there was an accurate redd count for the Carbon River. Carbon River reaches with complete data tracked the SPC spawn timing remarkably well. Therefore, reaches with incomplete data were expanded using the SPC spawn timing curve with a high degree of confidence. The 2017 SPC escapement, including Wilkeson Creek, utilized in the Carbon River escapement expansion is an adjusted area under the curve (AUC) escapement estimate accounting for the average even-year (1994-2017) ratio of redd-based escapement and live fish AUC estimate exclusively in SPC multiplied by the 2017 AUC live fish estimate for SPC sub-basin.

Survey conditions were not suitable on the Carbon River during the 2017 spawning period. Consistent with the last ten years, the 2017/1999 SPC AUC escapement ratio ( $577 / 1422 = 0.4058$ ) was applied to the 1999 Carbon River escapement (250) to estimate the 2017 value. This method estimated 101 Chinook spawning in the Carbon during 2017 ( $250 * 0.4058 = 101$ ). Based on mark sampling ratios observed in South Prairie Creek, the escapement was made up of 48 NORs and 53 HORs.

## Puyallup River Tributaries

Aggregate escapement to Puyallup River tributaries in 2017 was estimated at 215 (Table 4-21). Based on mark sampling in these tributaries, excluding Clark's Creek, 27 of these fish are NORs and 188 HORs.

Table 4-21. Chinook escapement estimates for Puyallup River tributaries, 2017.

Tributary	Escapement
Fennel Creek (WRIA 10.0406)	45
Canyon Falls Creek (10.0410)	5
Kapowsin Creek (10.0600)	27
Clear Creek (10.0022)	138
Clarks Creek (10.0027)	0
<b>Tributary total</b>	<b>215</b>

## Mainstem Puyallup River

Chinook spawning escapement to the mainstem Puyallup River was estimated to be 817. This escapement comprised 443 NOR and 374 HOR Chinook, based on mark sampling ratios observed in mainstem tributaries.

As with the Carbon River, surveys of Puyallup River were not possible in 2017. WDFW and PTF staff believe that mainstem spawning escapement is closely related to the tributaries (Fennel, Canyon Falls, Clear, Kapowsin, and Clarks creeks). Therefore, the 2016/1999 Puyallup tributary AUC ratio ( $474 / 113 = 4.1917$ ) was applied to the estimated 1999 Puyallup mainstem escapement (195) to estimate 2017 escapement of 817 Chinook ( $195 * 4.1917 = 817$ ). The same even-year (1994-2016) average AUC adjustment used for the Carbon River was applied to the Puyallup tributary AUC live-fish estimate to develop the 2017 Puyallup tributary AUC estimate for this analysis.

## Lower White River

The fall component of Chinook spawning in the lower White River and its tributaries, downstream of the Buckley trap, are included in the 2017 Puyallup River basin fall Chinook escapement estimate. Spawning ground surveys indicate that, in some years, a sizeable number of Chinook spawn in these areas.

Spring and fall Chinook spawn in the White River. The fall component in the lower White River and tributaries was identified by mark sampling during spawning ground surveys and the genetic analysis conducted by Ford et al. (2004). Carcass sampling during spawning ground surveys provides a ratio of hatchery-origin fall Chinook (i.e. fish with a clipped adipose fin), to unmarked fish. Based on previous genetic analysis of samples collected in Boise Creek (Ford et al 2004), 60% of the unmarked fish are assumed to be fall Chinook.

Fall Chinook spawning escapement into the lower mainstem White River and its tributaries in 2017 was estimated to be 616 fish. This escapement is made up of 290 NORs and 326 HORs based on mark sampling ratios observed during spawning ground surveys.

## Total Puyallup Escapement

The estimated total number of naturally spawning fall Chinook in the Puyallup basin in 2017 was 2,012. Based on carcass sampling, we estimated that 933 were NORs, and 1,079 were HORs. The estimate of NORs assumes the proportions of hatchery and natural origin spawners is the same in Puyallup River tributaries, the Puyallup River mainstem, South Prairie Creek, and the Carbon River.

### **4.10 Nisqually River**

Escapement to the Nisqually River in 2016 was estimated using a change in ratio methodology (Seber 1982). This method uses (1) the proportion of marked fish entering the river (as estimated by sampling tribal gillnet catch), (2) the total removals below the video counting slot in the Yelm Diversion dam and proportion of those removals marked, and (3) the proportion of marked fish passing above the Yelm Diversion Dam video counting slot to estimate the total return to the river.

Escapement to the Nisqually River was estimated to be 3,040 adult Chinook salmon (Table 4-1). This includes 1,049 natural-origin and 129 hatchery-origin adult fish volitionally escaping to the spawning grounds, as well as an additional 1,862 adult HOR's, which originally returned to Clear Creek and Kalama Creek Hatcheries and were trucked and released upstream to spawn naturally. The goal of this effort is to supplement natural spawning and increase the number of juvenile outmigrants and corresponding adult returns, which is outlined in the Nisqually Fall Chinook Recovery Plan.

### **4.11 Hood Canal**

Natural Chinook escapement to the Skokomish River and Mid-Hood Canal rivers in 2017 were 8,058 and 374, respectively (Table 4-22).

#### **Mid-Hood Canal**

The Mid-Hood Canal population is comprised of Chinook produced in the Dosewallips, Duckabush, and Hamma Hamma watersheds.

In the Dosewallips and Duckabush rivers, the lower reaches surveyed are spawning and transit areas. Upper reaches of the Dosewallips and Duckabush rivers have also been regularly surveyed since 1998, but few adults have been observed. Current escapement estimates are derived from combinations of live Chinook adult counts and Chinook redd expansions, depending on flow conditions and fish distributions.

In the Hamma Hamma River, most of the Chinook spawning area is currently being surveyed. A cooperative supplementation program was initiated in 1995 to rebuild Chinook abundance. Prior to 1998, escapement had been estimated from counts of cumulative new redds and/or from live Chinook using the area-under-the curve (AUC) method. However, since returns increased as the result of supplementation, the AUC method has been employed as the primary method of escapement estimation.

Summer chum salmon and pink salmon (in odd years) spawn at the same time as Chinook in the lower reaches of these three streams. Consequently, it can be difficult to distinguish Chinook redds from summer chum or pink redds unless Chinook are actively spawning and observed on redds. Pink salmon spawn predominately downstream of RM 6.7 on the Dosewallips, downstream of RM 2.6 on the Duckabush and throughout the reaches surveyed

on the Hamma Hamma. Summer chum salmon spawn predominately downstream of RM 3.6 on the Dosewallips, downstream of RM 2.6 on the Duckabush and throughout the reaches surveyed on the Hamma Hamma. It has been possible to count Chinook redds in the upper Dosewallips and Duckabush River reaches (especially in years without pink salmon).

The WDFW conducted spawner surveys on the Dosewallips, Duckabush, and Hamma Hamma rivers every 7 to 10 days from late August or early September through October. The escapement estimate to all three systems combined was 374 adults: 7, 2, and 365 Chinook in Dosewallips, Duckabush, and Hamma Hamma rivers, respectively (Table 4-22). During 2017, it is possible that some Chinook redds were not identifiable on the Dosewallips and Duckabush rivers in areas with summer chum spawning. However, based on the number of Chinook redds and adults observed during surveys and carcasses recovered during intensive weekly surveys, few Chinook were present and the escapement estimates for Dosewallips and Duckabush rivers are considered accurate.

### **Skokomish River**

Chinook spawning takes place in the mainstem Skokomish River up to the confluence with the South and North Forks at RM 9, in the South Fork (primarily up to RM 5.5), and in the North Fork from RM 9 to 15.7 (where Little Falls blocks further access). Natural escapement estimates have historically been based on counts of Chinook redds in the principal spawning habitat in the mainstem Skokomish (RM 2.2 to 9.0), North Fork (R.M. 9.0 to 15.6), and South Fork (R.M. 0 to 2.2). Since 2008, surveys have been conducted from RM 0 to RM 5.5 in the South Fork, and included in the total escapement estimate. In addition, escapement estimates are made for Vance Creek and Hunter Creek. However, dramatically increasing numbers of summer chum spawning in the mainstem Skokomish since 2014 led the co-managers to re-evaluate the redd-based spawning methodology, and ultimately shift to a modified Area under the Curve (AUC) methodology applied elsewhere in Hood Canal. This change was necessary because summer chum spawning has become so prolific and Chinook spawning has become increasingly concentrated in preferred habitat. These conditions lead to widespread superimposition and difficulties in detection.

Live and dead adults, along with visible redds, were counted in Skokomish River index areas during foot and raft surveys (e.g., see Smith and Castle 1994). Surveys are conducted every seven to ten days from late August through October. Weekly instantaneous live fish counts for the entire mainstem, South Fork and North Fork were used to calculate fish days, which were then divided by a stream life value of 21 days to estimate total Chinook escapement. In addition, foot surveys are made in Hunter and Vance creeks. Escapements to these tributaries are estimated based on redd counts and/or live Chinook observed.

In recent years, low flows at the mouth of the South Fork have prevented Chinook from accessing the lower South Fork early in the season. In 2017, however, Chinook had limited access the South Fork Skokomish after a brief period of increased flow in early September. Chinook carcasses and redds were observed as high as RM 6.1 during canyon surveys

The total estimated spawner escapement to the Skokomish River is 8,058 (Table 4-22). This total includes 6,430 in the mainstem Skokomish, 1,248 Chinook in the North Fork, and 380 Chinook in the lower (RM 0 to RM 5.5) South Fork Skokomish. These numbers were apportioned based on calculating a redd-based escapement estimate for the north and south forks where summer chum spawning was limited, then subtracting those numbers from the total AUC estimate. The preseason escapement prediction was 1,330 (FRAM 2017).

Table 4-22. Summary of Chinook escapement to Hood Canal streams during 2017.

Area	Stream	Escapement	Comments
82 G/J	Skokomish R.	6,430	AUC based on live fish (MS+NF), the apportioned using redd-based esc for NF and SF, due to large summer chum return in MS
	N.F. Skokomish R.	1,248	
	S.F. Skokomish R.	380	
<b>Total</b>		<b>8,058</b>	
12A	Little Quilcene R.	0	No Chinook observed
	Big Quilcene R.	0	One dead Chinook observed
<b>Total</b>		<b>0</b>	
12B	Dosewallips R.	7	AUC based on live fish
	Duckabush R.	2	AUC based on live fish
	Hamma Hamma R. a/	365	AUC Hamma
<b>Total</b>		<b>374</b>	
12C	Dewatto R.	52	AUC
	Lilliwaup Cr.	9	AUC
<b>Total</b>		<b>61</b>	
12D	Tahuya R.	19	AUC
	Union R.	51	Trap
<b>Total</b>		<b>70</b>	
<b>Hood Canal total</b>		<b>8,563</b>	

a/ Hamma natural escapement = 365, broodstock = 0, John Ck = 0 (John Creek fish previously counted in Hamma AUC due to late access)

### Mark Sampling

Mass marking has been implemented for releases from George Adams Hatchery, Hoodsport Hatchery, and Endicott Ponds. Double index tag (DIT) groups have been released from George Adams Hatchery since 1998. The proportion of all Hood Canal hatchery Chinook that were either tagged and/or marked has incrementally increased since brood year 2003. In addition, all of the Chinook released from the Hamma Hamma supplementation program were tagged and/or marked. Coded-wire tag (CWT), age, and sex composition data have been routinely collected from Chinook returning to George Adams Hatchery since 1988.

There has been more intensive sampling of Chinook on the spawning grounds since 1998. During 2017, the Skokomish, Dosewallips, Duckabush, and Hamma Hamma rivers were targeted for enhanced mark and CWT sampling and WDFW also sampled Chinook carcasses for marks and CWTs on the Dewatto, Tahuya, and Lilliwaup rivers.

Of the 626 Chinook sampled in Hood Canal rivers during 2017, 432 Chinook were adipose-clipped and, of these, three had CWTs. Twenty-seven unmarked Chinook were coded-wire tagged. We sampled 6.3% of the Chinook spawning escapement in the Skokomish River, 15.0% of the Mid-Hood Canal Chinook escapement (in the Hamma Hamma, Duckabush, and Dosewallips rivers), with an overall sampling rate of 7.3% in all Hood Canal rivers combined (Table 4-23).

Jacks are not included in Chinook spawning escapement estimates in Hood Canal, but few jacks were sampled during 2017.

Conservative estimates of hatchery contribution to natural the spawning escapement were made based on the total number of CWT tags and marks recovered (CWT's + adipose-clips + otoliths). However, these estimates may need to be corrected for clip error and tag detection rates for the returning brood years. Thus, the proportion of hatchery fish on the spawning escapement is most rigorously estimated by expanding adipose-clipped fish based on proportions of clipped fish released from each brood year. Age composition in the escapement, carcass sampling rate, and the proportion of hatchery production releases that were marked and/or tagged from BY 2012 (age 5), BY 2013 (age 4), and BY 2014 (age 3).

In 2017, there was close agreement in the two aforementioned methods, with mark sampling-based pHOS and expanded clip pHOS of 90% in the Skokomish River system (Table 4-23, Table 4-23). Of 510 Chinook sampled, 410 were adipose-marked (80.4%; Table 4-23). Spawning escapement in the Skokomish River was comprised of about 90% hatchery-origin Chinook and 18% natural-origin Chinook, with a high proportion of NOR returns to the North Fork where they accounted for 29% (Table 4-23).

Hatchery releases into the Hamma Hamma River for the purposes of supplementation are 100% CWT and otolith marked, with the exception of BY 2013, when all broodstock were collected directly from the Hamma Hamma River. The 2013 BY was 100% tagged but not otolith marked since the purpose of otolith marking has been primarily to assess differences in the survival of Hamma Hamma origin supplementation fish versus George Adams origin supplementation fish. All Chinook carcasses were sampled for CWT and otoliths during 2017. Origin for the 2013 BY were determined by CWT, while origin for all other brood years were determined by otolith mark. The CWT rate was then adjusted for tag loss based on a seven-year average of otolith marks without tags from Mid-Hood Canal.

In the Hamma Hamma River, 59 of 66 (89%) Chinook sampled had a CWT. However, otolith marks and corrections for tag loss produced final estimates for spawning escapement composition comprised of 89.7% supplementation-origin Chinook, and 21% natural-origin Chinook, and zero percent hatchery-origin strays in the Hamma Hamma River, based on combined CWT and otolith analysis. One Chinook carcass was sampled in the Duckabush and three were sampled in the Dosewallips River in 2017. The one carcass sampled in the Duckabush was an unmarked no CWT yielding a raw estimate of 100% natural-origin fish. Of the three sampled in the Dosewallips, two were unmarked, no CWT and one was unmarked with CWT. However, sample size was insufficient to use stream specific data, therefore the Hamma Hamma rates were applied to all Mid-Hood Canal returns. Only one true hatchery stray was sampled in Mid-Hood Canal based on ad-clips or CWT tag codes.

Table 4-23. Chinook salmon spawner escapement origin based on carcasses sampled for marks and coded-wire tags (CWTs) in Hood Canal rivers, 2017.

Management Unit	Escapement	Chinook Sampled		Tagged <sup>1/</sup>			Untagged <sup>1/</sup>			Unknown Tagged <sup>2/</sup>			Totals		Rate	Escapement		
		No.	%	AD	NM	Unk	AD	NM	Unk	AD	NM	Unk	CWT's Recovered	Ad-clips observed		HOR	NOR	
<b>Skokomish</b>																		
Mainstem River	6,430	356	5.5%	19	22	0	291	21	0	3	0	0	41	313	0.94	6051	379	
North Fk. River	1,248	121	9.7%	6	16	1	63	35	0	0	0	0	23	69	0.71	887	361	
South Fk. River	380	33	8.7%	0	0	0	22	5	0	6	0	0	0	28	0.85	322	58	
<b>Skokomish River Total</b>	<b>8,058</b>	<b>510</b>	<b>6.3%</b>	<b>25</b>	<b>38</b>	<b>1</b>	<b>376</b>	<b>61</b>	<b>0</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>64</b>	<b>410</b>	<b>0.90</b>	<b>7,260</b>	<b>798</b>	
<b>12A</b>																		
Big Quilcene R.	0	0	0.0%	0	0	0	0	0	0	0	0	0	0	0	NA			
Little Quilcene R.	0	0	0%	0	0	0	0	0	0	0	0	0	0	0	NA			
<b>12B</b>																		
Hamma Hamma R. <sup>3/</sup>	365	66	18.1%	1	58	0	0	7	0	0	0	0	59	1	0.90	327	38	
Duckabush R.	2	1	50.0%	0	0	0	0	1	0	0	0	0	0	0	0.90	2	0	
Dosewallips R.	7	3	42.9%	0	1	0	0	2	0	0	0	0	1	0	0.90	6	1	
<b>Mid-Hood Canal Total</b>	<b>374</b>	<b>70</b>	<b>18.7%</b>	<b>1</b>	<b>59</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>60</b>	<b>1</b>	<b>0.90</b>	<b>335</b>	<b>39</b>	
<b>12C</b>																		
Dewattor R.	52	6	11.5%	2	0	0	4	0	0	0	0	0	2	6	1.00	52	0	
Lilliwaup R.	9	1	0.0%	0	0	0	0	1	0	0	0	0	0	0	0.00	0	9	
<b>12D</b>																		
Tahuya R.	19	2	10.5%	0	0	0	1	1	0	0	0	0	0	1	0.50	10	10	
Union R.	51	51	100.0%	0	0	0	14	37	0	0	0	0	0	14	0.27	14	37	
<b>Hood Canal Total</b>	<b>8,563</b>	<b>640</b>	<b>7.5%</b>	<b>28</b>	<b>97</b>	<b>1</b>	<b>395</b>	<b>110</b>	<b>0</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>126</b>	<b>432</b>	<b>0.89</b>	<b>7,661</b>	<b>902</b>	

<sup>1/</sup> AD = Adipose fin-clipped; NM = No Mark; Unk = Unknown

<sup>2/</sup> Visual detection only life fish at the trap

<sup>3/</sup> Supplementation Origin Fish calculated from otolith recoveries

<sup>4/</sup> SOR for Hamma applied due to low sample size

<sup>5/</sup> Estimates based on mark sampling data only, not yet corrected for clip error or cwt detection rates, resulting in conservative, provisional estimates

Table 4-24. Chinook salmon spawner escapement origin based on carcasses sampled for marks and coded-wire tags (CWTs) in Hood Canal rivers, 2017.

	Age				Total
	2.1	3.1	4.1	5.1	
Mark rate	0.867	0.896	0.902	0.941	
ADB	0	11	8	1	
ADNB	11	243	71	3	
ADUkn					
ADNH	0	1	0	0	
Total ad-clipped	11	255	79	4	349
expanded	13	285	88	4	390
UMB	0	24	4	1	
UMNB	1	27	24	1	
UMNH	0	1	0	0	
Total no clip	1	52	28	2	
Total mark status known	12	307	107	6	432
Proportion Hatchery Origin Spawners (pHOS)					<b>0.903</b>

\*Excluding fish < 49cm in sample

AD = Adipose-clipped (marked)

UM = Unmarked

NB = no CWT detected

B = CWT detected

NH = No head

## 4.12 Dungeness

Since 1986, surveys by foot have been conducted throughout the spawning season from RM 0.0 to 18.7 in the mainstem Dungeness, and from RM 0 to 5.1 in the Gray Wolf mainstem, to generate a cumulative redd count for the season. The total redd count is multiplied by 2.5 to estimate the total number of adults. In 2017, 218 Chinook redds were counted in the Dungeness River and no redds were counted in the Gray Wolf (Table 4-25). The estimated number of natural spawners in the river was 545 and 60 adults, respectively. There were an additional 100 adults either trapped or netted from the river for the hatchery broodstock program including five pond mortalities. The total estimated return to the river was 705, which includes eight hatchery jacks (Table 4-1).

Table 4-25. The distribution of Chinook redds in the Dungeness Rivers system, 2017.

<b>2017 Dungeness River Chinook Redds</b>				<b>2.5 adults/redd</b>		
<b>Season summary</b>				<b>New redds</b>	<b>Proportion</b>	<b>Est. adults</b>
<b>Upper River</b>	WRIA	Lower RM	Upper RM			
Gold Cr (18.0121)	18.0121	RM 0.0	RM 0.3	0	0.0000	0
Dungeness R (18.0018)	18.0018	RM 17.5	RM 18.7	5	0.0207	13
Dungeness R (18.0018)	18.0018	RM 15.8	RM 17.5	10	0.0413	25
Dungeness R (18.0018)	18.0018	RM 13.8	RM 15.8	6	0.0248	15
Dungeness R (18.0018)	18.0018	RM 10.8	RM 13.8	12	0.0496	30
Gray Wolf R (18.0048)	18.0048	RM 0.0	RM 1.0	13	0.0537	32
Gray Wolf R (18.0048)	18.0048	RM 1.0	RM 2.5	11	0.0455	28
Gray Wolf R (18.0048)	18.0048	RM 2.5	RM 4.0	0	0.0000	0
Gray Wolf R (18.0048)	18.0048	RM 4.0	RM 5.1	0	0.0000	0
				<b>57</b>	<b>0.2355</b>	<b>142</b>
<b>Lower River</b>						
Canyon Cr (18.0038)	18.0038	RM 0.0	RM 0.2	0	0.0000	0
Dungeness R (18.0018)	18.0018	RM 9.2	RM 10.8	38	0.1570	95
Dungeness R (18.0018)	18.0018	RM 6.4	RM 9.2	51	0.2107	128
Dungeness R (18.0018)	18.0018	RM 3.3	RM 6.4	47	0.1942	117
Dungeness R (18.0018)	18.0018	RM 0.3	RM 3.3	49	0.2025	123
				<b>185</b>	<b>0.7645</b>	<b>463</b>
			<b>Grand total</b>	<b>242</b>	<b>1.0000</b>	<b>605</b>

Since 1986, the Dungeness River Chinook total returns have ranged from 50 in 1997 to 1,543 in 2006 (Figure 4-1). The decreases in escapement of Dungeness spring Chinook relative to recent years and relative to forecast are partially due to the termination of the captive brood program after the 2002 brood, and resulting decrease in numbers of hatchery juveniles released.

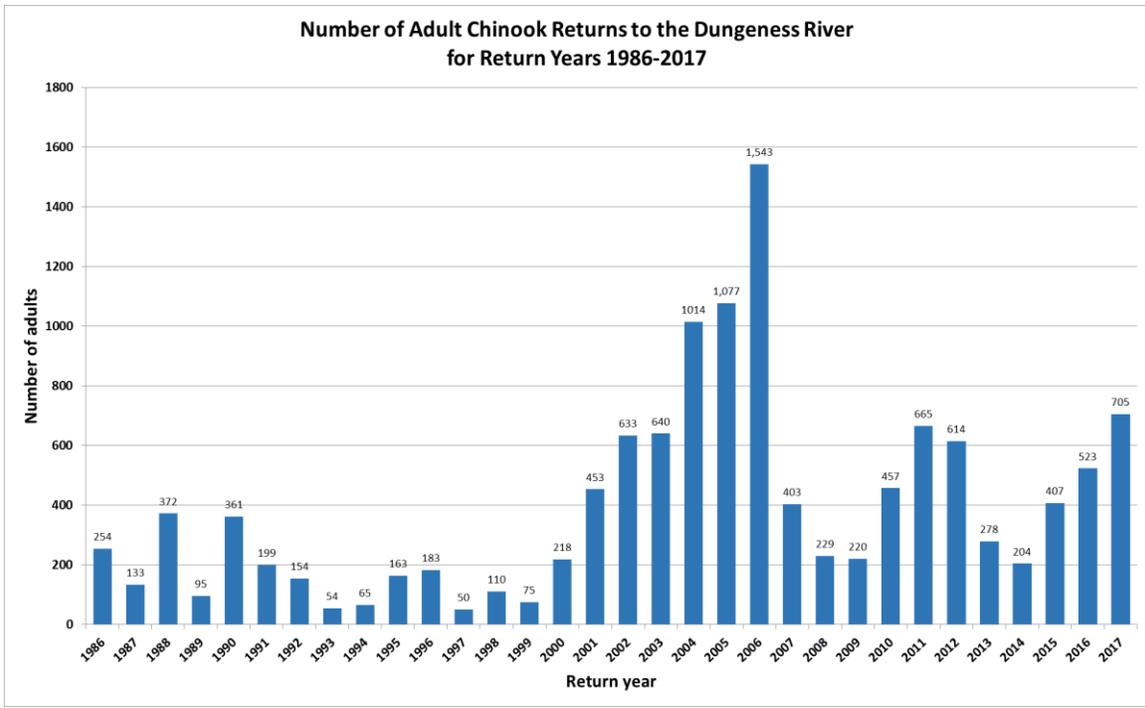


Figure 4-1. Estimated number of Chinook returns from 1986 to 2017 in the Dungeness.

The forecast employs mean Return per Release rates, with ages 4, 5, and 6 adjusted by the brood's performance the previous year. All hatchery releases are CWT'd and no hatchery releases are marked. The wild forecast uses an estimate of wild smolt production obtained from trapping in the lower Dungeness, multiplied by mean return rates, with ages 4, 5, and 6 adjusted by the brood's performance the previous year.

**Hatchery Release Strategies**

Most hatchery Chinook salmon are released into the Dungeness and Gray Wolf Rivers in June as spring accelerated zeros (Table 4-26). One release group of yearlings, BY2011, was released from Hurd Creek. The spring accelerated zero and yearling release groups were 100% tagged but not adipose clipped. The purpose of not clipping and tagging 100% of the hatchery releases was to avoid adult fish being harvested in the mark selective fisheries and still be positively identified as hatchery fish. None of the release groups in the Dungeness Basin are otolith marked since all fish were tagged.

Smolt releases in the Dungeness basin have been around 200,000 to 250,000 annually. Sub-yearlings were released in the upper Dungeness River near RM 15.8 and from the Gray Wolf Acclimation Pond located at RM 1.0. Yearling and sub-yearling smolts have been released from the Dungeness Hatchery at RM 10.5.

Table 4-26. Releases of CWT hatchery Chinook in the Dungeness River Basin for brood years 2011-2015.

Brood year	Age at return	Tag code	Release site	Life stage at release	No. released	Type of mark/tagged applied
2015	2	211112	Upper Dungeness Acclimation Pond	Spring accelerated zeros	50,065	CWT only
2015	2	211172	Dungeness Hatchery	Spring accelerated zeros	47,500	CWT only
2015	2	211109	Gray Wolf Acclimation Pond	Spring accelerated zeros	49,375	CWT only
2015	2	211110	Hurd Creek Hatchery	Spring accelerated zeros	50,353	CWT only
2014	3	211064	Upper Dungeness Acclimation Pond	Spring accelerated zeros	47,031	CWT only
2014	3	211065	Gray Wolf Acclimation Pond	Spring Accelerated zeros	48,009	CWT only
2014	3	211147	Hurd Creek Hatchery	Spring Accelerated zeros	23,303	CWT only
2013	4	210488	Upper Dungeness Acclimation Pond	Spring accelerated zeros	52,949	CWT only
2013	4	211062	Dungeness Hatchery	Spring accelerated zeros	55,888	CWT only
2013	4	211063	Gray Wolf Acclimation Pond	Spring accelerated zeros	52,865	CWT only
2012	5	211022	Upper Dungeness Acclimation Pond	Spring accelerated zeros	48,898	CWT only
2012	5	211023	Gray Wolf Acclimation Pond	Spring accelerated zeros	48,693	CWT only
2012	5	210489	Dungeness Hatchery	Spring accelerated zeros	51,340	CWT only
2011	6	210968	Gray Wolf Acclimation Pond	Spring accelerated zeros	56,080	CWT only
2011	6	210969	Dungeness Hatchery	Spring accelerated zeros	54,104	CWT only
2011	6	210970	Upper Dungeness Acclimation Pond	Spring accelerated zeros	53,786	CWT only
2011	6	210971	Hurd Creek Hatchery	Yearling	51,984	CWT only

### CWT Recoveries

Each carcass observed on the spawning ground and those collected and used for broodstock were sampled. Information, such as, fork length, post orbital hypural (POH) length, gender, mark status (adipose fin present or absent), scales, otoliths, DNA, gill condition, and tag presence were collected. If a CWT had been detected, the snout was removed and a label was attached for identification.

We sampled 411 carcasses (n=100 broodstock collection; n=311 spawning ground) from broodstock collections and natural spawners in the river. Of the total number of carcasses sampled, 295 of 411 (71.8%) were tagged (Table 4-27). Eight Chinook carcasses with CWT were strays originating from other watersheds. Age 2 Chinook were not used for escapement expansion estimates.

Table 4-27. The number of CWT recoveries from Dungeness River Chinook salmon collected from broodstock collections and on spawning ground surveys (SGS) in the Dungeness and Gray Wolf rivers in 2016.

Recovery type	Carcass sample size	# carcasses with CWT	Prop. Snouts detected with CWT	No. carcasses with no tag detected	Prop. no tag detected
Broodstock collection and mortalities	100	74	0.7400	26	0.2600
Spawning Ground Survey (SGS)	311	221	0.7106	90	0.2894
Total sample size	411	295	0.7178	116	0.2822

1/ 1 tag was lost- and 8 were readable

Of the 295 CWT tagged fish, 14 (4.75%) were age 2, 186 (63.05%) age 3, 92 (31.18%) age 4, and 3 (1.02%) were age 5. Eight-hatchery origin Chinook had strayed into the Dungeness River. Five tagged Chinook strayed from the Elwha Hatchery, two tagged Chinook from Morse Creek Hatchery releases, and one tagged Chinook strayed from Glenwood Spring Hatchery release. The Morse Creek Hatchery Chinook releases are of Elwha stock origin (Table 4-28).

Table 4-28. The number of CWT recoveries from Dungeness River Chinook salmon collected from broodstock collections and on spawning ground surveys (SGS) in the Dungeness and Gray Wolf rivers in 2017.

CWT No.	Rearing Hatchery	Mark-ADP	Brood year	Total age	Broodstock F+M	Dungeness SGS F+M+Unk	GW-SGS F+M	Total Female	Total Male	Total Unknown	Total F+M+Unk
210489	Dungeness Hatchery	Unmarked	2012	5	0	1	0	1	0	0	1
211022	Upper Dungeness Accl. Pond	Unmarked	2012	5	0	1	0	1	0	0	1
636491	Elwha Hatchery 1/	Unmarked	2012	5	0	1	0	1	0	0	1
210488	Upper Dungeness Accl. Pond	Unmarked	2013	4	9	15	1	21	4	0	25
211062	Dungeness Hatchery	Unmarked	2013	4	9	22	1	26	6	0	32
211063	Gray Wolf Accl. Pond	Unmarked	2013	4	6	20	2	23	5	0	28
636449	Dungeness Hatchery	Unmarked	2013	4	1	3	0	3	1	0	4
636501	Morse Creek Hatchery 1/	Unmarked	2013	4	0	1	0	1	0	0	1
636624	Morse Creek Hatchery 1/	Unmarked	2013	4	0	1	0	0	1	0	1
636671	Elwha Hatchery 1/	Unmarked	2013	4	1	0	0	0	1	0	1
211064	Upper Dungeness Accl. Pond	Unmarked	2014	3	19	58	4	31	49	1	81
211065	Gray Wolf Accl. Pond	Unmarked	2014	3	19	58	4	26	54	1	81
211147	Hurd Creek Hatchery	Unmarked	2014	3	7	14	0	8	13	0	21
636812	Elwha Hatchery 1/	Unmarked	2014	3	0	1	0	1	0	0	1
636833	Elwha Hatchery 1/	ADP	2014	3	0	1	0	0	1	0	1
636894	Glenwood Springs 1/	Unmarked	2014	3	0	1	0	1	0	0	1
211109	Gray Wolf Accl. Pond	Unmarked	2015	2	1	4	0	1	3	1	5
211112	Upper Dungeness Accl. Pond	Unmarked	2015	2	1	3	0	0	4	0	4
211172	Dungeness Hatchery	Unmarked	2015	2	1	3	0	0	4	0	4
636963	Elwha Hatchery 1/	Unmarked	2015	2	0	1	0	0	1	0	1
<b>Totals</b>					<b>74</b>	<b>209</b>	<b>12</b>	<b>145</b>	<b>147</b>	<b>3</b>	<b>295</b>
1/ Stray											

Of the 287 CWT tagged fish recovered that originated from Dungeness Basin release groups, 13 (4.52%) were age 2, 183 (63.76%) age 3, 89 (31.02%) age 4, and 2 (1.02%) were age 5. No Age 6 CWTs were recovered (Table 4-28).

Table 4-29. Number of coded wire tags recovered from Chinook in the Dungeness River by release group, release site, and rearing hatchery during RY 2016.

Brood year	Total age	Tag code	Total no. tags recovered	Prop.	Release date	Release site	Rearing hatchery	FW age
<b>2011</b>	<b>Age 6</b>		<b>0</b>	<b>0.0000</b>				
2012	Age 5	210489	1	0.0035	June, 2013	Dungeness River	Dungeness Hatchery	Zero
2012	Age 5	211022	1	0.0035	June, 2013	Dungeness River	Upper Dungeness accl. pond	Zero
2012	Age 5	211023	0	0.0000	June, 2013	Gray Wolf River	Gray Wolf accl. pond	Zero
2012	Age 5	210892	0	0.0000	March, 2014	Hurd Creek	Hurd Creek Hatchery	Yearling.
<b>Total</b>	<b>Age 5 1/</b>		<b>2</b>	<b>0.0070</b>				
2013	Age 4	210488	25	0.0871	June, 2014	Dungeness River	Upper Dungeness accl. pond	Zero
2013	Age 4	211062	32	0.1115	June, 2014	Dungeness River	Dungeness Hatchery	Zero
2013	Age 4	211063	28	0.0977	June, 2014	Gray Wolf River	Gray Wolf accl. pond	Zero
2013	Age 4	636449	4	0.0139	June, 2014	Dungeness River	Dungeness Hatchery	Zero
<b>Total</b>	<b>Age 4 2/</b>		<b>89</b>	<b>0.3102</b>				
2014	Age 3	211064	81	0.2822	June, 2015	Dungeness River	Upper Dungeness accl. pond	Zero
2014	Age 3	211065	81	0.2822	June, 2015	Gray Wolf River	Gray Wolf accl. pond	Zero
2014	Age 3	211147	21	0.0732	June, 2015	Hurd Creek	Hurd Cr. Hatchery	Zero
<b>Total</b>	<b>Age 3 3/</b>		<b>183</b>	<b>0.6376</b>				
2015	Age 2	211109	5	0.0174	June, 2015	Dungeness River	Upper Dungeness accl. pond	Zero
2015	Age 2	211112	4	0.0139	June, 2015	Gray Wolf River	Gray Wolf accl. pond	Zero
2015	Age 2	211172	4	0.0139	June, 2015	Hurd Creek	Hurd Cr. Hatchery	Zero
<b>Total</b>	<b>Age 2 4/</b>		<b>13</b>	<b>0.0452</b>				
<b>All ages</b>			<b>287</b>	<b>1.0000</b>				

1/ Not included are eight strays.

Based on the CWT results and scale samples analyzed, the preliminary NOR/HOR composition for Return Year (RY) 2017 was 75.2% HOR and 24.8% NOR. The ages of the NOR Chinook

for RY2017 consisted of 56.5% age-3, 35.6% age-4, 7.9% age-5, and 0.0% age-6. The ages of the HOR Chinook for RY2017 consisted of 66.4% age-3, 32.5% age-4, 1.1% age-5, and 0.0% age-6. The ages of all Chinook for RY2017 combined was 63.9%% age-3, 33.3% age-4, 2.8% age-5, and 0.0% age-6 (Table 4-30).

Table 4-30. Total number and percentages of Age 3, Age 4, and Age 5 HOR and NOR Chinook returns in 2017. Does not include nine age 2 HOR in broodstock collection.

	<b>NOR</b>	<b>Percentage</b>	<b>HOR</b>	<b>Percentage</b>	<b>Total</b>	<b>Percentage</b>
Age-3	99	56.5%	352	66.4%	451	63.9%
Age-4	62	35.6%	172	32.5%	235	33.3%
Age-5	14	7.9%	6	1.1%	19	2.8%
Age-6	0	0.0%	0	0.0%	0	0.0%
<b>Total</b>	175	100.0%	530	100.0%	705	100.0%

From 2006 to 2017, the total Dungeness River Chinook NOR plus HOR returns ranged from 204 to 1,543 (Table 4-29). The number of NOR Chinook returns ranged from 43 to 339 and the number of HOR returns ranged from 90 to 1,204. The twelve year average was 28.7% NOR and 71.3% HOR.

Table 4-31. Total number of NOR and HOR natural spawners and broodstock in the Dungeness River for return years 2006-2017.

Return year	Natural spawners NOR	Natural spawners HOR	Natural spawners NOR+HOR	Broodstock collection NOR	Broodstock collection HOR	Broodstock collection NOR+HOR	Natural spawners + Broodstock NOR	Natural spawners + Broodstock HOR	Total returns NOR+HOR
2006	293	1,112	1,405	46	92	138	339	1,204	1,543
2007	146	159	305	47	51	98	193	210	403
2008	86	54	140	53	36	89	139	90	229
2009	71	57	128	42	50	92	113	107	220
2010	76	269	345	18	94	112	94	363	457
2011	83	452	535	21	109	130	104	561	665
2012	212	296	508	38	68	106	250	364	614
2013	46	122	168	31	79	110	77	201	278
2014	21	87	108	22	74	96	43	161	204
2015	65	200	265	37	105	142	102	305	407
2016	135	273	408	30	77	107	165	350	515
2017	149	456	605	26	74	100	175	530	705

1/ Natural spawners: Chinook that spawned naturally in the river. Natural spawner estimate based on redd surveys.

2/ Broodstock collection: Chinook that were collected in the river or returned to the hatchery and used for broodstock. Total includes pre-spawn mortalities.

3/ NORs and HORs determined by CWT detection, otolith marks, scales, or visible marks (adipose clips) from broodstock and river carcasses sampled.

## Juvenile Salmonid Outmigrant Monitoring

The WDFW smolt trapping on the Dungeness River is conducted to estimate the natural origin sub-yearling Chinook production, as well as that of other anadromous salmonids. These data are reported to NMFS Protected Resources Division per File # 19804 (CITE), and are displayed here for information only.

A floating five-foot diameter screw trap has been used in the Dungeness River by the Washington Department of Fish and Wildlife to capture outmigrating juvenile salmonids since the 2005.

This trap is operated continuously between February to late July or mid-August. High water events, debris, and mechanical failures may shut down trapping operations temporarily. Although the hatchery released Chinook are unmarked, they are 100% coded wire tagged (CWT). Hatchery produced juvenile Chinook migrants can be distinguished from natural juveniles caught in the screw trap due to the detection of a CWT. Trapping and fish sampling methods are described in the report by Topping et al. (2008).

The number of naturally produced sub-yearling Chinook in the Dungeness River ranged from a low of 3,870 in 2015 to a high of 164,815 in 2013. An average of 52,409 sub-yearlings have been naturally produced in the Dungeness River. The two lowest years for Chinook sub-yearling production occurred during the last two brood years with 3,870 in 2015 and 5,556 in 2016 (Table 4-32).

Table 4-32. Catch and estimated production of juvenile salmonids migrating from the Dungeness River, 2005-2017.

First day trapping	Last day trapping	Subyearling Chinook Natural prod.	Subyearling Chinook Hatchery prod.	Coho 0+ Natural prod.	Pink 0+ Natural prod.	Chum 0+ Natural prod.	Steelhead >1+ Natural prod.
3/8/2005	8/5/2005	81,865		57,095	0		9,192
2/2/2006	8/17/2006	136,724		43,888	696,642	194,721	6,125
2/21/2007	8/19/2007	110,021	65,016	22,134	0	381,781	11,445
2/13/2008	8/12/2008	11,612	74,038	21,293	472,334	98,483	10,344
2/19/2009	8/12/2009	20,443	11,374	30,780	43,161	630,358	10,101
2/8/2010	7/28/2010	10,604	36,547	38,210	197,963	41,326	17,486
2/9/2011	8/31/2011	10,250	63,608	26,280	33,209	202,658	19,600
2/14/2012	8/28/2012	71,810	72,868	31,794	3,687,547	38,968	5,521
2/6/2013	8/8/2013	164,815	74,038	52,336	11,043	338,568	7,812
1/16/2014	8/13/2014	26,513	86,954	35,839	29,547,068	922,275	13,167
2/4/2015	7/28/2015	3,870	101,696	6,040	0	155,645	5,972
2/3/2016	7/25/2016	5,556	73,279	20,493	89,802	23,927	4,354
2/2/2017	8/10/2017	27,881	33,780	12,991	0	214,914	11,897
<b>Average production</b>		<b>52,459</b>	<b>63,018</b>	<b>30,706</b>	<b>3,864,308</b>	<b>270,302</b>	<b>10,232</b>

1/ Natural origin Chinook production estimates are extrapolated to and starting date of 1/15 and an ending date of 8/31

2/ Production estimates for Chinook, chum and pink are generated using maiden captured fish that are marked after capture and released above the trap. Individual efficiency tests are pooled using a G-test to inform efficiency strata that are applied to the estimated maiden catch for each efficiency strata.

3/ Production estimates for coho and steelhead are generated by utilizing a two trap design, coho and steelhead captured in a weir trap on Matriotti Creek located upstream of the screw trap are marked, released, and recaptured downstream in the screw trap. (Pete Topping, WDFW).

NOR smolt-to-adult return rates (SAR) were estimated by dividing the number of NOR adults produced from natural spawners by the number of natural origin smolts. NOR return rates, based on age-2 to age-5 returns, ranged from 0.000763 to 0.011599 (Table 4-33). Hatchery SAR were calculated for each of the different release sites and size groups (Graywolf Acclimation Pond sub-yearlings, Upper Dungeness sub-yearlings, Dungeness Hatchery sub-yearlings and yearlings, and Hurd Creek Hatchery yearlings; (Table 4-34).

Table 4-33. NOR smolt to adult return rates for Dungeness River Chinook.

Brood year	Total natural spawners	Smolt trap year	Juvenile Chinook abundance	Age-2	Age-3	Age-4	Age-5	Age-6	Total	Smolt to Adult Rate (SAR)
2004	953	2005	81,865	0	75	98	17	0	190	0.002321
2005	955	2006	136,724	0	38	96	12	0	146	0.001068
2006	1,405	2007	110,021	0	4	57	23	0	84	0.000763
2007	305	2008	11,621	0	25	44	19	0	88	0.007578
2008	140	2009	20,443	0	37	175	16	0	228	0.011153
2009	128	2010	10,604	0	56	57	10	0	123	0.011599
2010	345	2011	10,250	0	2	21	11	0	34	0.003317
2011	535	2012	71,810	0	13	74	28	TBD	115	0.001608
2012	508	2013	164,815	0	14	130	TBD	TBD	144	0.000874
2013	168	2014	26,513	0	16	TBD	TBD	TBD	TBD	TBD
2014	108	2015	3,870	4	TBD	TBD	TBD	TBD	TBD	TBD
2015	265	2016	5,556	TBD						
2016	408	2017	17,881							
2017	605									

Hatchery smolt-to-adult return rates were estimated by dividing the number of hatchery adult returns identified with coded wire tags by the number of tagged hatchery smolts released by brood year (Table 4-35).

Table 4-34. Dungeness Chinook salmon natural and hatchery smolt to adult return rates.

Ocean entry year	Natural SAR	Gray Wolf sub-yearling	Upper Dungeness sub-yearling	Dungeness sub-yearling	Dungeness yearling	Hurd yearling
2005	0.0023209				0.0005015	
2006	0.0010678	0.0005872			0.0000541	0.0012875
2007	0.0007635	0.0012092			0.0001102	0.0004967
2008	0.0075784	0.0040964			0.0003488	0.0009418
2009	0.0111530	0.0042257			0.0000980	0.0013062
2010	0.0115994	0.0028229		0.0022337	0.0015274	0.0010267
2011	0.0033171	0.0014954		0.0008763	0.0001407	
2012	0.0016077	0.0013552	0.0018795	0.0020701		0.0003756
2013	0.0008741	0.0017046	0.0013497	0.0021426		0.0008611

DRAFT January 10 2017: Randy Cooper, Pete Topping, and Joe Anderson, Washington Department of Fish and Wildlife.

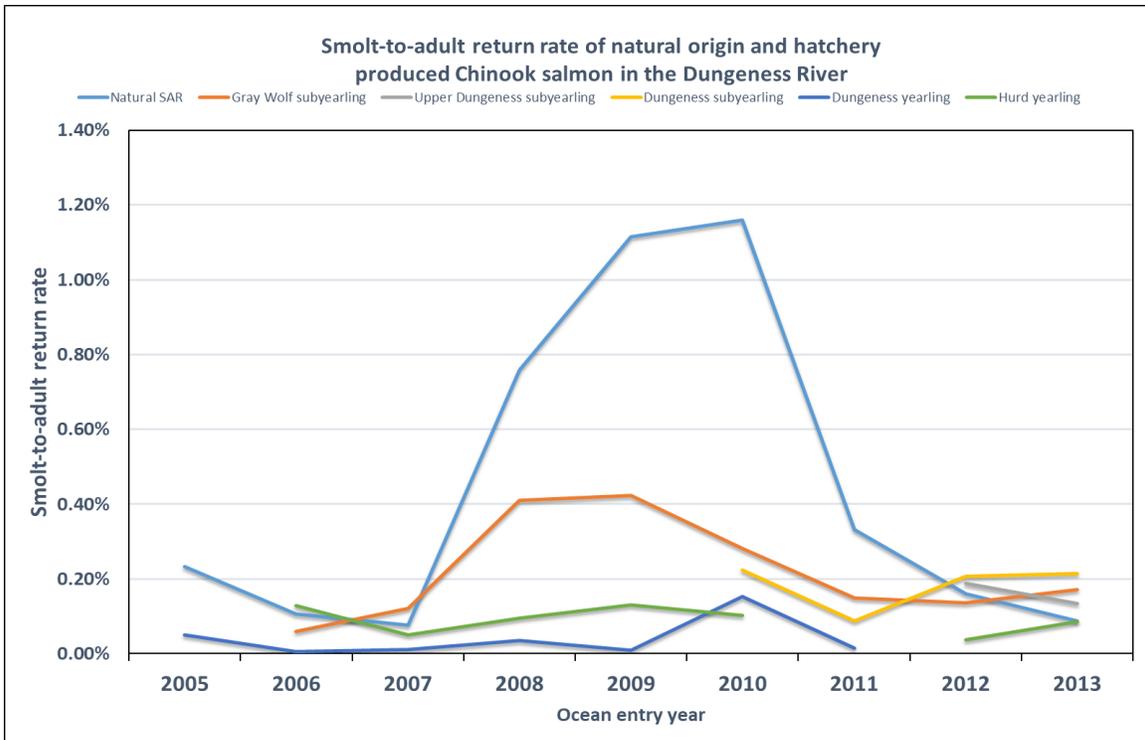


Figure 4-2. Smolt to adult return rate of natural origin (black) and hatchery produced (gray) Chinook salmon in the Dungeness River. Natural survivals are from the river mouth (smolt trap location) to adult return, whereas hatchery survivals are from release to adult return. In comparison to the natural survival, hatchery estimates therefore include the additional mortality suffered in the river prior to ocean entry. Estimates are total return to the river, and do not account for fishing mortality. DRAFT January 10 2017: Randy Cooper, Pete Topping, and Joe Anderson WDFW.

Table 4-35. Total number of NOR and HOR natural spawners and broodstock in the Dungeness River for return years 2006-2016.

Brood year	HOR natural spawners	NOR natural spawners	HOR+NOR natural spawners	Age-3 Natural Recruits	Age-4 Natural Recruits	Age-5 Natural Recruits	Age-6 Natural Recruits	Total Natural Recruits	Recruits per spawner
2004			953	75	98	17	0	190	0.1994
2005			955	38	96	12	0	146	0.1529
2006			1,405	4	57	23	0	84	0.0598
2007	159	146	305	25	44	19	0	88	0.2885
2008	54	86	140	37	175	16	0	228	1.6286
2009	57	71	128	56	57	10	0	123	0.9609
2010	269	76	345	2	21	11	0	34	0.0986
2011	452	83	535	13	74	26	0	113	0.2112
2012	296	212	508	14	120	14		148	0.2911
2013	122	46	168	18	62				
2014	87	21	108	99					
2015	200	65	265						
2016	273	135	408						
2017	456	149	605						

#### **4.13 Elwha River**

The Elwha Dam removal project began in September 2011 and was completed by March 2012. The natural river flow was restored through the former Lake Aldwell. Prior to September 2012, Chinook spawning in the Elwha River was limited to the 4.8 miles below the dam with most natural spawning concentrated between RM 2.8 and 4.4. In August 2014, the Glines Canyon Dam was removed. Before dam removal, Chinook surveys were conducted by raft and foot surveys. SONAR technology is being used in the Elwha River as a method to improve enumeration of Chinook passage during the entire run from June through September. This technology will improve Chinook escapement estimates due to the difficulty of observing redds and fish in turbid water conditions caused by the removal of the two dams. Denton et. al. (2018) used a DIDSON LR (long-range) multi-beam sonar system to enumerate Chinook salmon in the Elwha River on a daily basis from June 13<sup>th</sup> to September 28, 2017. For RY 2017, their best total return estimate for Chinook salmon was 3,083 fish with a calculated 95% CI (2,816 – 3,347).

The 2017 hatchery component of the Elwha Chinook Forecast terminal run size employed the return per spawner rates, with 4, 5, and 6 year old rates adjusted by the brood's previous performance. The adjustment is a multiplier consisting of the previous year's return rate divided by the mean return for that age. The wild (natural origin) return was estimated from 3 years of breakouts using otoliths and CWTs. The wild component of the returns has been rather consistently 5.5% of the total.

##### **Peak Spawning Ground Surveys and Redd Distribution**

In September 2017, the National Park Service (NPS), Lower Elwha Klallam Tribe (LEKT), National Marine Fisheries Service (NMFS), and Washington Department of Fish and Wildlife (WDFW) staff conducted redd surveys in reaches between the Glines Powerhouse and the river mouth (McHenry et al. 2018). Two Elwha tributaries, Little River and Indian Creek, were also included with these surveys. For the 2017 spawning survey season, 767 Chinook salmon redds, 827 live, and 219 dead adults were observed downstream of the former Glines Powerhouse site (Table 4-36).

Table 4-36. 2017 Elwha River Chinook salmon spawners from Upper Watershed Dam to the mouth. (McHenry et al. 2018).

Survey Reach	RKM midpoint	Redds	Redds/km	Live Chinook	Dead Chinook	Jacks
<b>Upper Elwha</b>						
Upper Watershed	43.8	2	0.07	1	0	0
Press/Geyser Valley	28.8	2	0.33	3	1	0
Former Mills reservoir	23.4	48	10.4	87	10	2
<b>Upper Elwha Subtotal</b>		<b>52</b>		<b>91</b>	<b>6</b>	<b>2</b>
<b>Middle Elwha</b>						
Glines Powerhouse	20.6	79	71.8	61	28	
Altaire Bridge	19.5	52	52.0			
Griff Creek	18.5	8	8.0			
Rabbit Hole	17.3	50	33.3	100	34	
Fisherman's Corner	16.1	58	72.5			
ONP Boundary	14.7	32	16.0	127	22	
McDonald Bridge	12.9	6	3.7			
Little river	12.2	9	4.7	26	0	
Indian Creek	12.1	35	18.4	68	13	
Aldwell South	11.0	128	55.6	100	47	4
Aldwell North	8.8	66	34.7	63	27	1
<b>Middle Elwha Subtotal</b>		<b>523</b>		<b>545</b>	<b>171</b>	<b>6</b>
<b>Lower Elwha</b>						
Dam outflow	7.3	7	5.8			
HWY 112 Bridge	6.1	77	40.5	115	20	
County Bridge	3.8	37	18.5			
East Channel	1.4	31	19.8	44	4	
Hunt Road Channel	2.0	40	14.3	32	13	
<b>Lower Elwha Subtotal</b>		<b>192</b>		<b>191</b>	<b>37</b>	
		<b>767</b>		<b>827</b>	<b>219</b>	<b>5</b>

In addition to SONAR enumeration and peak spawning ground surveys, adult Chinook were collected by various methods for broodstock purposes in the lower river. WDFW hatchery staff collected salmon for broodstock by net, seine, gaff, and trap methods. A total of 1,189 Chinook (729 males, 348 females, 112 jacks) were removed from the river and used as broodstock for the hatchery program. The terminal run size to the river was based on the SONAR estimate of 3,083 Chinook. The total number of Chinook that spawned naturally in the Elwha River and its tributaries was estimated at 2,006. This number was calculated by subtracting the number of Chinook that were collected for broodstock from the SONAR estimate (Table 4-37).

Table 4-37. Chinook broodstock collection, estimated total adult return, and estimated number of natural spawning fish Elwha River in 2017.

Capture method	No. Males	No. Females	Total adults	No. Jacks	Total adults with jacks
Gaff-Hook and line	9	147	156	0	156
Seining-Gill netting	269	119	388	0	388
Elwha Hatchery Trap Volunteers	363	58	411	83	494
Lower Elwha Hatchery transfers	98	24	122	29	151
<b>Total broodstock collection</b>	<b>729</b>	<b>348</b>	<b>1,077</b>	<b>112</b>	<b>1,189</b>
<b>SONAR adult estimate</b>			<b>3,083</b>		
<b>Estimated natural spawners in river<sup>a</sup></b>			<b>2,006</b>		

<sup>a</sup> Natural spawners = SONAR estimate of 3,083 minus adult broodstock collection of 1077 = 2,006 natural escapements

### CWT and Otolith Mark Recoveries

The following information for Elwha River Chinook carcass sampling in 2017 is taken from the preliminary summary report by Weinheimer et. al. 2018 (*in review*).

We surveyed the mainstem Elwha and tributaries from the former Glines Dam Powerhouse site at river km 21.4 to the confluence of the river with the Strait of Juan de Fuca. Surveys were conducted by foot and inflatable raft. The Elwha River was broken up into 6 sections. Each reach was scheduled to be surveyed every 7 to 10 days. Based on redd survey numbers from previous spawning seasons, we felt this sampling structure would allow us to sample most of the available carcasses in each reach throughout the season.

### Evaluating hatchery mark rates

The primary hatchery marking strategy for brood years of Elwha Chinook salmon expected to return in 2017 was a thermal otolith mark (Table 4-38). Avoidance of the adipose clip was intended to reduce vulnerability to mark selective fisheries. Most hatchery Chinook salmon are released into the Elwha River as sub-yearlings, but there is also a smaller yearling release group (Table 4-38).

In some years, equipment malfunctions limited the capacity to induce thermal otolith marks. Thermal otolith marks require sequentially altering water temperature during embryonic development in a prescribed protocol over the course of approximately 1-3 weeks, and specialized chillers are required to accomplish this task. Any hatchery juveniles that were not otolith marked due to chiller malfunctions were selectively placed into the yearling program receiving the CWT mark (Table 4-38, brood year 2012).

Chinook salmon carcasses were sampled weekly at the WDFW Elwha Rearing Channel (hereafter WDFW Hatchery) throughout the spawning season. Chinook salmon broodstock spawned at the WDFW hatchery originated from a variety of sources. The primary collection method was by gill net from the Elwha River. Chinook salmon

broodstock also included volunteers to the WDFW hatchery trap and volunteers to the LEKT hatchery trap that were subsequently transported to the WDFW adult holding pond.

Table 4-38. Releases of hatchery Chinook in the Elwha River Basin, brood years 2012-2015.

Brood Year	Type	Thermal Otolith	Thermal Otolith + CWT	CWT	AD + CWT + Thermal Otolith	Total
2012	Subyearling	907,387	0	0	251,892	1,159,279
	Yearling	0	0	201,074	0	201,074
2013	Subyearling	2,388,947	0	0	251,024	2,639,971
	Yearling	0	177,269	0	0	177,269
2014	Subyearling	2,429,097	0	0	250,295	2,679,392
	Yearling	0	158,799	0	0	158,799
2015	Subyearling	2,397,694	0	0	248,748	2,646,442
	Yearling	0	NA	0	0	NA

#### *Carcass Recoveries*

We sampled a total of 1,086 Chinook carcasses throughout the sampling season (Table 4-39). A total of 520 samples (48%) originated from the Elwha River and tributaries. Of the fish sampled outside the hatchery, 88.3% were sampled above the former Elwha Dam site. No carcasses were recovered during the single backcountry survey Sept 20-21.

The highest number of samples collected in one week from the river occurred during the week of Sept 25-29, and over three quarters (72%) of the samples we collected from the river were recovered during the month of September (Table 4-40). The number of carcasses found dropped significantly after October 9.

Sex data was recorded for each carcass. POH length was recorded for 1,080 (99.4%) carcasses and fork length for 1,039 (95.7%) carcasses. Otolith samples were taken from 1,084 (99.8%) carcasses, readable scale samples from 898 (82.7%) carcasses and DNA fin clips from 682 (62.8%) carcasses. A total of 26 carcasses were sampled in Indian Creek (N = 24) and Little River (N = 2).

Table 4-39. Total number of Chinook carcasses sampled by survey reach in the Elwha River Watershed 2017.

<b>Reach</b>	<b>No.-Carcasses Sampled</b>	<b>Percent of Total</b>
Reach 1 - Elwha Dam Site to river mouth	61	5.62%
Reach 2 - Gooseneck to former Elwha Dam Site	42	3.87%
Reach 3 - Highway 101 Bridge to Gooseneck	88	8.10%
Reach 4 - Fishermans to Highway 101 Bridge	87	8.01%
Reach 5 - Altaire Bridge to Fishermans plus Hughes (left channel)	122	11.23%
Reach 6 - Glines Powerhouse to Altaire Bridge	43	3.96%
Reach 7 - Rica to Glines	50	4.60%
Reach 8 - Grand Canyon to Goblins Gate	1	0.09%
Indian Creek	24	2.21%
Little River	2	0.18%
WDFW Hatchery	566	52.12%
<b>Total</b>	<b>1,086</b>	<b>100%</b>

Table 4-40. Number of Chinook carcasses sampled by week for individual reaches during the 2017 season. Zero indicates a survey was completed but no carcasses were sampled. A dash indicates no survey was conducted that week. No surveys were conducted during the weeks October 30 and November 3 due to lack of carcasses.

Week	Reach								Indian Creek	Little River	Hatchery
	1	2	3	4	5	6	7	8			
Aug 28 - Sep 1	0	-	-	-	-	-	-	-	-	-	-
Sep 4 - Sep 8	0	0	0	0	0	0	-	-	-	-	20
Sep 11 - Sep 15	1	2	3	0	3	6	-	-	-	-	103
Sep 18 - Sep 22	14	12	23	21	32	14	9	1	-	-	110
Sep 25 - Sep 29	30	17	38	49	59	9	21	-	10	-	198
Oct 2 - Oct 6	12	8	19	16	24	11	13	-	14	2	120
Oct 9 - Oct 13	4	3	5	1	1	3	7	-	-	-	15
Oct 16 - Oct 20	-	-	-	0	3	-	0	-	-	-	-
Oct 23 - Oct 27	0	0	0	-	-	-	-	-	-	-	-
<b>Totals</b>	<b>61</b>	<b>42</b>	<b>88</b>	<b>87</b>	<b>122</b>	<b>43</b>	<b>50</b>	<b>1</b>	<b>24</b>	<b>2</b>	<b>566</b>

## Broodstock collection method

Most of the fish sampled at WDFW Hatchery were net-collected fish rather than volunteers to either the WDFW or LEKT hatcheries (Table 4-41). We sampled over two thirds of all the gill net fish that came to the hatchery in 2017 and just over 48% of all the LEKT volunteer fish to the WDFW Hatchery (Table 4-40). We did not sample any gaffed fish during the 2017 season.

Table 4-41. Adult collection method summary for Elwha Chinook salmon carcass sampling 2017.

Sample Location	Collection Method	Number of Carcasses Sampled	Percent of Total Carcasses Sampled
Mainstem and Tributaries	Natural Spawners	520	47.88%
	Gaffed	0	0.00%
WDFW Hatchery	Gill Net (N)	321	29.56%
	Lower Elwha Klallam (LEKT)	73	6.72%
	Volunteers (V)	172	15.84%

Table 4-42. Elwha Chinook salmon broodstock collection summary in 2017. Numbers include non-viable females and pond mortalities.

Broodstock collection method	Total Collected	Percent sampled
Gill net	388	82.73%
LEKT Hatchery volunteers	151	48.43%
WDFW Hatchery volunteers	496	34.68%
Gaffed	156	0.00%
Total	1,191	47.52%

### Hatchery mark rates

We collected 1,077 otolith samples from Chinook salmon over the course of the season. 936 (86.9%) of the samples had an otolith mark present. Of the remaining 141 samples, 91 had no otolith mark but did have a CWT present, five fish were adipose marked but did not carry an otolith mark or CWT, two fish were not checked for hatchery marks or CWT, and three fish did not have an otolith mark, ad mark or CWT but had growth patterns on the scale samples that indicated hatchery rearing. Thus, 40 fish (3.7%) had no internal (Otolith or CWT) or external hatchery marks (Table 4-43).

Overall, the proportion of hatchery-origin Chinook salmon was 96.3%. We observed relatively small differences in the mark rates of the different survey reaches and hatchery broodstock sources (Table 4-43). Only one reach, reach 6, had a mark rate < 90%.

Table 4-43. Hatchery mark rates of Chinook salmon sampled from the Elwha River 2016 based on thermal otolith, adipose and CWT marks.

	Location	Otolith Mark		All Hatchery Marks	
		N	Percent Marked	N	Percent Marked
Hatchery	Net	320	85.63%	321	97.51%
	LEKT	73	84.93%	73	100.00%
	Volunteer	172	90.12%	172	98.26%
Carcass Survey	Reach 1	61	83.61%	61	93.44%
	Reach 2	41	95.12%	41	100.00%
	Reach 3	88	88.64%	88	94.32%
	Reach 4	85	85.88%	86	97.67%
	Reach 5	121	85.12%	122	90.98%
	Reach 6	42	83.33%	43	88.37%
	Reach 7	49	87.76%	49	95.92%
	Reach 8	1	100.00%	1	100.00%
	Little River	2	50.00%	1	100.00%
	Indian Creek	22	95.45%	21	100.00%
	Total	1,077	85.63%	1,079	97.51%

*CWT Data*

We collected CWTs from 275 fish in the Elwha River watershed during fall 2017. One hundred and six of the CWTs were recovered from the river (Table 4-44). The 2017 season was the first year we found CWTs in every reach we sampled. The majority of the CWTs originated from releases into the Elwha River, but some were derived from releases into the neighboring Morse Creek (N = 17), Dungeness (N= 3) and Hurd Creek (N=1) watersheds (Table 4-44). We also had two fish that originated from other locations in Puget Sound, Purdy Creek (N=1) and Soos Creek (N=1). Fish that were released from the Elwha were mostly from the yearling program (84.4%), except for 39 tags from the 2012-2015 brood years when a portion of the subyearling releases were coded-wire tagged (Table 4-39).

Table 4-44. Chinook Coded Wire Tag (CWT) data for snouts recovered during spawn year 2017.

Sampling Location	Number of CWT	Brood Year	Release Location	
Hatchery	Net	10	2012	Elwha
		1	2013	Dungeness
		4	2013	Morse
		84	2013	Elwha
		9	2014	Elwha
	LEKT	1	2012	Elwha
		1	2013	Morse
		16	2013	Elwha
		1	2014	Elwha
		1	2015	Hurd Creek
	Volunteer	5	2012	Elwha
		1	2013	Morse
		22	2013	Elwha
		7	2014	Elwha
		1	2015	Soos Creek
		1	2015	Purdy Creek
		2	2015	Elwha
	Total	169		

*Scale Data*

Of the 1,065 scale samples collected, 898 (84.3%) were successfully aged in the laboratory. Age-3 was the dominate age class in most sampling reaches and all the fish sampled at the hatchery, as over 60% of the entire collection was composed of age-3 Chinook salmon (Table 4-45). The highest percentage of age-5 Chinook salmon were collected from reach 2 which is just upstream of the former Elwha Dam site (omitting reach 8 which had only 1 fish sampled; Table 4-45). Forty-seven fish were aged as age 2 fish (jacks). One hundred and ninety six (21.9%) were identified as fish that migrated to the ocean at age-2 (stream-type Chinook, Table 4-46). All of these stream-type Chinook were hatchery origin.

Table 4-45. Chinook carcass age data from scale samples by reach for the Elwha River 2017.

Sample Location	Collection Method	Number of Samples	Total age				
			2	3	4	5	6
WDFW Hatchery	Net	253	0.00%	53.36%	40.32%	6.32%	0.00%
	LEKT	63	15.87%	61.90%	19.05%	3.17%	0.00%
	Volunteer	145	18.62%	60.00%	17.93%	3.45%	0.00%
Reach 1		54	1.85%	64.81%	29.63%	3.70%	0.00%
Reach 2		37	2.70%	62.16%	27.03%	8.11%	0.00%
Reach 3		77	2.60%	59.74%	31.17%	6.49%	0.00%
Reach 4		76	2.63%	68.42%	26.32%	2.63%	0.00%
Reach 5	Carcass Sample	107	2.80%	60.75%	29.91%	6.54%	0.00%
Reach 6		31	3.23%	61.29%	29.03%	6.45%	0.00%
Reach 7		39	2.56%	64.10%	30.77%	2.56%	0.00%
Reach 8		1	0.00%	0.00%	0.00%	100.00%	0.00%
Indian Creek		13	0.00%	92.31%	7.69%	0.00%	0.00%
Little Creek		2	0.00%	50.00%	50.00%	0.00%	0.00%
All Samples		898	5.35%	60.02%	29.51%	5.12%	0.00%

Table 4-46. Age at return of hatchery and unmarked sub-yearling and yearling releases 2017.

Origin	Age at Outmigration	N	Total Age				
			2	3	4	5	6
Unmarked	Sub-yearling	33	1	10	20	2	0
Unmarked	Yearling	0	NA	NA	NA	NA	NA
WDFW Hatchery	Sub-yearling	665	47	518	73	27	1
WDFW Hatchery	Yearling	196	0	9	171	16	0

#### 4.14 Hoko

WDFW and Makah Fisheries Management staff conducted foot surveys to count live and dead Chinook and Chinook redds in the mainstem between river miles 3.4 to 21.7 and tributaries, which represents all Chinook spawning area in the Hoko basin. There are ten mainstem and 13 tributary reaches, which include the Little Hoko River, a tributary to the lower mainstem, and Browne's, Herman, North Fork Herman, Ellis, Bear, and Cub creeks, which are tributaries to the upper mainstem. WDFW conducted surveys from RM 3.4 to 10.1 during the 2017 return year (Table 4-47).

WDFW attempted to survey the lower mainstem from RM 3.4-9.8 on October 18 but was unsuccessful due to high flows and poor water visibility after surveying the section by the hatchery (RM 9.8-10.1).

Table 4-47. Chinook redd surveys in mainstem Hoko River from RM 3.4- RM 10.1 by WDFW in 2017.

Survey date	Lower RM	Upper RM	New redds	Live Chinook	Dead Chinook	Survey conditions	Floy tags observed
10-18-2017	3.4	9.8	No survey	-	-	Rising river flows	
<b>10-18-2017</b>	<b>9.8</b>	<b>10.1</b>	<b>13</b>	<b>88</b>	<b>0</b>	<b>Good</b>	
10-26-2017	3.4	4.4	3	0	0	Good	
10-26-2017	4.4	5.6	10	14	0	Good	
10-26-2017	5.6	7.5	23	28	0	Good	
10-26-2017	7.5	8.7	18	7	0	Good	
10-26-2017	9.8	10.1	42	83	2	Good	
<b>Weekly total</b>	<b>3.4</b>	<b>10.1</b>	<b>96</b>	<b>6</b>	<b>2</b>	Good	
11-01-2017	3.4	4.4	0	1	0	Good	
11-01-2017	4.4	5.6	8	10	2	Good	
11-01-2017	5.6	7.5	6	17	0	Good	
11-01-2017	7.5	8.7	3	12	0	Good	<b>Pink L=5;</b>
11-01-2017	9.8	10.1	37	188	<b>9</b>	Good	<b>Pink L=92;D=1</b>
<b>Weekly total</b>	<b>3.4</b>	<b>10.1</b>	<b>54</b>	<b>228</b>	<b>11</b>	Good	<b>Total=98</b>
11-08-2017	3.4	4.4	0	3	0	Excellent	
11-08-2017	4.4	5.6	14	15	0	Excellent	<b>Pink L=1</b>
11-08-2017	5.6	7.5	10	8	2	Excellent	<b>Pink L=4;D=2</b>
11-08-2017	7.5	8.7	1	2	1	Excellent	<b>Pink L=2</b>
11-08-2017	9.8	10.1	4	57	6	Excellent	<b>Pink L=14</b>
<b>Weekly total</b>	<b>3.4</b>	<b>10.1</b>	<b>29</b>	<b>85</b>	<b>9</b>	Excellent	<b>Total = 23</b>

Table 4-48. Summary of Hoko and Sekiu Chinook surveys by Makah Fisheries Management staff in 2017.

Date	Stream Name	Trib To	WRIA	RM Lower	RM Upper	Live Chinook	Dead Chinook	New Redds
10/26	Bear	Hoko	19.0196	0.00	0.66	0	0	0
10/23	Brown's	Hoko	19.0170	0.59	0.97	0	0	0
10/23	Brown's	Hoko	19.0170	0.00	0.59	160	0	41
10/30	Brown's	Hoko	19.0170	0.00	0.59	11	11	8
10/30	Brown's	Hoko	19.0170	0.59	0.97			
10/26	Cub	Hoko	19.0197	0.00	0.37	0	0	0
11/6	Herman	Hoko	19.0183	0.00	2.00	0	0	0
11/3	Ellis	Hoko	19.0192	0.00	0.45	0	0	1
10/10	Hoko	Strait	19.0148	8.50	10.10	0	13	0
10/10	Hoko	Strait	19.0148	8.50	10.10	0	2	0
10/10	Hoko	Strait	19.0148	13.00	15.50	0	0	0
10/10	Hoko	Strait	19.0148	13.00	15.50	0	0	0
10/21	Hoko	Strait	19.0148	15.30	18.30	0	0	0
10/8	Hoko	Strait	19.0148	18.30	20.40	0	0	0
10/27	Hoko	Strait	19.0148	20.40	21.70	0	0	2
10/27	Hoko	Strait	19.0148	21.70	23.70	0	0	0
10/27	Little Hoko	Hoko	19.0149	0.00	3.50	3	0	10
11/10	Little Hoko	Hoko	19.0149	0.00	3.50	12	0	1
11/16	Unnamed		19.0189	0.42	0.64	0	0	0
9/29	Tsoo-Yess		20.0015	9.50	13.00	3	0	2

Redd counts are multiplied by 2.5 adults per redd to estimate natural escapement. We estimated the number of redds in sections that were not surveyed by applying the nearest redds per mile value. A total of 255 (192 redds WDFW and 63 redds MFM) redds were observed by Makah and WDFW fisheries staff during their surveys for an adult estimate of 638.

For the 2017 Hoko Chinook broodstock season, 192 females, 378 males, and 37 jacks returned to the Hoko Falls Hatchery pond facility. Of the 607 total fish that returned to the pond, 14 females, 21 males, and 6 jacks were mortalities and 114 females, 81 males and 31 jacks were lethally spawned. In addition, 2 females and 6 males were surplused. The remaining 62 females and 270 males were returned to the river to spawn (Table 4-49).

Table 4-49. Number of female, male, and jack Chinook that returned to the Hoko Falls Hatchery in 2017 that were spawned, released back to the river to spawn naturally, culled, surplused, and died before spawning. Data source: Joe Hinton, Hoko Falls Hatchery, Makah Tribe.

Sex	Rack count	Mortality	Surplused	Lethal spawned	Returned to stream
Female	192	-14	-2	-114	-62
Male	378	-21	-6	-81	-270
<b>Total adults</b>	<b>570</b>	<b>-35</b>	<b>-8</b>	<b>-195</b>	<b>-332</b>
Jack	37	-6	0	-31	0
<b>Total fish</b>	<b>607</b>	<b>-41</b>	<b>-8</b>	<b>-226</b>	<b>-332</b>

Table 4-50. Corrected to not double-count hatchery returns and natural Chinook spawners in the Hoko River in 2017.

255	Redds observed by WDFW and MFM
-22	Estimated number of redds from tagged fish released back into river, spawned, and double-counted
<u>233</u>	<u>Redds made by females that didn't show up at the hatchery</u>
<b>581</b>	<b>Total spawners associated with those redds</b>
226	Lethal spawned at hatchery
41	Mortality at hatchery
8	surplus at hatchery
270	males returned to the river by the hatchery (0.81 proportion released-floy tagged)
<u>62</u>	<u>females returned to the river by the hatchery (0.19 proportion fish released-floy tagged)</u>
<b>1,188</b>	<b>Total estimated spawners</b>

This total breaks out into:

913	Natural spawners, who spawned in the gravel
<u>275</u>	<u>Handled at the hatchery but not released</u>
<b>1,188</b>	<b>Total estimated spawners (Total 1,225).</b>

The number of hatchery origin and natural origin Chinook that returned to the Hoko Falls Hatchery for the broodstock program were 644 and 0, respectively (Table 4-51). Of the estimated 581 natural in-river spawners, 0 were hatchery origin spawners (HOR) (Table 4-51). The total numbers and percentages, by age, of total spawners, including jacks were 255 age 2 (20.8%), 350 age 3 (28.6%), 535 age 4 (43.4%), 82 age 5 (6.7%), and no age 6 or age 7. The returns to the river spawners plus broodstock collected consisted of 644 (52.5%) hatchery origin and 581 (3.5%) natural origin for a total return of 1,225 fish which includes 255 jacks (Table 4-51).

Table 4-51. Age and origin of broodstock and natural Chinook spawners in the Hoko River in 2017. Data source: Hap Leon, Makah Fisheries Management.

Brood Year	Age	Returns to Hatchery	In-River Spawners	Total	HOR Proportion
2015	2	37	218	255	0.15
2014	3	254	97	350	0.72
2013	4	269	267	535	0.50
2012	5	82	0	82	1.00
2011	6	3	0	3	1.00
2010	7	0	0	0	
<b>Total</b>		<b>644<sup>a</sup></b>	<b>581</b>	<b>1,225</b>	<b>0.53</b>

<sup>a</sup>: HOS estimate is greater than rack return estimate as a result of spawning ground estimated spawners.

## 5 Coded-wire Tag Sampling

Commercial and recreational catch is sampled to recover coded-wire tagged Chinook and coho. General objectives are to sample 20% of commercial catch in each area and week, and 10% of marine recreational catch in each area and month. Sampling rates for calendar year (January-December) 2016 are summarized below, and were based on catches reported by local biologists, and sample sizes queried from the RMIS database. Sampling rates of commercial fisheries in 2017 generally exceeded the 20% sampling objective, although Nooksack Terminal area, Tulalip Bay, Hood Canal, Strait of JDF Troll, and Areas 10 and 13A were below 20% (Table 5-1). Marine area recreational fisheries were sampled at rates between 11% and 37% for the year (Table 5-2). Note that these data were updated just prior to completion of this report, and will be validated and corrected as needed prior to submission to update the RMIS (Regional Mark Information System) database.

Table 5-1. Chinook coded-wire tag sampling rates for commercial fisheries in 2016 (calendar year).

Catch Area/River	Catch	# Sampled	Sample Rate
7-7A	28	24	86%
7B-7C-7D-Nooksack River	87	1	1%
Skagit River/Bay	2,522	1,349	53%
8A	44	54 <sup>a</sup>	123%
8D	6,294	1,073	17%
Stillaguamish River	0	0	--
10	48	8	10%
10E	5,667	2,990	53%
10F	59	28	47%
10G	3	5 <sup>a</sup>	167%
10A	248	244	98%
Duwamish River	303	267	88%
Puyallup/White rivers	872	335	38%
Nisqually River	4,890	2,976	61%
13A	2,380	287	12%
13C	0	0	-
13D-F	3,249	2,348	72%
9	21	11	52%
9A-12-12A-12B	178	7	4%
12C	12,878	7,882	61%
12H	18,529	9,141	49%
Skokomish River	10,403	2,221	21%
Purdy Creek	3,551	855	24%
Strait of JDF 4B-5-6C (Net)	280	140	50%
Strait of JDF 4B-5-6C (Troll) <sup>b</sup>	150	18	12%

<sup>a</sup> Number sampled includes In-sample with known catch as well as voluntary submissions with unknown catch.

<sup>b</sup> Includes 4B Summer Troll catch for 2016

Table 5-2. Chinook coded-wire tag sampling rates for marine recreational fisheries in 2016.

Catch Area	Catch	# Sampled	Sample Rate
Marine Sport Area 5	6,880	1,364	19.8%
Marine Sport Area 6	8,079	1,906	23.59%
Marine Sport Area 7	5,881	1,486	25.27%
Marine Sport Area 8.1	381	116	30.45%
Marine Sport Area 8.2	889	330	37.12%
Marine Sport Area 9	7,542	1,635	21.68%
Marine Sport Area 10	2,778	427	15.37%
Marine Sport Area 11	2,306	512	22.20%
Marine Sport Area 13	1,366	251	18.37%
Marine Sport Area 12	1,411	149	10.56%

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## Appendix 1. 2017-2018 List of Agreed Fisheries

### 1. Part I. Treaty/Non-Treaty OCEAN Fisheries (FRAM #2017 (Chinook) & #1731 (Coho))

Treaty Troll Quota	40,000 Chinook; 12,500 Coho
Non-treaty TAC	90,000 Chinook (and Mark Selective fishery impacts associated with a landed catch of 47,600 Coho.
NT Troll TAC	45,000 Chinook; Mark Selective Fishery impacts associated with a landed catch of 5,600 Coho
Recreational TAC	45,000 Chinook and Mark Selective Fishery impacts associated with a landed catch of 42,000 Coho.

#### 1.1 Treaty Troll: Areas 2, 3, 4 & 4B

5/1-6/30	Chinook directed fishery with subquota of 20,000 Chinook. Open May 1 through June 30 or attainment of 20,000 Chinook subquota, whichever comes first. All salmon except Coho. If the Chinook quota for the May-June fishery is not fully utilized, the excess fish may be transferred into the later all-salmon season on an impact-neutral basis for limiting stocks into the later all-salmon season. If the Chinook quota is exceeded, the excess will be deducted from the later all-salmon season.
7/1-9/15	All salmon species with subquota of 20,000 Chinook plus any portion of uncaught Chinook rolled over from the May 1 <sup>st</sup> through June 30 <sup>th</sup> time period on an impact neutral basis <u>or</u> quota of 12,500 Coho whichever comes first. Chum release 8/1-9/15.

#### 1.2 Non-Treaty Troll: U.S./Canada border to Cape Falcon

5/1- thru earliest of 6/30 or pre-season Chinook sub-quota of 27,000 (no more than 8,900 of which may be caught in the area between the U.S./Canada border and the Queets River and no more than 9,000 of which may be caught in	All salmon except Coho with 27,000 Chinook quota; no more than 8,900 of which may be caught in the area between the U.S./Canada border and the Queets River and no more than 9,000 of which may be caught in the area between Leadbetter Pt. and Cape Falcon; Open May 1-June 30, 7 days per week. In the area between the U.S.-Canada border and the Queets River, a landing and possession limit of 60 Chinook per vessel per calendar week (Monday through Sunday) is in place. An in-season conference call will occur when it is projected that 75% of the Chinook guideline have been landed overall or 75% of the sub-area guideline have been landed in the area between the U.S./Canada border and the Queets River or 75% of the sub-area guideline have been landed in the area between Leadbetter Pt and Cape Falcon to consider modifying the open period and adding or modifying landing and possession limits. Mandatory
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<p>the area between Leadbetter Pt. and Cape Falcon)</p>	<p>Yelloweye Rockfish Conservation Area, Columbia and Cape Flattery Control Zones closed. Trip limits, gear restrictions, and guidelines may be implemented or adjusted in-season. Vessels must land their fish within 24 hours of any closure of this fishery; under state law, vessels must report their catch on a state fish receiving ticket. Vessels in possession of salmon north of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook and halibut catch aboard, and destination. Vessels in possession of salmon south of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook and halibut catch aboard, and destination. Vessels fishing, or in possession of salmon while fishing north of Leadbetter Point must land and deliver their fish within the area and north of Leadbetter Point. Vessels fishing, or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi.</p>
<p>7/1 thru earliest of 9/19 or pre-season Chinook sub-quota of 18,000 (no more than 7,200 of which may be taken in the area between the U.S./Canada border and the Queets River) or Mark Selective Fishery quota of 5,600 Coho.</p>	<p>Open July 1-4, then Friday through Tuesday July 7 through September 19 with a landing and possession limit of 60 Chinook and 10 marked Coho per vessel per open period in the area between the U.S.-Canada border and the Queets River, or 75 Chinook and 10 marked Coho per vessel per open period in the area between the Queets River and Cape Falcon.. All salmon, except no Chum retention north of Cape Alava, Washington beginning August 1 (all retained Coho must have a healed adipose fin clip). An in-season conference call will occur when it is projected that 75% of the Chinook guideline Chinook have been landed overall or 75% of the sub-area guideline have been landed in the area between the U.S./Canada border and the Queets River to consider modifying the open period and modifying landing and possession limits. Mandatory Yelloweye Rockfish Conservation Area, Cape Flattery and Columbia Control Zones closed. Grays Harbor Control Zone closed beginning August 14. Trip limits, gear restrictions, and guidelines may be implemented or adjusted in-season. Vessels must land their fish within 24 hours of any closure of this fishery. Under state law, vessels must report their catch on a state fish receiving ticket. Vessels in possession of salmon north of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook, Coho, and halibut catch aboard, and destination. Vessels in possession of salmon south of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook, Coho, and halibut catch aboard, and destination. Vessels fishing, or in possession of salmon while fishing north of Leadbetter Point must land and deliver their fish within the area and north of Leadbetter Point. Vessels fishing, or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in</p>

	Garibaldi.
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### 1.3 Non-Treaty Recreational

#### Area 1: Leadbetter Point to Cape Falcon (Oregon)

6/24-9/4 (21,000 Mark Selective Fishery Coho sub quota)	Open 7 days per week; 2 fish per day, only one of which may be a Chinook; retained Coho must have a healed adipose fin clip; Chinook minimum size limit 24 inches and Coho minimum size 16"; Chinook guideline: 13,200; closed in Columbia Control Zone. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.
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#### Buoy 10

8/1-9/7	Open 7 days/week; 2 fish per day, only one of which may be a Chinook; Chinook minimum size 24 inches and Coho minimum size 16 inches; retained Coho must have a healed adipose fin clip. Release all salmon other than Chinook and hatchery Coho. Barbless hooks only.
9/8-9/30	Open 7 days/week; 2 fish per day. Release all salmon other than hatchery Coho. Coho minimum size 16 inches retained Coho must have a healed adipose fin clip. Barbless hooks only.
10/1-12/31	Open 7 days/week; 6 fish per day, 2 adults (minimum size 12 inches) may be retained, Coho must have a healed adipose fin clip. Release all salmon other than Chinook and hatchery Coho. Barbless hooks only.
1/1-3/31	Open 7 days/week; 6 hatchery Chinook per day, 2 adults (minimum size 12 inches); retained Chinook must have a healed adipose fin clip; release sockeye, Chum, Coho and wild Chinook. Barbless hooks only.
North Jetty	Open 7 days per week when Area 1 or Buoy 10 area is open. When Buoy 10 area and Area 1 are open concurrently, the daily limit and minimum size restrictions follow the most liberal regulations of those areas. Barbless hooks only.

#### Area 2: Queets River to Leadbetter Point

7/1-9/4 (15,540 Mark Selective Fishery Coho sub quota)	Open 7 days per week; 2 fish per day, only one of which may be a Chinook; retained Coho must have a healed adipose fin clip; Chinook minimum size limit 24 inches and Coho minimum size 16 inches; Chinook guideline: 21,400. Grays Harbor Control Zone closed beginning August 14. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.
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**Area 2-1 (east of a line from Leadbetter Point to Cape Shoalwater): Willapa Bay**

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6/8-7/31	To be determined
8/1-1/31	To be determined

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**Area 2-2 (east of line between tips of exposed jetties): Grays Harbor**

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West of Buoy 13 line 7/1-9/4	Open concurrent with Area 2, when Area 2 is open for salmon. Area 2 rules apply. Grays Harbor Control Zone closed beginning 8/14.
East of Buoy 13 line, when open	All salmon required to be released may not be totally removed from the water, except anglers fishing from boats 30' or longer as listed on either their State or Coast Guard regulation are exempt. Single-point barbless hooks required.
East of Buoy 13 line 7/1-8/1	Closed.
East of Buoy 13 line 8/1-9/15	2 fish limit, 12" min size limit. Release wild Coho. Open to salmon angling only in the area described as Humptulips – North Bay (the area conforms to the commercial SMCRA 2C).
East of Buoy 13 line 9/16-11/30	2 fish limit, 12" min size limit, of which only one may be a wild Coho. Release Chinook. Open to salmon angling only in the area described as East Grays Harbor (the area conforms to the commercial SMCRA 2D).

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**Westport Boat Basin and Ocean Shores Boat Basin**

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8/16-1/31	6 fish limit, 4 adults; 12" min size limit. Release Chinook.
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**Areas 3-4: U.S./Canada border to Queets River**

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**Area 3: Cape Alava to Queets River**

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6/24-9/4 (1,090 Mark Selective Fishery Coho sub quota)	Open 7 days per week; 2 fish per day; retained Coho must have a healed adipose fin clip; Chinook minimum size limit 24 inches, Coho minimum size 16 inches; Chinook guideline: 2,500. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.
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**Area 4: U.S./Canada border to Cape Alava and east to Sekiu River**

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6/24-9/4 (4,370 Mark Selective Fishery Coho sub quota)	Open 7 days per week; 2 fish per day; retained Coho must have a healed adipose fin clip. Chum non-retention during August and September. Chinook minimum size limit 24 inches and Coho minimum size 16 inches; Chinook guideline: 7,900; Chinook non-retention east of Bonilla-Tatoosh line beginning August 1. Closed waters: east of a true north-south line running through Sail Rock in July; <b>Closed to salmon angling</b> July 1-Sept. 30 inside the area bounded by a line from Kydaka Point to Shipwreck Point. In-
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season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.

**Area 4A: Makah Bay Treaty Evaluation Marine Set Net Fishery**

Chinook	Trty	Open 8/15 through 9/15 inside an area bounded by a line running from Strawberry Rock Point (48° 19' 07"N, 124° 40' 00"W) to the group of rocks (48° 19' 46"N, 124° 40' 35"W) which are located off Hobuck Beach and a line to the mouth of Hobuck Creek (48° 19' 54"N, 124° 39' 37"W), to be implemented per agreement between the Makah Tribe and WDFW.
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**2. Part II. PUGET SOUND including STRAIT of JUAN de FUCA and SAN JUAN ISLANDS fisheries (All fisheries modeled in FRAM #2017 (Chinook) & #1731 (Coho))**

For all Puget Sound marine recreational Chinook fisheries, the minimum size is 22" unless otherwise noted.

**2.1 Strait of Juan de Fuca Pre-terminal Areas**

**Areas 5, 6, 6C Treaty Troll (Ntrty net closed)**

NOTE: Area 4B: 5/1-10/31 see Ocean Troll. For 11/1-12/31 & 1/1-4/15 see below.

5/1-6/15	Closed
6/16-9/30	Open for salmon, Chum release; Freshwater Bay closed, south of Angeles Pt./Observatory Pt. line; Pt. Angeles Harbor closed west of line from tip of Ediz Hook to ITT Rayonier Dock; Hoko Bay closed inside the area bounded by a line from Kydaka Point to Shipwreck Point; Area 6 closed east of a line true north from Green Point; 1,000 foot closure around stream mouths. The catch estimates for this fishery modeled in FRAM are statistically-derived predictions, and are the best available pre-season estimates of catch in this fishery. In order to have the actual catch reflect run strength, however, these estimates will not be treated as a ceiling when the managers make in-season fishery management decisions.
10/1-10/31	Closed
11/1-4/15	In Areas 4B, 5, 6, 6C the treaty troll fishery will be open from November 1, 2017 through April 15, 2018, or when the catch reaches the harvest ceiling of 8,500 Chinook, whichever comes first. 1,000-foot closures around stream mouths. Hoko Bay closed inside the area bounded by a line from Kydaka Point to

	<p>Shipwreck Point for the month of November.</p> <p>The catch estimates for this fishery modeled in FRAM are statistically-derived predictions, and are the best available pre-season estimates of catch in this fishery. In order to have the actual catch reflect run strength, however, these estimates will not be treated as a ceiling when the managers make in-season fishery management decisions. The winter troll catch ceiling is 8,500 Chinook.</p>
4/16-4/30	Closed

**Areas 4B, 5, & 6C Treaty Net (Ntrty net closed)**

Note: The catch estimates for this fishery modeled in FRAM are statistically-derived predictions, and are the best available pre-season estimates of catch in this fishery. In order to have the actual catch reflect run strength, however, these estimates will not be treated as a ceiling when the managers make in-season fishery management decisions.

Chinook	<p>Open for setnet gear only, 6/18 through 8/19; 7 days a week; Hoko Bay closed, inside the area bounded by a line from Kydaka Point to Shipwreck Point; Freshwater Bay closed, south of Angeles Pt./Observatory Pt. line; 1,000-ft. closure around stream mouths.</p>
Sockeye/Pink	<p>Start to be determined by Fraser River Panel. The Co-managers have identified the following management actions to control bycatch of Chinook. Estimated bycatches are best estimates and are not quotas or ceilings. The priority for this fishery is to harvest the full Treaty share of sockeye and pink salmon, while managing the fishery so as to not greatly exceed the projected incidental harvest of Chinook salmon. All Chinook bycatch in this fishery will be promptly reported by each Tribe to the NWIFC TOCAS database and reported to the U.S. section of the Fraser Panel at least weekly, including take home and ceremonial and subsistence (C&amp;S). If in-season the Chinook bycatch in this fishery exceeds 1,300, the Tribes will consider management actions to limit the Chinook bycatch, such as time or area restrictions, while continuing the priority objective of harvesting sockeye salmon. If in-season the fishery is projected to result in a total Chinook bycatch exceeding 3,300 Chinook, the Tribes will, effective with that scheduled fishery opening, prohibit any commercial sales of Chinook salmon, and any Chinook salmon landed must be delivered to the fishers' respective Tribe.</p>
Coho	<p>Open for gillnets starting at 6 days per week with in-season adjustments based on cumulative catch. Fishery will target Coho from the end of Fraser Panel control, through 10/7; 1,000 ft. closure around stream mouths. Hoko Bay closed, inside the area bounded by a line from Kydaka Point to Shipwreck Point.</p>
Chum	<p>Open for gillnets, starting at 6 days per week (day may be added if effort is low), 10/8 through 11/11; 1,000-foot closure around stream mouths. Hoko Bay closed, inside the area bounded by a</p>

	line from Kydaka Point to Shipwreck Point.
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**Area 5 Recreational**

Kydaka Point Closure: Waters south of a line from Kydaka Point westerly approximately 4 miles to Shipwreck Point closed to salmon angling 5/31-10/31.

5/1-6/30	Closed
7/1-8/15	2 fish limit, release wild Chinook, wild Coho, and Chum.
8/16-8/31	2 fish limit, release Chum, Chinook, and wild Coho.
9/1-3/15	Closed
3/16-4/30	2 fish limit, release wild Chinook and Coho.

**Area 6 Recreational**

5/1-6/30	Closed
7/1-8/15	2 fish limit, plus 2 additional Sockeye salmon, release Chum, wild Chinook, and wild Coho, E. of true N/S line through "2" buoy near tip of Ediz Hook release Chinook salmon. South of Angeles Pt./Observatory Pt. line – closed to angling. Pt. Angeles Hbr. W. of line from tip of Ediz Hook to ITT Rayonier Dock – closed to salmon angling.
8/16-2/28	Closed to salmon angling.
3/1-4/15	2 fish limit, release wild Chinook and Coho.
4/16-4/30	Closed

**2.2 Strait of Juan de Fuca Terminal Areas**

**Area 6D Dungeness Bay Net**

Chinook	All	Closed
Pink	Trty	Closed
	Ntrty	Closed.
Coho	Trty	Open 9/21 through 10/31; Additional days beyond 10/31 may be considered; 9/21 through 10/10: seven days per week, fishing 7 am to 7 pm only, nets must be attended by fisher, Chinook and Chum release; 10/11 through 10/31 (or 11/5 should conditions allow): seven days per week, 24 hours per day; 1,500 ft closure around mouth of Dungeness River.

	Ntrty	Open Wk 38 (wb 9/17) through Wk 44 (wb 10/29) for skiff gillnet gear; 7AM – 7PM daily, Wk 38: 2 days, Th-F, Wks 39-44; 5 days M-F; Chinook and Chum NR, release by cutting ensnaring meshes; 1,500 ft. (1/4 nautical mile) closure around each river mouth. Additional openings possible based on in-season information.
Chum	All	Closed

**Dungeness River (Treaty and Recreational)**

Note: The following applies to all Dungeness River coho fisheries (Tribal & WDFW): Co-managers will meet on, or prior to October 7, 2017 to review river flow and weather conditions for the week of October 8-15. In the absence of river flow and weather conditions meeting agreed-to criteria, Dungeness River fisheries remain closed prior to the dates listed below.

**Dungeness River Treaty (Ntrty net closed)**

Chinook	Trty	Closed
Pink	Trty	Closed
Coho	Trty	Commercial fishing up to 3 days/wk, to be determined in-season, for Coho only, is scheduled to open on 10/16 and will be restricted to areas below the Dungeness hatchery intake using species selective (hand-held) gear. Subsistence fishing using selective gear is scheduled to open on 10/16. Refer to the co-management agreement above for possible emergency openings.
Chum	Trty	Closed

**Elwha River Treaty (Ntrty net closed)**

Chinook	Trty	Closed except Ceremonial Harvest of 4 fish in July.
Coho	Trty	Closed
Chum	Trty	Closed

**Dungeness Bay Recreational**

5/1-9/30	Closed to salmon angling.
10/1-10/31	2 fish limit, Hatchery Coho only.
11/1-4/30	Closed to salmon angling.

**Dungeness River Recreational**

(mouth to hatchery intake pipe at RM 11.3)	10/16-11/30	4 fish limit, Hatchery Coho only; 12” min size.
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**Elwha River Recreational**

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Closed to all fishing.

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**Hoko River Recreational**

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(mouth to cement bridge (mile 7.0) on Hoko/Ozette Hwy.)	All year Closed to salmon.
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All other STRAIT OF JUAN DE FUCA REGION freshwater recreational closed to salmon angling.

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**3.**

**2.3 San Juan Islands/Point Roberts Area**

**Areas 6, 7, & 7A Net**

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Chinook	All	Closed
Sockeye	Trty	Schedule to be determined. The Co-managers have identified the following management actions to track and control bycatch of Chinook. Estimated bycatches are best estimates and are not quotas. The priority for this fishery is to harvest the full treaty share of sockeye salmon, while managing the fishery so as to not greatly exceed the projected incidental harvest of Chinook salmon. All Chinook bycatch in this fishery will be promptly reported by each Tribe to the NWIFC TOCAS database and reported to the U.S. Section of the Fraser Panel at least weekly, including take home and ceremonial and subsistence (C&S). Prior to achieving a bycatch of 4,200 Chinook there will be no restrictions on the retention or sale of Chinook salmon. If, during the season, the Fraser Panel schedules a fishery that is projected to result in a total Chinook bycatch exceeding 4,200 fish, the Tribes will, effective with that scheduled fishery, prohibit any commercial sales of Chinook salmon, and any Chinook salmon landed must be delivered to the fisher's respective Tribe. Prior to achieving a purse seine bycatch of 2,300 coho for the month of September, there will be no restrictions on the retention or sale of coho salmon. After a purse seine bycatch of 2,300, the Tribes will prohibit coho retention for purse seines only. Reef net wild coho, wild Chinook, and chum NR. Reef net may retain marked Chinook through 9/30. July and August – C&S fishery. Further policy discussion may occur among the affected parties prior to the season.

	Ntrty	Schedule to be determined. The Co-managers have identified the following management actions to track and control by-catch. Modeled by-catches are best estimates and are not quotas. All vessel operators must complete best fishing practices certification prior to fishing. PS: brailing required. Chinook, Coho, and Chum NR. Reef net wild Coho, Chum, and wild Chinook NR. Reef net: fishers may retain hatchery Chinook, with a cap of 300 for all gears through 9/30. Estimates of by-catch will be shared at least weekly in the U.S. Section of the Fraser River Panel. Purse seine and gillnet fisheries will be managed to ensure that the non-treaty impact does not exceed 4,863 total Chinook (120% of pre-season estimate).
Pink	Trty	Purse seine, gill net, and reef net: schedule dependent upon Fraser Panel. See Chinook and coho bycatch in-season actions description in sockeye section above. Reef net: wild coho, wild Chinook, and chum NR. Reef net may retain marked Chinook through 9/30.
	Ntrty	Schedule to be determined. All vessel operators must complete best fishing practices certification prior to fishing. PS: brailing required. Chinook, Coho, and chum NR. Reef net: Chum, wild Chinook, and wild Coho NR. See Chinook by-catch in-season actions description in Sockeye section above.
Coho	Trty	Reef net: 7 days/wk beginning at end of Fraser Panel management through 11/8; Chinook NR after 9/30; wild Coho NR through 9/30, then coho retention. Chum NR through 9/30.
	Ntrty	Reef net: 7 days/wk beginning at end of Fraser Mgmt through Chum mgmt wk 45 (wb 11/5); Chinook NR after 9/30; unmarked-Coho release through 9/30, then Coho non-selective. Chum retention prohibited until after 9/30. All vessel operators must complete best fishing practices certification prior to fishing.
Chum	Trty	The Treaty fishery will open October 10 and remain open for the duration of the chum fishery, dependent on run status updates from CDFO. Prior to achieving a by-catch of 5,000 Coho there will be no restrictions on the retention or sale of Coho salmon. Prior to achieving a purse seine bycatch of 5,000 coho for October and November, there will be no restrictions on the retention or sale of coho salmon. After a purse seine bycatch of 5,000, the Tribes will prohibit coho retention for purse seines only. See attached 2017 7/7A Chum Fishing Plan. Reef nets open from end of Fraser Panel management through end of chum management (11/8), 7 days/wk. Reef net release requirements listed in Coho fishery description, above.

Ntrty	Dependent on update of run status from CDFO. PS and GN open wk 41 (wb 10/8) through wk 45 (wb 11/5). Open 10/10, 10/11, 10/15, and 10/15 through end of season. Co-managers will meet via conference call on Monday 10/16 to discuss catch to date. Fishery will re-open based on conditions outlined in the attached agreement. PS: brailing required, Chinook and Coho NR. GN: during wks 41 and 42, Chinook and Coho NR, live box required and limited soak times in effect. Reef nets open from end of Fraser Panel management through wk 45 (wb 11/5), 7 days/wk, must release all Chinook after 9/30; unmarked-Coho release through 9/30. All vessel operators must complete best fishing practices certification prior to fishing.
Subsistence	Trty 12/1 – 4/30 subsistence troll fishery (Chinook 22” min size). Bellingham Bay closed 4/1 – 4/30.

### Area 7 Recreational

5/1-6/30	Closed
7/1-7/31	2 fish limit, plus 2 additional Sockeye salmon; release wild Chinook and Coho. Waters of Area 7 in Rosario Strait and the eastern portion of the Strait of Juan de Fuca southerly of a line running true south from the westernmost point on Fidalgo Head to Burrows Island, then westerly and southerly along the shore of Burrows Island to the Burrows Island Lighthouse, then westerly to Bird Rocks, then westerly from Bird Rocks to the southernmost point on Decatur Island, then southerly across Lopez Pass to Lopez Island and following the shore of Lopez Island southerly and westerly to Iceberg Point, then from Iceberg Point to Cattle Point, then south southwest to the Salmon Bank Buoy, and then true south from the Salmon Bank Buoy to the Area 7 boundary, closed to salmon angling. Bellingham and Samish Bay closed to salmon angling.
8/1-9/30	2 fish limit, 1 Chinook plus 2 additional Sockeye salmon, release Chum and Coho. Waters of Area 7 in Rosario Strait and the eastern portion of the Strait of Juan de Fuca southerly of a line running true south from the westernmost point on Fidalgo Head to Burrows Island, then westerly and southerly along the shore of Burrows Island to the Burrows Island Lighthouse, then westerly to Bird Rocks, then westerly from Bird Rocks to the southernmost point on Decatur Island, then southerly across Lopez Pass to Lopez Island and following the shore of Lopez Island southerly and westerly to Iceberg Point, then from Iceberg Point to Cattle Point, then south southwest to the Salmon Bank Buoy, and then true south from the Salmon Bank Buoy to the Area 7 boundary, closed to salmon angling. Bellingham Bay closed to salmon angling 7/1-8/15; Samish Bay closed to salmon angling. Lummi Bay closure area: east of a line from Gooseberry Point to Sandy Point 9/8 – 10/15.
10/1-12/31	Closed to salmon angling.

1/1-4/30	2 fish limit, release wild Chinook and Coho. Bellingham Bay and Samish Bay closed to salmon angling 3/1 – 4/30.
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## 2.4 Nooksack/Samish Terminal Region

### Bellingham Bay (Areas 7B, 7C, 7D; 7A On-Reservation) Net

Chinook/Pink	Trty	<p>Areas 7B, &amp; 7D: August 1 through September 1, open weekly 4 PM Sunday to 4 PM Friday. Fishing pattern 3,5,5,5,5.</p> <p>Area 7C: August 1 through September 15, open weekly 4 PM Sunday to 4 PM Friday; fishing pattern 3,5,5,5,5,5.</p> <p>Samish Bay is closed southeasterly of a line from Oyster Creek to the fisheries marker on Samish Island, except that hand pull gill nets may fish from 4 PM Sunday – 4 PM Wednesday south to a line from Oyster Creek to Fish Point on Samish Island, August 1 through September 13 4 PM Sunday – 4 PM Wednesday, weekly; fishing pattern: 1,3,3,3,3,3,3. 6 ½” mesh in 7C and off-reservation areas of 7B, except when open for sockeye in 7 and 7A.</p>
	Ntrty	<p>Areas 7B &amp; 7C: Wks 33 (wb 8/13) - 36 (wb 9/3); PS Coho NR through 9/1. GN fishing pattern: 3, 4, 4, 5; PS fishing pattern: 1,1,1,1. See Hales Pass closure below beginning 9/1. Area 7C Wk 37 (wb 9/10); GN fishing pattern: 5, PS fishing pattern 3.</p>
Coho	Trty	<p>Area 7A on-reservation fishery: September 10 through October 11. Open weekly 4 PM Sunday – 4 PM Wednesday. Fishing pattern 3,3,3,3.</p>
		<p>Areas 7B and 7D: September 3 through October 21, open 4 PM Sunday – 4 PM Saturday. Fishing Pattern: 6,6,6,6,6,6,6.</p>
		<p>7C: On October 2, a Co-manager conference call will be held to determine the status of Samish Chinook escapement. If the escapement goal appears to be attainable, and through development of a co-manager agreed in-season update methodology it is determined that there is a harvestable surplus of Samish Coho, then a Coho fishery will open October 8 – October 25, 4 PM Sunday – 4 PM Wednesday, weekly; fishing pattern 3,3,3.</p>

	Ntrty	Area 7B: Wks 37 (wb 9/10) - 43 (wb 10/22); GN fishing pattern: 5,5,7,7,7,7,7 (24 hrs for all days); PS fishing pattern: 3,3,7,7,7,7,7. Hales Pass closed for all GN openings from Sept. 1 - 21, in the waters of Area 7B west of a line from Point Francis (48°41'46"N, 122°36'32"W) to the red and green buoy southeast of Point Francis (48°40'27"N, 122°35'24"W), then to the northernmost tip of Eliza Island (48°39'38"N, 122°35'14"W), then along the eastern shore of the island to its southernmost tip (40°38'40"N, 122°34'57"W) then north of a line from the southernmost tip of Eliza Island to Carter Point (48°38'24"N, 122°36'31"W). NT purse seine fisheries fishing in this area must release Coho Sept. 1-21.
Chum	Trty	Areas 7B & 7D: Oct. 22 – Dec.13; open weekly 4 PM Sunday – 4 PM Wednesday; 3,3,3,3,3,3,3.
	Ntrty	Area 7B: Wks 44 (wb 10/29) - 49 (wb 12/3); PS/GN; 7.5,5,5,5,5. Whatcom Creek Zone (east of line from Post Point to flashing red light at west entrance of Squalicum Harbor) open 7 days per week.

**Nooksack River Treaty Net (Ntrty net closed)**

Note: On a weekly basis, Nooksack Tribe commercial fisheries on the Nooksack River will open at 12:01 AM Sun, except that portion of the river between Marine Drive Bridge and the first turn ("Big Bend") in the river upstream of the Slater Road Bridge (approximately ¼ mile upriver from the Slater Road Bridge), which will open at 4:00 PM Sunday. On a weekly basis the Nooksack Tribe's commercial Chinook and pink fisheries will close 4:00 PM Friday; coho fisheries will close 4:00 PM Saturday and chum fisheries will close 4:00 PM Wednesday.

Chinook/Pink	4/1-6/15	April to mid-June: limited ceremonial and subsistence fishery will be managed for a total mortality of 15 NOR Chinook. A traditional fishery will occur 500 feet upriver from the Highway 9 bridge in the lower North Fork and the Nugents Corner Boat Launch in the mainstem (the boat launch is located just down river from Nugent's Corner Bridge) (RM 30.6 and 36.8). A total of 70 Chinook are projected in this fishery with an anticipated 3 NORs among the 70. This fishery is by permit only. Another fishery will occur in the lower Nooksack River between the Slater Road bridge and the river mouth (between RM 0.0 and 3.5). The lower river fishery will be selective and is projected to encounter 29 NOR Chinook with an estimated mortality of 12 NOR Chinook.
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	8/1-9/2	Open weekly 4 PM Sunday to 4 PM Saturday, August 1 to 4 PM September 2. Fishing pattern: 4,6,6,6,6. The river is divided into five zones during this period. These zones open in subsequent weeks, proceeding upriver, to protect migrating spring Chinook. The area in Zone 4 upriver of the Nooksack Tribal Works building will remain closed from August 20 through September 2 to protect holding Spring Chinook Zone 1 is from Marine Drive Bridge to Slater Bridge. Zone 2 is from Slater Bridge to Hannegan Bridge In Lynden. Zone 3 is from Hannegan Bridge to Nugents Corner Bridge. Zone 4 is from Nugents Corner Bridge to the confluence of the north and south forks. Zone 5 is upriver of the confluence of the north and south forks.
Coho	9/3 -10/21	Open weekly 4 PM Sunday through 4 PM Saturday. Fishing Pattern: 6,6,6,6,6,6,6. The area up-river of the Nooksack Tribal Works Building will remain closed until September 23 to protect holding Spring Chinook.
Chum	11/2-3 or 11/9-10	Subsistence harvest only. The Lummi Nation and Nooksack Tribe will determine in-season which two days to hold this subsistence fishery.
	10/22 – 12/13	Commercial. Open weekly 4 PM Sunday through 4 PM Wednesday. Fishing Pattern: 3,3,3,3,3,3,3.

**Bellingham Bay Terminal Area Recreational**

5/1-8/15	Closed to salmon angling.
8/16-9/30	4 fish limit, 2 Chinook; release wild Chinook from 10/1-10/31. Samish Bay closed to salmon angling through 10/15.
10/1-2/28	Same as Area 7.
3/1-4/30	Closed to salmon angling.

**Nooksack River Recreational; mainstem and North Fork**

(from Lummi Indian Reservation boundary to yellow marker at the FFA high school barn in Deming)	7/16-8/31	Daily limit 4 Pink salmon only.
	9/1-12/31	2 fish limit, plus 2 additional Coho; 12" min size. Release wild Chinook through 9/30 and release wild Coho.

(from yellow marker at the FFA high school barn in Deming to confluence of North and South forks)	10/1 – 12/31	2 fish limit, plus 2 additional Coho; 12” min size. Release wild Coho.
North Fork mouth to Maple Creek	10/1-11/30	2 fish limit, plus 2 additional Coho; 12” min size. Release wild Coho.
<b>Nooksack River Recreational, South Fork</b>		
(from mouth to Skookum Creek	10/1 – 12/31	2 fish limit, plus 4 additional Coho; 12” min size. Release wild Chinook 10/1-10/15, and release wild Coho and Chum. Gamefish closed 6/1-9/30.
<b>Samish River Recreational</b>		
(from mouth to I-5 Bridge)	8/1-11/30	2 fish limit, 12” min size. Release wild Coho
<b>Dakota Creek Recreational</b>		
(mouth to Giles Road Bridge)	10/1 – 12/31	2 fish limit, 12” min size. Release wild Chinook and wild Coho.
<b>Whatcom Creek Recreational</b>		
(mouth to yellow markers below foot bridge below Dupont St. in Bellingham)	8/1 – 12/31	6 fish limit, 2 adults; 12” min size. Release wild Coho.

All other NOOKSACK/SAMISH TERMINAL REGION freshwater recreational: Closed to salmon angling.

## 2.5 Skagit Terminal Region

Terminal area fisheries will be managed so as not to exceed total projected incidental fishery mortalities of Skagit wild summer/fall Chinook. Treaty schedules may be changed in-season as necessary to meet management objectives and harvestable shares and to address river and weather conditions. Swinomish, Sauk-Suiattle, and Upper Skagit Tribes’ fisheries will be managed so as not to exceed their individual shares based on the preseason forecast and any in-season update that becomes available. The modeled inter-tribal catch distributions are forecasts only and do not set a precedent for future years.

The Skagit co-managers will utilize the same update models for Sockeye, and Chum ISU consideration (with data from 2016 added) that have been used in recent years. Coho ISU will also be the same as that of previous years, with special consideration (see below). Other models may be considered with co-manager agreement should they become available before the fishery. (see appendix for further details).

NOTE: See appendix for details for the conduct, monitoring, reporting, assessment, and in-season co-manager actions upon which the following fisheries are agreed to. Additionally, in-season update methodology for sockeye, coho, and chum are addressed.

Communication: Co-managers will share available information from the Area 4, 5, and 6 recreational fisheries (species, mark, size, catch, encounter) the second week of August. This information will be evaluated against pre-season expectation and provide co-managers with additional information which may be useful in management considerations

<b>Skagit Bay (Area 8) Net</b>		
Note: Fishing schedules for Skagit Bay, Skagit River, and Baker River are pre-season projections. Schedules subject to adjustment to accommodate weather and river conditions.		
Spring Chinook	Area 8 – Trty	<u>Swinomish Tribe fishing pattern:</u> Wk 19 (wb 5/7) thru wk 21 (wb 5/21);3,3,3. <u>Upper Skagit Tribe fishing pattern:</u> No scheduled fishery.
Chinook	Area 8 - Trty	Swinomish tribe may elect to take some or all of their C&S reserved Chinook in Area 8.
Sockeye	Area 8 – Trty	<u>Swinomish Tribe fishing pattern:</u> Wk 26 (wb 6/25) thru wk 29 (wb 7/16); 3,5,5,5. Swinomish fishery will be managed so as not to exceed their individual sockeye share based on the preseason forecast and any in-season update that becomes available. Additional fishing dependent on ISU, per MOU. <u>Upper Skagit Tribe fishing pattern:</u> No scheduled fishery.
	Ntrty	Closed
Pink	Area 8 - Trty	<u>Swinomish Tribe fishing pattern:</u> No scheduled fishery. <u>Upper Skagit Tribe fishing pattern:</u> No scheduled fishery.
	Area 8 – Ntrty	Closed. May open pending co-manager agreement on ISU that indicates harvestable run size.

Coho	Area 8	Forecast is for no harvestable surplus and in response to the “Critical” forecast abundance level there are no fisheries planned. Given that the 2017 wild coho forecast is considerably below the critical escapement threshold, the co-managers agree to be very cautious when considering in-season updates and potential fishery openings that may be considered should an ISU indicate harvestable surplus. For this reason, the agreed to in-season update value used for management purposes will be the lower 75% prediction interval of the ISU rather than the midpoint value. To allow for uncertainty and a sufficient number of harvestable fish, the co-managers will not consider opening fisheries unless an agreed ISU exceeds 53,000, at which point a 12.5% treaty commercial harvest rate could be considered.
	Area 8 – Trty	<u>Swinomish Tribe fishing pattern:</u> No scheduled fishery. Swinomish tribe may elect to take some or all of their C&S reserved coho in Area 8. <u>Upper Skagit Tribe fishing pattern:</u> No scheduled fishery.
	Ntrty	Closed
Chum Test	Area 8	1 boat at Jetty 1 day/wk 44 (wb 10/29) & 45 (wb 11/5) and 1 boat in Bay 1 day/wk 44 (wb 10/29) & 45 (wb 11/5).
Chum	Area 8 – Trty	<u>Swinomish Tribe fishing pattern:</u> No preseason harvestable. No scheduled fishery. Fishery dependent on ISU and harvestable fish. <u>Upper Skagit Tribe fishing pattern:</u> No preseason harvestable.
	Ntrty	Closed. May open pending co-manager agreement on ISU that indicates harvestable runsize.

**Skagit River Treaty Net (Ntrty net closed)**

Note: Fishers from the Sauk-Suiattle Tribe may be invited to participate in the 2017 Swinomish salmon fishery in Skagit River Area 78C from the Mount Vernon bridge to the Spudhouse pending annual Swinomish Senate resolution, subject to and in accordance with all provisions of fishing ordinances and regulations of the Swinomish Indian Tribal Community that apply to such fishery.

**[Sauk-Suiattle Tribe reserves their treaty right to execute the release of C&S regulations that mirror their modeled impacts to obtain their species specific allocations if scheduled Skagit River fisheries are not implemented or an invitation to participate in commercial fisheries is not received.]**

The Skagit co-managers will utilize the same update models for Sockeye, and Chum ISU consideration (with data from 2016 added) that have been used in recent years. Coho ISU will also be the same as that of previous years, with special consideration (see below). Other models may be considered with co-manager agreement should they become available before the fishery.

Chinook	Ceremonial and Subsistence – 950 fish (25 spring and 925 summer/fall) total Swinomish, Sauk-Suiattle, and Upper Skagit Tribes. The Upper Skagit Tribe reserves the opportunity to take C&S reserved Chinook across the entire duration of this LOAF agreement, May 1, 2017 through April 30, 2018.	
Spring Chinook	Area 78C	<u>Swinomish and Sauk-Suiattle Tribes fishing pattern:</u> Wk 19 (wb 5/7) thru wk 21 (wb 5/21); 3,3,3. <u>Upper Skagit Tribe fishing pattern:</u> Wk 19 (wb 5/7) thru wk 21 (wb 5/21);1,1,1.
	Area 78D	<u>Upper Skagit Tribe fishing pattern:</u> Wk 19 (wb 5/7) thru wk 21 (wb 5/21);1,1,1.
Sockeye	Area 78C	Swinomish, Sauk-Suiattle, and Upper Skagit Tribes may elect to collect some of their allocation from the Baker River upstream fish trap. <u>Swinomish and Sauk-Suiattle Tribes fishing pattern:</u> Wk 26 (wb 6/25) thru wk 29 (wb 7/16);3,5,5,5. Additional fishing dependent on ISU, per MOU. <u>Upper Skagit Tribe fishing pattern:</u> Wk 26 (wb 6/25) thru wk 29 (wb 7/16);2,0.5,0.5,0.5; Additional fishing dependent on ISU, per MOU.
	Area 78D	Swinomish, Sauk-Suiattle, and Upper Skagit Tribes may elect to collect some of their allocation from the Baker River upstream fish trap. <u>Swinomish Tribe fishing pattern (Area 78D-4 and Baker River):</u> Wk 28 (wb 7/9) thru wk 29 (wb 7/16): 1,1; Additional fishing dependent on ISU, per MOU. <u>Upper Skagit Tribe fishing pattern:</u> Wk 26 (wb 6/25) thru wk 29 (wb 7/16); 2,0.5,0.5,0.5; Additional fishing dependent on ISU, per MOU.

Pink	Area 78C	<u>Swinomish and Sauk-Suiattle Tribes fishing pattern:</u> No scheduled fishery. Fishing dependent on ISU. <u>Upper Skagit Tribe fishing pattern:</u> No scheduled fishery. Fishing dependent on ISU.
	Area 78D	<u>Upper Skagit Tribe fishing pattern:</u> No harvestable surplus and no fisheries planned. Fishing dependent on ISU.
Coho	Forecast is for no commercial harvestable surplus and in response to the “Critical” forecast abundance level there are no fisheries planned. The Swinomish and Sauk-Suiattle, and Upper Skagit tribes reserve 100 coho each (300 coho total) for C&S fisheries. See Area 8 coho section for ISU.	
	Area 78C:	<u>Swinomish and Sauk-Suiattle Tribes fishing pattern:</u> No harvestable surplus and no fisheries planned.
	Area 78D	<u>Upper Skagit Tribe fishing pattern:</u> No harvestable surplus and no fisheries planned.
Chum	Area 78C	<u>Swinomish and Sauk-Suiattle Tribes fishing pattern:</u> No harvestable surplus and no fisheries planned. Fishery dependent on ISU and harvestable fish. <u>Upper Skagit Tribe fishing pattern:</u> No harvestable surplus and no fisheries planned. Fishery dependent on ISU and harvestable fish.
	Area 78D	<u>Upper Skagit Tribe fishing pattern:</u> No harvestable surplus and no fisheries planned. Fishery dependent on ISU and harvestable fish.
River Test	Chinook	Area 78C - Blakes wk 19 (wb 5/7) thru wk 35 (wb 8/27);1 boat, 6 hours/wk.
	Sockeye	Area 78C – Blakes wk 24 (wb 6/11) thru wk 29 (wb 7/16); 1 boat, 12 hours/wk; Area 78D-3 - Upper Skagit - wk 23 (wb 6/4) thru wk 30 (wb 7/23);1 boat, 4 hrs/wk.
	Coho	Area 78C - Blakes Drift wk 34 (wb 8/20) thru wk 45 (wb 11/5), 12 hours/wk; Area 78C – Spudhouse Drift, Upper Skagit, wk 34 (wb 8/20) thru wk 44 (wb 10/29);1 boat, 12 hours/wk; Area 78D-3 Wk 35 (wb 8/27) thru wk 44 (wb 10/29);1 boat, 4 hours/wk.
	Chum	Area 78C - Blakes Drift wk 44 (wb 10/29) and wk 45 (wb 11/5);1 boat, 12 hours/wk.
<b>Swinomish Channel Treaty Net (Ntrty net closed)</b>		
Coho	No separate openings. Area opens during Area 8 openings.	

<b>Area 8-1 Recreational</b>		
5/1-10/31	Closed	
11/1 – 4/30	2 fish limit, release wild Chinook and Coho.	
<b>Baker River/Lake Recreational</b>		
(mouth to Hwy 20 Bridge)	Closed.	
From Hwy 20 Bridge upstream to Dam	Closed.	
Baker Lake	7/8-9/7	4 fish limit, Sockeye only, 18” min. size.
<b>Cascade River Recreational</b>		
(mouth to Rockport-Cascade Road Bridge)	6/1–7/15	4 fish limit, only 2 may be adults, hatchery Chinook only, 12” min. size.
	9/16-11/30	Closed to salmon angling. Fishery may open pending in-season update from the Skagit test fishery and comanager agreement.
<b>Skagit River Recreational</b>		
See appendix for details for the conduct, monitoring, reporting, assessment, and in-season co-manager discussions and actions upon which the following fisheries are agreed.”		
(mouth to Memorial Hwy. Bridge (Hwy 536 at Mt. Vernon))	Closed to salmon angling. Fishery may open pending in-season update from the Skagit test fishery and comanager agreement.	
(From Memorial Hwy Bridge to Gilligan Creek)	6/11-7/15	3 fish limit, Sockeye only (12” min size). Closed on 6/28-6/29, 7/6-7/7, and 7/11 to avoid gear conflicts during Upper Skagit Indian Tribe commercial fisheries. Closure dates may be changed based on comanager discussion.
(From Gilligan Creek to Dalles Bridge at Concrete)	Closed to salmon angling. Fishery may open pending in-season update from the Skagit test fishery and comanager agreement.	
(From Dalles Bridge at Concrete to Hwy 530 Bridge at Rockport)	Closed to salmon angling. Fishery may open pending in-season update from the Skagit test fishery and comanager agreement.	
Hwy 530 Bridge at Rockport to	6/1–7/15	4 fish limit, only 2 may be adults, hatchery Chinook only, 12” min size.

Cascade River Road Bridge (Marblemount Bridge)	7/16-12/31	Closed to salmon angling. Fishery may open pending in-season update from the Skagit test fishery and comanager agreement.
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**All other SKAGIT TERMINAL REGION freshwater recreational closed to salmon angling.**

## 2.6 Stillaguamish/Snohomish Terminal Region

### Area 8A Net

Chinook	Trty	Closed (Ceremonial set-aside of up to 100 Chinook, July-September period).
	Ntrty	Closed
Pink	Trty	Closed
	Ntrty	Closed.
Coho	Trty	Tulalip Tribes: (9/10 – 10/07) 2 days per week. Simultaneous opening as in 8D. Update fishery through 10/07. Manage for Comprehensive Coho Management Plan breakpoints and rates (i.e. particular concerns with Stillaguamish and Skagit natural stocks). Intensive sampling for CWT and DNA (see “Tulalip Tribes 2017 8A Coho Fishery Monitoring and Sampling program”).
	Test	Closed
	Ntrty	Closed.
Chum	Trty	Closed
	Test	Closed
	Ntrty	Closed.

### Area 8D Net

Chinook	Trty	BS, RH, GN gear outside Tulalip Bay may be open during the following periods: 5/7 – 6/03      12:01 AM Sun – 11:59 PM Sat 6/04 – 8/26      12:01 PM Mon – 11:59 PM Thu 8/27 – 9/16      12:01 AM Mon – 11:59 PM Fri Setnets inside Tulalip Bay may be open during the following period: 5/7 – 9/09      12:01 AM Sun – 11:59 PM Sat
	Ntrty	Closed (see recreational SAF)

Coho	Trty	9/10 – 10/21; BS, RH, GN, SN open Mon, Wed, Fri; open to target Tulalip hatchery Coho. 10/22 – 11/11; BS, RH, GN, SN open Mon-Fri.
	Ntrty	Wks 38 (wb 9/17) - 45 (wb 11/5); PS Chinook NR; PS: 1,1,1,1,1,1,2; GN: 3,3,3,3,3,3,3, T and Th-F weekly. Closed east of the line from Mission Point to Hermosa Point.
Chum	Trty	BS, RH, GN gear outside Tulalip Bay: 11/12 – 12/02: Open Mon-Fri. Setnet. 11/12 – 12/02: Open Mon-Fri. Managed to allow for hatchery egg take needs based on Tulalip hatchery escapement updates and projections. All Area 8D fisheries will close concurrently as agreed to by Tulalip and WDFW to ensure egg take requirements are met.
	Ntrty	Wks 46 (wb 11/12) - 48 (wb 11/26); PS fishing pattern: 1,1,1; GN fishing pattern: 3,3,3 daylight hours. Closed east of the line from Mission Point to Hermosa Point. Managed to allow for hatchery egg take needs based on Tulalip hatchery escapement updates and projections. All Area 8D fisheries will close concurrently as agreed to by co-managers to ensure egg take requirements are met.

**Stillaguamish River Treaty Net (Ntrty net closed)**

Chinook	C&S fishery only; Open 5/1 – 7/29; Up to 7 days per week; Maximum catch of 35 Chinook; Open from mouth of Hatt Slough (RM 0) to Danielson Hole (RM 14).
Pink	C&S fishery only; Open 8/1 – 9/4; Up to 5 days per week; Maximum catch of 500 Pink; Open from mouth of Hatt Slough (RM 0) to Danielson Hole (RM 14).
Coho	C&S fishery only; Open 9/4 – 10/29; Up to 5 days per week; Maximum catch of 110 Coho; Open from mouth of Hatt Slough (RM 0) to Danielson Hole (RM 14).
Chum	C&S fishery only; Open 10/30 – 12/3; Up to 3 days per week; max catch of 300 Chum; Open from mouth of Hatt Slough (RM 0) to Danielson Hole (RM 14).

**Snohomish River Treaty Net (Ntrty net closed)**

Chinook, Pink, Coho, Chum	Closed
Coho Test	Closed

**Area 8-2 Recreational**

5/1-7/31	Closed
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8/1-9/4	2 fish limit, hatchery Coho only; shoreline fishing only from Possession Pt North through Possession Pt. waterfront park..
9/5–10/31	Closed to salmon angling.
11/1–4/30	2 fish limit, release wild Chinook and Coho.

**Tulalip Special Area Recreational Fishery**

Same as Area 8-2 Recreational, except during the period 5/30-9/30:	5/26-9/4	Open 12:01 AM Friday – 11:59 AM Monday each week. Closed June 17. Open within Tulalip Special Area boundaries only. Closed to all angling east of the line from Mission Point to Hermosa Point. 2 fish limit salmon, 2 pole endorsement (Chinook 22” min. size).
	9/5-9/8	Closed to salmon angling.
	9/9-9/30	Open Saturday and Sunday each week. Open within Tulalip Special Area boundaries only. Closed to all angling east of the line from Mission Point to Hermosa Point. 2 fish limit salmon, 2 pole endorsement (Chinook 22” min. size).

**Snohomish River Recreational**

Mouth to Highway 9 bridge	8/1–12/31	3 fish limit, 12” min. size. Release Chinook and Chum.
(mouth to confluence of Skykomish and Snoqualmie rivers, including all channels)	8/16–12/31	3 fish limit, 12” min. size. Release Chinook and Chum.

**Snoqualmie River Recreational**

(mouth to Snoqualmie Falls, including all channels)	9/1–12/31	3 fish limit, 12” min size. Release Chinook and Chum.
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**Skykomish River Recreational**

(From mouth to Wallace River)	6/1–7/31	4 fish limit, only 2 may be adults, hatchery Chinook only, 12” min. size.
(From mouth to Lewis St. Bridge in Monroe)	8/16 – 12/31	3 fish limit, 12” min size. Release Chinook and Chum.

From Lewis St Bridge in Monroe to confluence of North and South forks.	9/1 – 12/31	3 fish limit, 12” min size. Release Chinook and Chum
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**Wallace River Recreational**

Mouth to 200’ upstream of water intake of salmon hatchery	9/16 – 11/30	3 fish limit, 12” min size. Release Chinook and Chum.
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**Stillaguamish River Recreational**

(river and all sloughs downstream of Marine Drive to forks)	Closed to salmon angling.	
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All other STILLAGUAMISH/SNOHOMISH TERMINAL REGION freshwater recreational closed to salmon angling.

**2.7 Admiralty Inlet Area**

**Area 9 Net**

Chinook	Trty	Ceremonial and Subsistence – Up to 500 Chinook as agreed upon by those Tribes with U&A in Area 9, (PS and Hook & Line, release all Chum 6/1 – 9/30).
Chum	Trty	Currently, there is no tribal or co-manager agreement on a treaty commercial chum fishery in this management area. However, the Suquamish Tribe has proposed a treaty commercial chum fishery for 2017 and should it go forward all the tribes with adjudicated U&A in the proposed section of Area 9 may choose to participate. The Suquamish fishery will open with a proposed schedule of Wk 43 (wb 10/22) – wk 45 (wb 11/5); fishing pattern: 2,4,4; GN and PS. Open area restricted to that portion of North Hood Canal bounded to the south by the Hood Canal Bridge and bounded to the north by line from White Rock due east to landfall. If the fishery reaches a catch threshold of 30,000 chum salmon before 11/5, there will be a

		<p>conference call among the Tribes to discuss further fishery management actions.</p> <p>It is the desire of all participating tribes to develop a fishing plan for this portion of Area 9 (including monitoring and sampling components) for this year's fishery; and will in good faith work towards this objective for the 2017 season.</p> <p>Participating tribes agree to sample tissue for DNA analysis of their tribe's chum and wild coho bycatch to the extent practicable.</p>
	Ntrty	Closed

### Area 9 Recreational

5/1 – 7/15	Closed
7/16 – 8/15	<p>2 fish limit, release wild Chinook, wild Coho, and Chum.</p> <p>South of Olele Pt. to Foulweather Bluff: open to angling from shoreline only, release chinook and chum.</p> <p>Pt Gamble Bay in waters east of a line from northern boundary of Salsbury Point Park to Cliffside Road closed.</p> <p>If Marine Area 9 Chinook MSF closes prior to 8/15 due to quota being reached, then Area 9 will remain open for shoreline fishing only as described for 8/16 – 9/4.</p>
8/16 – 9/4	2 fish limit, release Chinook, wild Coho, and Chum. Shoreline fishing only. Pt Gamble Bay in waters east of a line from northern boundary of Salsbury Point Park to Cliffside Road closed (2017).
9/5 – 10/31	Closed to salmon angling.
11/1 – 11/30	2 fish limit, release wild Chinook and Coho
12/1 – 1/15	Closed
1/16 – 4/15	2 fish limit, release wild Chinook and Coho.
4/16 – 4/30	Closed

### Edmonds Pier Recreational

Year-Round	2 fish limit, 1 Chinook (Chinook 22" min size), release Chum 8/1-9/30.
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## 5. 3.0 South Sound Region

### 3.1 Area 10 Sub region

#### Area 10 Net

Chinook	Closed
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Sockeye	Trty	Fishery dependent upon ISU (Ballard lock counts). Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983).
	Ntrty	Closed
Pink	Trty	Chinook encounters limited to 400. Coho mortality limited to 250. Retention of Chinook prohibited. All waters within 1,800 feet of shoreline closed; Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983). <u>Suquamish</u> – Wk 31 (wb 7/30) – wk 35 (wb 8/27), Maximum of 5 days/wk, 1 PS, <u>Tulalip</u> – Wk 34 (wb 8/20) – wk 35 (wb 8/27), Anticipated effort: 3 GN, 1 RH, East portion of Area 10 closed. Fishery monitoring will include observer and fisheries enforcement.
	Ntrty	Wks 34 (wb 8/20) – 36 (wb 9/3); PS limited participation (5 boats/day); fishing pattern 1,2,2; Brailing and live boxes required; NR for CK, CO, SO, and CH; GN limited participation (5boats/day); fishing pattern 1,2,2; Live boxes and limited soak times required; NR for CK, CO, SO, and CH; observers required on vessels. Fishery will close if 400 Chinook mortalities are reached prior to scheduled completion. Fisheries closed east inside of a line originating from West Point, extending west to the closest mid-channel buoy; thence true through Pt Wells, until reaching latitude 47 44 500, thence extending directly east to the shoreline. Comanager conference call on 9/1.
Coho	Test	Gillnet: Wk 37 (wb 9/10) - wk 39 (wb 9/24); 3 boats, 3 sites; fishing pattern: 2,2,2.
	Trty	Wk 36 (wb 9/3) – wk 40 (wb 10/1). Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983).
	Ntrty	Closed

Chum	<p>In order to allow fishing opportunity that allows both the treaty and non-treaty fleets to have the ability to catch their shares and provide for escapement; better communication and cooperation is expected from both non-treaty and treaty co-managers. In order to improve management of all component stocks in the South Sound aggregate, the co-managers have agreed to improve in-season management and develop more refined in-season modeling methodologies. Both treaty and non-treaty co-managers will each compile relevant data sources, along with other relevant information such as timing of its availability in-season, predictive power, etc. that may improve ISU models or in-season management no later than May 1 and exchange those no later than May 15. The co-managers commit to schedule a conference call or in-person meeting to discuss these data and other possible data sets prior to June 1. The co-managers further commit to finalizing refinements to in-season management modeling, scheduling of fisheries, and processes for 2017 management no later than September 8, with an ongoing commitment to improve in-season management over the long term.</p>	
	Test	Purse Seine: Wk 41 (wb 10/8) - wk 46 (wb 11/12); 1 site, fishing pattern: 1,1,1,1,1,1.
	Trty	Treaty allocation based on intertribal sharing agreement; wk 41 (wb 10/8) – wk 45 (wb 11/12) fishing pattern – ISU dependent; Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983).
	Ntrty	<p>Wks 42 (wb 10/15) - 47 (wb 11/19); PS Chinook and Coho NR; PS fishing pattern: 1,1,1,2,1,1; GN fishing pattern: 1,2,2,2,2,2. ISU Dependent. Area east of a line from Four Mile Rock south to Alki Point will be closed.</p> <p>Commercial fishing past week 45 for South Sound normal chum in Area 10/11 will proceed based on co-manager agreement. This will be informed by agreed to ISU results and real time watershed information, catch balances and equity, and information related to impacts associated with late timed chum salmon.</p>

**Area 10A Treaty Net (Ntrty net closed): That portion of Elliott Bay east of the line from Pier 91 to the light at Duwamish Head.**

Chinook	Trty Test	Gillnet: Wk 29 (wb 7/16) – Wk 31 (wb 7/30); 7/19, 7/26 & 8/2 (Wednesday nights); 5 fishing sites (one boat per site).8 PM to 8 AM.
	Trty	Gillnet: Wk 32 (wb 8/6) 8/9; 8 PM to 8 AM. Based on ISU consistent with the harvest plan.

		Ceremonial and Subsistence fisheries.
Pink	Trty	Gillnet: Wk 35 (wb 8/27); fishing pattern: up to 5 days per week (Sun – Fri).
Coho	Trty	Gillnet: Fishery will open Wk 36 (wb 9/3) – Wk 42 (wb 10/15) up to 5 days per week (Sun – Fri). (Fishery will be closed if the Duwamish/Green River ISU does not show harvestable coho. If the ISU shows harvestable coho the fishing pattern will be as stated above).
		Ceremonial and Subsistence fisheries.
Chum	Trty	Gillnet: Wk 43 (wb 10/22) - Wk 48 (wb 11/26); fishing pattern: up to 5 days per week (Sun – Fri).
		Ceremonial and Subsistence fisheries.

**Duwamish/Green River (Area 80B) Treaty Net (Ntrty net closed)**

Chinook	Trty	Gillnet: Wk 32 (wb 8/6) 8/9; 8 PM to 8 AM. Based on ISU consistent with the harvest plan.
		Ceremonial and Subsistence fisheries.
Pink	Trty	Gillnet: Wk 35 (wb 8/27) Wk 36 (wb 9/3); fishing pattern: up to 5 days per week (Sun – Fri).
Coho	Trty Test	Gillnet: Wk 36 (wb 9/3) 9/7; Coho ISU test fishery on the river (from the mouth of the East and West waterways up to 16 <sup>th</sup> Avenue Bridge). The 6 sites are as follows: East waterway, West waterway, Old Riverside Marina, Kellogg Island, 1 <sup>st</sup> Ave Bridge and 16 <sup>th</sup> Ave Bridge.
	Trty	Gillnet: wk 37 (wb 9/10) – wk 43 (wb 10/22) Starting September 13th fishery will open up to 16 <sup>th</sup> Avenue Street Bridge, starting September 20th fishery will open up to Boeing St. Bridge. Starting September 27th fishery will open up to Hwy 99 Bridge; fishing pattern: Sunday – Friday; 5 days per week.
Chum	Trty	Gillnet: Wk 44 (wb 10/29) – Wk 48 (wb 11/26); fishing pattern: 5 days per week (Sun – Fri).
		Ceremonial and Subsistence fisheries.

**Area 10E Treaty Net (Ntrty net closed; see below for recreational SAF)**

Chinook	Trty	Wk 30 (wb 7/23) - wk 38 (wb 9/17); fishing pattern: 7 days/wk. Possible extension for Sinclair Inlet.
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Coho	Trty	On-Reservation only; wk 38 (wb 9/17) - wk 43 (wb 10/22); gillnet/beach seine; 7 days/wk.
Chum	Trty	Wk 43 (wb 10/22) - wk 50 (wb 12/10); schedule dependent upon ISU.

**Lake Washington System (includes Lake, Lake Union, Ship Canal, & Lake Sammamish)**

**Areas 10F, 10G, 10C, 10D Treaty Net (Ntrty net closed)**

Sockeye	Wk 23 (wb 6/4) – Wk 32 (wb 8/6) Based on ISU (lock counts).	
	Wk 23 (wb 6/4) – Wk 33 (wb 8/13) Bio-sample program	
	Wk 25 (wb 6/18) PSC test fishery	
	Ceremonial and subsistence fisheries	
Chinook	Based on ISU and adaptive management consistent with the harvest plan and co-manager agreement.	
	Ceremonial and subsistence fisheries	
Coho	The Coho fisheries in the four following areas are based on the ISU (if lock counts project run size <10,000 Coho entering the lake, then no Coho fishery):	
	Ceremonial and subsistence fisheries	
	Lower ship canal (below Ballard Locks)	If the ISU is > than 10,000 the fishery could open as early as Wk 37 (wb 9/10) – Wk 44 (wb 10/29) with the fishing pattern up to 7 days per week (Sun – Sat).
	Upper ship canal (above Ballard Locks):	If the ISU is > than 10,000 the fishery could open as early as Wk 37 (wb 9/10) – Wk 44 (wb 10/29) with the fishing pattern up to 5 days per week (Sun – Fri).
	North end Lake Washington (North of Hwy. 520 bridge):	If the ISU is > than 10,000 the fishery could open Wk 39 (wb 9/24) – Wk 46 (wb 11/12) with the fishing pattern up to 5 days per week (Sun – Fri).

**Lake Sammamish Treaty Net**

Chinook	Based on ISU and adaptive management consistent with the harvest plan	
	Ceremonial and subsistence fisheries	
Coho	If the ISU is > than 10,000 the fishery could open Wk 41 (wb 10/8) – Wk 47 (wb 11/19) with the fishing pattern up to 5 days per week (Sun – Fri).	
	Ceremonial and subsistence fisheries	

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**Area 10 Recreational**

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5/1-6/30	Closed
7/1-7/15	2 fish limit, release Chinook, wild Coho, and Chum.
7/16-8/15	2 fish limit, release wild Chinook, wild Coho, and Chum.
8/16-10/31	2 fish limit, release Chinook, wild Coho, and release Chum through 9/15.
11/1-2/28	2 fish limit, release wild Chinook and wild Coho.
3/1-4/30	Closed

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Shilshole Bay (East of Meadow Point/West Point line) closed 7/1-8/31.

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Outer Elliott Bay (E of West Pt./Alki Pt line to Pier 91/Duwamish Head line) Closed to salmon angling 7/1-8/31. Except 8/16 – 8/31 see Elliott Bay recreational SAF.

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**Area 10 Piers Recreational**

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Seacrest Pier, Pier 86, Waterman Pier, Bremerton Boardwalk, Illahee State Park Pier	Year-Round	2 fish limit, 1 Chinook, release Chum 8/1-9/15.
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**Elliott Bay Recreational SAF**

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5/1 – 8/10	Closed
8/11-8/13	2 fish limit, release wild Coho and Chum. Inner Elliot Bay waters open east of a line from Pier 91 to Duwamish Head.
8/18-8/31	2 fish limit, release Chinook, wild Coho, and Chum. Open Friday – Sunday in waters north of a line continuing from Jack Block Park through the north tip of Harbor island to shore northeast of the North Waterway (47°35.47'N, 122°20.58'W).
9/1-4/30	Same as Area 10.

**Sinclair Inlet Recreational SAF**

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5/1-6/30	Same regulations as Area 10.
7/1-9/30	Open S of Manette Bridge, S of line drawn true W from Battle Point, and W of line drawn true S from Point White; 3 fish limit, release wild Chinook, wild Coho, and release Chum 8/1-9/15, 2 pole endorsement.
10/1-4/30	Same regulations as Area 10.

**Green River Recreational**

WDFW and MIT commit to developing and executing a monitoring plan to assess Chinook encounter rates and non-retention mortality rates in both directed Chinook fisheries and non-Chinook directed fisheries within the system prior to the beginning of the 2017 river fishery. The implementation of either portion of the plan is contingent on available funding. The portion of the plan to estimate encounter rates is likely to cost significantly less than the portion to estimate mortality rates, and will be prioritized due to the higher likelihood there will be sufficient funds available to cover its implementation.

(1st Ave South Bridge to Old Hwy.99/ Tukwila Intl. Blvd.)	8/20 – 12/31	Daily limit 6. No more than 3 adults may be any combination of Coho and Chum, 12” min size, release Chinook.
(Old Highway 99/Tukwila Intl. Boulevard to I-405)	8/20 – 12/31	Daily limit 6. 1 Chinook, no more than 3 adults may be any combination of Coho and Chum, 12” min size. Release chinook 8/20-8/31.
(I-405 to the S. 277 <sup>th</sup> Bridge in Auburn)	9/1 – 12/31	Daily limit 6. No more than 3 adults may be any combination of Coho and Chum, 12” min size, release Chinook.
(S. 277 <sup>th</sup> Bridge to Auburn Black Diamond Rd Bridge)	9/16 – 12/31	Daily limit 6. No more than 3 adults may be any combination of Coho and Chum, 12” min size, release Chinook.
(from Auburn-Black Diamond Rd Bridge to Tacoma Headworks Dam)	11/1 – 12/31	Daily limit 6. No more than 3 adults may be any combination of Coho and Chum, 12” min size, release Chinook, Closed waters - within 150’ of the Palmer Ponds outlet rack and within 150’ of the mouth of Keta (Crisp) Creek.

The 2017/2018 WDFW sport pamphlet will reflect the following season end dates for trout and other game fish fall/winter season. These end dates are subject to change based on State-Tribal agreement:

Mouth to S. 277<sup>th</sup> Bridge in Auburn: Dec. 31

S. 277<sup>th</sup> Bridge to Tacoma Headworks Dam: Dec. 31

**Soos Creek Recreational**

Closed

**Lake Washington Recreational**

East of the Montlake Bridge	July-August	Dependent upon ISU (lock counts). Potential fishery starting date to be determined. 2 fish limit, sockeye only, 12” min. size. Chinook retention dependent on ISU and co-manager agreement.
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North of Hwy 520 Bridge	9/16 – 10/31	4 fish limit, Coho only; 12" min size
<b>Lake Sammamish Recreational</b>		
10/1 – 11/30	4 fish limit, Coho only.	
12/1 – 5/31	Landlocked salmon rules apply. Hatchery Coho may be retained as part of the trout daily limit. 12-inch minimum size.	

All other SOUTH SOUND AREA 10 REGION freshwater: Closed to salmon angling.

### 3.2 Area 11 Sub region

#### Area 11 Net

Chinook	All	Closed
Pink	Trty	Commercial fishery open beginning wk 32 (wb 8/6) – wk 35 (wb 8/27) Drift gillnets only, 3 days per week, 2 hours before sunrise through 2 hours after sunset, times will vary per week. Fishery will end when either 100 Chinook or 200 Coho mortalities are reached or the end of week 35.
	Ntrty	Closed
Coho	Trty:	Commercial fishery open beginning Wk 36 (wb 9/3) - Wk 42 (wb 10/15); ISU dependent; gillnets 7 days/wk, could close any time. Beach seine daylight hours only, 7 days/wk.
	Ntrty:	Closed
Chum	In order to allow fishing opportunity that allows both the treaty and non-treaty fleets to have the ability to catch their shares and provide for escapement; better communication and cooperation is expected from both non-treaty and treaty co-managers. In order to improve management of all component stocks in the South Sound aggregate, the co-managers have agreed to improve in-season management and develop more refined in-season modeling methodologies. Both treaty and non-treaty co-managers will each compile relevant data sources, along with other relevant information such as timing of its availability in-season, predictive power, etc. that may improve ISU models or in-season management no later than May 1 and exchange those no later than May 15. The co-managers commit to schedule a conference call or in-person meeting to discuss these data and other possible data sets prior to June 1. The co-managers further commit to finalizing refinements to in-season management modeling, scheduling of fisheries, and processes for 2017 management no later than September 8, with an ongoing commitment to improve in-season management over the long term.	

	Trty:	Commercial fishery open Wk 42 (wb 10/15) - wk 45 (wb 11/5); gillnets 7 nights/wk, could close at any time. Beach seine daylight hours only, 7 days/wk. 2017 – Early closure to protect Nisqually Late Chum.
	Ntrty	Wks 42 (wb 10/15) - 47 (wb 11/19); PS Chinook and Coho NR; PS fishing pattern: 1,1,1,2,1,1; GN fishing pattern: 1,2,2,2,2,2. ISU dependent. Commercial fishing past week 45 for South Sound normal chum in Area 10/11 will proceed based on co-manager agreement. This will be informed by agreed to ISU results and real time watershed information, catch balances and equity, and information related to impacts associated with late timed chum salmon.

**Area 11A Net Treaty Net (Ntrty net closed)**

Chinook	Closed
Coho	Commercial fishery open Wk 36 (wb 9/3) - wk 42 (wb 10/15); 3 nights/wk.
Chum	Closed

**Puyallup River (Area 81B) Treaty Net (Ntrty net closed)**

Chinook	Spring Chinook	Ceremonial and Subsistence
	Summer - Fall	Commercial fishery Wk 33 8/13, fishing pattern: 12 hours.
Coho	Commercial fishery Wk 36 (wb 9/3) - wk 42 (wb 10/15) fishing pattern: 1,2,2,2,2,2.	
Chum	Test fishery Wk 43 (wb 10/22) - wk 46 (wb 11/12) 1 day/wk, drift net only.	
Winter Chum	Commercial fishery wk 46 (wb 11/12) – wk 53 (wb 12/31) 1 to 3 days a week	

**White River Treaty Net**

Ceremonial and subsistence fisheries. Fishing pattern 7 days/wk.

**Area 11 Recreational**

5/1-5/31	Closed
6/1-4/30	2 fish limit, release wild Chinook and release wild Coho 11/1-4/30; Commencement Bay (E. of Cliff House Restaurant/Sperry Ocean Dock line) closed to salmon angling 6/1-7/31 and 4/1-4/30.

Dash Point Dock, Point Defiance Boathouse Dock, Les Davis Pier, Des Moines Pier and Redondo Pier	Year-Round	2 fish limit, 1 Chinook.
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**Puyallup River Recreational**

(from 11 <sup>th</sup> St. Bridge to Freeman Rd.)	8/15 - 12/31	6 fish limit, 2 adults, 12" min size, release wild Chinook. 8/1-8/31 Closed Sundays. 9/1-10/31 Closed Sunday, Monday, Tuesday.
(from Freeman Rd. to Carbon R.)	8/1 – 12/31	6 fish limit, 2 adults, 12" min size, release wild Chinook. 8/1-8/31 Closed Sundays. 9/1-10/31 Closed Sunday, Monday, Tuesday.

**Carbon River Recreational**

(mouth to Voight Creek)	9/1 – 11/30	6 fish limit, 4 adults; no more than 2 adult Chinook may be retained; 12" min size, release Chum and wild adult Chinook.
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All other SOUTH SOUND AREA 11 REGION freshwater recreational: Closed to salmon angling

**3.3 Area 13 Sub region**

**Fox Island/Ketron Island (Area 13)**

Chinook	Treaty	8/1-9/15, 7 days/wk
	Ntrty	Closed
Coho	Treaty	9/15-10/20, 7 days/wk
	Ntrty	Closed
Chum	Treaty	Closed unless opened by Medicine Creek Treaty Tribes' agreement
	Ntrty	Closed

**Area 13 Treaty Net (Ntrty net closed)**

Chinook	Closed
Pink	Closed
Coho	Closed
Chum	Closed

**Carr Inlet (Area 13A) Treaty Net <sup>1</sup>(Ntrty net closed)** <sup>1</sup> Based on Medicine Creek Treaty Tribal proposal annual regulations. Individual Tribal regulations may deviate from this schedule.

Chinook	8/1 - 9/23, 7 days/wk, opens in sections.
Coho	9/17– 10/28, 7 days/wk, in-season monitoring to meet hatchery escapement need.
Chum	10/29 – 11/11, 7 days/wk – then 11/12 – 12/5 Beach Seine Only.

**Chambers Bay (Area 13C) Treaty Net<sup>1</sup> (Ntrty net closed)**

Chinook	7/30 – 10/14; Beach seines Sunday noon to Tuesday noon. Set nets Wednesday noon to Friday noon.
Coho	10/15 – 11/4; Beach seines Sunday noon to Monday noon. Set nets Monday noon to Tuesday noon.
Chum	Closed

**Area 13D Treaty Net (Ntrty net closed)**

Chinook	7/15 - 9/9 or earlier date dependent on in-season management needs; 7 days/wk
Coho	9/10 - 11/19 or earlier date dependent on in-season management needs.
<b>Dana Pass (13D-1)</b>	7 days/wk
<b>Pickering Pass (13D-2)</b>	7 days/wk
<b>Peale Pass (13D-3)</b>	7 days/wk
<b>Southern Case (13D-4)</b>	7 days/wk
Chum	Open approximately 10/15; 2-3 days per week; managed weekly by updates (~10/15).
<b>Area 13E Net</b>	Closed to all fishing

**Budd Inlet (Area 13F) Treaty Net (Ntrty net closed)**

Chinook	7/15-9/9 or earlier date dependent on in-season management needs; 7 days/wk 9/10-9/22 open dependent on in-season monitoring to meet hatchery escapement needs.
Coho	Closed
Chum	Open approximately 11/6, 2-3 days per week, managed by weekly in-season updates

**Eld Inlet (Area 13G) Treaty Net (Ntrty net closed)**

Chinook	7/15-9/9; opening dependent upon in-season data, outer portion only.
Coho	Closed
Chum	Open approximately 11/6, 2-3 days per week, managed by weekly escapement updates

**Totten Inlet (Area 13H) Treaty Net (Ntrty net closed)**

Chinook	8/1-9/9; schedule dependent on in-season data
Coho	Closed
Chum	Open approximately 10/9, 2-3 days per week; managed by weekly escapement updates

**Little Skookum Inlet (Area 13I) Treaty Net (Ntrty net closed)**

Chinook	8/1-9/9; schedule dependent upon in-season data
Coho	Closed
Chum	Open approximately 11/12, 2-3 days per week; managed by weekly escapement updates

**Hammersley Inlet (Area 13J) Treaty Net (Ntrty net closed)**

Chinook	8/1-9/9 or earlier date dependent on in-season management needs
Coho	Closed
Chum	Open approximately, 9/17 – 12/31, 2-3 days/wk; managed by weekly escapement updates

**Northern Case Inlet (Area 13K) Treaty Net (Ntrty net closed)**

Chinook	7/15-9/9
Coho	9/10-10/31 or earlier date dependent on in-season management needs
Chum	Open approximately 9/17-12/31; 2-3 days/wk; managed by weekly escapement updates

**Nisqually River (Area 83D) Treaty Net (Ntrty net closed)**

Chinook/Pink	Gill Net 2 days/wk during the following weeks: wk 33 (wb 8/13) through wk 36 (wb 9/3).
Coho	Gill Net 1 day wk 40 (wb 10/1) then 3 days/wk during the following weeks: wk 41 (wb 10/8) through wk 47 (wb 11/19).

Chum	Commercial Fishery Closed. Yelm Escapement ISU model will be used in season to determine if fisheries are possible. Projected ISU derived escapement must exceed 2,000 fish above spawning goal of 18,000 for fisheries to open (approximately 184 peak live in Yelm). Fisheries will be managed to the lower 6 miles of the River to protect projected spawners. Chum management wk 48 – wk 5.
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**McAllister Creek (Area 83F) Treaty Net (Ntrty net closed)**

Chinook/Pink	Closed.
Coho	Closed.
Chum	Closed.

**Area 13 Recreational**

5/1/17-4/30/18	2 fish limit, Release wild Chinook and wild Coho. 2 pole endorsement. Lower Budd Inlet Closure: 7/16-10/31. Minter Cr. Mouth Closure: 4/16-9/30.
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**Fox Island Pier Recreational**

Year-Round	2 fish limit, 1 Chinook.
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**Chambers Creek Estuary Recreational**

(downstream of markers 400' below Boise-Cascade Dam to Burlington Northern Railroad Bridge)	7/1 – 11/15	6 fish limit, 4 adults; 12" min size, release wild Coho.
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**Deschutes River Recreational**

Capitol Lake (from outlet to 400' below lowest Tumwater Falls (Deschutes River) fish ladder).	7/1 – 10/15	Closed
(from Old Hwy 99 Bridge on Capitol Blvd in Tumwater to Henderson Blvd Bridge)	7/1 – 10/15	6 fish limit, 2 adults, 12" min size, release Coho.
(upstream of Henderson Blvd Bridge)	7/1 – 10/15	6 fish limit, 2 adults, 12" min size, release Coho.

<b>Kennedy Creek Recreational</b>		
(mouth to northbound Hwy. 101 Bridge)	10/1 – 11/30	6 fish limit, 2 adults, 12” min size, release wild Coho.
<b>McAllister Creek Recreational</b>		
(mouth to Olympia-Steilacoom Rd Bridge)	7/1 – 11/30	6 fish limit, 2 adults, 12” min size.
<b>McLane Creek Recreational</b>		
(from a line 50’ north of and parallel to the Mud Bay Rd. Bridge to a line 100’ upstream of and parallel to the south bridge on Hwy.101)	Same as Area 13	Same as Area 13
<b>Minter Creek Recreational</b>		
(mouth to 50’ downstream of hatchery rack)	11/1 – 12/31	4 fish limit, 12” min size, Chum only.
<b>Nisqually River Recreational</b>		
(mouth to the military tank crossing bridge, one mile upstream of the mouth of Muck Creek)	7/1 –11/15	6 fish limit, 2 adults, 12” min. size; release wild Chinook and Chum.

All other SOUTH SOUND AREA 13 REGION freshwater recreational closed to salmon angling.

## 6. 4.0 Hood Canal Region (All fisheries modeled in FRAM #2017 (Chinook) & #1731 (Coho))

### Hood Canal Mainstem (Areas 12, 12B, 12C, 12D)

Treaty: 1,000 foot closure around streams that are closed to net fishing. Beach seines and hook and line gear release Chum through 9/30 (through 10/10 if within 500' of western shore of Areas 12B and 12C).

Nontreaty: See WAC 220-47-307 for Nontreaty exclusion zones.

Chinook	Trty	Areas 12, 12B and 12D: Closed
		Area 12C: Beach seines open wb 7/23 - 8/31; 5 days/wk; release Chum 8/1-8/31. Open wb 7/23 – 8/24 for gillnets 5 days/wk; restricted to 7" min mesh starting 8/1. Area 12H: Open wb 7/09 through 9/16; hook and line gear continuous (daylight hours only); beach seines daylight hours Tues and Thur each week; possible in-season modifications; Chum release.
	Ntrty	Area 12H: Hoodspout Hatchery Zone, Wks 31 (wb 7/30) – 36 (wb 9/3); 5,000 Chinook quota. BS fishing pattern: 2,2,2,2,2,2; Release all Chum per the SCSCI. *We are using the tribal designation of 12H which is designated in state rules as the Hoodspout Hatchery Zone within area 12C.
Pink	All	Same as Chinook openings.
Coho	Trty	Area 12: Open 9/25 through 10/14 for gillnets. Beach seines for Coho only (release all Chinook and Chum through 9/30) may start no earlier than 9/16. Both gear types open 7 days/wk.
		Area 12B: Open 10/1 through 10/21 for gillnets; 500 foot closure along western shore through 10/10; beach seines for Coho only (release all Chinook and Chum through 9/30) may start no earlier than 9/16. Both gear types open 7 days/wk.

		<p>Area 12C: Open 10/1 through 10/21.</p> <ul style="list-style-type: none"> <li>a) Gillnets: 10/1-10/7 5 d/wk; 10/8-10/21 7 d/wk.</li> <li>b) Beach seines: 9/21-10/7 5 d/wk; 10/8-10/21 7 d/wk DAYLIGHT HOURS ONLY (release all Chum through 9/30).</li> <li>c) 500 foot beach closure from Ayock Pt. to approx. 2,000 feet south of Lilliwaup (at the large house, north of Octopus Hole) through 10/10 for both gear types.</li> <li>d) Beach seines for Coho DAYLIGHT HOURS ONLY (release all Chum through 9/30) may start no earlier than 9/21).</li> </ul>
		<p>Area 12D (west of Madrona Pt. - local name): Open for gillnets no earlier than 10/1. Weekly schedules identical to Area 12C.</p>
	Ntrty	Closed
Chum	<p>The Co-Managers have agreed to a co-management process that is described in the attached 2017 Co-Management Agreement for Hood Canal Chum Salmon Fisheries. Chum fishing schedules may be modified (except the initial P.S. 1-1-1) if pre-season harvestable abundance and catch shares are changed using the agreed early window ISU, based on Non-Treaty purse seine cumulative CPUE for October 15 through October 31. If there are sufficient NT shares remaining for an additional P.S. day, then a co-manager agreed upon extended window ISU model will be used to make a final in-season update of the harvestable abundance and catch shares, and fishing schedules may be further modified accordingly.</p>	
	Trty	<p>Area 12: Open 10/15 through 11/20; 7 d/wk</p>
		<p>Area 12B: Open 10/22 through 11/20; 7 d/wk; except north of an East-West line from Zelatched Point to Seal Rock open through 11/27.</p>
		<p>Area 12C: Open 10/22 through 11/27; 7d/wk.</p>
		<p>Area 12D: Closed.</p>
		<p>Area 12H: Hook and line gear open from 10/15 through 11/25; beach seines open Tuesday and Thursday of each week. Then Monday and Wednesday for the week beginning 11/05; possible in-season adjustments to 3 days/wk. Starting 1, hatchery escapement control measures will go into effect.</p>

	Ntrty	Area 12, 12B. Wks 42 (wb 10/15) - 47 (wb 11/19): PS Chinook NR; PS fishing pattern: 1,1,1,2,1,1; GN fishing pattern: 1,2,2,2,2,2 daylight hours. PS closed within 2 miles south of the Hood Canal Bridge 10/24 and 10/30. Hazel Point Closure area open to PS when bridge area is closed.
		Area 12C Fisheries scheduled wks 45 (wb 11/5) - 48 (wb 11/26): PS Chinook NR; PS fishing pattern: 1,2,1,1; GN fishing pattern: 2,2,2,2 daylight hours. Fishing is contingent upon the results from the agreed to ISU.
		Area 12H: BS (Hoodsport Hatchery Zone) beach seine fishing wks 45-48, pattern pending discussions with tribal Co-managers.
		Area 12D Closed

**Port Gamble (Area 9A)**

Chinook	All	Closed
Coho	Trty	Open wb 8/13 through 10/28; 7 days/wk; gillnet only. Ceremonial Harvest of 20 Chinook in August.
	Ntrty	Open Wks 34 (wb 8/20) - 43 (wb 10/22) skiff GN limited to 100 fathoms length and 60 meshes in depth; 7 days/wk; Chinook NR; Chum NR through 9/30; release NR fish by cutting ensnaring meshes. The beach area of the Port Gamble Indian Reservation, between Pt. Julia and the boundary marker at the south end of the reservation - closed to all fishing.
Chum	Trty	Open 10/29 through 11/25; 7 days/wk; gillnet only.
	Ntrty	Closed

**Quilcene / Dabob (Area 12A)**

Coho	Trty	Open 8/21 through 10/14; Chum and Chinook release from hook and line and beach seine gear through 9/30; beach seines 5 days/wk, daylight hours. Hook and line fisheries for Coho only, open continuously. Gillnets closed until Summer Chum escapement exceeds 1500. (1) GN day/wk; when escapement reaches 2,500 GN (2) day/wk; when escapement reaches 3,500 GN will be determined as per the SCSCI BCR. Beach seine advance notification required prior to fishing.
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	Ntrty	Beach seine open wks 34 (wb 8/20) – 40 (wb 10/1); Limited participation (4 permits/day); CK and CH NR; fishing pattern 5,5,5,5,5,5,5; Fishery will be managed consistent with SCSCI. GN closed unless Treaty GN opening.
Chum	Trty	Open to set and drift gillnets wb 10/15 through 11/20, South of an E-W line through Pt. Whitney.
	Ntrty	Closed

**Big Quilcene River (Area 82F) Treaty (Ntrty net closed)**

Coho	Openings to be determined in-season, for Coho only, from 9/1 through 10/15. Closed below Rogers St. From Rogers St. to U.S. Hwy 101, hook and line gear only, release all other salmon. The hatchery area, from U.S. Hwy 101 to the Quilcene Hatchery rack, may be opened for short periods to take surplus Coho. Hand held gear only (dipnets, hand lines, etc.).
Chum	Closed

**Skokomish River (Area 82G) Treaty (Ntrty net closed)**

**Purdy Creek (Area 82J) Treaty Net (Ntrty net closed)**

The Skokomish Tribe will continue to sample all agreed to fisheries in order to provide weekly in-season updates (i.e. CWT, species, mark status, and mark rates). The WDFW will provide weekly in-season updates for Chinook returns to the George Adams Hatchery rack. Note: Hook and line gear and beach seines release Chum through 10/15 above Hwy 106 Bridge.

**Skokomish River – Mouth to HWY 106 Bridge (Area 82G) Treaty (Ntrty net closed)**

Coho	Open 10/08 – 11/04, 7 days/wk.
Chum	Open wb 11/05 through 11/25, 7 days/wk.

**Skokomish River – HWY 106 Bridge to HWY 101 Bridge (Area 82G) Treaty (Ntrty net closed)**

Chinook	Open wb 8/06 - wb 8/27, 3 days/wk.
Coho	Open wb 10/08 – wb 11/04, 7 days/wk.
Chum	Open 11/05 through 11/25; 7 days/wk.

**Purdy Creek (Area 82J) Treaty Net (Ntrty net closed) 250 feet from the confluence/mouth of Purdy Creek to the HWY 101 Bridge (fishing nets may not be attached to any abutment or railings on the HWY 101 Bridge).**

Chinook	Gill Nets only: Open every Saturday beginning July 09 – August 19. In-season adjustments will occur to ensure weekly broodstock targets are achieved.
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Chum	Gill Nets, Dip Nets and Hook & Line: Open beginning 11/12 as necessary to reach tribal share.
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**Misc. Hood Canal Rivers (Dosewallips, Duckabush, Hamma Hamma, Tahuya, Dewatto, Union)**

All species	Closed to commercial harvest.
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**Area 12 Recreational (Including Quilcene/Dabob Bay)**

5/1-6/30	Closed
7/1-9/30	South of Ayock Pt. - 4 fish limit, 2 Chinook (Chinook 20" min size); release Chum and wild Chinook; 2 pole endorsement. Waters within channels created by exposed tidelands including the free flowing waters of the Skokomish river downstream (North) of the City of Tacoma PUD overhead transfer powerlines are closed.
8/1-9/30	North of Ayock Pt. – 4 fish limit, release Chinook and Chum. River mouth closures on Dosewallips, Duckabush, Dewatto, Hamma Hamma rivers. Hook measuring ½ inch or less from point to shank from 8/1-8/15. Closed in Tarboo Bay north of Broad Spit starting 9/16.
10/1-12/31	4 fish limit, 2 Chinook; release wild Chinook and release Chum through 10/15.
1/1-4/30	2 fish limit, release wild Chinook.

**Hoodport Hatchery Zone Recreational**

Same as Area 12 except:

7/1-12/31	4 fish limit, no minimum size, release wild Chinook and release Chum 7/1-10/15. 2 pole endorsement valid through 10/15.
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**Dewatto River Recreational**

(mouth to Dewatto-Holly Rd. Bridge)	10/1 – 10/31	2 fish limit, 12" min size, Coho only.
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**Dosewallips River Recreational**

(mouth to Hwy. 101 Bridge)	11/1 – 12/15	2 fish limit, 12" min size, Chum only.
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**Duckabush River Recreational**

(mouth to Mason Co. PUD #1 overhead electrical)	11/1 – 12/15	2 fish limit, 12" min size, Chum only.
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distribution line)		
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**Quilcene River Recreational**

(from Rodgers St. to Hwy 101 Bridge)	8/16 – 10/31	4 fish, 12” min size, Coho only.
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**Skokomish River Recreational**

	Closed	
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**Tahuya River Recreational**

	Closed	
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All other HOOD CANAL REGION freshwater recreational closed to salmon angling.

## 7. Appendix

### 8. 2017 7/7A Chum Fishing Plan

04/11/2017

Chum salmon fisheries in Areas 7 and 7A are regulated to comply with a base harvest ceiling of 130,000 Chum salmon, unless a critically low level of abundance is identified for those stocks migrating through Johnstone Strait (“Inside Southern Chum salmon”) (PST 2008). Chapter 6 of Annex IV specifies that U.S. commercial fisheries for Chum salmon in Areas 7 and 7A will not occur prior to October 10. Paragraph 10 (a-b) specifies run sizes below 1.0 million as critical (estimated by Canada). For run sizes below the critical threshold, the U.S. catch of Chum salmon in Areas 7 and 7A will be limited to those taken incidentally to other species and in other minor fisheries, and shall not exceed 20,000.

In 2014, the U.S. landed 146,571 chum salmon from Area 7/7A, exceeding the U.S. catch ceiling of 130,000 by 16,571 chum salmon. This overage triggered the payback mechanism outlined in Chapter 6.10. (h) of the Pacific Salmon Treaty:

“Catches in excess of 135,000 Chum shall result in an overage being calculated by subtracting 130,000 from the total Chum catch. Overages will be accounted for by reducing the U.S. annual catch ceilings in up to two subsequent non-critical Inside Southern Chum salmon years;”

In 2015 and 2016, the co-managers landed 243,293 chum salmon, effectively paying back the 2014 overage (Table 1).

**Table 1.** U.S. 7/7A chum catches, 2009-2016

Year	NT catch	Treaty catch	Total U.S. catch	Total U.S. Share	Uncaught share	Overage	Paid Back
2009	16,406	7,667	24,073	20,000 <sup>a/</sup>	n/a	0	
2010	6,062	17,342	23,404	20,000 <sup>a/</sup>	n/a	0	
2011	24,084	36,401	60,485	130,000	69,515	0	
2012	32,157	40,709	72,866	130,000	57,134	0	
2013	30,239	49,411	79,650	130,000	50,350	0	
2014	60,135	86,436	146,571	130,000	0	16,571	
2015	59,754	65,303	125,057	130,000	4,943	0	4,943
2016	66,531	51,705	118,236	130,000	11,764	0	11,764

<sup>a/</sup> In fishing years 2009 and 2010, the Inside Southern Chum run size was below the critical threshold of 1.0 million; thus, per Chapter 6 of the PST the harvest ceiling was 20,000 additional chum following the notice from Canada that the run size was below the critical threshold.

In 2013, the co-managers enacted a fishing plan intended to result in the full harvest of the 130,000 chum salmon allowed to be caught in Area 7/7A under the current Chapter 6 of the Pacific Salmon Treaty. Adoption of these annual pre-season chum fishing plans for Area 7/7A has resulted in the full harvest of the U.S. share in recent years (Table 1).

To continue to promote fishing opportunity that allows both the treaty and non-treaty fleets to catch their full shares, the co-managers will use the management approach below for the 2017 season.

- Treaty and non-treaty reef net fisheries will remain open continuously from the end of Fraser management to the end of the chum season or until their respective shares are harvested, whichever comes first. Reef nets will release all chum, unmarked coho and unmarked Chinook through September 30. Release all Chinook beginning October 1.
- Treaty purse seine (PS) and gillnet (GN) fisheries will open on Tuesday October 10 and remain open continuously until the end of the season or until the treaty share is harvested, whichever comes first.
- Non-treaty PS and GN fisheries will open on Tuesday October 10, Wednesday October 11, Saturday October 14, and Sunday October 15.
- Non-treaty purse seine and gillnet fisheries will be evaluated relative to the thresholds below based on non-treaty chum catch reported on the in-season co-manager conference call scheduled for Monday, October 16, 2017. Non-treaty fisheries will re-open on the prescribed dates and remain open continuously until the end of the season or until the non-treaty share is harvested, whichever comes first.

**Table 2.** 2017 Treaty and Non-Treaty chum fishing schedule for Area 7 & 7A

	10-Oct TUE	11-Oct WED	12-Oct THU	13-Oct FRI	14-Oct SAT	15-Oct SUN	16-Oct MON	17-Oct TUE
Treaty and Non-Treaty Reef Net								
Treaty Gillnet and Purse Seine								
Non-Treaty Gillnet and Purse Seine								
Co-manager Conference Call								

- If total non-treaty catch is:
  - <29,000; non-treaty fishery will reopen Wednesday, October 18.
  - >29,000; non-treaty fishery will reopen Thursday, October 19.
- The co-managers will exchange data on by-catch throughout the season, and take appropriate management actions should levels of by-catch greatly exceed expectations.
- The co-managers will meet by conference call and adjust schedules if needed in response to in-season notification by Canada’s Department of Fisheries and Oceans that chum salmon returns are below the critical thresholds identified in Chapter 6, paragraph 10 of the Pacific Salmon Treaty.

## 9. 2017 Skagit Coho ISU - Blake's and Spudhouse Test Fishery Models

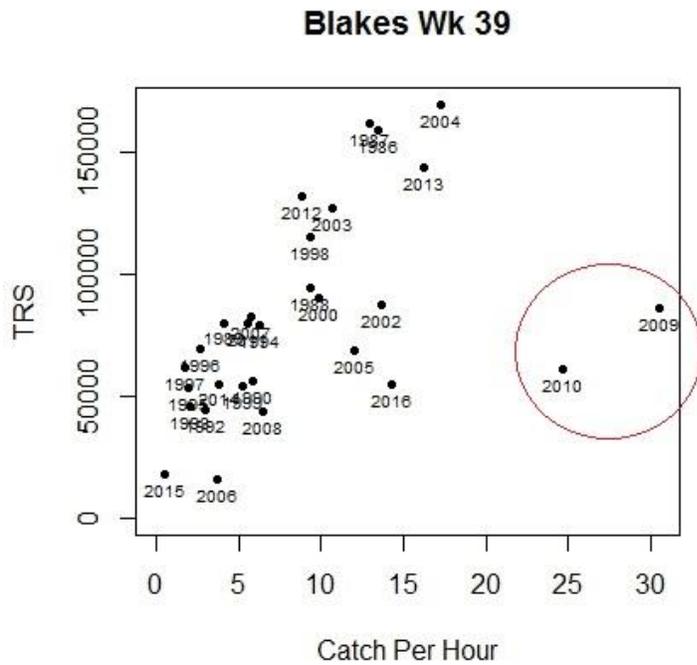
*Pete Kairis, Swinomish Tribe, 4/10/2017*

A wide variety of ISU models based on the Blake's and Spudhouse test fisheries were assessed using the 1986-2016 test fishery data. For each of the test fisheries, I examined models based on catch/hour and catch/set for weeks 38 through 43 individually, as well as models based on cumulative totals over several ranges of management weeks. For the cumulative models, I only included years for which a test fishery was conducted each week in the range. For example, if a test fishery occurred in week 39 but not week 40 of a certain year, then that year would be excluded when building a week 39-40 cumulative model. In an attempt to improve the model consistency, I also eliminated individual tests that had fewer than 6 hours of net-in-the-water, as these were abnormally short fisheries usually caused by gear failure or other problems.

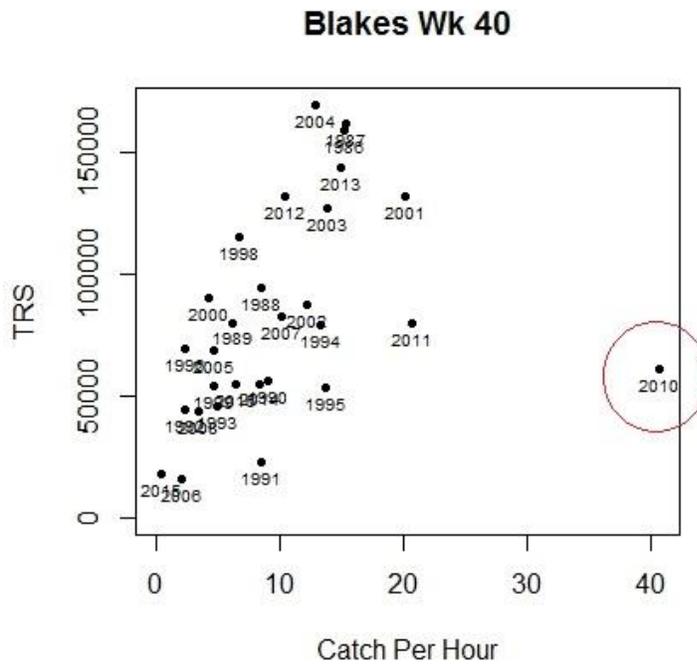
Two Blake's coho tests were conducted during week 40 of both 2002 and 2005. For both years, the first of these tests was a test that was cancelled early because of an equipment failure, and the second test was the same test rescheduled. I removed the first (aborted) set from the data set. In 1986, two coho tests were conducted each week from week 38 through 43. Looking at the set log, these appear to be two complete tests with the same gear and location, so I combined them when calculating catch/hour for those weeks.

The Blake's test catch/hour for weeks 39 and 40 in 2010 appeared to be outliers relative to the rest of the data set, so these weeks were removed from the analysis (Figures 1 and 2). The week 39 Blake's test fishery in 2009 was also removed as an apparent outlier in terms of catch/hour. However, since the week 40 Blake's test fishery in 2009 was cut short due to equipment problems and lasted less than 6 hours, the 2009 test fisheries wouldn't have been included in the cumulative models anyway. Similarly if the week 40 point for 2010 was removed (the more pronounced outlier) but not week 39 of the same year, that year would not be included in the cumulative models. The decision to classify these points as outliers is subjective and open for discussion.

For each model analyzed, I calculated basic performance statistics based on the residuals. I also ran a leave-one-out cross-validation. For each year of each model, I re-fit the same catch/hour or catch/set vs. TRS model *without* that year's data point, and used it to predict the TRS that year. Performance criteria (MSE, MAPE, MPE) were then calculated across all years using the cross-validation predicted values. This process results in a better assessment of model performance than simply analyzing the regression residuals. Years that were dropped from the dataset (for example, if they had fewer than 6 hours net-in-the-water were removed as outliers) were not included in the performance analysis for that particular model. The final set of models analyzed, including the regression and performance statistics for each, is provided in Table 1. Because catch/hour models performed consistently better than catch/set models for the Blake's test fishery, and the catch/set models performed consistently better than the catch/hour models for the Spudhouse test fishery, the Blake's catch/set and Spudhouse catch/hour models were not included in the table.



**Figure 0-1.** Blake's week 39 test fishery catch/hour. The 2009 and 2010 data points appear to be outliers, so they were removed from the analysis.



**Figure 0-2.** Blake's week 40 test fishery catch/hour. The 2010 data point appears to be an outlier, so it was removed from the analysis.

Table 1. The final set of models analyzed included those based on catch per hour (C/H) and catch per set (C/S). The range of years used to build the models was 1986-2016, with three outliers removed as described in the text. Weeks with a total time of net-in-the-water less than 6 hours were excluded. Blake's catch/set and Spudhouse catch/hour models were excluded from this table.

ISU Week	Description	r <sup>2</sup>	P	Df	N	Slope	Intercept	RMS E	MPE	MAPE	Cross Validation RMSE	Cross Validation MPE	Cross Validation MAPE
Week 38	Blakes Wk 38 C/H	0.41	0.0004	24	26	6,484.29	44,652.74	30,304	-20.25%	42.58%	33,516	-22.52%	46.77%
	Spudhouse Wk 38 C/S	0.09	0.1727	20	22	5,120.52	52,951.40	32,955	-34.99%	58.21%	35,708	-38.52%	63.30%
Week 39	Blakes Wks 38-39 C/H	0.57	0.0000	21	23	7,925.58	29,751.98	25,095	-11.75%	28.91%	27,343	-13.09%	31.83%
	Spudhouse Wks 38-39 C/H	0.26	0.0365	15	17	7,786.37	33,454.32	24,596	-27.11%	49.41%	27,851	-30.90%	55.56%
	Blakes Wk 39 C/H	0.58	0.0000	25	27	6,625.17	32,253.64	27,039	-17.75%	37.57%	29,515	-19.30%	40.71%
	Spudhouse Wk 39 C/S	0.36	0.0040	19	21	7,456.90	35,282.46	24,166	-24.03%	45.20%	27,316	-26.62%	50.08%
Week 40	Blakes Wks 38-40 C/H	0.68	0.0000	21	23	8,837.28	16,963.12	21,776	-7.17%	24.82%	23,351	-7.49%	26.77%
	Spudhouse Wks 38-40 C/S	0.30	0.0342	13	15	8,418.10	27,987.67	24,996	-26.99%	50.62%	29,495	-31.52%	58.44%
	Blakes Wks 39-40 C/H	0.69	0.0000	24	26	8,251.37	15,363.17	23,573	-10.46%	28.83%	25,531	-11.16%	31.20%
	Spudhouse Wks 39-40 C/S	0.41	0.0044	16	18	7,908.25	29,681.49	24,921	-24.33%	47.51%	29,952	-28.38%	54.42%
	Blakes Wk 40 C/H	0.43	0.0001	26	28	5,274.37	35,128.46	32,485	-24.05%	46.17%	35,487	-26.43%	50.03%
	Spudhouse Wk 40 C/S	0.11	0.1074	22	24	3,533.29	55,232.04	31,963	-32.47%	55.89%	35,040	-35.51%	60.91%
Week 41	Blakes Wks 38-41 C/H	0.76	0.0000	18	20	9,243.84	8,567.54	18,883	-3.38%	20.33%	20,495	-3.02%	22.34%
	Spudhouse Wks 38-41 C/S	0.53	0.0048	11	13	13,224.21	11,114.86	22,002	-20.00%	42.53%	25,698	-22.92%	50.00%
	Blakes Wks 39-41 C/H	0.68	0.0000	20	22	7,873.94	14,324.30	22,392	-9.95%	26.66%	24,721	-10.76%	29.39%
	Spudhouse Wks 39-41 C/S	0.54	0.0017	13	15	11,062.71	16,098.68	20,734	-17.80%	38.86%	23,685	-20.83%	45.08%
	Blakes Wk 41 C/H	0.31	0.0041	23	25	3,571.78	48,136.97	33,502	-28.97%	50.67%	38,173	-32.68%	56.01%
	Spudhouse Wk 41 C/S	0.05	0.3234	18	20	2,120.89	61,653.85	33,220	-38.29%	60.46%	36,401	-42.69%	66.58%
Week 42	Blakes Wks 38-42 C/H	0.86	0.0000	15	17	10,250.82	5,983.30	15,076	-1.42%	17.27%	16,861	-0.83%	19.69%

	Spudhouse Wks 38-42 C/S	0.6 2	0.0025	10	12	11,878.9 8	13,486.7 3	15,85 0	-17.18%	38.23 %	18,821	-19.76%	45.51%
	Blakes Wks 39-42 C/H	0.8 6	0.0000	16	18	10,007.6 8	3,405.34	15,87 4	-3.60%	21.65 %	17,610	-3.47%	24.81%
	Spudhouse Wks 39-42 C/S	0.6 4	0.0010	11	13	10,309.5 0	17,134.9 5	15,67 3	-16.16%	35.35 %	18,071	-18.98%	41.52%
	Blakes Wks 40-42 C/H	0.7 7	0.0000	18	20	9,174.84	6,132.07	21,20 6	-9.86%	30.04 %	23,041	-10.36%	33.28%
	Spudhouse Wks 40-42 C/S	0.2 9	0.0297	14	16	8,713.91	33,197.0 6	29,03 4	-29.02%	49.05 %	32,018	-34.44%	56.23%
	Blakes Wk 42 C/H	0.4 2	0.0004	23	25	5,424.08	45,090.0 1	33,97 5	-29.10%	49.31 %	40,284	-33.01%	54.54%
	Spudhouse Wk 42 C/S	0.6 5	0.0000	17	19	8,597.31	36,692.2 8	20,78 0	-21.71%	39.80 %	23,202	-24.21%	43.98%
Week 43	Blakes Wks 38-43 C/H	0.8 5	0.0000	13	15	10,779.5 6	5,173.70	16,49 8	-1.36%	15.43 %	18,411	-0.64%	18.07%
	Spudhouse Wks 38-43 C/S	0.8 2	0.0003	8	10	14,307.0 6	4,218.82	11,72 8	-11.98%	28.28 %	14,859	-13.98%	35.07%
	Blakes Wks 39-43 C/H	0.8 0	0.0000	14	16	9,962.53	7,822.87	20,20 4	-7.03%	23.59 %	23,583	-8.13%	27.61%
	Spudhouse Wks 39-43 C/S	0.8 0	0.0002	9	11	12,732.0 5	8,725.72	12,67 4	-12.28%	30.55 %	15,741	-14.82%	37.24%
	Blakes Wks 40-43 C/H	0.7 0	0.0000	15	17	9,354.38	9,921.26	24,94 6	-13.86%	34.12 %	28,705	-15.55%	38.79%
	Spudhouse Wks 40-43 C/S	0.4 1	0.0141	12	14	10,529.3 1	26,956.6 8	28,33 8	-27.83%	47.27 %	32,170	-34.23%	55.61%
	Blakes Wk 43 C/H	0.0 9	0.1650	21	23	1,858.06	71,120.5 1	42,92 9	-46.06%	70.18 %	68,406	-58.05%	83.64%
	Spudhouse Wk 43 C/S	0.2 6	0.0307	16	18	5,306.85	51,068.6 6	28,39 4	-34.06%	55.95 %	32,669	-37.97%	61.94%

In general, the best model performing models when assessing a combination of  $r^2$ , P-value, and the cross-validation RMSE, MPE, and MAPE were the Blake's test fishery models using cumulative totals from week 38 through the ISU week. Some Spudhouse models also performed moderately well, but they exhibited worse MPE and MAPE than the corresponding Blake's models and were based on fewer data points. As mentioned above, the catch/hour models performed better than the catch/set models for the Blakes fishery, but the catch/set models performed better than the catch/hour models for the Spudhouse fishery. The reason for this difference is unknown.

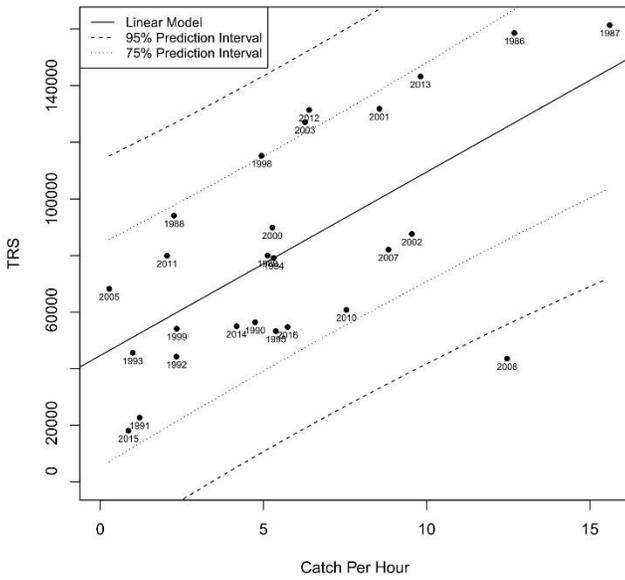
It should be noted that all of the models tend to over-predict run size (negative MPE) over the 1986-2016 time period, although the MPE of the cumulative Blake's catch/hour models for weeks 41 and later is quite low. Another point to consider is that removing points as outliers certainly changed the regressions and made the performance statistics look better than would have been the case if they were still in the data set. Because those outliers had very high catch/hour relative to the rest of the data set, an in-season update based on catch/hour in weeks 39/40 of greater than about 25 should be treated with caution as a potential abnormality. Because of intercepts higher than the pre-season forecast of run size (approximately 19,000 hatchery + wild) or low model performance, no models for weeks 38 or 39 are useful for 2017. The strongest ISU models use cumulative test data through weeks 40 or later. However, attention must be paid to the intercepts of each model, as many cannot predict a run size as low as the pre-season forecast and as such are of little use this year. After the week 40 test fishery, the Blake's Week 38-40 cumulative catch/hour model ( $P < 0.0001$ ,  $r^2 = 0.68$ , cross-validation RMSE=23,351) could be used as a preliminary indicator of run size, but because the intercept of 16,963 is only slightly above forecast, using it as an agreed ISU would not make sense. Following the week 41 test fishery, the Blake's Week 38-41 cumulative catch/hour model ( $P < 0.0001$ ,  $r^2 = 0.76$ , cross-validation RMSE=20,495) will be used as the ISU. The Blakes's Weeks 38-42 cumulative model ( $P < 0.0001$ ,  $r^2 = 0.86$ , cross-validation RMSE=16,861) will be used following the week 42 test fishery, and the Blake's Weeks 38-43 cumulative model ( $P < 0.0001$ ,  $r^2 = 0.85$ , cross-validation RMSE=18,411) will be used following the week 43 test fishery. The weeks 39-42 and 38-43 Spudhouse models could be considered as backups should the Blake's tests not occur (care must still be taken with regard to intercepts), or they could be used to create an average Blake's/Spudhouse ISU weighted by RMSE. However, the Spudhouse models are considerably more erratic in performance and have higher intercepts, and for those reasons should not be relied upon alone.

Given that the 2017 wild coho forecast is considerably below the critical escapement threshold, the co-managers agree to be very cautious when considering in-season updates and potential fishery openings that may be considered should an ISU indicate harvestable surplus. For this reason, the agreed to in-season update value used for management purposes will be the lower 75% prediction interval of the ISU rather than the midpoint value. To allow for uncertainty and a sufficient number of harvestable fish, the co-managers will not consider opening fisheries unless an agreed ISU (lower 75% prediction interval of the ISU model projection) exceeds 53,000, at which point a 12.5% treaty commercial harvest rate could be considered.

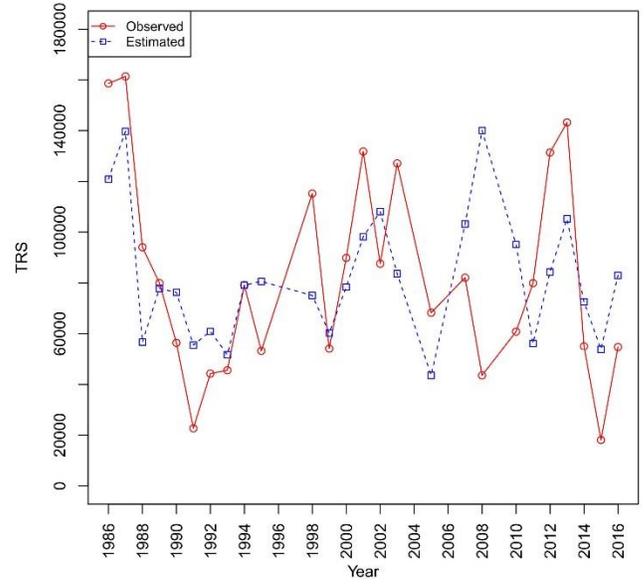
# BLAKE'S MODELS

## Week 38: Blake's Week 38 C/H – \*NOT USEFUL FOR 2017\*

Blakes Wk 38 Catch Per Hour

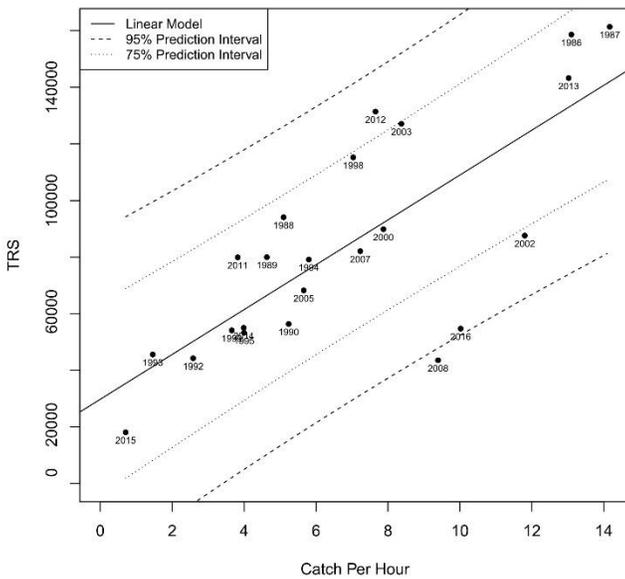


Cross-Validation Hindcast

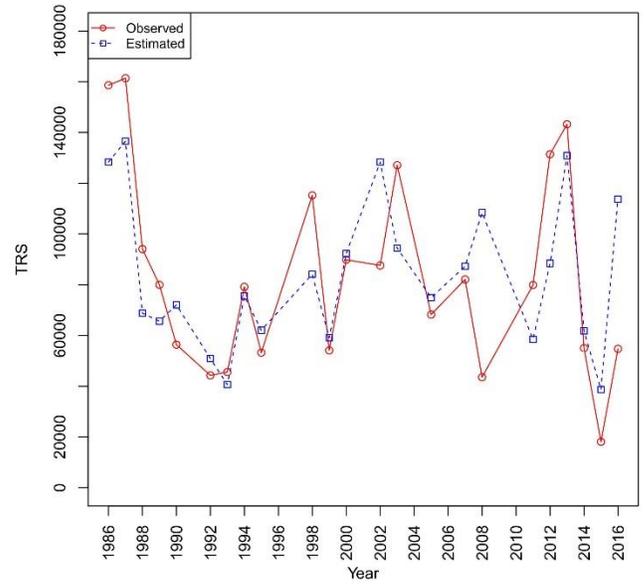


## Week 39: Blake's Weeks 38-39 C/H -- \*NOT USEFUL FOR 2017\*

Blakes Wks 38-39 Catch Per Hour

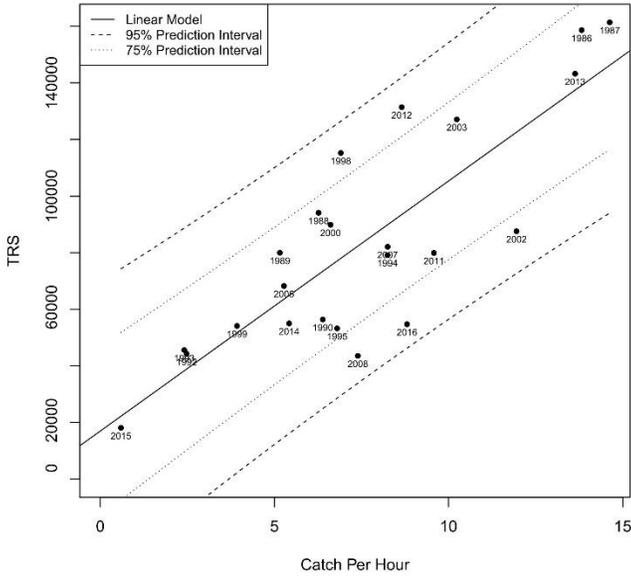


Cross-Validation Hindcast

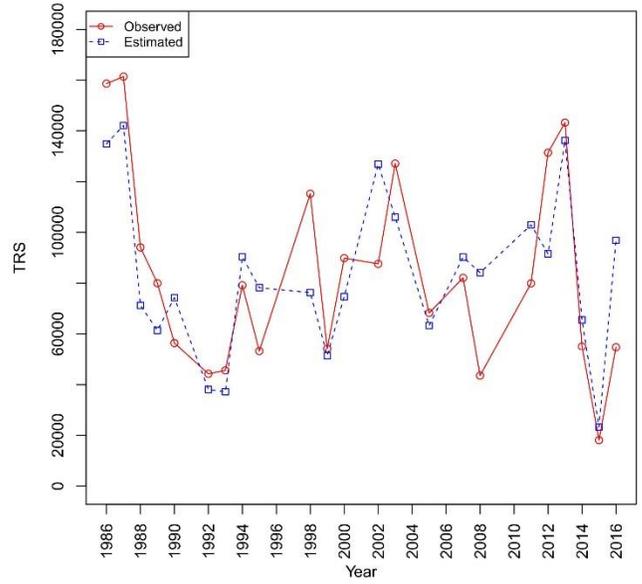


**Week 40: Blake's Week 38-40 Cumulative C/H -- \*NOT USEFUL FOR 2017\***

**Blakes Wks 38-40 Catch Per Hour**

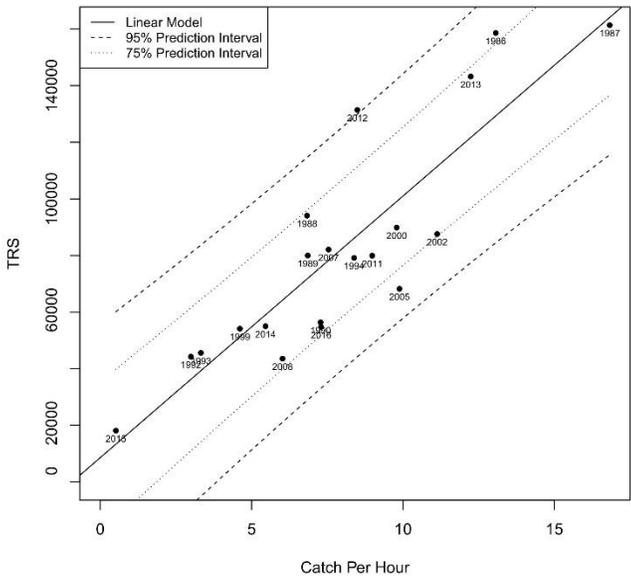


**Cross-Validation Hindcast**

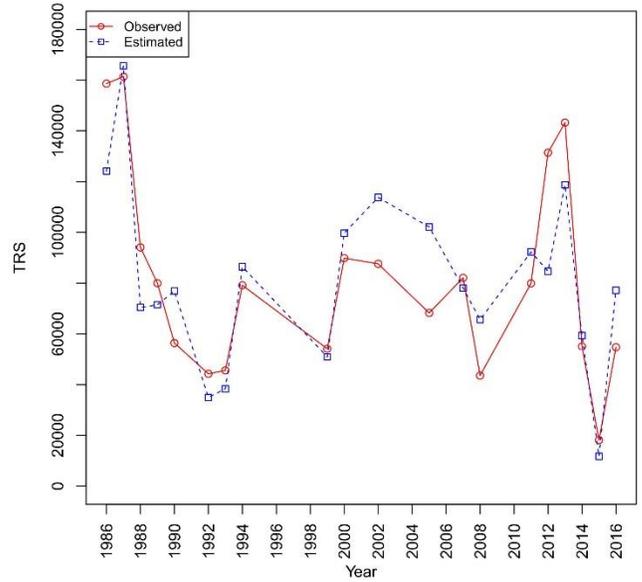


**Week 41: ISU, Blake's Week 38-41 Cumulative C/H**

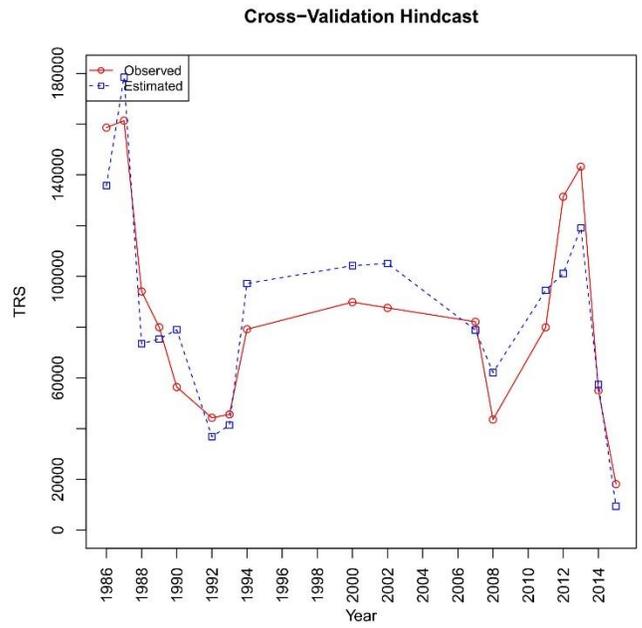
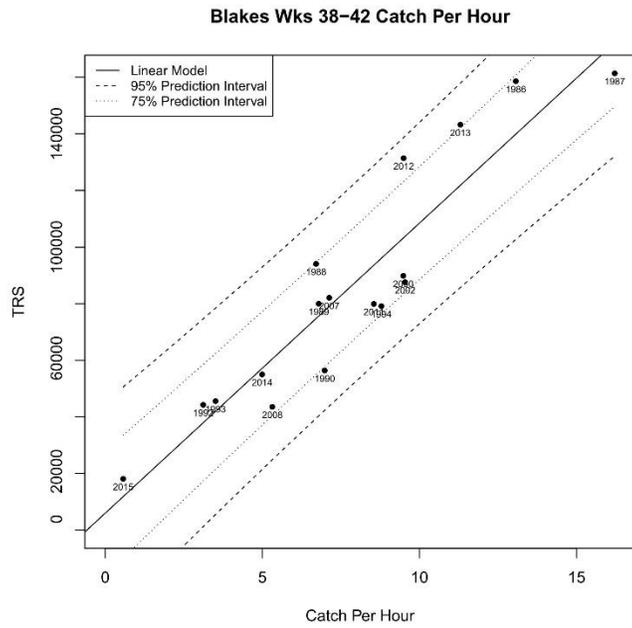
**Blakes Wks 38-41 Catch Per Hour**



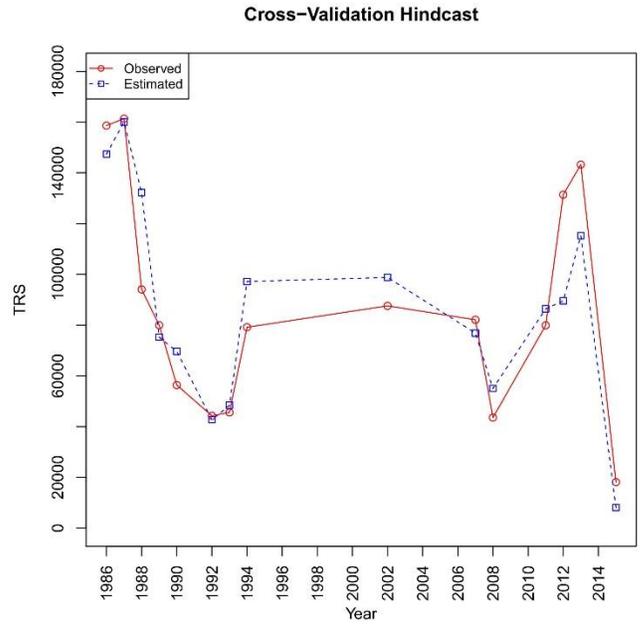
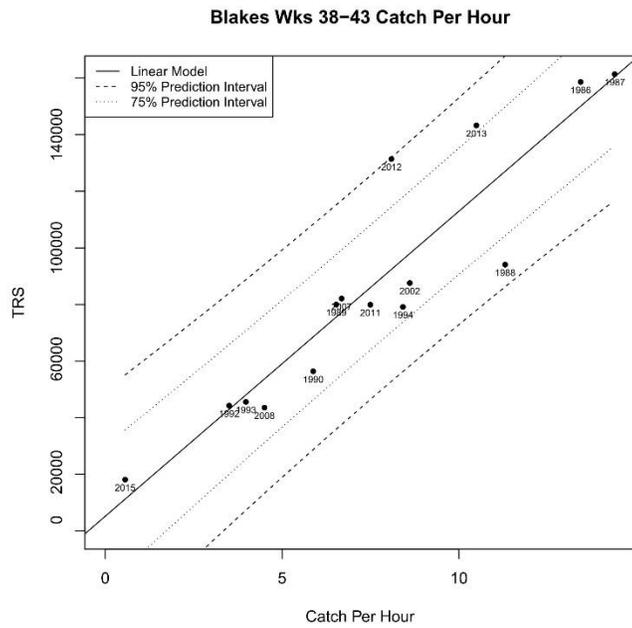
**Cross-Validation Hindcast**



## Week 42: ISU, Blake's Week 38-42 Cumulative C/H

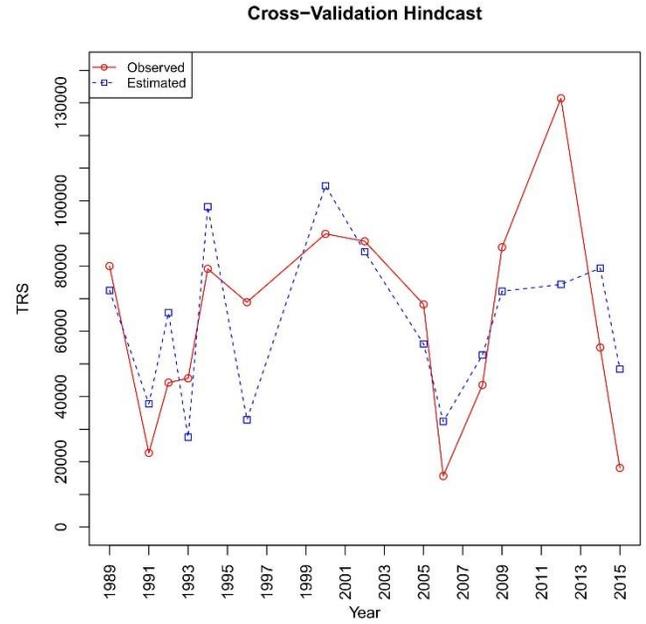
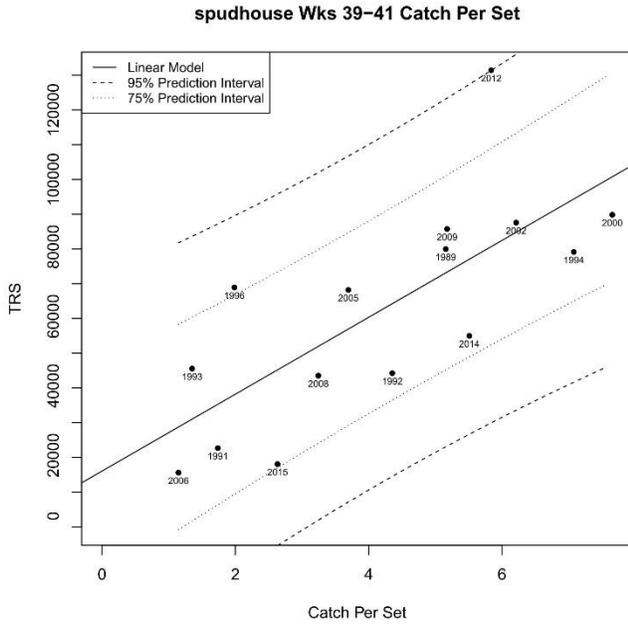


## Week 43: ISU, Blake's Week 38-43 Cumulative C/H

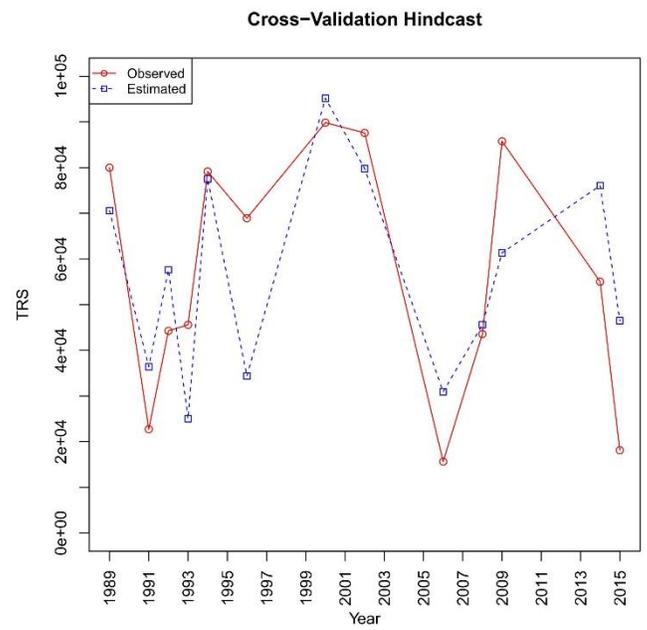
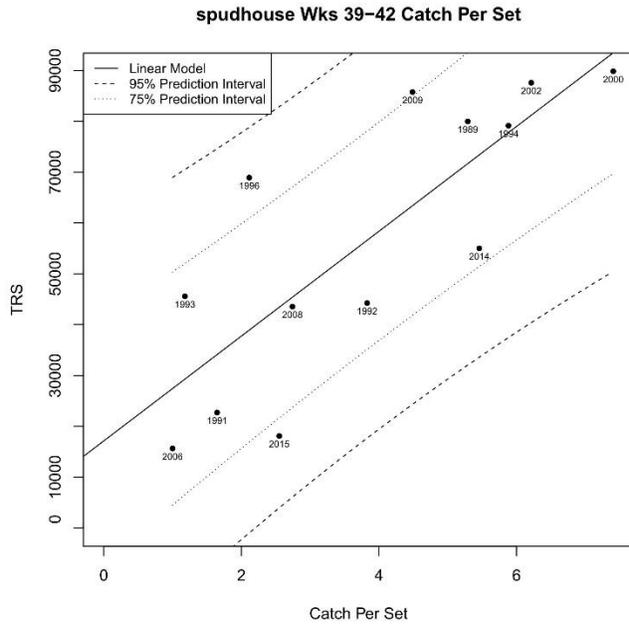


# SPUDHOUSE MODELS

## Week 41: Spudhouse Weeks 39-41 Cumulative C/S



## Week 42: Spudhouse Weeks 39-42 Cumulative C/S





## **10. 2017 WDFW Recreational Spring Chinook Fishery**

### **Introduction**

The Skagit Spring Chinook mark selective fishery occurs on the Skagit River between the Highway 530 Bridge at Rockport and the Cascade River Road Bridge at Marblemount, and in the Cascade River from the mouth to the Rockport–Cascade Road Bridge. Dates are from June 1 to July 15. The daily limit is four ad-clipped Chinooks per day, no more than two over 24". The bonus limit of jacks was first implemented in 2008 in an attempt to encourage anglers to keep jacks, instead of sorting and only keeping larger Chinooks. We are encouraging the removal of jacks in order to reduce genetic impacts caused by straying and hybridization with the native summer Chinooks.

This area and time frame was selected to avoid impacts to all but one wild stock. Three stocks, Sauk Springs, Suiattle Springs and Sauk Summers are not known to be present above the mouth of the Sauk River. From radio tagging studies performed by the Skagit System Cooperative from 1979-1981 (Granstrand and Gibson, 1981), Skagit Summer Chinook are rarely found above the mouth of the Sauk River until after July 15. Cascade River Spring Chinook are present, having to pass through the fishery to reach their spawning grounds.

#### Description of Sampling

The Skagit River spring Chinook fishery was monitored via creel from 2005 to 2012. In 2010 Dr. Kristen Ryding secured funding for three years in order to the indirect method for estimating the Coded Wire Tag (CWT) recoveries, for years 2010 through 2012. The indirect method of sampling will be used in future years in place of continued sampling.

## **11. 2017 WDFW Skagit River Sockeye Fishery**

### **Introduction:**

The Skagit in river fishery will occur from the Memorial Highway Bridge in Mt. Vernon to Gilligan Creek, from June 11-July 15th. June 28, 29, July 6, 7 and 11 will be closed to avoid gear conflicts during Upper Skagit Indian Tribe commercial fisheries. The catch limit will be 3 Sockeye per day.

### **Description of Sampling**

To assess angler effort, catch, total harvest and impacts to other stocks and species WDFW will conduct a creel survey on the Skagit River during the fishery. Sampling will occur four days a week and will cover both morning and afternoon time periods. They will sample for both effort and catch. Because two samplers can only cover eight of the potential fourteen time periods per week, expansions to time periods not covered will need to be made. Sampling will occur one day on weekends randomly selected. From Monday-Friday sampling will occur on three randomly selected days per week. Catch will be calculated on a daily basis, and for days not sampled expansions will be made using data collected from that week and strata (weekend or weekday).

During the creel interview two pieces of information will be collected, angler effort and catch data. Information collected from angler interviews include number in party, angler type (i.e., boat or shore), whether or not anglers have completed their trip, start and stop time, number of trailers and cars associated with the party, and the number of fish kept and released by species and mark.

### **Effort:**

Index effort counts will be made by counting the number of boat trailers and cars at four public boat launches located within the fishing area and at several bank access sites. Two effort counts per shift, four per day will be made by samplers. Effort count times will be chosen by breaking the day into four time periods with times randomly chosen. In addition total effort will be counted twice a week by jet sled. The total number of boats and bank anglers within the fishing area will be counted. Total daily effort will be expanded by the ratio of index counts to actual counts.

Average numbers of anglers per boat, trailer, and by vehicle will come from angler interviews, each piece will be necessary to calculate total effort. Total hourly effort will be expanded by the total number hours of fishing available on any given day.

Catch: Interviews will take place at all know access sites in proportion to effort. CPUE for Sockeye, Chinook, steelhead and bull trout encounters will be calculated from interviews. Other species may also be calculated if interest/concern warrants. CPUE will be calculated by angler type (boat, bank) on a daily basis from angler interviews. Total catch will be calculated by multiplying CPUE by the total daily effort for each angler type.

### **Methods**

The methods used to expand effort and angler catch data to estimate total effort and harvest are outlined in WDFW Methods Manual-Creel Information from Sport Fisheries (Hahn 2000).

Biological sampling: If sockeye are tagged for timing studies, the pertinent information will be collected. WDFW will work with biological staff from USIT to determine details. If Chinook or steelhead are encountered pertinent biological sampling will occur. **Skagit River tributaries; Gamefish fisheries.** The following tributaries will be closed to gamefish fishing, on the specified dates, in order to protect weak returns of salmon in 2017.

**Skagit River tributaries; Gamefish fisheries.** The following tributaries will be closed to gamefish fishing, on the specified dates, in order to protect weak returns of salmon in 2017.

Stream	Limiting Species	Closure Date
All Creek	Pink	July 31
Bacon Creek	Pink	Aug 15
Upper Baker River	Sockeye	Aug. 31
Boulder Creek	Pink	Aug 15
Buck Creek	Chinook	July 31
Camp Creek	Chinook	July 31
Cascade River	Chinook	July 15
Channel Creek	Sockeye	Aug. 31
Diobsud Creek	Pink	Aug. 15
Downey Creek	Chinook	July 31
Found Creek	Chinook	July 31
Goodell Creek	Pink	Aug. 15
Hansen Creek	Pink	Aug. 31
Illabot Creek	Pink	Aug. 15
Jordan Creek	Pink	Aug. 15
Kindy Creek	Chinook	July 31
Ladder Creek	Pink	Aug. 15
Lime Creek	Chinook	July 31
Marble Creek	Chinook	July 31
Milk Creek	Chinook	July 31
Nookachamps Creek	Pink	Aug. 31
Pugh Creek	Chinook	July 31
Sauk River	Chinook	July 15
Straight Creek	Chinook	July 31
Suiattle Creek	Chinook	July 15
Sulphur Creek	Chinook	July 31
Tenas Creek	Chinook	July 31
Thornton Creek above Hwy 20	Coho	Oct 31
White Chuck River	Chinook	July 15

## 12. Green/Duwamish coho salmon in-season update model

The Muckleshoot Indian Tribe conducted a coho test fishery during statistical week 36 from 2003-2010 and 2016. This test fishery was revived in 2016 due to the unprecedentedly low run sizes projections for many stocks in Puget Sound, including the Green River stock. This test fishery uses gill net catches from six sites in the lower Duwamish River between the mouth in the East and West Waterway and the 16<sup>th</sup> Avenue Bridge. One net (300 feet of 5 inch mesh webbing) is fished at each site from 7 PM to 7 AM. Coho from each net are enumerated and combined with the terminal run size to project returns for the current year.

This in-season update methodology models escapement as a function of test fishery catches. Initial modeling examined multiple metrics to predict escapement. These metrics included the maximum catch among the six sites and the geometric mean of the  $n$  ( $n = 2, 3, 4,$  and  $6$ ) largest catches (Table 1). These models were fit in R using a general linear model with a Poisson distribution. The model with the lowest Akaike's Information Criteria value was used to project the in-season run size.

Table 1. Available data for the Green River in-season update model. TRS is the terminal run size and projected is the projection from the model.

Year	Max	2	3	4	All	TRS	Projected
2003	71	70.5	69.3	62.9	29.4	80,414	64,220
2004	709	543.7	327.7	248.9	154.2	168,411	169,680
2005	44	37.5	28.2	24.1	17.0	75,060	60,017
2006	69	59.9	45.4	37.4	24.1	85,494	62,838
2007	98	77.3	69.4	59.3	37.4	52,101	65,126
2008	88	46.9	32.8	27.4	19.5	65,951	61,184
2009	52	39.5	32.0	28.8	22.5	43,021	60,260
2010	34	33.5	33.3	29.3	23.5	32,396	59,522
2016	182	96.3	53.0	37.3	25.5	52,146	65,893

Over the nine years of available data, the average projection was 11.3% greater than the observed terminal run size (Table 1).

### 13. South Sound chum salmon in-season update model - MIT

The Northwest Indian Fisheries Commission has conducted a chum test fishery during statistical week 41-49 from 1981-2016 (Table 1). This test fishery occurs near the area 9:10 line at Apple Cove Point using a purse seine boat that participates in the non-treaty commercial fishery.

Table 1. Available sample sizes from the 1981-2016 Apple Cove Point test fishery by week on the diagonal and sample sizes for groups of weeks on the off-diagonal. For example, 10 in week 41-46 means 10 years of data exist where these six weeks were all sampled.

Week	41	42	43	44	45	46	47	48	49
41	17	16	16	16	16	10	0	0	0
42 <sup>1</sup>		32	31	31	30	21	10	8	0
43			35	35	34	26	11	9	1
44				36	35	25	11	9	1
45 <sup>2</sup>					35	25	11	9	1
46						26	12	9	1
47							12	9	1
48 <sup>3</sup>								9	1
49									1

<sup>1</sup> Two sampling events during week 42 in 1983 were combined.

<sup>2</sup> The first of two sampling events during week 45 in 1985 and 1990 were moved to week 44.

<sup>3</sup> The first of two sampling events during week 48 in 1988 was moved to week 47.

This in-season update methodology models South Sound terminal run sizes as a function of test fishery catches. Initial modeling examined multiple metrics to predict escapement. These metrics included geometric mean of all hauls in the weekly test fishery. Sequential multiple regression models were fit weekly beginning with the week 41 and 42 test fishery catches. These models were fit in R using a general linear model with a Poisson distribution. The model with the lowest Akaike's Information Criteria value was used to project the in-season run size.

These models improve as each week of data is added. This modeling structure can accommodate non-treaty gill net and purse seine catch per unit to further refine run size projections. Non-treaty net catches are most consistently available from weeks 43-46.

#### **14. Warm Water Test Fishery 2017 – 2018 - MIT**

This proposal put forth is designed to prosecute a test fishery that will collect a second year of information on the feasibility and potential impacts of a directed fishery (C&S and commercial) on warm-water fishes in the Lake Washington basin. The results of this test fishery will inform management moving forward with a full scale commercial fishery as well as a number of secondary considerations.

One major consideration is to determine the impact on ESA listed salmonids. This test fishery is scheduled to encompass times we can minimize impacts to ESA listed salmonids. Chinook adults typically start migrating into the lake in mid-June with spawning concluding the first week of November. The timing of the test fishery proposed, May-June 15 (2017) and January-April (2018), will eliminate impacts on migrating adult Chinook. The June portion of this test fishery will only occur in Lake Sammamish to eliminate impacts to adult migratory Chinook that beginning to enter the Lake Washington Ship Canal during this period. Using large mesh gillnets will eliminate impacts on age-0 Chinook and any potential steelhead smolts migrating out to sea. The probability of encountering an adult wild steelhead is very low to zero. If one is encountered, it would likely be a wild stray fish from a neighboring watershed such as the Green River. Steelhead surveys in the Sammamish River tributaries, including Lake Sammamish, were discontinued at the end of 2003 after five years of surveys in which no steelhead or steelhead redds were observed. Therefore, no risk of encounters exists in Lake Sammamish. There are very few remaining steelhead spawning in the Cedar River. From 2009 through 2015, redd-based escapement estimates for the Cedar River have averaged just over two (2) steelhead per year. Further, several of these redds may be the result of large cutthroat trout that are known to overlap with steelhead.

Regardless, the potential exists to encounter steelhead which necessitates structuring this test fishery to minimize these impacts. In the first year of this test fishery (January – April 2017), the entire Lake Washington Ship Canal and the southwestern shoreline of Lake Washington extending from the Ship Canal to slightly past the mouth of the Cedar River were excluded from the proposed test fishery. This closure was implemented because this area was believed to be the most likely area where migrating adult steelhead would be encountered. Through March 31, 2017 (12 weeks of effort), no steelhead have been encountered in any areas of the Lake Washington basin we have fished. In the second year of this test fishery, we propose to direct limited effort in a portion of this previously closed zone in Lake Washington on the western shoreline between the 520 bridge and the mouth of the Cedar River. To limit potential encounters with adult migrating steelhead in this zone, we will only fish it after March 31. This should eliminate adult steelhead encounters because they should have migrated into the Cedar River.

The test fishing area will be divided into 7 zones. Lake Washington will have six zones (eastside of Mercer Island below I-90, eastside between the two bridges (I-90 and 520), on the west side north of the 520 bridge, on the east side north of the 520 bridge, west side between I-90 and 520, and west side south of the 520 bridge). Lake Sammamish will be the seventh zone. Each zone will be fished separately with only one zone being fished at any given time with a maximum of eight 300 foot gillnets deployed. Three to four boats will be present at all times – up to two tribal boats, up to two additional research

boats and one enforcement boat. The gillnet mesh will range from 3 ½ to 6 inch stretch mesh. To further minimize interactions with steelhead, the gear will be monitored very closely and any steelhead caught will be immediately released (ancillary to this project we have successfully tagged and released multiple walleye). The cold water in the lake during this period will help reduce mortality of any released fish. Fishing will occur from one to four nights per week. Nets will be initially set on Monday morning and be retrieved no later than Friday morning.

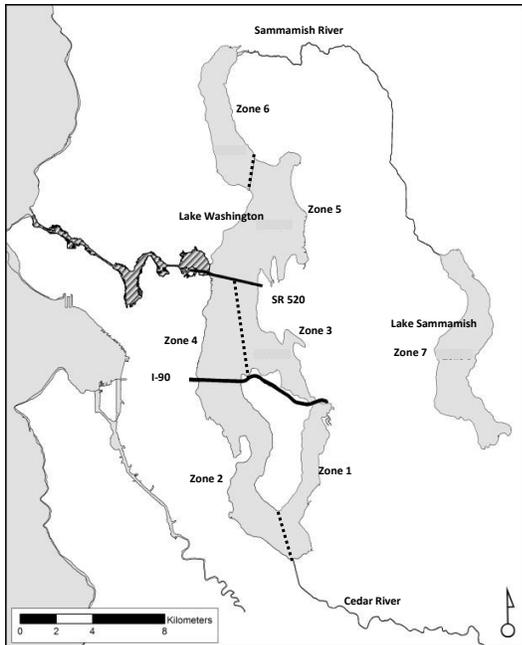


Figure 1. Proposed warmwater test fishery zones (1-7) and exclusion areas (cross-hatched) that will not be fished to minimize steelhead encounters.

A second consideration is that catch rates of targeted species (i.e. smallmouth bass, walleye) may be high enough to result in an economically viable fishery. The test fishery proposed will address this issue. Data collected will inform managers of areas and times that a tribal net fishery could be economically viable as well as areas to avoid/target minimizing bycatch and optimizing harvest.

Prosecuting this test fishery will allow us to address a number of other issues that will benefit salmonid management in the Lake Washington basin. A new predator, walleye, which likely has negative impacts to salmonids, has been introduced and a lack of information is available on adult diets and distribution in Lakes Washington and Sammamish is available. A second highly invasive predator, northern pike, was captured during the first year of our test fishery. We will instrument up to 15 walleye (or northern pike) with multi-year acoustic transmitters during this time to assess their overlap with migrating juvenile salmonids in addition to locating areas these invasive predators may be targeted in subsequent fisheries. Instrumented walleye (or pike) will be monitored with a network of fixed station acoustic receivers through the Lake Washington and Sammamish basin. This network is used to monitor the migratory behavior of smolting Coho salmon as well as returning adult Sockeye and Chinook salmon. We

will use the overlap of juvenile Coho and walleye as a model of the potential interactions with ESA listed Chinook.

#### Take estimation and reporting

We believe there is a very small to zero potential impact for this test fishery to interact with adult steelhead in Lake Washington and no potential for interaction with adult migratory Chinook. Even with that we have designed this test fishery to minimize these interactions. Should there be an encounter, steelhead or Chinook will be handled carefully by trained professional staff and as much biological data will be taken as possible. Lengths, fin clips for genetic analyses, marks, and locations. Further, should staff believe survival upon release is questionable; the steelhead will be retained and reported as ceremonial and subsistence treaty catch.

Understanding the potential for interaction with the public, we propose monthly reporting on this test fishery to NOAA. These reports will contain gear used, area fished, and effort. Further, any natural adult steelhead or Chinook encountered will be immediately reported. This test fishery will be immediately shut down if and when a third natural origin adult steelhead is encountered or fifth natural origin adult Chinook.

## 15. Monitoring Piscivorous Fish Populations in Lake Washington and 16. In the Lake Washington Shipping Canal

4/10/2017

### Objectives

1. Describe the utility of boat-mounted electrofishing and gill netting to remove predators of salmonids in the Lake Washington Shipping Canal (LWSC) and selected areas of Lake Washington.
2. Assess the species composition, relative abundance, and temporal changes of piscivorous fish populations (fish that prey on juvenile salmonids) in Lake Washington and the Lake Washington Shipping Canal.
3. Detect the presence of illegally introduced fish species such as walleye and northern pike.

### Monitoring Plan Summary

Electrofishing catch rates coupled with variable-mesh gill nets are a common approach for monitoring temporal changes in fish abundance and species composition in lakes. This document describes a plan to monitor piscivorous (fish that prey on juvenile salmonids) fish populations in Lake Washington and the Lake Washington Ship Canal (LWSC) at “index sites” where piscivore fish populations are perceived to be high. The use of index sites will reduce variability in catch rates across sites and allow for an unbiased assessment of inter-annual changes in fish abundance. Additionally, electrofishing will allow for the capture of piscivorous fish with minimal impacts to ESA-listed salmonids.

### Methods

*Electrofishing:* Electrofishing will be conducted at night using a boat electro-shocker and a three-person crew (two netters and one boat driver). Up to ten index areas will be identified within Lake Washington and the Lake Washington Ship Canal (Figures 1 & 2), and four 600-second (pedal-down time) “shock sections” will be established within each index area. The boat will be maneuvered through the shallows (depth range 0.2–1.5 m) adjacent to the shoreline at an average rate of 40 m/min.

Sampling of the index areas will occur during the night over a 6-week time period from early September to mid-October, with each shock section being sampled twice during the sampling period. Selected index sites may also be sampled with electrofishing gear during a spring (April 25 – June 3) sampling effort. Early fall is an effective time to electrofish, as piscivorous fishes are actively using the shallow water index areas identified in Figures 1 & 2. Early fall is also the optimal time to detect evidence of natural reproduction (juvenile fish) from illegally introduced species such as walleye. Catch per unit effort (CPUE) of electrofishing (fish/hour) will be calculated for each target species, and compared among weeks to describe changes in gear effectiveness throughout the study period.

*Gill Netting:* Variable-mesh monofilament gill nets (25 feet-2 inch; 25 feet-2.5 inch; 50 feet-3 inch; 50

feet-4 inch) will be set in selected index areas within Lake Washington and the LWSC at night (12-16 hour set time; Figure 2) during the spring (April 25 – June 3) sampling period.

Gill nets will be set with alternating orientations, i.e., parallel and perpendicular to shore, to evaluate the effect of net orientation on catch per unit effort (CPUE). Although setting nets perpendicular to shore is effective for capturing bass, results from Wolvert and McLelland (2015, 2016) suggests setting nets parallel to shore is more effective. Locality data (Lat/Long) and depth range will be recorded for each net set.

*Processing Samples:* Target species including Walleye, Northern Pike, Smallmouth Bass, Largemouth Bass, Rock Bass, Yellow Perch, and Northern Pikeminnow will be removed, measured to the nearest millimeter and weighed to the nearest gram. All non-target species will be counted, and any captured alive will be released after being weighed.

*Timing Considerations:* Monitoring/sampling will occur during spring (April 25 – June 3) and fall (September 1 – October 15) sampling periods. Electrofishing will occur at night during both spring and fall sampling periods, and gill netting would occur only during the spring sampling period.

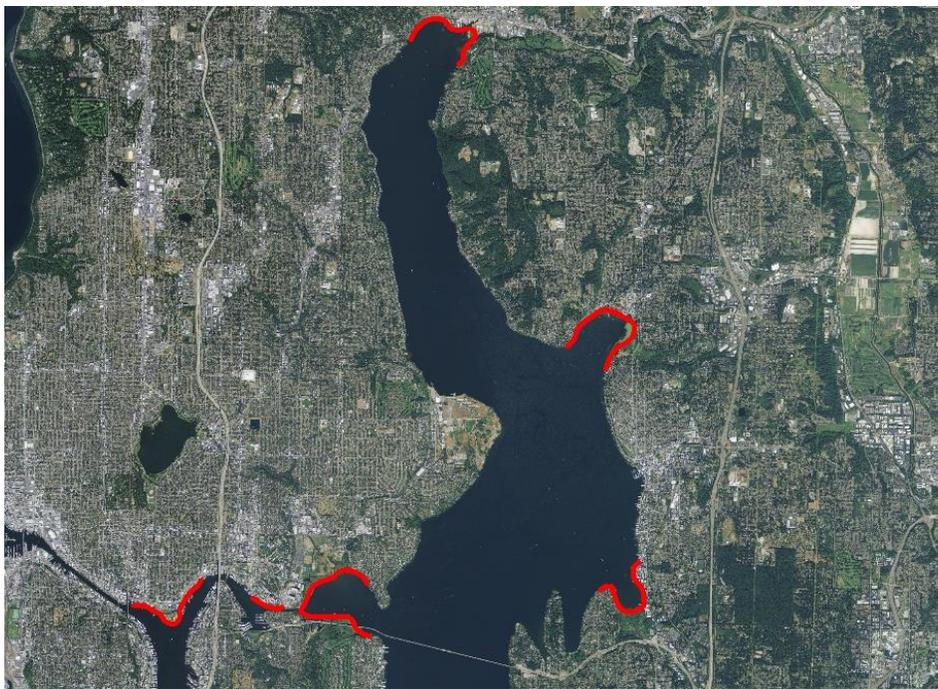


Figure 1. Potential index sites in the north half of Lake Washington, including the Lake Washington Shipping Canal, and Lake Union.

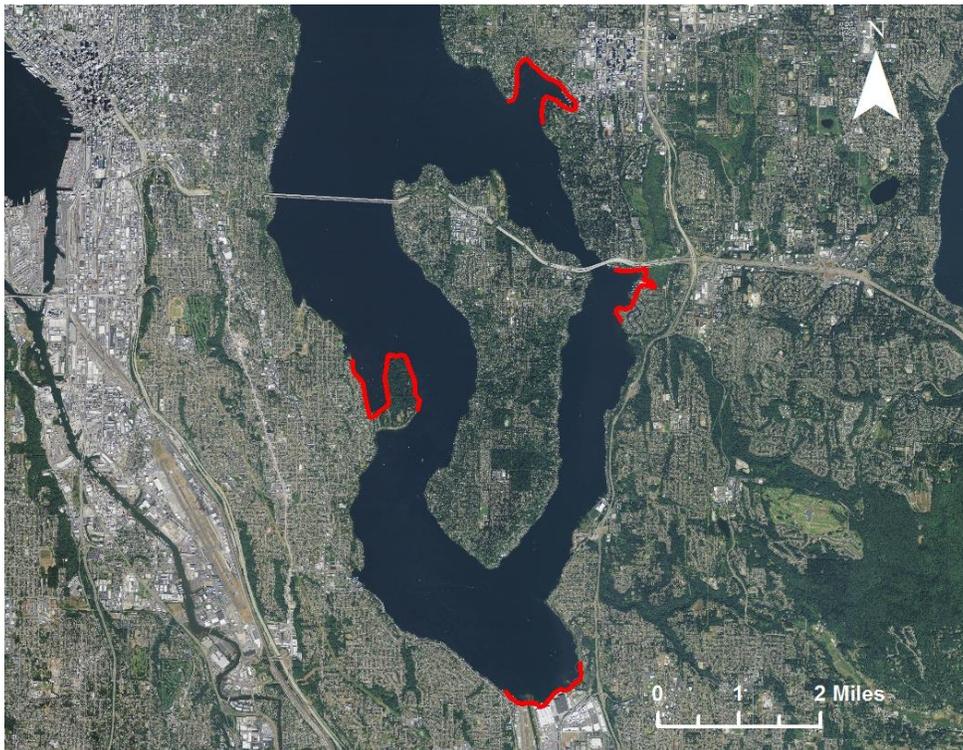


Figure 2. Potential index sites in the south half of Lake Washington.

### **ESA Considerations**

The Puget Sound Chinook Harvest Management Plan (PSCHMP; NMFS 2010) as extended allows for limited take of listed species during research activities within each Management Unit (MU): "Mortality associated with certain monitoring and research activities (e.g. test fisheries and update fisheries), that primarily inform in-season harvest management decisions, will be accounted with other fishery related mortality under the ER ceilings defined for each MU. Mortality associated with other research and monitoring, which have broader applicability to stock assessment, will not be accounted under the ER ceilings. Mortality in this latter category will not exceed a level equivalent to 1% of the estimated annual abundance (i.e. 1% ER), for any MU." As such, there is limited take for Puget Sound Chinook available to this proposed project under the PSCHMP, in combination with other projects within the MU. Steelhead take for research purposes has historically been covered separately, but was written into the NMFS 2016-17 biological opinion for the Puget Sound salmon fisheries, which effectively extend the 2010 PSCHMP.

This piscivore monitoring study will have limited potential to take listed anadromous species (PS Chinook and PS steelhead). While it is likely no take will occur, the chance exists, and so estimated take values are provided below:

1. Steelhead adults: The probability of encountering an adult steelhead is low. Puget Sound adult steelhead would not be migrating through the Lake Washington watershed or any neighboring watersheds during either spring or fall sampling periods. If one is encountered, it would likely be a stray fish from a neighboring watershed such as the Green or Snohomish rivers. The take is estimated as one adult.

2. Steelhead juveniles: Due to the timing of the study, juvenile steelhead will likely have migrated through and exited the action area. Late migrants that may be present have a low likelihood of encountering the gear; gillnet mesh size is too large to entangle juveniles (2 to 4 inch stretch mesh), and boat electroshocking will be conducted in shallow nearshore areas where juvenile Steelhead are not likely to be present. The take is estimated as two juvenile Steelhead.

3. Chinook adults: Chinook adults typically start migrating through the action area in mid-June. Although spring sampling would occur before Chinook adults are present in the action area, the fall portion of this project is scheduled to take place in the months of September and October, when Chinook adults will be migrating through the Lake Washington system. Electrofishing will be done in shallow embayments and nearshore areas above the thermocline where Chinook adults are unlikely to be present. Chinook adults migrating through the LWSC and Lake Washington are more likely to use deep-water off-shore habitats where electrofishing will not occur. A combined gear take of 10 Chinook adults (NOR and/or HOR) is estimated.

4. Chinook juveniles: Juvenile Chinook will likely have migrated through and exited the action area by September/October (the fall sampling period), but small numbers of juveniles may still be present during the spring sampling period (late-April – early June). Gillnet gear encounters will be unlikely as the mesh size is too large to catch a Chinook juvenile (2 to 4 inch stretch mesh) and poses very little threat. Late migrants or lake-rearing individuals that may be present have a low likelihood of encountering the boat electroshocker, as monitoring will be conducted in shallow nearshore areas where juvenile Chinook are less likely to be present. However, late migrating or lake-rearing juvenile Chinook may be encountered, and the take is estimated as 30 fish (NOR and/or HOR). The electroshocking portion of this study will stop once 30 juvenile Chinook are caught, and estimated take values for Chinook will be reassessed at that time. It is considered unlikely that this reassessment will be triggered.

As outlined above, the PSCHMP as extended provides coverage allotment for take of both Puget Sound Chinook and steelhead. Expected steelhead take is presented in bullets 1 and 2 above. Regarding Chinook take (HOR and NOR combined), the age classes need to be considered separately to relate them to the 1% annual abundance cap for this Chinook management unit (HOR and NOR combined). Accounting for the ten Chinook adults is straightforward. However, the Chinook smolt value needs to be equated to the loss of an adult fish in order to be considered as a portion of the annual adult abundance. Below is FRAM's adult equivalent (AEQ) value for age 2 Chinook, as well as recent annual abundance values used in FRAM. (These HOR+NOR abundances were in the denominator for exploitation rate calculations in either the pre-season 2013-15, or the post-season FRAM runs 2010-12.) The age-2 AEQ value is used here as a proxy to a smolt AEQ value, and will therefore considerably overestimate the take percentage. The survival rate of a smolt to an age 2 fish is unknown, but is certainly considerably less than 100%.

- Equation:  $(\#Handled * AEQ * Handling Mort) / Average Abundance$ . (Note that "Average Abundance" and "#Handled" refers to NOR and HOR fish combined.)
- Age 2 Chinook Lake Washington (Upper SPS FF) AEQ Mortality (May-June Time Step): 0.471
- Lake Washington Chinook Abundance (AEQ Mortality + Escapement) from FRAM Runs:

Year	Total Abundance	Natural Abundance	Source
2015	5164	722	Final pre-season
2014	8309	987	Final pre-season
2013	13182	1405	Final pre-season
2012	16164	2957	April 22 post-season
2011	6707	985	April 22 post-season
2010	6114	565	April 22 post-season

- $(30 \text{ smolt} * 0.471 * \text{Handling Mort}) / 9,300 = 0.15\%$
- $(10 \text{ adult} / 9,300) = 0.11\%$
- $\text{Total take} = 0.15\% + 0.11\% = 0.26\%$

- At 100% handling mortality the exploitation rate is approximately 0.1% for two year old fish (n=30); note that this value is understood as significantly overestimating the actual percentage of take to the annual abundance as it assigns a smolt the same adult value as a 2 year old fish. Ten adult Chinook are also included in the take estimate. Thus, it can be assumed that the percentage of take from the annual abundance is considerably below the 1% allotment provided for in the PSCHMP (at 0.26%).

In summary, project impacts are significantly below the 1% allotment for Chinook annual abundance. The estimated take of HOR and NOR combined is 10 adults, and 30 smolts, which is 0.26% of annual abundance (when using the AEQ value of a 2 year old fish as a proxy for the AEQ of a smolt which is unknown).

### References

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- Tabor, R. A., B. A. Footen, K. L. Fresh, M. T. Celedonia, F. Mejia, D. L. Low, and L. Park. 2007. Smallmouth bass and largemouth bass predation on juvenile Chinook salmon and other salmonids in the Lake Washington basin. North American Journal of Fisheries Management 27:1174-1188.
- Wolvert, S. and H. McLellan. 2016. Chief Joseph Kokanee Enhancement Project 2014 Annual Report. BPA Project # 1995-011-00.

## 17. Tulalip Tribes 2017 8A Coho Fishery Monitoring and Sampling program

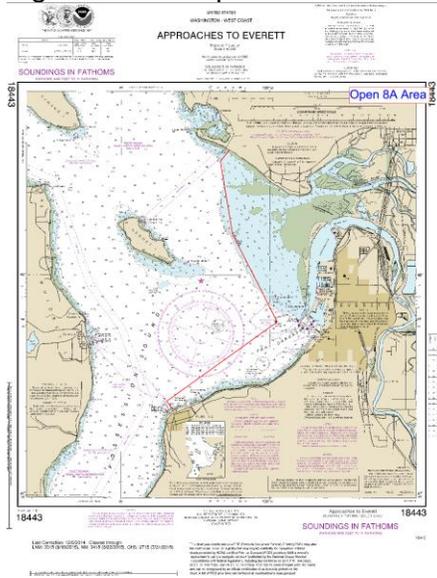
Given the anticipated poor return of natural coho to the Skagit and Stillaguamish River during 2017, Tulalip has adjusted its regular fishing effort in the 8A management Area by i) reducing the 5 days per week schedule to only 2 days per weeks, ii) the two open fishing days will be simultaneous to Area 8D opening so the effort is accordingly split to the two areas, iii) limiting the open area to fishing in 8A to the eastern shore of 8A and proximal to the mouth of the Snohomish River (See Figure 1. below -- those waters of 8A east of a line from the southern tip of 8D at 2000 feet offshore to the marker off mission flat, thence to the buoy (yellow can) at the mouth of the Snohomish River, thence to 2,000 feet offshore, then to Mukilteo Point). This area restriction was modeled in FRAM as a 50% reduction in the FRAM Base Period exploitation rate for the Stillaguamish and Skagit natural coho stocks. No changes were implemented to Snohomish natural, Wallace Hatchery, and Tulalip stocks. This reduced area also limits the access of larger gillnet boats (15% gillnet fleet) to the fishing grounds, which was modeled as a 15% reduction in the gillnet gear specific harvest rates.

Tulalip is also implementing an intense 8A sampling program including:

- High sampling rate for CWT, aiming to sample 50% of the coho catch each week. Each buyer station will be covered with a sampling team. This effort will be coordinated by Tulalip Tribes with sampling assistance from WDFW, and laboratory backup to the Tulalip Stock Assessment Lab from the Stillaguamish Tribe CWT Lab.
- At least 100 samples each week for DNA (SNP) analysis from unmarked and untagged coho.
- A coordinated plan with Stillaguamish, Skagit, Tulalip Tribes and WDFW to create a SNP baseline including the Snohomish, Stillaguamish and Skagit natural stocks, and potentially to other Puget Sound stocks as funding allows. Co-managers will collect 100 samples from natural adults during escapement surveys for three years (2017-2019) in each watershed.

Co-managers will have weekly conference calls starting in week 38 through week 42. On Tuesdays morning, Tulalip will provide 8A catch and sampling information from the previous week including (total catch, mark status and CWT detection and as available tag codes). Conference calls on Tuesday afternoon will include technical and policy staff. Additional policy meetings might be necessary to discuss potential management actions.

Figure 1. Area open to the 2017 Tulalip 8A Commercial Coho fishery



## 18. 2017 Stillaguamish-Snohomish Terminal Area Run Size In-Season Update

Coho production in the Stillaguamish/Snohomish region of origin includes natural coho runs from both the Stillaguamish and Snohomish rivers, as well as hatchery production from the Tulalip Hatchery, the Wallace River Hatchery, and the Stillaguamish Hatchery.

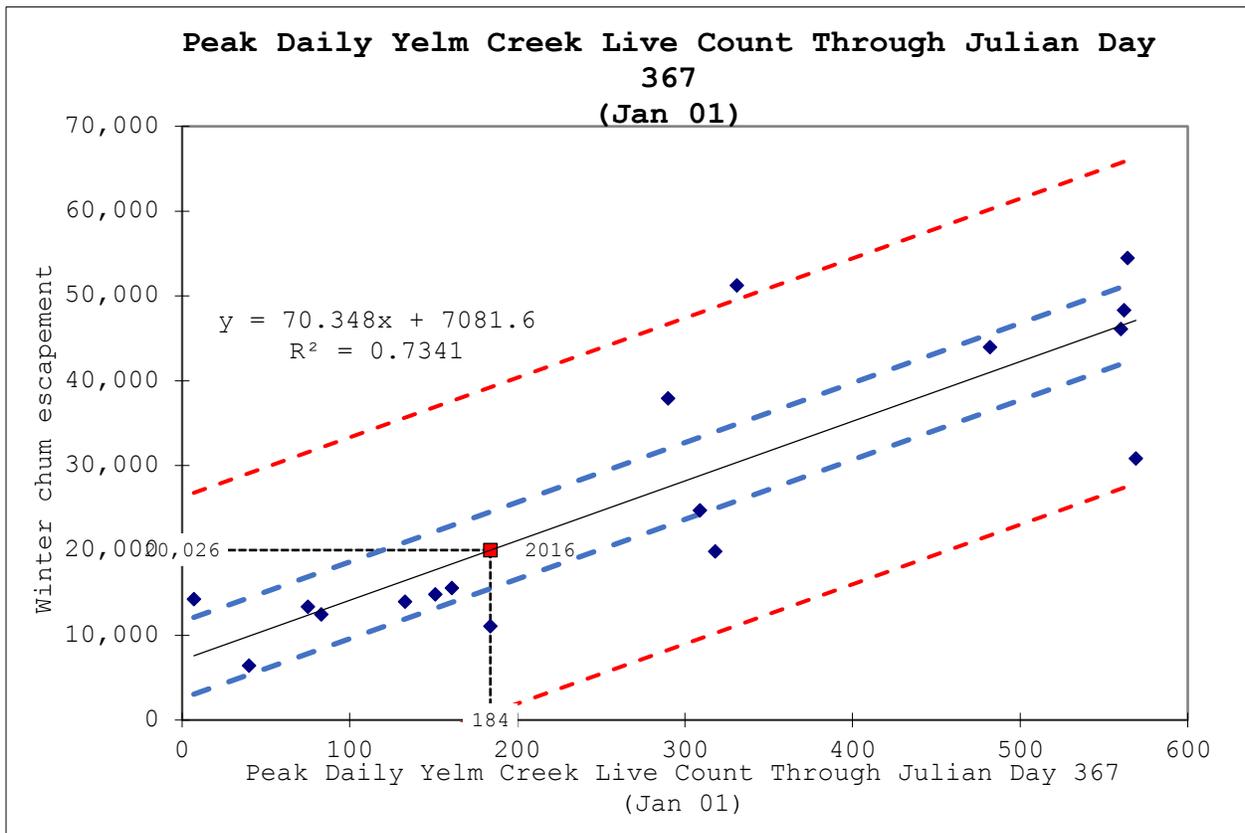
Managers will use information from the Tulalip commercial gillnet 8A fishery to evaluate the status of these management units in-season. The ISU update model(s) for the terminal Stillaguamish/Snohomish coho aggregate occurring in fishing area 8A relies on coho catch during calendar weeks 38-40 and reconstructed terminal abundances for the period 1985-2015 (in 2016 8A coho fisheries did not occur as the anticipated run strengths for the region stocks were very poor). We have previously identified week 39 as the best week to model the strength of the runs based on the mean or median catch per landing, with models explaining 75-80% of the variability of the modelled terminal run size. For the last two fishing 8A seasons, co-managers have implemented in R a linear model with bootstrap estimates of the median TRS, model parameters, as well as their empirical distributions. These estimates allows co-managers to assess the uncertainty in both, the run size estimates, as well as the model parameters.

During 2017, Tulalip coho fisheries in 8A will be targeting Snohomish coho and Tulalip hatchery stocks in the eastern portion of 8A (see map in “Tulalip Tribes 2017 8A Coho Fishery Monitoring and Sampling program”), and that poses challenges on how to make inferences on estimates based on this fishery. Treaty and non-treaty co-managers will each compile and exchange relevant data sources to evaluate potential biases, along with other relevant information that may improve the ISU model(s) or inseason management no later than June 16. The co-managers commit to schedule a conference call or in-person meeting to discuss these data and other possible datasets prior to June 30. The co-managers further commit to finalizing refinements to inseason management modeling for the 2017 season, no later than

August 4th, with an ongoing commitment to improve inseason management during 2017 and over the long term.

## 19. Nisqually Late Chum In-Season Update Model

The Nisqually Indian Tribe and NWIFC staff have built an in-season update model that predicts escapement using historical and current live counts in Yelm Creek, a small tributary at River Mile 13.5 in the Nisqually River. Live counts have been consistently surveyed weekly for over 40 years in Yelm Creek and recent years since 1990 have been regressed with total escapement for an escapement prediction tool. We plan to use this tool to predict an escapement at least 2,000 fish over the escapement goal of 18,000.



## **20. Nisqually HGMP Development 2017**

The Co-managers are working with NOAA in developing a revised HGMP for the Nisqually River. The intent of the work is to capture the direction the co-managers are taking in the recovery of Nisqually Fall Chinook with the decision to move in a different direction absent the weir as a central tool for achieving local adaptation.

The co-managers have done a tremendous amount of quality work to date in the development of the HGMP, but some additional work is necessary to reach completion. To facilitate the incorporation of the best available science, the Nisqually Indian Tribe will be coordinating a number of workshops over the course of the summer. Topics for these workshops will include freshwater capacity monitoring and assessment, estuary capacity monitoring and assessment, stock productivity monitoring, habitat status and proposed future recovery actions. The schedules are being worked out with critical partners and will be available to all interested parties as they become more certain.

The intent of the co-managers, in close cooperation with NOAA, is to develop a draft HGMP by October 2<sup>nd</sup> of 2017. Specific elements including monitoring plans and implementation, harvest and habitat modeling and planning will continued to be refined as funding allows and updated through the co-managers annual adaptive management meeting with an intensive data review after 4 years to direct future actions.

## **21. 2017-18 Summer Mark-Selective Sport Fishery**

### **22. Marine Area 5**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 5 during the 2017 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The summer Chinook MSF in Marine Area 5 will occur from July 1, 2017 through August 15, 2017. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

The preseason prediction of total legal-sized Chinook encounters in Area 5 is 7,940 (FRAM 2017). WDFW plans to manage this fishery as a season, beginning and ending on the agreed-to dates (above). WDFW will ensure that the fishery does not exceed 9,528 predicted legal-sized Chinook encounters.

#### Sampling Design and Estimation Methodologies

WDFW will employ the 'Reduced Murthy' sampling design to monitor the Area 5 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using Voluntary Trip Reports (VTRs). WDFW will employ the appropriate number of staff during the Area 5 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will provide the co-managers with bi-weekly in-season catch and effort estimates beginning the week ending July 21, 2017.

WDFW will compile a comprehensive post-season report for all summer Chinook MSFs conducted in Marine Areas 5-13 by February 1, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 5 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other coded-wired tagged stocks as described in Attachment A.

## **23. 2017-18 Summer Mark-Selective Sport Fishery**

### **24. Marine Area 6**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 6 during the 2017 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The summer Chinook MSF in Marine Area 6 will occur from July 1, 2017 through August 15, 2017, only in the portion of the area west of a true north/south line through buoy #2 near the tip of Ediz Hook. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

#### Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the 'Baseline Sampling Design' (see Attachment A). The size and mark-status of the targeted Chinook population will be estimated using Voluntary Trip Reports (VTRs). Total Chinook encounters and associated mortalities resulting from the Area 6 summer MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 6 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will compile a comprehensive post-season report for all summer Chinook MSFs conducted in Marine Areas 5-13 by February 1, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 6 summer MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 6 MSF, in addition to estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other coded-wired tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

## **25. 2017-18 Summer Mark-Selective Sport Fishery**

### **26. Marine Area 7**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 7 during the 2017 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The summer Chinook MSF in Marine Area 7 will occur from July 1, 2017 to July 31, 2017. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon.

#### Fishery Controls

The preseason prediction of total legal sized Chinook salmon encounters in Area 7 is 2,236 (FRAM 2017). WDFW plans to manage this fishery as a season, beginning and ending on the agreed-to dates (above).

#### Sampling Design and Estimation Methodologies

WDFW will employ the 'Aerial Access' sampling design to monitor the Area 7 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 7 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will provide the co-managers with bi-weekly in-season catch and effort estimates beginning the week of July 23, 2017.

WDFW will compile a comprehensive post-season report for all summer Chinook MSFs conducted in Marine Areas 5-13 by February 1, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 7 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double Index-Tagged and other coded-wire tagged stocks as described in Attachment A.

## **27. 2017-18 Summer Mark-Selective Sport Fishery**

### **28. Marine Area 9**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement Chinook salmon mark-selective fisheries (MSFs) in Marine Area 9 during the 2017 summer season. These fisheries will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of these fisheries on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate these mark-selective fisheries.

#### Fishery Regulations

The summer Chinook MSF in Marine Area 9 will occur between July 16 and August 15, 2017. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

The preseason modeled expected catch is 5,599 Chinook in Area 9 (FRAM 2017). WDFW will manage this fishery not to exceed the above catch quota. Upon reaching the quota, Area 9 will remain open to MSF coho fishing from shore until September 4, 2017.

#### Sampling Design and Estimation Methodologies

WDFW will employ the 'Full Murthy' sampling design to monitor the Area 9 summer MSFs and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 9 summer MSFs in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will provide the co-managers with preliminary weekly estimates of effort and encounters starting no later than Friday July 28, 2017 and continue through August 15, 2017. WDFW will compile a comprehensive post-season report for all summer Chinook MSFs conducted in Marine Areas 5-13 by February 1, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 9 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other CWT stocks as described in Attachment A.

## **29. 2017-18 Summer Mark-Selective Sport Fishery**

### **30. Marine Area 10**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement Chinook salmon mark-selective fisheries (MSFs) in Marine Area 10 during the 2017 summer season. These fisheries will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of these fisheries on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate these mark-selective fisheries.

#### Fishery Regulations

The summer Chinook MSF in Marine 10 will occur between July 16 and August 15, 2017. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Thresholds

The preseason modeled expected catch is 2,166 Chinook in Area 10 (FRAM 2017). WDFW will manage these fisheries not to exceed the above catch quota.

#### Sampling Design and Estimation Methodologies

WDFW will employ the 'Full Murthy' sampling design to monitor the Areas 10 summer MSFs and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 10 summer MSFs in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will provide the co-managers with weekly in-season catch and effort estimates no later than Friday July 28, 2017 and continue through August 15, 2017. WDFW will compile a comprehensive post-season report for all summer Chinook MSFs conducted in Marine Areas 5-13 by February 1, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 10 summer MSFs, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other coded-wire tagged stocks as described in Attachment A.

## **31. 2017-18 Summer Mark-Selective Sport Fishery**

### **32. Marine Area 11**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 11 during the 2017 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The summer Chinook MSF in Marine Area 11 will occur from June 1, 2017 through September 30, 2017. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

The preseason prediction of total legal-sized Chinook encounters in Area 11 is 7,199 (FRAM 2017). WDFW plans to manage this fishery as a season, beginning and ending on the agreed-to dates (above). However, if in-season estimates indicate that total Chinook encounters will exceed 80% of the preseason modeled legal-size encounters, WDFW will initiate co-manager discussion regarding potential fishery actions. WDFW will ensure that the fishery does not exceed 8,638 predicted legal-sized Chinook encounters.

#### Sampling Design and Estimation Methodologies

WDFW will employ the 'Reduced Murthy' sampling design to monitor the Area 11 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using Voluntary Trip Reports (VTRs). WDFW will employ the appropriate number of staff during the Area 11 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will provide the co-managers with bi-weekly in-season catch and effort estimates beginning the week ending June 23, 2017.

WDFW will compile a comprehensive post-season report for all summer Chinook MSFs conducted in Marine Areas 5-13 by February 1, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 11 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other CWT stocks as described in Attachment A.

### **33. 2017-18 Summer Selective Sport Fishery**

#### **34. Marine Area 12**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 12 during the 2017 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

##### Fishery Regulations

The summer Chinook MSF in Marine Area 12 will occur from July 1, 2017 through September 30, 2017, only in the portion of the area located south of Ayock Point. Anglers will be allowed a daily limit of up to four salmon. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

##### Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

##### Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the 'Baseline Sampling Design' (see Attachment A). The size and mark-status of the targeted Chinook population will be estimated using Voluntary Trip Reports (VTRs). Total Chinook encounters and associated mortalities resulting from the Area 12 summer MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 12 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

##### Reporting Schedule

WDFW will compile a comprehensive post-season report for all summer Chinook MSFs conducted in Marine Areas 5-13 by February 1, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 12 summer MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 12 MSF, in addition to estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other CWT stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

## **35. 2017-18 Summer Mark-Selective Sport Fishery**

### **36. Marine Area 13**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 13 during the 2017 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The summer Chinook MSF in Marine Area 13 will occur from May 1, 2017 through September 30, 2017. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

#### Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the 'Baseline Sampling Design' (see Attachment A). The size and mark-status of the targeted Chinook population will be estimated using Voluntary Trip Reports (VTRs). Total Chinook encounters and associated mortalities resulting from the Area 13 summer MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 13 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will compile a comprehensive post-season report for all summer Chinook MSFs conducted in Marine Areas 5-13 by February 1, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 13 summer MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 13 MSF, in addition to estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other coded-wired tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

### **37. 2017-18 Winter Mark-Selective Sport Fishery**

#### **38. Marine Area 5**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 5 during the 2017-2018 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The winter Chinook MSF in Marine Area 5 will occur from March 16 to April 30, 2018. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

#### Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the 'Baseline Sampling Design' (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using Voluntary Trip Reports (VTRs). Total Chinook encounters and associated mortalities resulting from the Area 5 winter MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 5 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will compile a comprehensive post-season report for all winter Chinook MSFs conducted in Marine Areas 5-13 by November 30, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 5 winter MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 5 MSF, in addition to estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other coded-wire tagged stocks as described in Attachment A will be provided at a later date, as estimates from Catch Record Card become available (see Attachment A).

### **39. 2017-18 Winter Mark-Selective Sport Fishery**

#### **40. Marine Area 6**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 6 during the 2017-2018 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery-origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

##### Fishery Regulations

The winter Chinook MSF in Marine Area 6 will occur from March 1 to April 15, 2018. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

##### Fishery Controls

The preseason prediction of total Chinook encounters in Area 6 is 2,302 (FRAM 2017). WDFW plans to manage this fishery as a season, beginning and ending on the agreed-to dates (above). Given the shorter duration of this fishery for 2018, the precision and accuracy of in-season estimates may be compromised by lack of available effort data. Co-managers will initiate an in-season call sometime during the week of March 19-23, 2018 to discuss fishery progress. If at any time during the fishery in-season estimates indicate that total encounters for the fishery will significantly exceed this preseason modeled estimate, WDFW will modify the fishery to control impacts on stocks of concern.

##### Sampling Design and Estimation Methodologies

WDFW will employ the 'Aerial Access' sampling design to monitor the Area 6 winter MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 6 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

##### Reporting Schedule

WDFW will compile a comprehensive post-season report for all winter Chinook MSFs conducted in Marine Areas 5-13 by November 30, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 6 winter MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 6 MSF, in addition to estimates of marked and unmarked mortalities of Double Index-Tagged and other coded-wire tagged stocks as described in Attachment A will be provided at a later date as estimates from Catch Record Card become available (see Attachment A).



## **41. 2017-18 Winter Mark-Selective Sport Fishery**

### **42. Marine Area 7**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 7 during the 2017-2018 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The winter Chinook MSF in Marine Area 7 will occur from January 1, 2018 to April 30, 2018. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

The preseason prediction of total Chinook encounters in Area 7 is 9,889 (FRAM 2017) and total unmarked encounters (legal-unmarked plus sublegal-unmarked) is 2,887 (FRAM 2017). WDFW plans to manage this fishery as a season, beginning and ending on the agreed-to dates (above). However, if in-season estimates indicate that total Chinook encounters are projected to be at 80% of the preseason modeled encounters, WDFW will initiate co-manager discussion regarding potential fishery actions. WDFW will ensure the fishery does not exceed 3,176 total unmarked encounters and/or exceed 11,867 total encounters.

#### Sampling Design and Estimation Methodologies

WDFW will employ the 'Aerial Access' sampling design to monitor the Area 7 winter MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 7 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will provide the co-managers with bi-weekly in-season catch and effort estimates beginning the week ending January 13, 2018.

WDFW will compile a comprehensive post-season report for all winter Chinook MSFs conducted in Marine Areas 5-13 by November 30, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 7 winter MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other CWT stocks as described in Attachment A.

### **43. 2017-18 Winter Mark-Selective Sport Fishery**

#### **44. Marine Area 9**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 9 during the 2017-2018 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

##### Fishery Regulations

The winter Chinook MSF in Marine Area 9 will occur from November 1 to November 30, 2017 and from January 16 to April 15, 2018. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

##### Fishery Controls

The preseason prediction of total Chinook encounters in Area 9 is 11,053 (FRAM 2017). WDFW plans to manage this fishery as a season, beginning and ending on the agreed-to dates (above). However, if in-season estimates indicate that total Chinook encounters are projected to be at 80% of the preseason modeled encounters, WDFW will initiate co-manager discussion regarding potential fishery actions. WDFW will ensure that the fishery does not exceed 13,264 predicted total Chinook encounters.

##### Sampling Design and Estimation Methodologies

WDFW will employ the 'Aerial Access' sampling design to monitor the Area 9 winter MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 9 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

##### Reporting Schedule

WDFW will provide the co-managers with bi-weekly in-season catch and effort estimates beginning the week ending November 18, 2017.

WDFW will compile a comprehensive post-season report for all winter Chinook MSFs conducted in Marine Areas 5-13 by November 30, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 9 winter MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other coded-wire tagged stocks as described in Attachment A.

## **45. 2017-18 Winter Mark-Selective Sport Fishery**

### **46. Marine Area 10**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 10 during the 2017-2018 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The winter Chinook MSF in Marine Area 10 will occur from November 1, 2017 through February 28, 2018. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

The preseason prediction of total Chinook encounters in Area 10 is 5,349 (FRAM 2017). WDFW plans to manage this fishery as a season, beginning and ending on the agreed-to dates (above). However, if in-season estimates indicate that total Chinook encounters are projected to be at 80% of the preseason modeled encounters, WDFW will initiate co-manager discussion regarding potential fishery actions. WDFW will ensure that the fishery does not exceed 6,419 predicted total Chinook encounters.

#### Sampling Design and Estimation Methodologies

WDFW will employ the 'Reduced Murthy' sampling design to monitor the Area 10 winter MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 10 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will provide the co-managers with bi-weekly in-season catch and effort estimates beginning the week ending November 18, 2017.

WDFW will compile a comprehensive post-season report for all winter Chinook MSFs conducted in Marine Areas 5-13 by November 30, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 10 winter MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other coded-wire tagged stocks as described in Attachment A.



## **47. 2017-18 Winter Mark-Selective Sport Fishery**

### **48. Marine Area 11**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 11 during the 2017-2018 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The winter Chinook MSF in Marine Area 11 will occur from October 1, 2017 to April 30, 2018. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

#### Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the 'Baseline Sampling Design' (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using Voluntary Trip Reports (VTRs). Total Chinook encounters and associated mortalities resulting from the Area 11 winter MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 11 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will compile a comprehensive post-season report for all winter Chinook MSFs conducted in Marine Areas 5-13 by November 30, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 11 winter MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 11 MSF, in addition to estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other coded-wire tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

## **49. 2017-18 Winter Mark-Selective Sport Fishery**

### **50. Marine Area 12**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 12 during the 2017-2018 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The winter Chinook MSF in Marine Area 12 will occur from October 1, 2017 to April 30, 2018. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

#### Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the 'Baseline Sampling Design' (see Attachment A). The size and mark-status of the targeted Chinook population will be estimated using Voluntary Trip Reports (VTRs). Total Chinook encounters and associated mortalities resulting from the Area 12 winter MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 12 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will compile a comprehensive post-season report for all winter Chinook MSFs conducted in Marine Areas 5-13 by November 30, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 12 winter MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 12 MSF, in addition to estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other coded-wire tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

## **51. 2017-18 Winter Mark-Selective Sport Fishery**

### **52. Marine Area 13**

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 13 during the 2017-2018 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

#### Fishery Regulations

The winter Chinook MSF in Marine Area 13 will occur from October 1, 2017 to April 30, 2018. Anglers will be allowed a daily limit of up to two hatchery Chinook. All sub-area closures included in the 2017-18 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

#### Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

#### Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the 'Baseline Sampling Design' (see Attachment A). The size and mark-status composition of the targeted Chinook population will be estimated using Voluntary Trip Reports (VTRs). Total Chinook encounters and associated mortalities resulting from the Area 13 winter MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 13 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

#### Reporting Schedule

WDFW will compile a comprehensive post-season report for all winter Chinook MSFs conducted in Marine Areas 5-13 by November 30, 2018. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 13 winter MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 13 MSF, in addition to estimates of marked and unmarked mortalities of Double Index-Tagged (DIT) and other coded-wire tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

## 53. Puget Sound Chinook Mark-Selective Sport Fisheries

### 54. Attachment A

Based on agreements between the State of Washington and the Northwest Treaty Tribes, the Washington Department of Fish and Wildlife (WDFW) has been conducting recreational mark-selective Chinook fisheries (MSFs) in the marine catch areas of Puget Sound since 2003. This attachment outlines the general intent, data needs, sampling and monitoring plans, estimation methodologies, and reporting schedules associated with these fisheries.

#### *Fishery Intent*

Agreed-to Chinook MSFs (see attached Fishery Management Plans for specific fisheries and dates) will be conducted in Marine Areas 5-13 during the summer and winter seasons to provide recreational fishing opportunity directed at hatchery Chinook salmon, while limiting impacts on wild stocks of conservation concern, particularly ESA-listed Puget Sound Chinook. Sampling and monitoring programs will be implemented along with these fisheries in order to provide the information necessary to evaluate and plan potential future Chinook MSFs. Prior to next fishing season, WDFW and the tribes will jointly review and analyze results of the sampling and monitoring programs for these fisheries to evaluate the effectiveness at achieving the intended objectives.

#### *Data Needs for Evaluating the Fishery*

Monitoring, sampling and reporting programs will be implemented by WDFW for the purpose of providing the data necessary to estimate the impact of these MSFs on unmarked Chinook and to support the evaluation of future MSFs.

These monitoring and sampling programs are designed to provide data to estimate the following parameters:

- Mark rate in the fishery – marked and unmarked encounters will be estimated using test fishing, voluntary trip reporting (VTR) or dockside sampling programs.
- Number of marked Chinook retained – estimated using dockside sampling programs
- Number of unmarked Chinook retained – estimated using dockside sampling programs
- Number of marked Chinook released – estimated using dockside sampling and test fishing or VTR programs
- Number of unmarked Chinook released – estimated using dockside sampling and test fishing or VTR programs
- Number of Chinook encounters of sublegal size - estimated using dockside sampling and test fishing or VTR programs
- Stock composition of mortalities – estimated using CWT data collected during dockside sampling
- Mortalities of marked and unmarked double-index tagged (DIT) and other CWT stocks

The co-managers agree to implement these fisheries with the understanding that the capability to estimate stock-specific unmarked fish mortalities is preserved. Methods for estimating unmarked mortalities of DIT-CWT stocks within these MSFs have been determined jointly by the co-managers, considering recommendations of the Selective Fisheries Evaluation Committee of the Pacific Salmon Commission. WDFW will be responsible for reporting the necessary fishery information and data to the Pacific States Marine Fishery Commission that allows these estimates to be generated.

Estimates of total fishery related mortalities, including the total exploitation rate or the Southern US exploitation rate, that represents the management objective for Puget Sound Chinook management units under the co-managers' Harvest Management Plan, will be made by combining the mortality estimate for each Marine Area's mark-selective fishery with mortality estimates in other selective and non-selective fisheries. To ensure that all information necessary to make these estimates is collected, plans for sampling and monitoring of all fisheries will be included as a component of the co-managers' annual pre-season agreement.

### *Sampling Components*

#### Dockside Sampling

WDFW samplers collect biological data and information regarding effort and catch by conducting angler interviews at assigned access sites. During interviews, samplers acquire data on the number of anglers fishing in each boat, the Marine Catch Area(s) fished, trip duration, trip intent (targeted species) and fish encounter composition (kept and/or released by species). When an interviewed party possesses Chinook or coho salmon, samplers inspect the fish for CWTs using wand detectors and collect snouts from CWT-positive individuals for later lab processing. Samplers also take length measurements and collect scale samples from landed Chinook. Lastly, samplers attempt to obtain information on fishing method in order to inform test-fishing methodologies.

#### Effort Surveys

##### *On-the-Water Surveys*

On-the-water Interviews (Boat Surveys) are conducted to provide information on the proportion of effort in a fishery originating from certain access sites. During these surveys, samplers attempt to intercept all anglers on the water in a given fishery and determine where they intend to tie up or exit the fishery upon completing their trip. This provides us with a list of sites (ramps/launches) used to access the fishery as well as information on the relative amount of use (# of anglers) each site receives. Based on this information we designate a "sample-frame" of 5-6 of the highest use access sites for each fishery, from which we select sample sites for dockside creel sampling. Information from the boat surveys also allows us to estimate the total effort that originates from non-sampled sites and include it in our estimates.

##### *Aerial Surveys*

Aerial effort surveys are conducted in fisheries where Boat Surveys are infeasible due to large survey areas and unsafe boating conditions. During these surveys flights are conducted to count the total number of boats on the water in a fishery. The sample-frame (sites where we station samplers) consists of the three to four access sites expected to be of highest use in the fishery. Paired with

interviews conducted at these sites, the aerial surveys provide information on the proportion of total fishery effort that originates from non-sampled sites, enabling expansion of observed dockside counts to fishery-wide totals.

### Size/Mark-status Composition Estimates

#### *Test Fishing*

Test fishing is used to obtain accurate estimates of the size and mark-status composition of the Chinook population being targeted by a fishery. When included in the sampling design for a given fishery, it is conducted for the duration of the fishery. Test fishers spend approximately five days per week on the water attempting to mimic the behavior of the recreational fishing fleet. Fishing method information from dockside interviews is used to inform the methods used by test fishers and efforts are focused at locations that mirror choices made by the at-large private fleet. For each fish brought to the boat, test fishers record the encounter number, time sampled, species and mark-status. For all Chinook, test fishers record the fork length and total length and collect DNA and scale samples.

#### *Voluntary Trip Reports*

Voluntary Trip Reports (VTRs) are completed and returned by a subset of private fleet anglers to obtain additional information on Chinook encounter rates by size class and mark-status. Anglers are asked to record the date, number of anglers, target species, Marine Catch Area, and for each Chinook or coho hooked, whether the fish was kept or released, legal or sublegal sized, and marked (adipose clipped) or unmarked.

### *Sampling and Monitoring Plans*

For complete details regarding the following sampling plans and associated assumptions, see the WDFW Methods Report (WDFW 2012).

#### Full Murthy

The Full Murthy sampling design is the most intensive of the four sampling plans. It utilizes intensive dockside sampling, on-the-water effort surveys and test fishing data to provide precise estimates of Chinook catch and effort, along with total encounters and associated mortalities. VTRs are also collected to be used as supplements to test fishing data, if necessary.

Dockside sampling is conducted on five days during each week. Sampling strata are divided into weekday (Monday through Thursday) and weekend (Friday, Saturday and Sunday) strata. During each week,  $n=2$  out of  $N=4$  days are randomly selected for sampling from the Monday through Thursday stratum. In addition, every Friday, Saturday, and Sunday is sampled. Samplers are stationed at two ramps on each of the selected sampling days. Samplers achieve 100% sampling coverage at the assigned ramps from approximately dawn until dark in order to intercept all boats. All anglers and fish exiting the fishery through the sampled sites will be counted. Any boats that are missed at the sampled sites will be counted and recorded on the sampling forms.

Sites from the sample frame for a given fishery are selected for sampling via a weighted-random site selection process (probability proportional to size). Initially, site selection is based on site size measures

calculated from on-the-water survey data obtained during the previous year's fishery. Once the initial surveys are completed during the current year, updated size measures of sites in our sample frame are calculated based on the current year's data.

### Reduced Murthy

The Reduced Murthy sampling design is a scaled-back version of the Full Murthy sampling design. It utilizes intensive dockside sampling, on-the-water effort surveys and test fishery or VTR data, depending on the fishery.

The main difference between the Reduced Murthy and Full Murthy is a reduced dockside sampling frequency. Dockside sampling is conducted on  $n=6$  out of  $N=14$  days during each two week period. Sampling strata are divided into weekday (Monday through Thursday) and weekend (Friday, Saturday and Sunday) strata. During each two-week period,  $n=2$  out of  $N=8$  days are randomly selected for weekday sampling. In addition,  $n=2$  out of  $N=3$  days are randomly selected for sampling during each weekend. Samplers are stationed at two ramps on each of the selected sampling days. Samplers achieve 100% sampling coverage at the assigned ramps from approximately dawn until dark in order to intercept all boats. All anglers and fish exiting the fishery through the sampled sites will be counted. Any boats that are missed at the sampled sites will be counted and recorded on the sampling forms.

Sites from the sample frame for a given fishery are selected for sampling via a weighted-random site selection process (probability proportional to size). Initially, site selection is based on site size measures calculated from on-the-water survey data obtained during the previous year's fishery. Once the initial surveys are completed during the current year, updated size measures of sites in our sample frame are calculated based on the current and previous year's data.

Unlike the Full Murthy sampling design, where test fishing is a mandatory component, some fisheries sampled with the Reduced Murthy sampling design will utilize a test fishery while others will use VTR data to estimate the size and mark-status composition of the targeted Chinook population. For details regarding a specific fishery, see the attached management plan for that fishery.

### Aerial Access

The Aerial Access sampling design is a modified version of the Reduced Murthy sampling design that uses aerial effort surveys in place of on-the-water effort surveys. Dockside sampling frequencies are the same as those for the Reduced Murthy, however, instead of sampling at two sites (selected from the sampling-frame) on each sample day; samplers are stationed at all sites designated in the sample-frame (three to four sites of moderate to high effort). For each flight, the sample fraction is estimated by pairing the aerial total boat counts with the sample-frame total for boats active during the flight period (determined from dockside interviews). This allows for an expansion of estimates to account for out-of-frame effort.

As with the Reduced Murthy, fisheries monitored using the Aerial Access design may or may not include a test fishery. Those with no test fishery will use VTRs to provide an estimate of the size and mark-status composition of the targeted Chinook population.

### Baseline

The Baseline sampling design is a less intensive monitoring program that includes dockside sampling and interviews and the collection of VTR data. Baseline sampling is opportunistic in nature, with overall

sampling effort allocated across space and time in a manner that maximizes the number of angler interviews obtained per sample effort. While dockside sampling procedures remain the same as in other sampling designs, the frequency of sample days may be slightly reduced. The main difference between Baseline and other, more intensive, sampling designs is the absence of effort surveys. Due to this, Baseline sampling data cannot be used to produce in-season or immediate post-season estimates absolute catch and effort. These estimates become available at a later date through the WDFW Catch Record Card system, allowing further fishery evaluation including total Chinook encounters and associated mortalities by size and mark-status.

### ***Estimation Methods***

For fisheries monitored using the Full Murthy, Reduced Murthy and Aerial Access sampling designs, WDFW will produce periodic in-season and post-season estimates of catch and effort. To estimate total Chinook encounters and associated mortalities by size and mark-status category, WDFW will use the agreed-to ‘bias-corrected M2’ methodology (Conrad & McHugh 2008, WDFW 2012).

Fishery-total catch and effort estimates for fisheries monitored using the Baseline sampling design will be available approximately 1 to 1½ years after the close of the fishery, via the WDFW Catch Record Card system. Once these estimates are available, the appropriate methods for estimation of total encounters and mortalities will be determined using the decision support schematic provided in the ‘CRC for Encounters’ report (WDFW & NWIFC 2013). For fisheries with adequate sample sizes of VTR encounters, this involves the ‘bias-corrected M2’ approach, as mentioned above. In situations where VTR sample sizes are insufficient, total encounters and mortalities will be estimated using an ‘M1’ approach, where the size and mark-status composition of the Chinook population is estimated using dockside sampling data (see WDFW & NWIFC 2013 for details).

### ***Reporting***

For some fisheries, WDFW will provide the co-managers with in-season updates of fishery performance (see attached Fishery Management Plans for details).

Following each summer and winter season, WDFW will compile a comprehensive post-season report for all Chinook MSFs conducted in Marine Areas 5-13. These reports will include a summary of the information collected as part of each fishery’s sampling and monitoring program. In addition, for fisheries sampled using the Full Murthy, Reduced Murthy and Aerial Access sampling designs, the reports will also include:

- Weekly estimates of effort and number of Chinook caught and released, by mark-status
- Estimates of total Chinook encounters and associated mortalities by size and mark-status
- Comparisons of total encounters with pre-season FRAM modeled projections
- Comparisons of mortalities with pre-season FRAM modeled projections
- Estimated fishery-total mortalities of marked and unmarked DIT Chinook, by stock and age

### ***References***

Conrad R and McHugh P. 2008. Assessment of Two Methods for Estimating Total Chinook Salmon

Encounters in Puget Sound/Strait of Juan de Fuca Mark-Selective Chinook Fisheries. Northwest Fishery Resource Bulletin, Manuscript Series Report No 2. <http://wdfw.wa.gov/publications/00492>

Washington Department of Fish and Wildlife (WDFW). 2012. Methods Report: Monitoring Mark-Selective Recreational Chinook Fisheries in the Marine Catch Areas of Puget Sound (Areas 5 through 13). Revised Draft Report: January 30, 2012. Olympia, Washington.  
<http://wdfw.wa.gov/publications/01357/>

Washington Department of Fish and Wildlife (WDFW) and Northwest Indian Fisheries Commission (NWIFC). 2013. Estimating Total Chinook Encounters using Catch Record Card-Based Estimates of Harvest. Draft Report: November 26, 2013. Olympia, Washington.

## **55. 2017-18 WDFW Proposal for Shore-Only Recreational Fishery Regulations in Marine Areas 8-2 and 9 Targeting Marked Coho Salmon during August and September**

As part of the 2017 North of Falcon proposed fishing package, the Washington Department of Fish and Wildlife (WDFW) has proposed shore-only recreational fisheries targeting marked Coho salmon in Marine Area 9 (Area 9) during September and a limited Marine Area 8-2 (Area 8-2) shore fishery at the south end of Whidbey Island during August and September. WDFW has proposed shore-only fisheries in Areas 8-2 and 9 to help significantly reduce recreational fishing pressure on key stocks of concern compared to typical boat-based salmon fishing efforts in these areas.

The proposed shore fishery boundary in Area 8-2 extends from the southern border of the Area 9/Area 8-2 line north approximately 3,233 feet to the border of Possession Beach Waterfront Park (see map of Area 8-2 south shore fishery at the end of this document). The total estimated shoreline for all of Area 8-2 is 692,282 feet, while the proposed southern Area 8-2 beach fishery near Possession Point represents a small fraction of the total area at 3,233 feet, approximately 0.47% of the total shoreline in Area 8-2. This proposal represents a significant reduction in typical annual angling effort in Areas 8-2 and 9. For example, in Area 9 the average odd-year estimate of effort in the month of September is approximately 43,500 angler trips. We estimate that this proposal would reduce effort in Area 9 to approximately 2,300 angler trips, a 95% reduction. Similarly, in Area 8-2, the average angler trips for the months of August and September equate to 26,186 angler trips. We would expect approximately 4,678 angler trips from our proposal, a reduction of 82%.

Within Area 9 there will be a shore-only recreational fishery in the sub-area from the Hood Canal Bridge north to the Olele Point-Foulweather Bluff line. The fishery will target Pink and Coho salmon from July 16<sup>th</sup> through September 4<sup>th</sup> (Labor Day), with non-retention requirements for Chinook and Chum salmon.

### Sampling Plan

WDFW has sampled shore-based recreational angling in Puget Sound for many years as part of our baseline level of sampling and monitoring. Baseline-sampling is opportunistic in nature, with overall sampling effort allocated across space and time in a manner that maximizes the number of angler interviews obtained per sample effort. Data collection activities will focus on conducting angler interviews with catch sampling as anglers exit the shore fishery. Also, WDFW samplers will distribute and collect voluntary trip reports from shore anglers to collect additional catch and effort information. The following is a list of data that will be collected and recorded on the sampling forms, per standard Baseline-sampling protocols, during each shore-based angler interview:

- Angling effort (angler trips, trip length);
- Encounters composition (retained and/or released) by species and mark status (marked versus unmarked); and
- Samplers will also inspect landed Coho salmon for coded-wire tags (CWTs) using wand detectors and acquire snouts when CWTs are present; resulting tag data are used to estimate the CWT-based composition (unexpanded) of landed catch.
- Further, data on bird encounters are collected as part of the standard angler interview protocol.

From these data we will estimate catch rates (i.e., catch per unit effort, CPUE), mark rates, and landed-catch composition (i.e., from CWT recoveries). Additionally, we will summarize relative catch and effort

patterns over the shore-only season, based on the assumption that Baseline-sampling observations of these parameters are good indicators of associated fishery-wide trends. Additional WDFW sampling staff will be deployed in 2017 to monitor the below-listed beaches, compared to the number of samplers stationed at beaches in typical years. WDFW sampling staff who would usually sample boat-based effort in Areas 8-2 and 9 during September will be redirected and shifted to beach sampling sites. The following beaches will be sampled at a higher frequency compared to past years during 2017. These areas will be sampled three to five days a week on a random schedule including one day per weekend or anticipated high use days.

### **Area 9**

- Point Wilson Beach
- Marrowstone Island Beach
- Salisbury Point County Park
- Point No Point Beach
- Fort Casey Shore
- Driftwood Park and Beach
- Bush Point Ramp and Beach
- Lagoon Point Beach
- Double Bluff County Park

For the sub-area from the Hood Canal Bridge to the Olele Point-Foulweather Bluff line, sampling sites would include:

- Shine Tidelands State Park
- Salisbury Point County Park

### **Area 8-2**

- Possession Point Bait Co
- Possession Beach Waterfront Park

### **Effort Assessment**

In addition to increasing the angler interview sampling activities at shore-based sites, WDFW proposes to assess shore-based effort levels during the month of September by conducting effort surveys, either by boat or via aerial overflights on both weekday and weekend days. Effort surveys will be conducted opportunistically throughout the month when we would expect both high and low angler effort periods.

### **Communication**

Co-managers will have weekly conference calls starting week 34 continuing through week 40 regarding Area 8A/8-2 fisheries. On Tuesday mornings, WDFW will provide catch and sampling information from the previous week of shore fishing including total catch, mark status and CWT detection and other species information. Conference calls on Tuesday afternoon will include technical and policy staff. Additional policy meetings may be necessary to discuss potential management actions.





## 56. 2017-18 WDFW 8D Commercial Coho Fishery

WDFW is proposing a reduction to the commercial fishery for Coho in Area 8D. The reduction takes fishing days from 5 days per week to 3 days per week. The proposed gillnet schedule, in coordination with the Tulalip Tribes, is for WDFW to fish T, Th-F starting in Week 38 (week beginning Sep 17). Purse seines would remain at one day per week, Tuesdays for the initial part of the schedule and then mirror the South Sound and Hood Canal schedules. To address concerns over possible increases in effort due to large returns to the Tulalip Hatchery in 2016, WDFW will triple the gillnet effort modeled in the fishery (this, in combination with the reduction in days per week, effectively doubles the initial input). Given the potential impacts to the Stillaguamish Coho stock and the potential for increases in effort in this fishery, WDFW is proposing the following plan for in-season controls and communication:

- ✓ On the Monday following each fishery week, WDFW and co-managers will share catch and effort data for the fishery occurring within the previous week.
- ✓ If at any time, WDFW observes more than 8 landings from this fishery on a single day, an in-season call with co-managers will be initiated and an agreed-to management action will be implemented to control effort within this fishery.
- ✓ If at any time co-managers determine that additional fishery controls are necessary, an in-season call will be initiated to determine additional necessary actions.

Management Week	Week Begins	Area 8D		
		mgt	GN	PS
38	17-Sep	CO	T,Th-F	T
39	24-Sep	CO	T,Th-F	T
40	1-Oct	CO	T,Th-F	T
41	8-Oct	CO	T,Th-F	T
42	15-Oct	CO	T,Th-F	W
43	22-Oct	CO	T,Th-F	T
44	29-Oct	CO	T,Th-F	M
45	5-Nov	CO	T,Th-F	T,Th
46	12-Nov	CM	<W,Th,F>	M
47	19-Nov	CM	<W,Th,F>	T
48	26-Nov	CM	<W,Th,F>	W

Initial model inputs:

September	October
0.00670	0.01229

Revised model inputs:

September	October
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0.01300	0.02155
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**STATE OF WASHINGTON  
DEPARTMENT OF FISH AND WILDLIFE  
FISH MANAGEMENT PROGRAM  
Mill Creek – Region 4 Office  
16010 Mill Creek Blvd,  
Mill Creek, WA 98012**

April 8, 2017

**TO:** Kate Konoski, Stillaguamish Tribe Fisheries Manager  
Diego Holmgren, Tulalip Tribes Fisheries Manager

**FROM:** Jennifer Whitney, WDFW District 13 Fish Biologist

**SUBJECT: REVISED 2017 PROPOSED SPORT GAMEFISH SEASONS FOR THE  
STILLAGUAMISH RIVER**

Stillaguamish salmon stocks are forecast to be in critical status in 2017 with forecasts of; Coho 7,622 wild and 1,520 hatchery (OA3), Chinook 438 wild and 1,038 hatchery (escapement without fishing), Pink 40,205 (4B) and chum 5,614 wild and 367 hatchery (4B). Co-managers discussed the following seasons to provide in-river sport gamefish (steelhead) opportunity while minimizing impacts on Stillaguamish salmon;

Main Stem Stillaguamish River;

- Closed to all fishing with the exception of the area downstream of Marine View Drive which will follow Marine Area 8-2 rules.

North Fork of the Stillaguamish River;

- First Saturday in June to July 31, open to fly-fishing only, from the mouth of the North Fork to the Swede Heaven Bridge, release all fish except up to 2 hatchery steelhead may be retained. Closed to all fishing from the Swede Heaven Bridge to North Fork Falls.
- August 1 to November 30, closed to all fishing, from the mouth to North Fork Falls.
- December 1 to January 31, open to fly fishing only, North Fork between the mouth of French Creek and the Swede Heaven Bridge, release all fish except up to 2 hatchery steelhead may be retained. Closed to all fishing below the mouth of French Creek and from the Swede Heaven Bridge to North Fork Falls.

South Fork of the Stillaguamish River;

- First Saturday in June through September 4, from the Mountain Loop Highway upstream, open for gamefish, selective gear rules, statewide minimum size and daily limit (2 trout). Closed below the Mountain Loop Highway.

- September 5<sup>th</sup> through January 31, South Fork closed to all fishing from the mouth upstream.

Areas above anadromous barriers; Open with a season from the Saturday before Memorial Day through Oct 31<sup>st</sup> with statewide min size/daily limits;

- Pilchuck Creek, from Pilchuck Falls upstream, including tributaries.
- Boulder River, from Boulder Falls upstream.
- Stillaguamish River North Fork, upstream of falls including tributaries.
- Black Creek, from Bear Creek confluence upstream.

Closed to all Fishing;

- Boulder River from mouth to Boulder Falls
- Canyon Creek
- Pilchuck Creek from mouth to Pilchuck Falls
- Squire Creek

## 57. 2017 Co-Management Agreement for Hood Canal Chum Salmon Fisheries

The Hood Canal Treaty Tribes (Skokomish Tribe, Port Gamble S’Klallam Tribe, Jamestown S’Klallam Tribe and Lower Elwha Klallam Tribe) and the Washington Department of Fish and Wildlife (WDFW) have reached agreement on application of an in-season abundance estimation (ISU) process for the 2017 season. All parties to this agreement have responsibility for ensuring their fisheries management actions are appropriate to ensure harvest of available shares. Both the treaty Indian and non-Treaty chum salmon fishing schedules are described in the List of Agreed Fisheries (April 2017). For the 2017 Hood Canal chum salmon season, the Hood Canal Tribes and WDFW agree:

- 1) To meet prior to August 31, 2017 to review and agree upon the final dataset to be used in conjunction with the ISU methods recommended by Tribal and WDFW biometricians, as described in the memorandum dated July 10, 2012 (2012 memorandum). December 8, 2016 the co-managers agreed to the dataset for the “early season” (October 15 – 31). The agreed to data for the “early season” were queried from WaFT for landings which resulted from openings within the date ranges for the window of time. Discrete landings were identified based on vessel ID; in-season individual tickets will be utilized for determining discrete landings. The dataset for any proposed “extended season” (using CCPUE data through November 7) ISU model will be generated using the same attributes as for the “early season” model.
- 2) The co-managers shall evaluate various “extended season” ISU models, with the expectation that WDFW and Tribal technical staffs will jointly develop and agree upon an extended ISU method. Final details on an “extended” model, with data collected through November 7<sup>th</sup> using cumulative CPUE as the independent predictor variable, and its use in-season will be agreed on or prior to September 15<sup>th</sup>. Specifically, the co-managers will address the use of an extended window of October 20<sup>th</sup> to November 7<sup>th</sup> as opposed to October 15<sup>th</sup> to November 7<sup>th</sup>. If co-manager consensus cannot be reached on an extended model and its use by September 15<sup>th</sup>, then the extended CCPUE model with the October 20<sup>th</sup> to November 7<sup>th</sup> date window will be used.
- 3) That the portion of Area 12 between the Hood Canal Bridge and extending two-mile south and west of the Hood Canal Bridge will be closed to Purse Seine fishing on Tuesday, October 24, and on Monday, October 30.
- 4) Those waters of Area 12 east of the Area 12/12B boundary and south of a line projected 94° true from Hazel Point to the light on the opposite shore are closed to purse seines except this area is open to purse seines on Tuesday, October 24, and on Monday, October

30.

- 5) That on-water enforcement will be sufficient to ensure compliance with all regulations, particularly the closed area described above on Tuesday, October 24, and on Monday, October 30.
- 6) To convene a conference call no earlier than 11:00am on October 31, 2017 to discuss results of the “early season” ISU model;
  - a. During the call co-managers would apply the CCPUE ISU method recommended by Tribal and WDFW biometricians, described as the “early season” model in the memorandum dated July 10, 2012 (2012 memorandum), to catch and effort estimates obtained from the Hood Canal non-Treaty Purse Seine fishery operating from October 15 through October 31;
  - b. The resulting run size would then be the basis for calculating total allowable catch shares of Hood Canal fall chum for managing Treaty and non-Treaty Hood Canal fall chum fisheries which might occur during the week that begins on November 5, 2017 if sufficient shares remain;
  - c. Pre-season fishing schedules as proposed in the 2017-18 List of Agreed Fisheries beginning November 5 will be adjusted as necessary to fully harvest allowable catch shares consistent with the Puget Sound Salmon Management Plan;
- 7) Should the remaining non-treaty catch share be sufficient for WDFW to implement a purse seine opening on Tuesday November 7, the co-managers will convene a conference call on November 8, 2017 to review catch information and discuss results of the “extended” ISU model;
  - a. Apply the agreed to co-manager “extended” ISU method to the catch and effort estimates obtained from the Hood Canal non-Treaty Purse Seine fishery operating during the specified window period for the model that is within the date range of October 15 through November 7 to update the estimate of Hood Canal fall chum abundance;
  - b. The resulting run size would then be the basis for calculating total allowable catch shares of Hood Canal fall chum for managing Treaty and non-Treaty Hood Canal fall chum fisheries which would occur beginning Thursday November 9, 2017.



## 7 9-Year Spawning Escapements

Nooksack Early Management Unit. Spawning escapement in the South Fork Nooksack River, are a complex of multiple origin and run-timing Chinook populations. The portion of the complex estimated to be of SF early NOR returns are highlighted for convenience.

Year	N./Mid. Fork		South Fork					
	NOR	HOR	SF Native NOR	SF HOR	N. Fk Early NOR	Fall NOR	Kendall Cr. HOR	Fall/other HOR/Unk
2006	275	909	61 (1)		102 (2)	192	84	90
2007	334	1,104	26 (3)		38 (6)	128	112	35
2008	307	959	80 (3)		105 (1)	126	109	23
2009	269	1,634	45		58	187	128	38
2010	204	1,844	21 (0)		43 (0)	107 (0)	293	29 (0)
2011	99	766	90 (3)		61 (1)	96 (1)	176	48 (8)
2012	281	477	116 (1)		172 (1)	93 (2)	79 (17)	42 (0)
2013	100	1,247	10 (1)		39 (0)	16 (2)	162 (39)	15 (2)
2014	91	1,307	22 (1)	10 (0)	56 (1)	11 (0)	99 (2)	10 (0)
2015	401	1,316	7 (0)	11 (0)	39 (0)	32 (0)	9 (0)	37 (0)
2016	187	735	319 (4)	302 (7)	179 (3)	86 (1)	32 (5)	39 (0)

Note: Numbers in parentheses represent additional pre-spawn mortalities encountered.

### Skagit Springs Management Unit.

Year	Upper Sauk	Suiattle	Upper Cascade
2008	983	203	284
2009	367	273	338
2010	768	263	330
2011	345	215	265
2012	1,826	460	488
2013	1,080	620	310
2014	923	460	225
2015	743	478	188
2016	1,502	648	295

### Skagit Summer/Falls Management Unit.

Year	Upper Skagit	Lower Sauk	Lower Skagit
2008	8,441	538	2,685
2009	5,290	250	1,439
2010	6,644	356	1,017
2011	4,480	210	820
2012	9,808	715	3,295
2013	8,801	530	1,551
2014	8,308	364	1,785
2015	10,705	406	2,203
2016	15,423	1,044	2,921

Stillaguamish Management Unit. Stillaguamish River escapement estimates for both summer and fall Chinook populations proportioned by HOR/NOR adult returns. Numbers in parentheses from represent additional fish (both HOR and NOR) collected for brood-stock (BS) utilization.

Year	MU Total	
	NOR (BS)	HOR (BS)
2008	773 (58)	938 (71)
2009	434 (52)	805 (97)
2010	329 (58)	508 (82)
2011	521 (45)	1,116 (128)
2012	988 (109)	799 (70)
2013	602 (73)	395 (59)
2014	157 (57)	262 (87)
2015	389 (61)	320 (68)
2016	615 (76)	438 (65)

Snohomish Management Unit.

Year	Skykomish		Snoqualmie	
	NOR	HOR	NOR	HOR
2008	4,780	1,033	2,190	370
2009	1,146	268	649	246
2010	1,836	676	1,585	203
2011	881	299	479	221
2012	2,462	1,283	898	481
2013	1,860	495	770	119
2014	1,654	1,409	698	140
2015	1,585	1,449	694	135
2016	2,363	1,422	1,013	355

Lake Washington Management Unit.

Year	Cedar River		Sammamish River	
	NOR	HOR	NOR	HOR
2008	1,345	153	147	1,154
2009	574	139	25	899
2010	553	113	43	1,788
2011	647	163	25	715
2012	898	185	60	1,979
2013	1,591	260	93	2,240
2014	303	277	18	464
2015	1,176	632	49	939
2016	609	436	100	1,147

Green River Management Unit.

<b>Year</b>	<b>NOR</b>	<b>HOR</b>
2008	3,792	2,179
2009	165	523
2010	859	1,233
2011	459	534
2012	1,638	1,452
2013	524	1,517
2014	756	1,974
2015	864	3,223
2016	2,566	7,497

Puyallup River Fall Management Unit.

<b>Year</b>	<b>NOR</b>	<b>HOR</b>
2008	2,132	946
2009	538	1,027
2010	550	1,080
2011	487	1,093
2012	654	419
2013	252	596
2014	544	926
2015	984	1,140
2016	737	1,963

White River Spring Management Unit.

<b>Year</b>	<b>NOR</b>	<b>HOR</b>	<b>APP</b>
2008	595	584	638
2009	263	284	277
2010	239	126	362
2011	450	369	983
2012	808	204	1,119
2013	795	931	2,734
2014	218	105	637
2015	358	490	736
2016	645	501	2,851

**Nisqually River Management Unit.**

<b>Year</b>	<b>NOR</b>	<b>HOR</b>
2008	1,368	2,031
2009	185	687
2010	353	1,714
2011	302	1,962
2012	617	1,850
2013	738	933
2014	528	512
2015	715	790
2016	796	168

**Skokomish River Management Unit.**

<b>Year</b>	<b>NOR</b>	<b>HOR</b>	<b>Total</b>
2008			1,134
2009			1,066
2010	162	1,052	1,214
2011	54	1,267	1,321
2012	142	1,391	1,533
2013	171	1,551	1,722
2014	109	740	849
2015	117	315	432
2016	179	1,163	1,342

**Mid-Hood Canal Management Unit.**

<b>Year</b>	<b>Hamma Hamma</b>	<b>Duckabush</b>	<b>Dosewallips</b>
2008	255	0	18
2009	98	9	23
2010	91	0	15
2011	294	5	11
2012	425	6	7
2013	707	7	4
2014	117	13	11
2015	236	20	3
2016	268	15	8

**Dungeness River Management Unit.**

Return year	Natural Spawners <sup>1/</sup>			Broodstock Collection <sup>2/</sup>			Total Returns (Natural Spawners + Broodstock)		
	NOR	HOR	Total	NOR	HOR	Total	NOR	HOR	Total
2008	86	54	140	53	36	89	<b>139</b>	<b>90</b>	<b>229</b>
2009	71	57	128	42	50	92	<b>113</b>	<b>107</b>	<b>220</b>
2010	76	269	345	18	94	112	<b>94</b>	<b>363</b>	<b>457</b>
2011	83	452	535	21	109	130	<b>104</b>	<b>561</b>	<b>665</b>
2012	212	296	508	38	68	106	<b>250</b>	<b>364</b>	<b>614</b>
2013	46	122	168	31	79	110	<b>77</b>	<b>201</b>	<b>278</b>
2014	21	87	108	22	74	96	<b>43</b>	<b>161</b>	<b>204</b>
2015	65	200	265	37	105	142	<b>102</b>	<b>305</b>	<b>407</b>
2016	135	273	408	30	77	115	<b>165</b>	<b>350</b>	<b>523</b>

1/ Natural spawners: Chinook that spawned naturally in the river. Natural spawner estimate based on redd surveys.

2/ Broodstock collection: Chinook that were collected in the river or returned to the hatchery and used for broodstock. Includes pre-spawned mortalities as well.

3/ NORs and HORs determined by CWT, otolith, scales, or visible marks from broodstock and river carcasses sampled.

**Elwha River Management Unit.**

Year	HOR/NOR
2008	1,137
2009	2,192
2010	1,278
2011	1,862
2012	2,638
2013	4,243
2014	4,360
2015	4,112
2016	2,628

**Hoko River Management Unit.**

Year	HOR/NOR
2008	483
2009	385
2010	793
2011	1,504
2012	663
2013	1,406
2014	1,760
2015	2,877
2016	1,324