

**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 Covering  
The 2011-2012 Fishing Season

Revised October 3, 2012

## **Acknowledgements**

This data contained in this report are the result of the widespread work of Tribal and WDFW staff throughout the Puget Sound Region. Staff members directly contributing to preparation of this report include:

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## Executive Summary

This annual report on the Puget Sound Chinook Comprehensive Harvest Management Plan summarizes results of salmon fisheries occurring between May 1, 2011 and April 30, 2012. This includes comparisons of pre-season projections with actual catch in all commercial and some recreational fisheries. 2010 Recreational catch estimates are presented for those areas where data were not available in time for the 2010-2011 report. Chinook spawning escapement estimates for 2011 are reported for all Puget Sound populations, with details on escapement surveys and estimation methods. Comparisons are also made between pre-season projections of escapement, and actual results.

Commercial Chinook catch in Puget Sound pre-terminal fisheries was lower than projected in the Strait of Juan de Fuca, and higher than projected in the San Juan Islands. Commercial catches in the Nooksack, Skagit, and Strait of Juan de Fuca terminal areas were all near expectations. Catch in South Sound in aggregate was below expectation, while catch in Hood Canal was slightly above expectation.

Marine and freshwater landed recreational Chinook catch in the 2010-2011 season was estimated, from a combination of creel and preliminary Catch Record Card data, to be 42,600 below the pre-season projection of 52,300. Creel survey-based estimates of catch in 2011-2012 mark-selective recreational fisheries in Areas 5, 9-10, and 11, Skagit, Skykomish, Nisqually and Skokomish rivers are included in this report. Total encounter estimates for the 2011-12 marine area selective fisheries were higher than expected in Area 5, but much lower than expected in Areas 9, 10 and 11.

Spring Chinook escapement was above pre-season prediction for White, and below prediction for the Skagit and Dungeness. White River exceeded its upper management threshold, while the Skagit and Dungeness were between their lower and upper thresholds. For summer/fall stocks, escapement was above prediction for the Stillaguamish, Nisqually, Mid Hood Canal, Elwha and Hoko. Escapement was slightly lower than predicted for Lake Washington and Skokomish, and much lower than predicted for the Skagit, Snohomish, Green and Puyallup. Escapement of Sauk summer, Lower Skagit Fall, South Fork Stillaguamish, Green, and Mid Hood Canal were below their lower management thresholds.

Coded-wire tag sampling of 2010 commercial fisheries achieved sampling rate above 20% in most, but not all areas. Areas 5 (Strait of Juan de Fuca), 12C (Hood Canal), and 13A (Carr Inlet) were the only areas with substantial catches, but with sampling rates below 20%. All marine area recreational fisheries were sampled at rates between 10% and 50% for the year.



# 1 Introduction

The Co-managers' 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 fulfills that requirement by assessing the performance and effectiveness of fishery management actions adopted for the most recent management year. Included in this report are:

- Management objectives for the 2011-2012 management year (May 1, 2011 through April 30, 2012)
- Projected and actual commercial landed catch in Puget Sound, and descriptions of fisheries, for the 2011-2012 management year
- Projected and actual landed catch for 2011 Puget Sound recreational fisheries where creel surveys were conducted, and for all 2010 Puget Sound recreational 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 2011, with details on estimation methods and factors affecting the quality of estimates
- Summaries of biological sampling of spawning escapement, and estimates of contributions of hatchery- and natural-origin spawners where available
- 2010 Coded-wire tag sampling rates for commercial and recreational fisheries

## 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) are shown in Table 1. Table 2 identifies the rates that were used as the ceiling for each Management Unit (MU) in 2011, and the projected exploitation rates and escapements for each unit, from the final pre-season FRAM model run (1811).

Pre-season fishery planning for 2011-2012 fisheries projected that natural spawning escapement would fall below the critical abundance thresholds for the Nooksack early, Stillaguamish and Mid-Hood Canal MUs, and for the Suiattle population within the Skagit MU, so CERC's were implemented for those units. Model escapement projections for other MUs exceeded their LAT's. The exploitation rate on the Snohomish MU in northern fisheries was projected to exceed the difference between the MU's ERC and critical ERC, so the CERC of 15% in SUS fisheries was implemented.

Table 1. 2011 Puget Sound Chinook Harvest Management Objectives.				
Management Unit	ER Ceiling	Critical ER Ceiling	Upper Management Threshold	Low Abundance Threshold
Nooksack		7.0% SUS (9% allowed 1 of 5 years)	4,000	
North Fork			2,000	1,000
South Fork			2,000	1,000
Skagit summer / fall	50%	15% 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	
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	20%	15% SUS	1,000	200
Puyallup fall	50%	12% PTSUS		500
South Prairie Creek			500	
Nisqually	65%			
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 2. Management guidelines implemented and projected exploitation rates and escapements for Puget Sound Chinook from 2011-2012 pre-season planning.

Management Unit	ERC or CERC implemented	Projected ER <sup>1</sup>	Projected Escapement <sup>1</sup>	UMT	LAT
Nooksack	9% SUS	7.94% SUS	289	4,000	2,000
Skagit summer fall	50%	49.9%	11,879	14,500	4,800
Skagit spring	38%	28.5%	1,194	2,000	576
Stillaguamish	15% SUS	9.54% SUS	665	900	700
Snohomish	15% SUS	10.7% SUS	6,484	4,600	2,800
L. Wash. (Cedar)	20% SUS	15.8% SUS	1,166	1,680	200
Green	15% PT SUS	8.4% PTSUS	5,343	5,800	1,800
White	20%	19.4%	1,427	1,000	200
Puyallup	50%	48.3%	2,062	500 South Prairie Cr	500
Nisqually	65%	64.8%	941		
Skokomish	50%	50.0%	1,461	3650 aggregate 1650 natural	1300 aggregate 800 natural
Mid Hood Canal	12% PT SUS	11.9% PTSUS	142	750	400
Dungeness	10% SUS	4.0% SUS	844	925	500
Elwha	10% SUS	3.9% SUS	1,589	2,900	1,000
Western SJDF	10% SUS	4.8% SUS	1,397	850	500
1. FRAM 1811 projections					

## 2 Commercial Harvest

This chapter provides post-season estimates of Chinook catch for Puget Sound commercial fisheries, and also includes 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 regime agreed to for the 2011-12 fishing season is described in detail in the Co-managers List of Agreed-to Fisheries, which describes all salmon fisheries for all areas of Puget Sound and ocean fisheries off the Washington coast (see Appendix). The final pre-season projections of catch under this regime were made in FRAM run number 1811.

Actual catch is accounted by summarizing fish tickets, which are the sales receipts used for recording commercial, C&S, and research fishery landings. Fish ticket data are stored in a database maintained jointly by WDFW and the Puget Sound Tribes. In some fisheries, particularly non-treaty purse seine fisheries, estimates of non-landed mortality are also available, for comparison to pre-season expectations. WDFW conducts on-the-water observations of by-catch in commercial fisheries, concentrating on areas and gears where Chinook retention is not allowed. Summary results of that monitoring are included below in Table 11.

Recreational, non-treaty troll and treaty troll catches in Washington coastal fisheries north of Cape Falcon were substantially less than their quotas (Table 3). Comparisons of projected and actual Puget Sound catch are provided here 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 2011-2012 fisheries, including in-season management actions that deviated from the pre-season plan, and explanations for differences in projected and actual catch.

Table 3. Summary of projected (FRAM 1811) and actual landed Chinook catch in Washington ocean and Puget Sound fisheries in 2011.		
Fishery	Projected	Actual
Washington ocean non-treaty troll	30,900	29,700
Washington ocean recreational	30,900	30,800
Washington ocean treaty troll	41,000	34,600
<b>Puget Sound pre-terminal net &amp; troll total</b>		
Strait of Juan de Fuca troll	8,100	1,818
Strait of Juan de Fuca net	1,663	352
San Juan Islands net*	8,088	9,797
Area 9 treaty net / hook & line	700	0
Nooksack-Samish terminal net	23,665	24,392
Skagit terminal net	4,774	4,618
Stillaguamish-Snohomish net	3,218	4,319
South Puget Sound terminal net	46,570	32,135
Hood Canal terminal net	18,424	35,782
Strait Tributaries terminal net	5	5
* includes non-retention mortality in NT purse seine fishery		

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

Incidental Chinook catches during treaty commercial, subsistence, and ceremonial net fisheries directed at Fraser River sockeye and pink salmon in the Strait of Juan de Fuca (Areas 4B, 5, and 6C) and the San Juan Islands (7 & 7A) were 286 and 5,672 respectively. Sockeye test fishing in Area 5 caught 10 Chinook. Set net fisheries in Area 4B and 5 in July and August caught 30 Chinook. Subsequent fisheries for chum in these areas involved very low Chinook bycatch (3).

Non-treaty fisheries targeting Fraser sockeye and pink in Areas 7 and 7A landed 116 Chinook, including 42 landed by gillnet, and 74 fish illegally retained by purse seine fishers. Because Purse seines are required to release all Chinook, release mortality estimates are calculated using available data from on-the-water bycatch monitoring. Post-season analysis estimated 3,925 Chinook mortalities in this fishery, in addition to the 74 illegally retained. 11 marked Chinook were retained by reefnet fishers. No Chinook were landed during the 7/7A 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 1,818 Chinook, mostly in Area 4B.

## 2.2 Nooksack/Samish Terminal Area

### Treaty Spring Chinook Ceremonial and Subsistence Fishery

The Nooksack tribal fishery operated from May 10 – 26, and caught 37 spring Chinook, four of which were of natural origin. DNA analysis of the four natural-origin fish determined that they were from the North/Middle Fork population. Included in that catch were 2 jacks that were not sampled, but presumed to have been of hatchery origin. The Lummi Nation fishery operated from April 10 to July 14, and caught 93 Chinook, of which 12 were natural origin, based on otolith analysis. Total catch (130) and catch of natural-origin Chinook (16) were less than the pre-season projections (150 and 17, respectively, Table 4).

Chinook caught in the C&S fishery were sampled to determine length, age, and external mark status. More certain identification of the stock composition of catch is contingent on reading otoliths and / or genetic analysis.

### Fall Chinook, coho, and chum fisheries

The tribal fall Chinook / pink fishery in Bellingham Bay (Area 7B), Samish Bay (7C), and Lummi Bay (7D) operated as planned from August 1 through September 3 (management weeks 32 – 36), with catch of 4,991 Chinook. The coho fishery operated as planned in September, October and November (weeks 37-43), with incidental harvest of 8,166 Chinook. One Chinook was harvested incidentally during the chum fishery. The total fall Chinook catch of 13,157 was very close to the preseason projection (13,104), but run timing was later than normal so a larger percentage of the catch was taken incidental to coho fishing.

The non-treaty fishery in 7B/7C landed 9,968 Chinook from July through September, slightly higher than the pre-season projection of 9,534. No Chinook were landed after September.

Fisheries for fall Chinook and pink, coho, and chum in the Nooksack River occurred as planned in weeks 32 – 37, 38-43, and 44-51, respectively. The total Chinook catch was 1,136, exceeding the projected catch of 813; 374 were caught during the Chinook period, 745 during the coho fishery, and 17 during the chum period.

Table 4. Expected and actual Chinook catches in the Nooksack/Samish terminal area, 2011.			
Area	Timestep	Projected	Actual
Nooksack R Treaty net	Early Chinook, May-Jun	150	131
	Fall Chinook, coho	813	1136
7B, 7C, 7D Treaty net	Fall Chinook, Jul-Sep	12,907	13,157
	Oct-Dec	197	
7B, 7C Non-treaty net	Jul-Sep	9,534	9,968
	Oct-Dec	64	0

## 2.3 Skagit Bay/Skagit River Terminal Areas

### Skagit Bay and Skagit River

The majority of 2011 Skagit terminal area impacts on Chinook were expected to occur during commercial fisheries targeted at hatchery spring Chinook, sockeye, pink and coho, during Ceremonial and Subsistence fisheries targeted at spring and summer/fall timed Chinook (280 fish total divided among the three Skagit Tribes), during Skagit River test fisheries, and during a mark-selective sport fishery targeting hatchery spring Chinook (see Chapter 3 for discussion of recreational fisheries). Chinook non-retention was required in the river recreational fisheries before June 1 and after July 15. No non-treaty commercial fisheries were scheduled in Area 8 during 2011. Chinook retention was permitted in Treaty fisheries, the test fisheries, and during the spring Chinook selective river sport fishery June 1 through July 15 (for marked fish only).

Test fisheries were conducted mostly as scheduled preseason, with a few exceptions. The Blake's Chinook test in management weeks 27 and 28, and the Blake's coho test in weeks 36 and 37, did not take place. The Spudhouse coho test did not occur in weeks 36-38 or 43-45, and the River Area 3 coho test did not occur in weeks 38, 39, or 43. Neither the Jetty nor the Bay chum tests occurred in week 45.

Chinook catches in the test fisheries were less than expected by 73 Chinook. Expected catch during spring run-timing was 87; observed catch was 74 (13 fish less than expected). During summer/fall-run timing, expected catch was 354; observed catch was 294 (60 fish less than expected). During the coho test fisheries, observed Chinook catch was 174, compared to 200 predicted (26 fish less than expected). Sixty-three Chinook were caught in the sockeye test fishery, 9 less than the expected number of 72 (Table 2.5). Overall, the Chinook catch in all the test fisheries combined, 368 Chinook, was 73 Chinook less than the preseason prediction of 441.

Hatchery spring timed Chinook-directed treaty commercial fisheries occurred as scheduled preseason over weeks 19–21 for Swinomish and Sauk-Suiattle fisheries, and weeks 20–21 for the Upper Skagit fishery. Preseason modeled catch projections for this directed commercial fishery were 344 hatchery and 70 natural spring-timed Chinook (FRAM Chin1811). An additional 10 C&S hatchery springs were modeled, making a total of 424 (354 hatchery and 70 natural) spring timed Chinook projected caught in these fisheries. Postseason spring-timed Chinook catches for these same fisheries totaled 403; 353 hatchery and 50 natural origin spring Chinook. This is a difference of 1 less hatchery origin Chinook and 20 less natural origin Chinook, or a total difference of 21 less spring-timed Chinook.

The directed sockeye treaty commercial fisheries were modeled to occur over weeks 25-29. Fisheries occurred mainly as planned, except Swinomish and Sauk-Suiattle cancelled the first week of their fisheries (week 25) because of a crab fishery conflict and stopped half a day early in week 28 and altogether in week 29 because the Swinomish sockeye share had been reached based on the forecast run size of 23,954. (The post-season estimate of Baker sockeye run size was considerably higher at approximately 37,000 fish.) A total of 1,234 summer/fall were projected to be caught during the treaty commercial sockeye fisheries (FRAM Chin1811). An additional 19 spring-timed Chinook (15.4 wild and 3.4 hatchery) were expected to be caught in Area 78D-4, which was still in the spring management period in week 27. Postseason Chinook catches during the commercial sockeye fishery, for those same time periods, totaled 102 fish (100 summer/falls, no wild

springs and 2 hatchery springs). This is a difference of 1,116 fewer summer/falls and 17 fewer springs than modeled preseason.

The directed pink treaty commercial fisheries were scheduled to open week 34 for the Swinomish and Sauk-Suiattle tribes and week 35 for the Upper Skagit tribe. The preseason modeled Chinook catch in these fisheries was 1,119 fish (FRAM Chin 1811). Swinomish and Sauk-Suiattle fished as scheduled preseason except for the addition of 1 extra day in week 36, which was added because these tribes were under their pink shares based on the pre-season forecast. The Upper Skagit Tribe closed their week 35 fishery one day early because the number of pinks caught was low and the run appeared to be later timed than normal. Based on the late run timing, Upper Skagit did not fish week 36, increased their week 37 fishery by 1 hour, increased their week 38 fishery by 3.2 days, and fished 3.5 days in the previously unscheduled week 39. Total treaty commercial catch of summer/fall Chinook during the pink fishery was 3,103, which was higher than that modeled preseason by 1,111 fish.

The Swinomish and Sauk-Suiattle Tribes' commercial coho fisheries were scheduled to open in week 39, and the Upper Skagit Tribe's fishery was scheduled to open in week 40 (Table 5). Coho abundance was expected to be "Normal" (i.e., ER ceiling of 60%). The week 39-40 Blake's test fishery ISU model indicated a terminal return of 134,687, slightly higher than the TAA of 132,866 predicted by FRAM coho1116. The week 38-41 ISU model gave a lower run size of 84,977. The Swinomish and Sauk-Suiattle tribes fished as scheduled pre-season. The Upper Skagit Tribe delayed their coho fishery to allow the abundance of pink carcasses to pass through first. They did not fish in weeks 40 or 41 and added 1 fishing day to week 42, 2 days to week 43, and 2.5 days to week 44. Pre-season modeled Chinook catch during the coho fishery was 248 summer/falls, but 160 were actually caught, a difference of 88 fish less than expected. Preliminary observed wild and hatchery terminal return abundance of coho was approximately 51,800, lower than the both the preseason forecast and the inseason update.

There was no preseason forecast of harvestable chum. A one day place-holder fishery was scheduled preseason for week 46 for the Swinomish and Sauk-Suiattle tribes, the opening contingent on an ISU indicating harvestable fish. No Chinook mortalities were anticipated in the placeholder fisheries. The preliminary ISU of chum abundance, 1,791 fish, was considerably below the preseason forecast of 24,760, so no treaty commercial chum fisheries occurred. The post-season estimated terminal run size was 16,223. Non-treaty chum directed fisheries were not scheduled preseason based on the low preseason forecast.

There were 3,798 total Chinook observed mortalities in Skagit Treaty terminal area commercial and C&S net fisheries during the adult accounting period: 34 in the C&S fisheries (4 spring-timed and 30 S/F-timed); 399 spring-timed Chinook in the hatchery spring Chinook directed fishery; 100 summer/fall-timed and 2 spring Chinook in the Baker sockeye fishery; 3,103 summer/fall Chinook in the pink fishery, 160 summer/fall-timed Chinook in the coho fishery; and no chum fishery occurred in 2011. There were 368 total Chinook mortalities estimated in Skagit terminal area Test Fisheries during the adult accounting period: 74 spring-timed Chinook and 294 summer/fall-timed Chinook in Test Fisheries.

In comparison, catch projections during preseason planning indicated that 4,167 Chinook would be caught in Skagit Treaty terminal area commercial and C&S fisheries: 10 spring-timed and 270 summer/fall-timed in the C&S fisheries; 414 during the hatchery spring Chinook directed fisheries; 1,216 summer/fall-timed Chinook and 19 spring-timed Chinook during a Baker sockeye directed fishery; 1,992 summer/fall-timed Chinook during pink fisheries, 248 summer/fall-timed Chinook during coho fisheries, and 0 during a placeholder chum directed fishery. (Numbers do not total to 4,167 due to rounding of fractional



projections.) An additional 441 Chinook (87 spring-timed and 354 summer/fall-timed) were projected to be caught in Skagit terminal area Test Fisheries.

Thus, post-season observed Skagit terminal treaty commercial and C&S Chinook mortalities were 369 fewer Chinook than what was projected pre-season. Seventy-three less Chinook than expected were caught in the terminal area Test Fisheries.

This decrease in observed mortalities compared to projected mortalities was true for both spring-timed and summer/fall-timed Chinook. For springs, both the number of wild (50) and hatchery (355) mortalities during the C&S and commercial fisheries, including those in the Area 78D-4 sockeye fishery, were lower than projected (85 and 357, respectively). The observed discrepancy in observed hatchery spring Chinook catch is in part expected, as until 2005 hatchery strays were purposely avoided when conducting wild escapement surveys. Since then, the stray rate has been estimated at about 22%. Most of the lower than projected catch occurred during the directed sockeye fishery (1,132 fewer) and the C&S fishery (256 fewer), while higher than projected occurred in the pink fishery (1,111 higher). Of the post-season estimated mortalities in tribal fisheries, all were landed catch, because Chinook retention was allowed during all tribal fisheries.

The 2011 observed spawning escapement of wild Skagit spring Chinook was 825, which was less than the FRAM predicted escapement of 1,194. The pre-season forecast abundances of all Skagit spring populations were above their Low Abundance Thresholds (LATs), so the 38% RER was applied during the pre-season planning process. The post-season estimated wild spring Chinook escapement was below the Upper Management Threshold of 2,000, but higher than the Low Abundance Threshold of 576.

The 2011 observed spawning escapement of wild Skagit summer/fall Chinook, 5,536, plus the 66 wild summer Chinook removed from the river for the wild indicator broodstock totaled 5,602 Chinook. This was lower than the Upper Management Threshold of 14,500, but above the overall Low Abundance Threshold for wild summer/fall Chinook of 4,800. However, the escapement of Lower Sauk Summers (237) was below its individual LAT of 400, and the escapement of Lower Skagit Falls (820) was below its individual LAT of 900. The FRAM-predicted spawning escapement of summer/fall natural and indicator stock was modeled at 11,879 Chinook.

As described above, both spring-timed and summer-fall timed Chinook catches during the treaty commercial and C&S fisheries were lower than expected. The pre-season prediction of the terminal treaty commercial and C&S harvest rate of wild spring-timed Chinook was 6.43% based on a terminal run size of 1,323 wilds. The preliminary post-season estimated harvest rate was about 6.37%, using a preliminary terminal return of 780 wild spring Chinook. For summer/fall Chinook, the pre-season prediction of the terminal treaty commercial and C&S harvest rate was 23.3% based on a projected TRS of 15,962. The preliminary post-season estimated harvest rate on summer/falls was about 36.6%, using a preliminary terminal return of 9,272 fish. Total observed Chinook catches (spring-timed and summer/fall-timed combined) from Treaty commercial, C&S, and test fishery catch (4,166) was 442 fewer Chinook than projected pre-season, 4,608.

Table 5. Skagit terminal area projected and actual Chinook catches for treaty fisheries in 2011.								
	Preseason Projected-- <i>unFRAMIZED</i> values			Post-season Observed/Estimated			Difference	
Fishery	Schedule	Landed Catch	Total Mortality	Schedule	Landed Catch	Total Mortality	Landed Catch	Total Mortality
<b>Test:</b>								
Chinook	1 site, wks 19-35	169	169	Wks 19-26, 29-35	131	131	-38	-38
sockeye	1 site, wks 23-30	72	72	Same	63	63	-9	-9
Coho	3 sites, wks 34-45	200	200	Wks 34-45	174	174	-26	-26
Chum	3 sites, wks 44-45	0	0	Blakes same, Jetty & Bay only week 44	0	0	0	0
<b>Area 8/78C Hatchery Spring Chinook Swinomish and Sauk-Suiattle Tribes:</b>								
Week 19	1 day	39	39	Same	15	15	-24	-24
Week 20	1 day	63	63	Same	25	25	-38	-38
Week 21	1 day	45	45	Same	35	35	-10	-10
<b>Area 78C/78D Hatchery Spring Chinook Upper Skagit Tribe:</b>								
Week 19	none	0	0	Same	0	0	0	0
Week 20	1 day	126	126	Same	167	167	41	41
Week 21	1 day	141	141	Same	157	157	16	16
<b>Area 8/78C/78D Chinook C&amp;S Swinomish, Sauk-Suiattle, Upper Skagit Tribes:</b>								
Sum/Fall-Spring Chin.	Variable to target	280	280	Variable to target	34	34	-246	-246
<b>Areas 8/78C Sockeye Swinomish and Sauk-Suiattle Tribes:</b>								
Week 25	1 day	74	74	None	0	0	-74	-74
Week 26	3 days	164	164	Same	45	45	-119	-119
Week 27	7 days	362	362	Same	24	24	-338	-338
Week 28	5 days	387	387	4.5 days	5	5	-382	-382
Week 29	1 day	112	112	None	0	0	-112	-112
<b>Areas 78C/78D Sockeye Upper Skagit Tribe:</b>								
Week 27	1 day	56	56	Same	7	7	-49	-49
Week 28	1 day	80	80	Same	21	21	-59	-59
<b>Areas 8/78C Pink Swinomish and Sauk-Suiattle Tribes:</b>								
Week 34	2 days	280	280	Same	224	224	-56	-56
Week 35	2 days	146	146	Same	478	478	332	332
Week 36	5 days	216	216	6 days	525	525	309	309
Week 37	6 days	184	184	Same	571	571	387	387

Table 5, cont.. Skagit terminal area projected and actual Chinook catches for treaty fisheries in 2011.								
<b>Areas 78C/78D Pink Upper Skagit Tribe:</b>								
Week 35	2.167 days	341	341	1.167 days	200	200	-141	-141
Week 36	3.167 days	412	412	None	0	0	-412	-412
Week 37	2.167 days	149	149	2.208 days	215	215	66	66
Week 38	1 day	264	264	4.208 days	521	521	257	257
Week 39	None	0	0	3.5 days	369	369	369	369
<b>Areas 8/78C Coho Swinomish/Sauk-Suiattle Tribes:</b>								
Week 39	3 days	41	41	Same	38	38	-3	-3
Week 40	2 days	14	14	Same	0	0	-14	-14
Week 41	2 days	6	6	Same	0	0	-6	-6
<b>Areas 78C/78D Coho Upper Skagit Tribe:</b>								
Week 40	1.5 days	101	101	None	0	0	-101	-101
Week 41	1.167 days	51	51	None	0	0	-51	-51
Week 42	1.167 days	27	27	2.167 days	68	68	41	41
Week 43	1.167 days	7	7	3.167 days	54	54	47	47
Week 44	None	0	0	2.5 days	0	0	0	0
<b>Areas 8/78C Chum Swinomish/Sauk-Suiattle Tribes:</b>								
Week 46	1 day	0	0	None	0	0	0	0
<b>Total Skagit Terminal Area</b>		<b>4,608</b>	<b>4,608</b>		<b>4,166</b>	<b>4,166</b>	<b>-442</b>	<b>-442</b>

## 2.4 Stillaguamish/Snohomish Terminal Area

In Area 8A treaty pink and coho fisheries there were 99 Chinook caught, primarily during weeks 34-36; total catch was much lower than the preseason projected level (787, Table 6). Catch in the non-treaty pink and coho fisheries was 11, compared to a preseason projection of 8.

In Area 8D catch during the hatchery Chinook directed fishery 4,164, which was substantially higher than the pre-season projection of 2,323. The higher catch is attributable to higher than forecast hatchery abundance. One Chinook was caught during the coho fishery.

Ceremonial and subsistence fisheries in the Stillaguamish River during the Chinook / pink management period (weeks 33 – 39) harvested 44 Chinook, compared with the pre-season projection of 100.

Table 6. Projected (FRAM 1811) and actual Chinook net harvest in the Stillaguamish - Snohomish terminal area non-treaty commercial and treaty fisheries in 2011.			
Area		Projected	Actual
8A Commercial	Trty	787	99
	Ntrty	8	11
8D Commercial	Trty	2,323	4,165
	Ntrty	0	0
Stillaguamish R. Net	Treaty	100	44

## 2.5 South Puget Sound Terminal Areas

Table 7 compares projected and actual catches for 2011 South Puget Sound treaty fisheries. Descriptions of the treaty and non-treaty commercial fisheries by terminal area are in the following sections.

Table 7. Pre-season projections and actual Chinook catch in 2011 South Puget Sound terminal net fisheries.			
Area	Management Period	Projected	Actual
Area 9/10/11	Coho (test)	61	12
	Chum (test)	67	4
	A9 T subsist H&L	700	0
	Treaty pink/coho	510	0
	NT pink (total mortality cap)	200	0
	NT chum	5	4
	Treaty Chum	437	14
Area 10E	Chinook	5,974	3,163
Area 10A	Chinook (test)	378	350
	Chinook/coho	81	333
	Pink	N/A	12
	Chum	20	0
Duwamish River	Chinook/coho	520	4,279
Lake Washington/Ship Canal	Sockeye/coho	1,003	36
Lake Sammamish	Chinook	5,000	0
Puyallup River	Spring Chinook (C&S) Puyallup R. + White R.	326	198
	Fall Chinook C&S	83	83
	Pink/Coho	1,895	1,319
Areas 13D-K	Chinook/Coho/Chum	7,338	6,595
Area 13 & 13A	Chinook/Coho/Chum	5,439	2,076
Areas 13C/Chambers	Chinook	3,716	2,116
Nisqually River	Chinook/coho + tangle net	13,143	11,541

### **2.5.1 Marine Areas 9, 10 & 11**

Test fisheries in Area 10 for coho, and for chum at Apple Cove Point, involved incidental catch of 16 Chinook. Due to the low abundance of South Sound coho, there was no treaty, coho directed fishery.

The planned tribal fishery directed at pink salmon did not occur. The chum-directed fishery in Area 10 and 11 incidentally harvested 14 Chinook. The fisheries directed at Chinook and coho in Area 10E harvested 3,163 Chinook.

### **2.5.2 Lake Washington**

There were no Chinook-directed fisheries in Lake Washington, the Ship Canal, North Lake Washington, or Lake Sammamish. Sockeye returns to Lake Washington were insufficient to allow any directed fisheries. The tribal C&S fisheries for Lake Washington sockeye were also kept closed due to the poor returns. Incidental Chinook catch during the coho fishery in Lake Union, and the upper and lower Ship Canal harvested 553 Chinook, which was less than expected. There were no coho-directed fisheries in North Lake Washington or Lake Sammamish.

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

The test fishery in Area 10A informs the decision whether to conduct a full fleet Chinook fishery targeting Green River Chinook. Test catch was 350, a level exceeding the nominal threshold to operate the commercial fishery. The Muckleshoot and Suquamish Tribes conducted one 12-hour commercial opening in Elliott Bay and the Duwamish River, on the night of August 9<sup>th</sup>. The tribes also had a one day fishery directed at pink salmon on August 28<sup>th</sup>. Additional openings for coho occurred in both areas later in the season. Opening the coho fishery in the river is contingent on a test fishery to determine clearance of Chinook. Total Chinook catch for the season (includes all salmon fisheries) was 333 in Elliott Bay (10A) and 4,279 in the Duwamish River (80B).

### **2.5.4 Puyallup/White rivers**

Ceremonial and subsistence fisheries for White River spring Chinook in management weeks 20 – 27 caught 198 fish – 117 in the Puyallup River and 81 in the White River. The pre-season projected catch was 236.

Ceremonial and subsistence catch of fall Chinook in the Puyallup River was 83 fish. The commercial fishery for was not open during the Chinook management period; incidental harvest of 1,319 Chinook occurred as planned during the coho/pink period (weeks 34 – 40).

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

The Chinook fishery in Carr Inlet (13A) caught 2,076 Chinook, in August and early September (weeks 32 – 39). Pre-season projected catch was 5,439.

The Chinook fishery at Chambers Bay (13C) occurred in weeks 34 – 40, with most of the total catch of 2,116 fish taken in weeks 36 – 39. Pre-season projected catch was 3,716.

The Chinook fishery in Case Inlet (13D) occurred from late-July through September (weeks 31 – 41); total catch was 3,071, with the highest landings in week 37. The Squaxin

Island Tribe conducted a fishery in the Nisqually Reach (reported under Area 13D in the table above) which caught 2,868 Chinook. Coded-wire tag recoveries from this catch indicated a predominance of Nisqually River Chinook.

The Chinook fishery in Budd Inlet (13F) occurred from the beginning of August to mid-September (weeks 32 – 38), with total catch of 3,211.

### **2.5.6 Nisqually River**

The tribal commercial fishery in the Nisqually River caught 11,158 Chinook. The Chinook-directed fishery was conducted July 24 through September 8 (one week longer than the preseason plan to close August 31. Approximately 10% of the catch was taken during the coho period in weeks 41 – 43. Eleven Chinook were caught for ceremonial and subsistence purposes. The pre-season management objective was for the terminal harvest rate to not exceed 38%. Based on a preliminary accounting of terminal run size (28,800) the extreme terminal harvest rate was 38.6%.

Tribal staff conducted a study of tangle-net gear (i.e. small mesh gillnet), to assess catch efficiency and incidental mortality associated with releasing unmarked Chinook. A total of 206 Chinook were caught, 202 tagged and released. Associated mortality was estimated to be 49%. A summary of the study is included as an appendix to this report.

## **2.6 Hood Canal**

Treaty Chinook directed fishing in 12C occurred as planned from July 17 thru August 31 (weeks 30 – 36). Catch during the Chinook period was 7,405, with 104 of those landed during the first two weeks of the coho fishery.

Chinook harvest in the Hoodspout Hatchery Zone (12H) totaled 16,495, occurred as planned from July 17 through September 11. The majority of catch occurred in weeks 33 – 37.

Chinook harvest in the Skokomish River occurred as planned from August 1 through mid-September (during the Chinook period). Total Chinook harvest was 11,749, with 149 of those taken during the first two weeks of the coho period.

Terminal area Chinook catch exceeded the pre-season projections, due to hatchery returns exceeding the forecasted level. Terminal harvest rates aligned with in-season estimates.

In Port Gamble (Area 9A) 125 Chinook were harvested, primarily in late-August (weeks 35 and 36). Catch exceeded the pre-season projection of 52.

Chinook catch in other areas of Hood Canal were very low, as expected: 6 were landed in Area 12 /12B, one in Quilcene Bay (12A), and one in Area 12D, all of these during coho fisheries.

There were no Chinook landed in non-treaty fisheries in Hood Canal in 2011.

Table 8. Projected (FRAM 1811) and actual Chinook catch and exploitation rates in Hood Canal terminal area net fisheries, 2011.			
Area	Target Species	Catch	
		Projected	Actual
Port Gamble 9A (T)	Coho, Chum	52	125
Quilcene/Dabob Bay 12A	Coho, Chum		1
Hood Canal 12, 12A, 12B, 12C, 12D (T)	Chinook, Chum, Coho	3,468	7,412
Hood Canal 12, 12B, 12C (NT)	Chum	3	0
Hoodsport Zone 12H (T)	Chinook, Chum	7,846	16,495
Skokomish River (82G/J) (T)	Chinook, Coho, Chum	7,003	11,749

## 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. No Chinook were caught in the Dungeness Bay (6D) coho fishery. Five Chinook were harvested for ceremonial purposes in the Elwha River (Table 9).

Table 9. Projected and actual catches of Chinook in Strait of Juan de Fuca terminal net fisheries, 2011.		
Terminal Area	Projected	Actual
Area 6D & Dungeness River Treaty	1	0
Area 6D Non-Treaty	0	0
Elwha River Treaty (C&S)	4	5
Hoko River Treaty	0	0

## 2.8 Non-Treaty Commercial Monitoring Data and Total Mortality Estimates

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. In 2011, an effort was made to sample gillnets more intensively than in the recent past. Summaries of observer data for 2011 are presented in Table 10. 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 in below in Table 11.



Table 10. Summary of commercial fishery observation data for 2011 Puget sound non-treaty salmon net fisheries.

Area	Gear type	# sets observed	Chinook	Coho	Sockeye	Pink	Chum	Steelhead
10	PS	143	377	1,579	9	46,425	3,738	4
11	PS	42	1	15	0	0	3,111	0
7	PS	129	324	268	19,166	64,687	397	4
7A	PS	94	762	246	3,030	42,139	1,436	3
8A	PS	57	18	210	0	11,071	3	1
10	GN	43	5	1	0	0	1,666	0
11	GN	4	0	0	0	0	133	0
12	GN	78	2	15	0	0	1,914	0
12B	GN	15	0	0	0	0	188	0
7	GN	27	0	3	272	59	0	0
7A	GN	27	1	0	276	32	0	0

Table 11. Total pre-season projected and post-season estimated Chinook mortality (landed + released) in Puget Sound non-treaty commercial salmon fisheries in 2011.

Area	Total Mortality (released + landed)	
	Projected	Actual
6D	0	N/A (0 landed)
7/7A	3,341	4,125
8	33	N/A (10 landed by GN)
8A	85	105
10/11	387	195
12/12B	31	42
9A/12A	0	N/A (0 landed)

## **3 Recreational Harvest**

This chapter summarizes expected recreational catch in Puget Sound marine waters and freshwater tributaries for the 2011-2012 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 2010-2011 management year are also included here.

### **3.1 2010-2011 Recreational Catch**

Total Recreational Chinook harvest in 2010-2011, estimated from a combination of preliminary Catch Record Card (CRC) data and creel estimates where available, was 42,600, compared to a preseason projection of around 52,300. Note that CRC estimates are still in draft format, and subject to future revision. Projected and actual catches are presented for individual fisheries in Table 12. 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 12. Projected (FRAM 1010) and actual (preliminary creel & preliminary CRC) landed Chinook catches in Puget Sound recreational fisheries during the 2010-2011 season, through March 31, 2011.		
Area/Fishery	Projected	Actual
Area 5-6		
MSF (July-August)	4,700	7,256
Other	882	1,371
Strait Tributaries	0	0
Area 7	4,616	3,775
Non MSF		1,682
MSF (December-April)		2,093
Nooksack/Samish FW	4,767	5,668
Area 8-1 & 8-2		
MSF	1,587	211
Skagit River		
Spring MSF	376	240
Area 8D SAF	604	188
Stillaguamish River	0	0
Snohomish River		
Skyokomish MSF	500	243
Area 9		
Summer MSF	5,334	4,977
Winter MSF	2,489	432
Area 10		
Area 10 Summer MSF	2,216	2,966
Area 10 Winter MSF	1,738	146
Area 11		
Area 11 Summer MSF	6,440	3,947
Area 11 other	866	139
Area 10E SAF	1,024	50
Lake Sammamish	283	214
Area 10A SAF	1,800	168
Green River	0	7
Puyallup River		
Carbon R MSF	1,364	163
Puyallup R MSF	787	315
Area 13		
Area 13 Summer MSF	733	673
Area 13 other	334	0**
Chambers Cr	49	132
Nisqually	2,147	2,984
Deschutes	236	19
Area 12	701	699
Skokomish River	5,680	5,640
** Through March 31, 2011		

## **3.2 2011-2012 Recreational Catch**

### **3.2.1 Expected catch**

Projected Chinook catches in 2011-2012 recreational fisheries are listed in Table 13. Total projected catch was 54,130. The recreational fishing regime included mark selective fisheries (MSF) for portions of the year in marine areas 5, 6, 7, 8-1, 8-2, 9, 10, 11, 12 and 13, and in the Skagit, Skykomish, Skokomish, Puyallup, Carbon and Nisqually rivers. For those fisheries where creel survey estimates of harvest are available, those estimates are listed as actual catches in Table 13. Intensive sampling efforts were applied to marine area selective fisheries throughout the year, and to several freshwater selective fisheries, so estimates of landed catch and total encounters are available for the many of those fisheries. Brief summaries of results of those sampling programs are included below. In-depth analyses of sampling and statistical methods are available in a series of reports produced by WDFW. The latest final reports are available online at: <http://wdfw.wa.gov/publications/search.php?Cat=Fishing / Shellfishing>. Many of the results presented here are from draft reports, which will be available online in the future. 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. For marine fisheries, catch estimates are made using CRC estimates of total catch, combined with species composition data obtained from the baseline sampling program. Because of the timing of the annual reporting cycle for the CRC program, these estimates will not be available until 2013.

Table 13. Projected (FRAM 1811) and actual (preliminary, where available) landed Chinook catches in Puget Sound recreational fisheries during the 2011-2012 season.

Area/Fishery	Projected	Actual
Area 5-6		
MSF (July-August)	5,966	4,627*
Other	1,597	
Strait Tributaries	0	
Area 7	5,412	
Non MSF		
MSF (January-April)		
Nooksack/Samish FW	5,496	
Area 8-1 & 8-2		
MSF	2,045	
Skagit River		
Spring MSF	455	234
Area 8D SAF	411	
Stillaguamish River	0	
Snohomish River		
Skyokomish MSF	452	763
Area 9		
Summer MSF	4,928	2,363
Winter MSF	1,212	
Area 10		
Area 10 Summer MSF	2,456	2,662
Area 10 Winter MSF	1,926	
Area 11		
Area 11 Summer MSF	8,479	2,657
Area 11 other	342	
Area 10E SAF	1,175	
Lake Sammamish	231	
Area 10A SAF	0	
Green River	0	
Puyallup River		
Carbon R MSF	1,076	
Puyallup R MSF	1,101	
Area 13		
Area 13 Summer MSF	1,395	
Area 13 other	200	
Chambers Cr	54	
Nisqually MSF	2,079	2,116
Deschutes	214	
Area 12	1,020	
Skokomish River MSF	4,408	5,306
* Area 5 only		

### 3.2.2 Marine Areas 5 & 6 Summer MSF

2011 was the 9<sup>th</sup> year of summer mark-selective Chinook fishing in marine areas 5 & 6. The 2011 fishery was opened for a set season, July 1 through August 15.

WDFW conducted comprehensive fishery monitoring activities during the Areas 5 and 6 mark-selective fisheries. Sampling activities in Area 5 included dockside creel sampling (with in-season catch and effort estimates), on-the-water effort surveys (boat surveys), and intensive efforts to distribute and collect voluntary trip reports (VTRs) from the angling public. The Area 6 design consisted of baseline angler/catch sampling only and therefore did not have an on-the-water (i.e., boat surveys, test fishing) sampling component. In both Areas 5 and 6, an enhanced Voluntary Trip Report (VTR) 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 (2012).

For Area 5, a total of 4,627 Chinook were estimated to have been landed (4,535 marked and 92 unmarked (Table 14)). Unmarked Chinook encounters were higher than projected pre-season, while marked Chinook encounters were lower than projected.

Due to the alternate sample design for area 6, comparisons will not be possible until Catch Record Card data can be combined with sampling data to generate total harvest and encounter estimates.

Table 14. Comparison of modeled (i.e., using FRAM, model run 1811) and estimated total Chinook encounters for the Area 5, July 1-Aug. 15, 2011 mark-selective Chinook fishery.					
Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	Unmark.	6,170	4,200	1,970	42
	Mark.	13,759	6,809	6,950	5,924
	Total	19,929	11,009	8,920	5,966
	% Mark.	69	62	78	99
Estimated (Creel) Encounters	Unmark.	14,686	9,345	5,340	92
	Mark.	6,764	4,895	1,869	4,535
	Total	21,450	14,241	7,209	4,627
	% Mark.	32	34	26	98

### 3.2.3 Marine Areas 9 & 10 Summer MSF

In 2011, a recreational mark-selective fishery occurred for the fifth consecutive summer in marine areas 9 and 10. The 2011 fishery was open from July 16-August 31. As in the previous years, WDFW's Puget Sound Sampling Unit (PSSU) implemented an intensive monitoring program in Areas 9 and 10 during their summer seasons in order 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 (2012).

Total harvest in Areas 9 and 10 was estimated to 2,388 and 2,671 Chinook, respectively (5,059 total ( Table 15)). In-season estimates of encounters with marked and unmarked Chinook were lower than pre-season projections in both areas.

Table 15. Comparison of modeled (i.e., using FRAM, model run 1811) and estimated total Chinook encounters for the Areas 9 and 10 July 16-August 31, 2011 mark-selective Chinook fisheries.						
Area	Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
9	FRAM Encounters	Unmark.	3,373	1,388	1,985	28
		Mark.	14,677	5,632	9,045	4,900
		Total	18,050	7,020	11,030	4,928
		% Mark.	81	80	82	99
	Estimated (Creel) Encounters	Unmark.	2,238	1,161	1,076	25
		Mark.	4,852	2,624	2,228	2,363
		Total	7,090	3,786	3,304	2,388
		% Mark.	68	69	67	99
10	FRAM Encounters	Unmark.	2,724	1,104	1,620	88
		Mark.	7,501	2,721	4,780	2,368
		Total	10,225	3,825	6,400	2,456
		% Mark.	73	71	75	96
	Estimated (Creel) Encounters	Unmark.	2,595	1,886	709	29
		Mark.	3,979	2,921	1,058	2,643
		Total	6,573	4,807	1,766	2,671
		% Mark.	61	61	60	99

### 3.2.4 Area 11 Summer MSF

A summertime recreational mark-selective fishery was implemented for the fifth year in Area 11 in 2011, 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 2,657 Chinook were landed during the fishery (Table 16, from WDFW 2012). Unmarked and marked Chinook encounters were well below pre-season projections.

Table 16. Comparison of modeled (i.e., using FRAM, model run 1811) and estimated total Chinook encounters for the Area 11 summer 2011 mark-selective Chinook fishery, June 1-September 30, 2011.					
Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	Unmark.	5,637	1,607	4,030	48
	Mark.	25,190	9,690	15,500	8,431
	Total	30,827	11,297	19,530	8,479
	% Mark.	82	86	79	99
Estimated (Creel) Encounters	Unmark.	3,719	2,129	1,590	20
	Mark.	4,951	2,942	2,009	2,637
	Total	8,670	5,070	3,599	2,657
	% Mark.	57	58	56	99

### 3.2.5 MSF Fishery in the Skagit River

Chinook non-retention was required in the Skagit River sport fisheries before June 1 and after July 15. Chinook retention was permitted during the spring Chinook selective river sport fishery June 1–July 15 (for marked fish only).

A mark-selective recreational fishery was opened on the Skagit River from June 1–July 15 (from the highway 530 bridge at Rockport to the Cascade River and the mouth of the Cascade River to the Rockport-Cascade Road Bridge). The preseason modeled expectation of encounters was 695, of which it was expected that 497 would be marked and 198 would be unmarked and released. Of the marked fish, 42 (8.55%) were expected to be released. Assuming a 10% release mortality, this would result in a total mortality during the mark-selective fishery of 479 fish (455 marked kept, 4 marked release mortalities, and 20 unmarked release mortalities). Of these, 8 were expected to be wild fish.

The actual postseason estimate of encounters is 447 fish; 234 marked Chinook were retained and 30 released, and 183 unmarked fish were released and 0 retained. At an assumed 10% release mortality, this results in 21 release mortalities. Total mortality was therefore estimated at 255 spring Chinook, or 221 less than preseason projections.



### **3.2.6 CWT Sampling and Harvest Estimation in Sport Fisheries**

In 2011, WDFW continued a multi-year project using PSC funding to review WDFW's freshwater sport fishery sampling programs, specifically the methods for estimating CWT recoveries from Puget Sound Chinook CWT indicator stocks in those fisheries. Through this project, creel estimates were completed for the Skagit spring (see detail above), Skykomish summer, Nisqually fall, and Skokomish fall Chinook mark-selective fisheries. Preliminary creel estimates are available for all of these fisheries. In the Skykomish, 763 adults were retained, compared to the projection of 452. For the Nisqually, 2,116 adults were retained (2,092 marked and 24 unmarked), compared to the projection of 2,079. Finally for the Skokomish, 5,306 adults were retained (5,268 marked and 37 unmarked), compared to the projection of 4,408. Complete results for all of these sampling programs, including estimates of total mortality, will be available in a future final report.

## 4 Spawning escapement

This section presents natural Chinook escapement estimates for 2011, and compares them to projections from FRAM 1811, and management thresholds.

In general, pre-season FRAM projections are made for natural escapement (the number of Chinook spawning naturally). For some MUs where hatchery-origin adults contribute to natural spawning, the FRAM projections of escapement include natural-origin recruits (NOR) and hatchery-origin recruits (HOR) that spawn naturally. This includes projections for the Skagit, Cedar, Green, Puyallup, Nisqually, Skokomish, Mid-Hood Canal, Dungeness, and Elwha. For the White MU, the projection includes all fish returning to the Buckley Trap or White River Hatchery facilities, including supplementation-origin fish that do not spawn naturally. Natural-origin adults that are used for hatchery broodstock may be included in the projections of natural escapement.

FRAM projects 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. The comparisons in Table 17 represent the best currently available data for comparing predicted and actual escapements.

Spring Chinook escapement was above predictions for the White, and below for the Dungeness and Skagit. White River escapement exceeded its Upper Management Threshold, while Dungeness and Skagit escapements were between their lower and upper thresholds. NOR estimates are not available yet for the Nooksack, so a comparison cannot be made to the FRAM projections or thresholds.

For summer/fall populations, escapement was higher than predicted for the Stillaguamish, Nisqually, Mid Hood Canal, Elwha, and Hoko. Escapement was much lower than predicted for the Skagit, Snohomish, Green, and Puyallup, and slightly lower than expected in Lake Washington and Skokomish. Escapement of Sauk summer, Lower Skagit fall, South Fork Stillaguamish, Green, and Mid Hood Canal were below their lower thresholds.

Details for each escapement estimate, including information on biological sampling of carcasses on the spawning grounds, and hatchery/natural-origin composition estimates, are presented in the following sections.

Table 17. Pre-season projections and post-season estimates of 2011 Puget Sound Chinook natural spawning escapement					
Management Unit		NOR	HOR	Total	Projected (FRAM 1811)
Nooksack	NF	96	769	865 <sup>2</sup>	249 <sup>1</sup>
	SF			468 <sup>3</sup>	40 <sup>1</sup>
Skagit spring	Suiattle			215	235 <sup>1</sup>
	Cascade			265	334 <sup>1</sup>
	Sauk			345	625 <sup>1</sup>
	Total spring			825	1,194
Skagit summer/fall	Sauk summer			210	459 <sup>1</sup>
	Upper Skagit summer			4,480	8,543 <sup>1</sup>
	Lower Skagit fall			820	1,780 <sup>1</sup>
	Total summer/fall			5,510 <sup>4</sup>	10,782
Stillaguamish	NF	425 <sup>5</sup>	490 <sup>5</sup>	915 <sup>5</sup>	635 <sup>1</sup>
	SF	82	21	103	31 <sup>1</sup>
	Total	507	511	1,018	666
Snohomish	Skykomish	880	300	1,180	4,325 <sup>1</sup>
	Snohomish	506	194	700	2,159 <sup>1</sup>
	Total	1,386	494	1,880	6,484 <sup>1</sup>
Lake Washington	Cedar	648	162	810	1,166
	Sammamish	33	700	733	
Green		397	596	993	5,343
Puyallup		343	1,143	1,486	2,062
White		2,640	1,243	3,883	1,416 <sup>7</sup>
Nisqually		430	1,834	2,264	941
Skokomish		159	1,162	1,321	1,461
Mid Hood Canal	Dosewallips			11	
	Duckabush			5	
	Hamma Hamma	35	238	273 <sup>6</sup>	
	Total			289	142
Dungeness		104	561	665 <sup>8</sup>	844
Elwha		147	1,716	1,863 <sup>8</sup>	1,589
Hoko		1,081	423	1,504 <sup>8</sup>	1,397

1. Natural-origin only.  
2. Natural/Hatchery-origin proportions not yet available  
3. Includes NOR, HOR, and NF/MF strays. Composition breakout pending otolith analysis.  
4. An additional 66 fish were collected for use as broodstock for the summer indicator program.  
5. Additional 38 NOR and 135 HOR collected for broodstock  
6. Includes 21 collected for broodstock  
7. Includes returns of natural, hatchery, and acclimation pond origin adults, none of which are adipose clipped.  
8. Include natural spawners, fish collected for broodstock, and associated mortalities. See text for details.

## 4.1 Escapement surveys and estimation methods

### 4.2 North Puget Sound

#### 4.2.1 Nooksack River Early Chinook

North and Middle forks early Chinook

Since 2005, separate methods have been used to estimate escapement to the North Fork and Middle Fork of the Nooksack River. In previous years the North/Middle estimate had been derived by expanding the total number of accounted, 'volitional recruit' carcasses observed in the North and Middle Forks by 3.48. This expansion factor was the average ratio of cumulative redd counts and total carcass counts in five previous years. .

Due to lower flows and higher river bank exposure in 2005 - 2008, we believed that the spawning surveys accounted for the majority of redds in the Middle Fork. To avoid over-estimating escapement, it was decided to expand the Middle Fork redd count by the standard 2.5 fish per redd expansion factor) and to only apply the 3.48 expansion factor to the North Fork carcass counts. .

In 2009, higher than normal flows and associated scouring in the Middle Fork limited redd observations during the early Chinook spawning season, so the Co-managers decided to adjust the Middle fork escapement methodology to account for less than optimum viewing conditions. The following methodology was agreed to for the 2009 through 2011 early Chinook returns only in the Middle Fork. An expansion factor was calculated in a method similar to the North Fork (see explanation above). For 2005 - 2008, the escapement based on redd counts (# redds x 2.5) was divided by the number of carcasses observed. The average of these annual ratios was applied to carcass counts to calculate the 2009 and 2010 Middle Fork escapement (Table 18).

Table 18. Ratios of redd-based escapement estimates to numbers of carcasses observed for MF Nooksack early Chinook, 2005-2008.

Return Year	MF Redds observed	MF estimate based on redds x 2.5	ALL MF carcasses observed	MF Expansion %
2005	116	290	219	1.32
2006	71	178	150	1.19
2007	106	265	150	1.77
2008	114	285	85	3.35
<b>4-year Average</b>				<b>1.91</b>

There was another significant change in methodology introduced in 2010 for the NF/MF Nooksack River escapement estimate. The carcasses observed in Kendall Creek were not expanded but enumerated as actual counts. Our prior assumption that the Kendall Area is reflective of the other areas nearby, like Wick's Slough, Bear Ck Slough, and Coal Ck slough, was no longer valid due to river flow changes in the North Fork Nooksack River. This may have been accurate before 2010, but due to river bank changes, Kendall

Creek extended 0.4 mile downstream from Kendall Creek Hatchery rack, creating more near hatchery spawning habitat.

In 2010 and 2011 we were able to account for nearly all spring Chinook carcasses present in Kendall Creek and expanding this number would over-inflate the actual returns to the North Fork. We believe a more accurate escapement is to not expand Kendall Creek carcasses and to use the (3.48) expansion for the rest of the North Fork Nooksack carcass recoveries.

Using the above method, the 2011 North/Middle Fork Nooksack spring Chinook estimated volitional recruit escapement (includes natural and cultured spawners) to the spawning grounds is 865 fish.

Kendall Creek area carcasses =	199
Northfork River carcasses (130 x 3.48) =	452
Total NF escapement estimate =	651
Middle Fork carcasses (112 x 1.91)=	214
Total NF/MF Nooksack escapement =	865

The main stem North Fork Nooksack River exhibited its characteristic glacial color throughout the summer survey season. The majority of Spring Chinook spawning did take place though in main stem side channels near the mouths of major year round tributaries. In 2011 there were higher than normal water conditions, as the rainy season continued well into July and August. We were able to recover Spring Chinook carcasses in side channels of the North Fork mainstem after the water receded.

Estimates of natural and hatchery-origin contributions to escapement were made for North/Middle forks escapement. For the North Fork, based on results of otolith, cwt, and scale sampling, there were an estimated 604 HOR's and 47 NOR's. For the Middle Fork, based on scale and CWT sampling, and assuming that all unmarked/untagged fish were of natural origin, there were an estimated 165 HOR's and 49 NOR's. For the combined NF/MF escapement estimate of 865, 769 were estimated to be HOR's and 96 NOR's.

Table 19. North and Middle fork Nooksack escapement estimates and spawner composition, 2005-2011.							
Year	2005	2006	2007	2008	2009	2010	2011
Total North Fork carcasses includes; sampled, un-sampled and non-sampled carcasses observed	505	289	337	282	498	272	130
North Fork carcasses multiplied by 3.48 expansion factor	1757	1006	1173	981	1733	947	452
Kendall Creek carcasses (NON expanded)						707	199
Middle Fork Estimate based on 2.5 fish per redd	290	178	265	285	na	na	na
Middle Fork Estimate based on 2005-2008 averaged carcass to redd ratio (1.91)	na	na	na	na	170	378	214
Combined North/Middle Fork Escapement Estimate	2047	1184	1438	1266	1903	2032	865
North Fork estimated NOR (from otolith reads)	11.4%	27.3%	26.8%	27.3%	14.1%	9.7%	7.8%
Middle Fork estimated NOR (from otolith reads)	3.50%	20.2%	7.4%	13.6%	13.4%	11.3%	22.3% (UM/UT, otolith n/a)
Number of NOR Fish (Escape/NOR%=)	210	311	334	307	269	205	96

#### South Fork Nooksack

While no escapement estimate is available for the South Fork early Chinook population for 2011, there are preliminary results that can be described. The combined total count in the South Fork and its tributaries through Sept. 30 was 187 Chinook redds. That is lower than the 2010 count, when a total of 219 redds were enumerated. Expanded by 2.5 adults per redd, that results in a total estimate of 468 total Chinook of all stocks and wild and hatchery origins combined, lower than in 2010. It was a good year sampling carcasses, and a combined total of 167 carcasses were sampled through Oct. 7. In 2010 only 76 carcasses were sampled. Of the carcasses that were in adequate condition to permit full sampling, it appears 77 were natural origin based on the presence of adipose fin and absence of coded wire tag detections. Fifty-eight could be identified as hatchery origin by coded wire tag, or adipose fin clip. Otolith and/or DNA analysis may refine these numbers, and enable an escapement estimate to be calculated in the future.

#### **4.2.2 Skagit River**

Escapement estimates for the six populations of Skagit River Chinook were calculated using estimated fish per redd expansions. Redds were counted using one of two methods. In tributaries to the Skagit River, the Cascade River and tributaries, and upper reaches of the Sauk River, redds were marked and counted by foot or float surveys. Total visible redds in the mainstem Skagit River and in the Sauk River below the mouth of the White Chuck River were counted by helicopter survey and estimated using the area under the curve method (AUC). Due to the high cost associated with helicopter charter the number of flight surveys was kept to a minimum but effective number. The first flight for a population occurred just after spawning began so the actual date of the first redd was not known. Likewise, the final flight may have occurred before spawning was fully completed. Because redds were generally observed during the first flight and may have been built after the last flight, actual beginning and end dates of mainstem spawning aerial surveyed populations were estimated using historical data and field observations.

##### Suiattle spring Chinook

Suiattle River spring Chinook spawn in the clear water tributaries of the glacially turbid Suiattle River. Spawning has not regularly been observed throughout the mainstem, but has been documented in the mainstem at interfaces with clear water tributaries. However in 2011 an unusual combination of environmental variables reduced turbidity in the mainstem and resulted in conditions suitable for some off channel and mainstem Suiattle River spring Chinook spawning.

The Suiattle River spring Chinook escapement estimation method has been used since 1994. Spawning ground indexes were surveyed on foot every 7 to 10 days. Redds were marked with dated PVC flagging tape and counted and recorded. The cumulative redd count from all surveyed tributaries (which is the entire known spawning area) was expanded by 2.5 fish per redd to calculate the escapement estimate.

Regularly surveyed indexes included sections of Big Creek, Tenas Creek, Straight Creek, Circle Creek, Buck Creek, Lime Creek, Downey Creek, Sulphur Creek, and Milk Creek. Occasional spot surveys have occurred on a number of small streams when access appears possible. Circle Creek suffered severe habitat damage from a flood in 1990 which created fish passage issues. Surveyor access to Circle Creek was eliminated during a 2003 flood which wiped out the Forest Service 25 vehicle bridge spanning the Suiattle River. In late 2009 and early 2010 the Forest Service contracted to have the Boundary Bridge (the bridge that connects Forest Service road 26 and 25) replaced restoring access to Circle Creek for 2010 Chinook spawning ground surveys. Circle Creek was still accessible by vehicle in 2011, but the spawning habitat had still not improved. The creek was a straight and narrow channel with large cobble and small rubble and stream flow too fast for spawning.

Access to the Suiattle River tributaries was restored to nearly pre 2003 flood ease in 2010 when the Forest Service contracted to have the bridge connecting road 26 and road 25 repaired. Additionally, the stretch of road from RM 12 to Downey Creek remained roughly repaired to allow limited administrative vehicle access nearly to Downey Creek. Forest Service Road 26 beyond mile 12 remained closed to the public, but again in 2011 we acquired permission from Darrington District Ranger Peter Forbes to use the road for access to the spring Chinook spawning ground survey indexes.

The indexes surveyed in 2011 represented the total known spawning distribution of the population. The indexes included most clear water tributaries in the basin with enough flow to allow Chinook access. Redds constructed in the mixing zone between a tributary and the mainstem were included in the total for the tributary.

Tributaries were surveyed for spring Chinook redds between August 3 and September 20, 2011. The survey interval goal was generally maintained throughout the survey period.

Over five decades of observation, WDFW biologists have not observed mainstem spawning by Suiattle spring Chinook. However environmental conditions were highly unusual during the spring Chinook spawning period of 2011; due to cool weather and high remaining snow pack the river uncharacteristically had high visibility (about 4' at the best and decreasing to 6" on the last mainstem survey) despite high flow conditions. During a routine survey of Straight Creek, a WDFW technician observed and tracked a small braid of the Suiattle River flowing over the Straight Creek alluvial fan. The surveyor observed Chinook redds and live Chinook in the braid. With the observation it was decided to survey by raft accessible mainstem sections of the Suiattle River from river mile 24.5 to 9.6 while flows remained clear. Mainstem surveys were performed by highly experienced WDFW rafters. The rafted sections were treacherous with numerous blind corners, sweepers, log jams, and large standing waves. All sections were rafted in pairs and ample safety gear including helmets was worn and carried.

A total of 86 redds were identified by surveyors and the 2011 Suiattle River spring Chinook escapement estimate was 215 fish (Table 20). A total of 29 of the 86 redds were found during the mainstem surveys. Most redds were found in small braids off the main channel, but a small number of redds were located in the actual mainstem. The final escapement number was dependent on co-manager review and agreement which had not yet occurred at publication.



Table 20. Suiattle River spring Chinook redd counts from 2011 spawning ground surveys. Redds found at the interface of the Suiattle River and a tributary were included in the count for the tributary.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>*1</sup>	Redds
Big Creek	3.0723	Foot	0.0-0.6	7.8	4
Tenas Creek	3.0761	Foot	0.0-0.5	9.6	10
Suiattle mainstem <sup>*2</sup>	3.071	Raft	9.6-24.5	9.6	29
Straight Creek	3.0797	Foot	0.0-0.1	15.1	3
Buck Creek	3.0813	Foot	0.0-1.7	18.1	1
Circle Creek	3.0892	Foot	0.0-0.2	18.4	0
Harriet Creek	3.0896	Foot	0.0-0.2	20.4	0
Lime Creek	3.0897	Foot	0.0-0.5	20.8	1
Downey Creek	3.0919	Foot	0.0-2.1	24.4	22
Sulphur Creek	3.0973	Foot	0.0-0.9	26.3	11
Milk Creek	3.1022	Foot	0.0-0.1	28.6	5
Total redds:					86

<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>2011 was the first year the mainstem was surveyed due to unusually good water clarity. Ability to survey in future seasons will be highly dependent on unusually clear mainstem Suiattle conditions.

### Upper Cascade spring Chinook

Upper Cascade spring Chinook surveys cover the entire known spawning distribution of the population. Surveyed areas were the mainstem Cascade River from river mile (RM) 8.1 to 18.6, the lower reaches of the North and South Fork Cascade Rivers, and indexes in two tributaries, Marble Creek and Kindy Creek.

The Cascade spring Chinook escapement estimate methodology was implemented in 1992. Indexes were surveyed by foot, or cataraft when flows were too high. Redds were marked with dated PVC flagging and counted. The cumulative redd count was expanded by 2.5 fish per redd to calculate escapement.

Maintaining the prescribed survey interval of 10 to 14 days was a challenge in 2011 due to high flows. Normally we would begin spawning ground surveys in the Cascade around the second week of August. However, in 2011 we were unable to survey all indexes until September 3. The indexes below river mile 12.4 could be surveyed by pontoon boat during the entire spawning period, but the sections above were too treacherous to raft so we had to wait. After flows decreased we surveyed indexes above river mile 12.4 by foot and found redds of varying age from slightly less visible to obviously very new. We concluded elevated flows had likely not caused scour as feared, and redd life had not exhausted during the period we were unable to survey. We located a season total of 106 upper Cascade spring Chinook redds in 2011 (Table 21). The escapement estimate was 265 fish. The final escapement number was dependent on co-manager review and agreement which had not yet occurred at publication.

Table 21. Upper Cascade River spring Chinook index total redd counts from 2011 spawning ground surveys.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>*1</sup>	Redds
Cascade River	3.1411	Foot	8.1-9.0	8.1	11
Marble Creek	3.1451	Foot	0.0-0.3	8.6	1
Cascade River	3.1411	Foot/Raft	9.0-12.4	9	42
Cascade River	3.1411	Foot	12.4-15.8	12.4	38
Cascade River	3.1411	Foot	15.8-18.6	15.8	14
Kindy Creek	3.1528	Foot	0.0-0.5	16.2	0
North Fork Cascade River	3.1605	Foot	0.0-0.1	18.6	0
South Fork Cascade River	3.1411	Foot	18.6-19.3	18.6	0
Total redds:					106

<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 spring Chinook

Spawning ground surveys for upper Sauk River spring Chinook encompass the known spawning distribution of the population. Mainstem Sauk River indexes were between RM 31.0 (which is 0.9 miles below the mouth of the White Chuck River) and RM 39.7, at the confluence of the North Fork Sauk and South Fork Sauk Rivers. The North Fork Sauk River was surveyed from the mouth upstream to an impassable falls 1.6 RM upstream, and the South Fork Sauk River was surveyed from the mouth to approximately RM 3.5 which is an assumed Chinook barrier most years.

Surveys were performed on foot or by cataraft except for the 0.9 mile index below the White Chuck River. The section from RM 31.0 to RM 31.9 is too dangerous to walk or float and is surveyed by helicopter. Redds in sections surveyed from the ground were marked with dated PVC flagging and recorded. All visible redds in the aerial survey sections were counted and recorded. Redd days were calculated from the aerial surveyed section using the area under the curve (AUC) method. Estimated redds were calculated by dividing redd days by redd life. The redd life value used was 21 days (Schuller, 1974). Actual and estimated redds were summed and expanded by 2.5 fish per redd to estimate escapement. The Sauk River spring Chinook escapement estimate methodology has remained unchanged since 1994.

Manageable flows throughout most of the 2011 season enabled complete survey coverage of all upper Sauk spring Chinook indexes. We surveyed the upper Sauk River spring Chinook spawning areas from August 29, 2011 through September 30, 2011. Surveys were conducted by foot or pontoon boat on indexes above the White Chuck River every 10 to 14 days. The index below the White Chuck River was surveyed approximately every two weeks by helicopter. Most redds were constructed between the second and third week of September. As has been noted in previous reports, Sauk spring Chinook have been trending toward later spawn timing than historical and the pattern continued in 2011. We located a total of 135 redds during ground surveys and estimated 3 Sauk spring Chinook redds during flight surveys (Table 22). The 2011 Sauk River spring Chinook escapement estimate was 345 fish. The final escapement number was

dependent on co-manager review and agreement which had not yet occurred at publication.

Table 22. Upper Sauk River spring Chinook index total and estimated redd counts from 2011 spawning ground surveys.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>*1</sup>	Redds
Sauk River	3.0673	Flight	31.0-31.9	31	3
Sauk River	3.0673	Foot/Float	31.9-34.5	31.9	56
Sauk River	3.0673	Foot/Float	34.5-37.8	34.5	55
Falls Creek	3.1182	Foot	0.0-0.2	34.9	1
Sauk River	3.0673	Foot/Float	37.8-39.7	37.8	4
South Fork Sauk River	3.1204	Foot	0.0-3.5	39.7	10
North Fork Sauk River	3.0673	Foot	39.7-40.1	39.7	0
North Fork Sauk River	3.0673	Foot	40.1-41.3	40.1	9
Total redds (rounded):					138

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

#### Skagit Spring aggregate escapement

The 2011 observed spawning escapement of wild Skagit spring Chinook was 825, less than the FRAM predicted escapement of 1,194. Total wild spring Chinook escapement was below the Upper Management Threshold of 2,000, but higher than the Low Abundance Threshold of 576. Escapement for all three populations were above their LATs as well.

#### Upper Skagit summer Chinook

Skagit summer Chinook escapement estimation methodologies have remained unchanged since at least 1974. The escapement estimate is composed of a ground based survey redd count of tributaries and an aerial based mainstem surveys with the number of redds estimated using the AUC method. The survey protocol stipulates surveying nearly the entire known spawning distribution of the population which includes the mainstem Skagit River from the mouth of the Sauk River (RM 67.2) to the Seattle City Light powerhouse at Newhalem (RM 94.3), and several tributaries. Tributaries surveyed were the lower Cascade River (RM 0.0 to 3.4) and also included indexes in Illabot Creek, Diobsud Creek, Bacon Creek, Falls Creek (tributary of Bacon Creek) and Goodell Creek. All redds located in tributaries were marked with dated PVC tape and recorded. Infrequent spawning in some tributaries not normally surveyed has been documented historically, but limited staffing prevented us from monitoring those areas. The survey interval for tributaries was every 10 to 14 days and the interval for flights was approximately once every two weeks. Cumulative redds from all tributary counts were added to the AUC redd estimate and multiplied by 2.5 fish per redd to calculate the escapement estimate. The AUC method used an assumed redd life of 21 days to calculate total redds (Schuller, 1974). Beginning and end points for the curve were estimated using field observations of redd construction and historical data

Tributary surveys began September 7 and concluded October 31, 2011. Weather conditions were favorable for surveys throughout the spawning period and we maintained our tributary interval protocol and surveyed every 10 to 14 days. There were no fish passage issues observed in any of our tributary indexes in 2011. We surveyed the mainstem Skagit River by helicopter four times beginning September 9 and concluding October 17. Weather conditions were favorable for all the flights.

We estimated 1,792 Skagit summer Chinook redds were constructed in 2011 (Table 23). We located 97 redds in tributary indexes and we estimated 1,695 mainstem redds from flight surveys. The 2011 Skagit River summer Chinook escapement estimate was 4,480 fish. Redds constructed in the tributaries prior to September 1 were not included in the total estimate. Carcass recoveries have shown the majority of these fish were hatchery strays from the Marblemount hatchery spring Chinook program, so they were enumerated separately. The final escapement number was dependent on co-manager review and agreement which had not yet occurred at publication

Table 23. Skagit summer Chinook redd counts from 2011 spawning ground surveys.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>*1</sup>	Redds
Skagit River	3.0176	Flight	67.2-78.1	67.2	610
Illabot Creek	3.1346	Foot	0.0-2.6	71.6	7
Skagit River	3.0176	Flight	78.1-89.5	78.1	947
Cascade River	3.1411	Foot/Float	0.0-4.2	78.1	30
Diobsud Creek	3.175	Foot	0.0-1.3	80.7	4
Bacon Creek	3.1774	Foot	0.0-4.2	82.9	50
Falls Creek <sup>*2</sup>	3.178	Foot	0.0-0.4	0.4	3
Skagit River	3.0176	Flight	89.5-94.3	89.5	138
Goodell Creek	3.1867	Foot	0.0-1.3	92.9	3
Total redds (rounded):					1,792

<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 3.1780 is a tributary of Bacon Creek. The mouth is located at river mile 4.0 of Bacon Creek on the right bank.

#### Lower Sauk summer Chinook

Sauk River summer Chinook escapement was estimated by summing calculated mainstem redds with redds counted in one tributary, and expanding the sum by fish per redd. The methodology has remained unchanged since at least 1974. The mainstem was surveyed by helicopter at approximately two week intervals from the mouth of the Sauk River to RM 31.0. The reach from RM 31.0 to 31.9 (mouth of the White Chuck) was high gradient with limited spawning habitat and was assumed to separate the spring and summer Chinook stock distributions. Redd days were calculated by the AUC and divided by the assumed redd life of 21 days to calculate total redds (Schuller, 1974). Beginning and end points for the curve were estimated using field observations of redd construction and historical data. Any redds counted in the tributary were added to the AUC redds and

the sum was multiplied by 2.5 fish per redd to calculate escapement. The area surveyed represented the total known spawning distribution of the population. Dan Creek was the only tributary surveyed.

A major flood in October 2003 changed the distribution of summer Chinook spawning in the Sauk River from historic patterns. Downstream of the Suiattle River mouth the Sauk River experienced a loss of spawning gravel due to deposition of fine sediment and as a result less spawning was observed. Upstream of the Suiattle River, new usable gravel was deposited and increased spawning was observed. As an example of the changes, prior to the 2003 flood few redds were typically observed above the Darrington Bridge at RM 21.0 (spawning ground database). However, In recent years as much as 26% of the Sauk summer Chinook population has utilized the spawning habitat above the bridge. In 2011 9.5% of all redds were in the reach from Darrington to 0.9 miles below the White Chuck. However we estimated 48.8% of all Sauk River summer Chinook redds were constructed between the Sauk River mouth and the mouth of the Suiattle River in 2011. The observation may suggest available spawning habitat has increased in the lower river. We surveyed the Sauk River four times by helicopter between September 9 and October 17, 2011 (the Skagit summers were surveyed during the same flights). Flow and visibility conditions were generally favorable during all flights. We surveyed Dan Creek September 15 and concluded flows were not passable for Chinook. 2011 was a pink year and despite a robust run, very few pinks had made it upstream to the spawning gravel suitable for Chinook because of the low flows. We decided until flows increased it was not necessary to survey Dan Creek again. Low flows persisted throughout and beyond the Chinook spawning period.

The 2011 Sauk summer Chinook escapement estimate was 210 fish. An estimated 84 redds were constructed in the Sauk River summer Chinook zone and zero redds were counted in the tributary index (Table 24).

Table 24. Sauk summer Chinook redd counts from 2011 spawning ground surveys. Dan Creek flows were too low for Chinook passage throughout 2011 spawning.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>*1</sup>	Redds
Sauk River	3.0673	Flight	0.0-13.2	0	41
Sauk River	3.0673	Flight	13.2-21.1	13.2	35
Dan Creek	3.1079	Foot	0.0-0.8	16.8	0
Sauk River	3.0673	Flight	21.1-31.0	21.1	8
Total redds (rounded):					84

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

### Lower Skagit fall Chinook

The Skagit River fall Chinook escapement was estimated using redd counts from main stem Skagit River aerial surveys and cumulative counts from 10 tributaries. The main stem was flown by helicopter at approximately two week intervals from Highway 9 at Sedro Woolley to the Sauk River Mouth. Redd days were estimated from the aerial counts using the AUC method. Beginning and end points for the curve were estimated using field observations of redd construction and historical data. Estimated redd days were then divided by an assumed redd life of 21 days to calculate total redds (Schuller 1974). The tributary cumulative redd count was added to the AUC derived redds and multiplied by 2.5 fish per redd to calculate escapement

Surveying of tributaries in 2011 began September 14 and concluded November 15, 2011 (Table 25). Protocol was to survey each index once every 7 to 10 days and for the exception of a few high water episodes, moderate flow conditions presented favorable surveying conditions throughout the fall Chinook spawning period allowing a full set of surveys to be attained. Tributaries surveyed included; Jackman Creek, Finney Creek, Pressentin Creek, O'Toole Creek (supplemental index), Grandy Creek, Day Creek, Alder Creek, Jones Creek, and Hansen Creek. WDFW did not survey all the indexes. The Upper Skagit Indian Tribe (USIT) surveyed the upper index of Finney Creek, and Grandy Creek. The Skagit Fisheries Enhancement Group (SFEG) also participated in fall Chinook surveys; they surveyed Hansen Creek, Jones Creek, and Alder Creek. East Fork Nookachamps Creek was not surveyed by SFEG in 2011. All tributaries were surveyed by foot, and all new redds were marked with dated PVC flagging and recorded. The areas surveyed represented nearly the entire known spawning distribution of the lower Skagit fall Chinook population. Some limited spawning may have occurred in tributaries not sampled.

The main stem was surveyed by helicopter four times in 2011 from RM 24.5 (Highway 9 Bridge) to the mouth of the Sauk River (RM 67.2) beginning September 23 and ending on November 3. As in past years, the Baker and Sauk Rivers both added color and reduced visibility Skagit River during aerial surveys

From the flight data we estimated 267 redds were in the main stem section from the Highway 9 Bridge to the Sauk River and we documented 61 redds in the tributary indexes. The preliminary 2011 Skagit fall Chinook escapement estimate was 820 fish. The final escapement number is dependent on co-manager review and agreement which had not yet occurred at publication.

Table 25. Lower Skagit River fall Chinook redd counts from 2011 spawning ground surveys. Redd counts were provided from Grandy Creek, and part of Finney Creek by the Upper Skagit Tribe. The Skagit Fisheries Enhancement group surveyed Jones Creek, Hansen Creek, and Alder Creek.

Stream	WRIA	Survey method	Reach (RM)	Redds
Skagit River	3.0176	Flight	24.5-56.5	195
Skagit River	3.0176	Flight	56.5-67.2	72
Hansen Creek	3.0265	Foot	3.0-4.3	0
Day Creek	3.0299	Foot	0.0-2.2	7
Jones Creek	3.0332	Foot	0.0-1.3	0
Grandy Creek	3.0337	Foot	0.0-1.1	1
Alder Creek	3.0359	Foot	0.0-1.6	3
O'Toole Creek	3.0365	Foot	0.0-0.2	0
Presentin Creek	3.0385	Foot	0.0-0.4	0
Finney Creek	3.0392	Foot	0.0-6.0	50
Jackman Creek	3.0626	Foot	0.0-0.7	0
Total redds (rounded):				328

*\*1: East Fork Nookachamps not surveyed this year*

#### Skagit summer/fall Chinook aggregate escapement

The 2011 observed spawning escapement of wild Skagit summer/fall Chinook, 5,510, plus the 66 summer Chinook removed from the river for the wild indicator broodstock totaled 5,576 Chinook, lower than the Upper Management Threshold (14,500) and pre-season projection (10,782), but higher than the Low Abundance Threshold (4,800). The Sauk and Lower Skagit populations were both below their population LATs.

#### Skagit Hatchery Spring Chinook Stray Rate Study

A study began in 2006 to determine the number of hatchery spring Chinook spawning in natural spawning areas prior to the onset of native summer Chinook spawning. The study was conducted by Washington Department of Fish and Wildlife and the Skagit River System Cooperative (SRSC), the management body for the Swinomish and Sauk-Suiattle tribes of Indians. Prior to 2005, no attempt had been made to enumerate the number of strays that did not enter the hatchery.

Weekly redd surveys were conducted by foot or pontoon boat in the Lower Cascade River (RM 0.0 – 3.4) and Boulder Creek, a tributary to the Cascade River where hatchery strays were known to spawn. Encountered carcasses were sampled for coded wire tags to ascertain origin. Tributaries to the upper Skagit River, Bacon Creek, Illabot Creek and Diobsud Creek were also surveyed by foot to determine whether strays were spawning in those streams.

Carcass recoveries revealed redds built before September 1 in the all the sites surveyed could be reasonably expected to have been constructed by hatchery spring Chinook strays.

Surveys began July 27, 2011. Note that the areas surveyed do not overlap with the areas surveyed for natural-origin spring Chinook described above. A cumulative total of 146 redds were observed in the Cascade River and an additional 54 redds in other tributary indexes prior to September 1. Using an expansion of 2.5 fish per redd, an estimated 500 stray Marblemount Hatchery spring Chinook spawned in natural spawning areas. These fish are not included in the natural escapement estimates reported above for the three Skagit spring Chinook populations.

Table 26. Redd counts from 2011 hatchery spring Chinook spawning surveys. The origin of the strays was the WDFW Marblemount Hatchery.

Stream	RM	8/4	8/12	8/16	8/17	8/18	8/22	8/29	8/31	Total
Cascade River	0.0-0.9	9	24			17		6		56
Cascade River	0.9-3.4	8	31			25		17		81
Boulder Creek	0.0-0.4	4	4			1				9
Bacon Creek	0.0-1.5							4		4
Bacon Creek	1.5-3.5				5			2		7
Bacon Creek	3.5-4.2				1			2		3
Falls Creek	0.0-0.2								1	1
Diobsud Creek	0.0-1.4			10			3			13
Illabot Creek	0.0-2.0						2			2
Illabot Creek	0.0-2.6			24						24
									Total	200



### **4.2.3 Stillaguamish River**

Escapement estimates for the two Stillaguamish Chinook populations were calculated by multiplying the cumulative redd count by 2.5. 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 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 on a seven to ten day cycle to maximize carcass sampling rates and ensure enumeration of all redds. All redds were flagged, enumerated and recorded with a GPS waypoint.

#### Stillaguamish summer Chinook

Stillaguamish summer Chinook spawning surveys covered the entire known distribution of the population. 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.

Survey conditions for counting Chinook in the North Fork Stillaguamish were generally good throughout the spawning period. The first redds were detected August 22. Most redds were laid by the end of September with the final few constructed in late October. Rain events in October caused occasional elevated stream levels and temporarily hampered some of the later surveys with decreased visibility

A total of 365 Stillaguamish summer Chinook redds were counted in 2011. The escapement estimate was 915 fish. Based on carcass sampling, 425 of these were NOR's, and 490 were HOR's. An additional 173 fish were taken for hatchery brood stock and were not included in the escapement estimate (38 NOR, 135 HOR). Total NOR summer escapement (natural spawning + broodstock collection) was 463 Chinook, compared to a pre-season projection of 534. Table 27 lists redd counts and escapement estimates by surveyed reach.

Table 27. Stillaguamish Summer Chinook redd counts and escapement by survey reach in 2011.

<b>Stream Reach</b>	<b>WRIA</b>	<b>Method</b>	<b>Reach (RM)</b>	<b>Redds</b>	<b>Escapement</b>
North Fork	5.0135	Foot/Float	0.0-14.3	27	68
North Fork	5.0135	Foot/Float	14.3-30.0	209	523
North Fork	5.0135	Foot/Float	30.0-34.4	39	98
Grant Creek	5.0156	Foot	0.0-0.4	0	0
Deer Creek	5.0173	Foot	0.0-6.0	NA	NA
Brooks Creek	5.0215	Foot	0.0-0.1	0	0
Boulder River	5.0229	Foot	0.0-2.9	19	48
French Creek	5.0246	Foot	0.0-3.0	1	3
Squire Creek	5.026	Foot	0.0-4.0	70	175
Ashton Creek	5.0262	Foot	0.0-1.2	0	0
<b>Total Redds</b>				<b>365</b>	
<b>Escapement Estimate</b>					<b>915</b>

#### Stillaguamish fall Chinook

Fall Chinook escapement in 2011 was estimated using expansion of redd counts from aerial, foot, and raft surveys. Areas surveyed were the Mainstem between the mouth and the confluence of the North and South Forks (river miles 0.0 to 17.8), the South Fork from the confluence to Granite Falls (river miles 17.8 to 34.7), and from Red Bridge to Coal Creek (river miles 55.1 to 62.5), Canyon, Jim, Siberia, and Pilchuck Creeks. Survey conditions were challenging for the enumeration of new redds in the fall Chinook spawning reaches. Flow and turbidity conditions early- October hindered our ability to keep survey frequency between seven to ten days. No surveys were done in the South Fork after October 19 because of high turbidity. As a result of these factors, the redd count total and escapement estimate for the South Fork are likely biased low.

A total 41 Chinook redds were found in the South Fork Stillaguamish River in 2011. The escapement estimate was 103 adult fish, more than the preseason projection of 31. Redd counts by surveyed reach and escapement estimates are listed in Table 28.

Table 28. Stillaguamish fall Chinook redd counts and escapement by survey reach in 2011.

<b>Stream Reach</b>	<b>WRIA</b>	<b>Method</b>	<b>Reach (RM)</b>	<b>Redds</b>	<b>Escapement</b>
Mainstem	5.0001	Flight	0.0-18.2	2	5
South Fork	5.0001	Foot/Float	18.2-30.6	26	65
South Fork (upper)	5.0001	Foot	30.6-65.0	4	10
Pilchuck Creek	5.0062	Foot/Float	0.0-6.2	5	13
Jim Creek	5.0322	Foot/Float	0.0-4.1	1	3
Siberia Creek	5.0324	Foot	0.0-0.4	0	0
Canyon Creek	5.0359	Foot	0.0-0.5	3	8
<b>Total Redds</b>				<b>41</b>	
<b>Escapement Estimate</b>					<b>103</b>

#### Carcass sampling

WDFW and Stillaguamish Tribe Natural Resources staff conducted spawning ground survey work and carcass sampling in North and South Forks of the Stillaguamish River and their tributaries. Tribal staff focused their Chinook carcass recovery efforts in the North Fork between the mouth and Swede Heaven Bridge (RM 0.0 to 30.0). In total, 256 carcasses were sampled for CWTs on the NF of the Stillaguamish (RM 0.0 to 34.0). The sampling rate of Chinook carcasses encountered by WDFW and Tribal staff on the spawning grounds were 42.8 and 18.0% for Summer and Fall populations, respectively. These rates were calculated by dividing the number of carcasses sampled by the escapement estimate for each population. Table 29 lists carcass sampling rates for each stream reach in the basin, partitioned by where each population is thought to spawn.

Table 29. Stillaguamish basin Chinook spawning ground carcass sampling rates in 2011.

Reach	Total Sample	CWT Ad	No CWT Ad	CWT No clip	No CWT No clip	Escape Est.	Sample Rate
North Fork (RM 0.0-14.3)	22	10	2	0	10	68	32.35%
North Fork (RM 14.3-30.0)	256	153	21	1	81	523	48.95%
North Fork (RM 30.0-34.4)	55	27	2	0	24	97.5	56.41%
Grant Creek	0	0	0	0	0	0	0.00%
Deer Creek	0	0	0	0	0	N/A	0.00%
Brooks Creek	0	0	0	0	0	0	0.00%
Boulder River	4	3	0	0	1	47.5	8.42%
French Creek	1	0	0	0	1	2.5	40.00%
Segelson Creek	0	0	0	0	0	0	0.00%
Squire Creek	53	25	6	5	17	175	30.29%
Ashton Creek	0	0	0	0	0	0	0.00%
<b>TOTAL</b>	<b>391</b>	<b>218</b>	<b>31</b>	<b>6</b>	<b>134</b>	<b>913.5</b>	<b>42.80%</b>
South Fork (RM 18.2-30.6)	13	4	3	0	6	65	20.00%
Pilchuck Creek	1	0	0	0	1	13	7.69%
Jim Creek	2	0	1	0	1	3	66.67%
Siberia Creek	0	0	0	0	0	0	0.00%
Canyon Creek	0	0	0	0	0	8	0.00%
<b>TOTAL</b>	<b>16</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>8</b>	<b>89</b>	<b>17.98%</b>

#### **4.2.4 Snohomish River**

Escapement estimates of naturally spawning Summer/Fall Chinook salmon returning the Snohomish River are calculated from cumulative redd counts made from physical surveys of their spawning grounds, and from counts of adult fish passed at Sunset Falls. Survey methods included ground based walking and float surveys, and aerial surveys done 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 were flagged to prevent re-counting on subsequent surveys. GPS waypoints were recorded for most redds documented in ground-surveyed reaches. 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 to give 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.

##### **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 favorable for enumeration of redds during most of the spawning season. Ground survey intervals were kept to seven to ten days except for when rain-fed flow pulses in late-September and October caused minor survey delays. Four aerial surveys were flown on the Mainstem Snohomish, Skykomish and North and South Fork Skykomish Rivers between September 23 and November 3. High flows and turbidity on the Sultan River made it impossible for the Snohomish PUD to observe redds October or November. Eight redds were observed in September. To estimate Chinook spawning in the Sultan, historic average contribution of Sultan to total Snohomish spawning effort (8.5% between 1999 and 2010) was reduced by 33% ( $0.33 \times 0.085$ ) to account for high turbidity potentially causing spawning avoidance behavior in the Sultan River.

The 2011 estimated escapement for Skykomish Chinook was 1,180 fish. Of these, 403 were estimated from aerial surveys of mainstem reaches, 450 were estimated from ground counts of tributary reaches, 50 were estimated for the Sultan using historic averages, and 277 were adults trapped at Sunset Falls. Table 30 lists Skykomish Chinook spawning ground survey reaches, redd counts and escapement estimates.

##### **Snoqualmie summer/fall Chinook**

The escapement estimate for Snoqualmie summer/fall Chinook was made using cumulative redd counts from boat and foot 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 the end of August to mid-November.

Survey conditions were good for most of the spawning season. Rainstorms in October elevated stream flows and turbidity and caused minor interruptions in survey coverage.

In 2011 the escapement of 700 Chinook in the Snoqualmie Basin was based on a total count of 228 redds. Table 31 lists redd counts and escapement estimates by survey reach for Snoqualmie fall Chinook.

Table 30. Skykomish summer/fall Chinook redd counts and escapement, 2011.

<b>Stream Reach</b>	<b>WRIA</b>	<b>Method</b>	<b>Reach (RM)</b>	<b>Redds</b>	<b>Escapement</b>
Snoh-Sky (Mainstems)	7.0012	Float/Flight	20.5-51.5	143	358
NF Skykomish	7.0982	Foot/Flight	0.0-13.5	18	45
SF Sky (Sunset Falls)	7.0012	Trap/Haul	51.5-up	-	277
Pilchuck River	7.0125	Foot/Float	2.0-26.5	59	148
Woods Creek	7.0826	Foot/Float	0.0-3.5	0	0
Elwell Creek	7.0865	Foot	0.0-1.0	4	10
Sultan River	7.0881	Foot/Float	0.0-9.7	-	50
Wallace River (lower)	7.094	Foot/Float	0.0-4.4	56	140
Wallace River (upper)	7.094	Foot/Float	4.4-7.3	51	128
Olney Creek	7.0946	Foot	0.0-0.6	4	10
Proctor Creek	7.097	Foot	0.0-0.4	0	0
Bridal Veil Creek	7.1248	Foot	0.0-0.4	6	15
<b>Total Redds</b>				<b>341</b>	
<b>Escapement Estimate</b>					<b>1180</b>

Table 31. Snoqualmie Fall Chinook redd counts and escapement by reach in 2011.

<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	13	33
Snoqualmie River (Upper)	7.0219	Float	32.9-39.6	148	370
Cherry Creek	7.024	Foot	1.8-3.5	0	0
Tolt River (Lower)	7.0291	Foot/Float	0.0-6.0	26	65
Tolt River (Upper)	7.0291	Foot/Float	6.0-8.9	7	18
SF Tolt River	7.0302	Foot	0.0-2.3	20	50
Raging River	7.0384	Foot	0.0-4.6	39	98
Tokul Creek (Lower)	7.044	Foot	0.0-0.3	27	68
Tokul Creek (Upper)	7.044	Foot	0.3-0.6	0	0
<b>Total Redds</b>				<b>280</b>	
<b>Escapement Estimate</b>					<b>700</b>

## Carcass Sampling

WDFW field staff sampled 374 Chinook carcasses within the Snohomish basin. In total, the Chinook carcass sampling rate on the spawning grounds was 19.9%. This was calculated by dividing the number of carcasses sampled by the escapement estimate. Table 32 lists carcass sampling rates for each stream reach in the basin. Based on these samples, escapement of hatchery- and natural-origin escapement Chinook was estimated for both populations. For the Skykomish, the total escapement of 1,180 included an estimated 880 NORs and 300 HORs. For the Snoqualmie, the total escapement of 700 included 506 NORs and 194 HORs.

Table 32. Snohomish Chinook HOR/NOR and spawning ground carcass sampling rates grouped by stratum, 2011.

<b>Stratum</b>	<b>Escape ment</b>	<b>No. Hatchery</b>	<b>No. Natural</b>	<b>% Hatchery</b>	<b>% Natural</b>	<b>Number Sampled</b>	<b>Percent Sampled</b>
Bridal Veil	337	-	337	0.0%	100.0%	12	0.04
Sultan	50	4	25	7.4%	50.0%	2	0.04
Skykomish	378	46	332	12.1%	87.9%	33	0.09
Pilchuck River	148	49	98	33.3%	66.7%	12	0.08
Wallace River	268	201	67	75.0%	25.0%	68	0.25
<b>Skykomish Pop.:</b>	<b>1,180</b>	<b>300</b>	<b>880</b>	<b>25.4%</b>	<b>74.6%</b>	<b>127</b>	<b>0.11</b>
Snoqualmie	633	174	458	27.5%	72.5%	138	0.22
Tokul	68	20	48	29.4%	70.6%	109	1.61
<b>Snoqualmie Pop.:</b>	<b>700</b>	<b>194</b>	<b>506</b>	<b>27.7%</b>	<b>72.3%</b>	<b>247</b>	<b>0.35</b>
<b>Snohomish Total.:</b>	<b>1,880</b>	<b>494</b>	<b>1,386</b>	<b>26.3%</b>	<b>73.7%</b>	<b>374</b>	<b>0.20</b>

### 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 Tolt River, Cherry Creek

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

## **4.3 South Puget Sound**

### **4.3.1 Lake Washington**

#### 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, 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, 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 a redd.

In 2011 a total of 324 Chinook redds were observed in the Cedar River mainstem during the spawning season (including the surveyed area upstream from Landsburg Dam and including all small tributaries). Of the 324 Chinook redds, 322 were observed in the Cedar River mainstem (280 below Landsburg Dam and 42 above), and 2 were observed in Taylor Creek, a small tributary. Expansion by 2.5 fish per redd resulted in the estimated escapement of 810 Chinook. A total of 379 adult Cedar River Chinook were sampled for adipose fin clips in 2011. This sample indicated that 80% of the Cedar River Chinook were wild (unclipped) and 20% were hatchery origin (clipped) fish.

#### 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. Chinook escapement to the Sammamish River/ North Lake Washington Tributaries in 2011 was estimated at 733 fish.

#### Big Bear/Cottage Lake Creeks

Escapement to Big Bear Creek and Cottage Lake Creek involves weekly surveys of all known Chinook spawning areas to enumerate live and dead 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, and the Cottage Creek index area (a subset of the Bear/Cottage Index area) was surveyed twice each week during the 2011 spawning season. The escapement estimate was 101 fish. Of these, 36 were counted in the Bear Creek mainstem, 25 in the Upper Cottage Creek Index, and 40 in the Lower Cottage Creek Index. A total of 59 Chinook were sampled for adipose fin clips in 2011. This sample indicated that 26% of all Chinook in the Bear/Cottage system were wild (unclipped) and 74% 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 2011 spawning season, and total escapement was estimated at 632 fish (583 fish from the mainstem and 49 fish from the East Fork). A total of 283 adult Chinook from the Issaquah Creek system were sampled for adipose fin clips in 2011. This sample indicated that 1% of all Chinook in the Issaquah Creek system were wild (unclipped) and 99% were hatchery origin fish.

Chinook escapement to Issaquah Hatchery in 2011 was 2,954; 1,021 of these were released upstream to spawn in upper Issaquah Creek. Chinook passed above the hatchery are not included in the Issaquah Creek natural escapement estimate. Chinook escapement to the University of Washington hatchery was 917 fish.

#### **4.3.2 Green River**

Over 56 kilometers (km) of the Green River, broken into 31 separate reaches, were surveyed for Chinook redds in 2011. The area surveyed covers the extent of Chinook spawning, from river km 98.2 at the Howard Hanson Dam (the Headworks) downstream to river km 43 in the city of Auburn, King County. Additionally, Newaukum Creek is surveyed from the mouth upstream for 7.2 km. The surveys were conducted over a period of seven weeks; from September 14th to October 22nd. Although discharge measurements at the Palmer gauge were higher than average in 2011, survey conditions remained favorable throughout the Chinook spawning season.

Chinook redds are monitored using three methods in the Green River: 1) Foot surveys are used in tributaries and side channels, 2) Aerial surveys are used to cover portions of the mainstem that cannot easily be floated, and 3) Float surveys are used to cover large portions of the mainstem. Because of the low Chinook escapement in 2011, it was possible to conduct a complete census of redds in the Green River and Newaukum Creek.

Index reaches in the Green River mainstem that typically receive the highest Chinook spawning activity (the "Middle River" reach and the "Headworks" reach), were surveyed twice a week using float surveys. Survey frequency in these reaches with high Chinook use was increased in 2011 due to concerns that excessive pink salmon spawning would decrease the length of time that Chinook salmon and their redds were able to be observed during the surveys. Remaining reaches, including the "Lower Canyon" reach (float survey) and Newaukum Creek (foot survey) were surveyed once a week during the 2011 spawning season.

Aerial surveys were used to estimate the total number of redds in the "Lower River" reach and the "Gorge" reach, which are not surveyed by raft. The aerial count for these sections is expanded by the ground to air ratio (G/A). The G/A is calculated by dividing the season total raft counts by the flight- week raft counts for selected reaches surveyed by both methods.

Following the Chinook spawning season, the total count of redds is summed across all reaches and multiplied by 2.5 (Orell, 1976) to generate the final spawning escapement estimate. A total of 353 redds were observed in the Green River mainstem, and 44 redds were observed in Newaukum Creek. The Green River Chinook spawning escapement for 2011 is estimated at 993 Chinook. While this is an increase over the low calculated for 2009, it is still significantly below the historic average.

Naturally spawning Chinook carcasses found in the Green River and Newaukum Creek were sampled opportunistically for biological data during spawning ground surveys. A total of 360 carcasses were sampled in 2011. Of these carcasses sampled, 3 were jacks by size ( $\leq 54$ cm). The carcass recovery surveys in 2011 (Table 33) indicate that approximately 60% (596 fish) of the naturally spawning Chinook in the Green River basin were Hatchery Origin Returns (HORs), and approximately 40% (397 fish) were Natural Origin Returns (NORs).

Table 33. Percentages of hatchery and wild fish in natural spawning escapement in the Green River, as estimated by adipose fin clips, 2003-2011.			
Year	Adipose Fin Clip (Hatchery)	Un-clipped (Wild)	Total Carcasses Sampled
2003	56.40%	43.60%	567
2004	68.50%	31.50%	888
2005	59.90%	40.10%	892
2006	58.00%	42.00%	889
2007	59.10%	40.90%	570
2008	38.60%	61.40%	609
2009	73.80%	26.20%	237
2010	60.10%	39.90%	534
2011	60.08%	39.92%	360

### 4.3.3 White River

Escapement estimates for White River spring Chinook comprise trap counts at the Army Corps of Engineers Buckley Diversion Dam fish trap (Buckley trap) and hatchery returns to the Minter Creek/Hupp Springs and White River hatcheries.

The Buckley Diversion Dam is a migration barrier to anadromous fish and contains a fish trapping facility where fish are trapped and trucked upstream of Mud Mountain dam. The Buckley trap enables enumeration of fish transported to the upper watershed. However, precise counts are dependent upon accurate species identification and record keeping. Records of trap and haul operations conducted in the absence of state or tribal fisheries managers are a subject of ongoing concern. The total number of natural-origin recruits (NOR) and acclimation pond (AP) Chinook trapped at Buckley was 3,817; of these 3,785 were hauled upstream of the dam (Table 34) and 35 NORs were taken to the White River hatchery for use as broodstock.

Table 34. Numbers of Chinook hauled upstream of Buckley fish trap in 2011.

Origin	Adults	Jacks	Totals
Wild (NOR)	2,640	97	2,737
Acclimation Pond	451	597	1,048
<b>Totals</b>	<b>3,091</b>	<b>694</b>	<b>3,785</b>

There are two hatchery programs for White River spring Chinook. The Minter Creek/Hupp Springs program was initiated in the mid-1970's in response to steep declines in population abundance. This program was expanded following completion of the Muckleshoot Tribe's White River hatchery in 1989. In 2011 escapement to the Minter Creek/Hupp Springs hatchery was 524 adults and 190 jacks, for a total of 714. None of these fish were taken to the White River Hatchery.

Escapement to the White River hatchery in 2011 was 1,222. These fish were either collected at the Buckley fish trap on the south side of the diversion dam, or volunteered to the hatchery trap on the north side of the diversion dam. Of the total, 792 were adults and 430 were jacks.

#### 4.3.4 Puyallup River

The Puyallup Tribal Fisheries (PTF) and Washington Department of Fish and Wildlife (WDFW) staffs 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 2011 is 439 spawners. This escapement is made up of 211 NORs and 228 HORs. The 2011 SPC redd estimate/AUC estimate ratio was 2.06, based on even-year data from 1994 to 2010. The 2011 AUC spawner curve yielded an escapement estimate of 209 spawners for SPC. Expanding the SPC AUC-based escapement (209 X 2.06) yielded a South Prairie escapement of 430. Wilkeson Creek contributed 9 Chinook to the escapement estimate.

##### Carbon River

Suitable survey conditions never occurred on the Carbon River during the 2011 spawning period. Consistent with the last ten years, the 2011/1999 SPC escapement ratio ( $439 / 1422 = 0.3087$ ) was applied to the 1999 Carbon River escapement (250) to estimate the 2011 value. This method estimated 77 Chinook spawning in the Carbon during 2011 ( $250 * 0.3087 = 77$ ). Based on mark sampling ratios observed in South Prairie Creek, the escapement was made up of 37 NORs and 40 HORs.

### Mainstem Puyallup River Tributaries

Aggregate escapement to Puyallup River tributaries excluding Clark's Creek in 2011 was estimated at 159. Based on mark sampling in these tributaries, 11 of these fish are NORs and 148 HORs.

Tributary escapement estimates are AUC based or live/dead counts due to the number of Pink salmon that inundate the system on odd years.

Puyallup River tributaries:	Escapement estimate:
Fennel Creek (WRIA 10.0406)	49
Canyon Falls Creek (10.0410)	1
Kapowsin Creek (10.0600)	10
Clear Creek (10.0022)	99
Clarks Creek (10.0027)	396
Tributary total	555

An additional 396 fish were estimated to have spawned in Clark's Creek, bringing the tributary total to 555. Mark sampling data collected in Clark's Creek are not used for the tributary mark rate estimate because, many of the Chinook produced and released from Clark's Creek hatchery are not marked and the identification of origin of natural spawners is not possible.

### Mainstem Puyallup River

Chinook spawning escapement into the mainstem Puyallup River is estimated to be 250 fish. This escapement was made up of 45 NOR and 205 HOR Chinook, based on mark sampling ratios observed in Puyallup River mainstem tributaries.

As with the Carbon River, surveys of Puyallup River were not possible in 2011. WDFW and PTF staff believe that Puyallup River mainstem spawning escapement trend is closely related to the tributaries (Fennel, Canyon Falls, Kapowsin, and Clarks creeks). Therefore, the 2011/1999 Puyallup tributary ratio ( $145/113 = 1.2832$ ) was applied to the estimated 1999 Puyallup mainstem escapement (195) to estimate 2011 escapement of 250 Chinook ( $195 * 1.2832 = 250$ ).

1999 natural spawning escapement estimate for Clark's Creek is used in the Puyallup River mainstem ratio. It cannot be assumed that the composition of Clark's Creek Chinook spawning escapement is the same as in the Puyallup River mainstem due to the proximity to Clark's Creek hatchery.

### Lower White River

The fall component of Chinook spawning in the lower White River and its tributaries, downstream of the Buckley diversion dam fish trap, are included in the 2011 Puyallup River basin fall Chinook escapement estimate. Spawning ground survey efforts by co-managers indicate that, in some years, a sizeable population of Chinook spawns 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 2011 was estimated to be 165 fish. This escapement is made up of 21 NORs and 144 HORs based on mark sampling ratios observed during spawning ground surveys.

#### Total Puyallup Escapement

The total 2011 estimated Puyallup River naturally spawning fall Chinook escapement is 1,486 fish, lower than the pre-season projection of 2,062. It is estimated that 343 were NORs, and 1,143 were HORs, based on mark-sampling of carcasses observed. The estimate of NORs assumes the proportion of hatchery versus natural origin spawners is the same between Puyallup River tributaries (except Clark's Creek) and the Puyallup River mainstem and SPC and the Carbon River.

### 4.3.5 Nisqually River

The Nisqually weir did not operate during the Chinook migration, so escapement was estimated using the traditional method. Survey conditions in the mainstem Nisqually were favorable because of the low water conditions, but the large number of pink salmon in the river made counting redds and Chinook difficult. The Mashel River was low throughout the season, allowing good counts of spawners, but making upstream passage difficult for the fish. The peak live plus dead counts in the mainstem Nisqually and the Mashel were on 9/28/11 and 9/29/11 respectively.

Stream	Date	River Mile	Peak Count
Nisqually River	9/28/11	21.8-26.2	80L+13D=93
Mashel River	9/29/11	0.0-3.2	83L+17D=100

Using the current escapement model for the Nisqually River,

$$\text{Escapement} = 6.81((2.5 * \text{Mainstem Peak}) + \text{Mashel Peak}) = 2,264$$

$$6.81((2.5 * 93) + 100) = 2,264$$

Based on carcass sampling, the return of 2,264 consisted of 430 natural origin and 1,834 hatchery origin recruits. The total escapement was much higher than the pre-season projection of 941.

Total escapement to the Clear Creek and Kalama Creek hatcheries was 13,377 adults plus 8,068 jacks. These totals include fish counted in Kalama Creek (536 adults) and Clear Creek (243 adults), below the hatcheries. These reaches have not been previously surveyed.

#### 4.4 Hood Canal

A summary of Chinook spawner escapement estimates for tributaries to Hood Canal during 2011 is provided in Table 35.

Table 35. Summary of Chinook escapement to Hood Canal streams during 2011.

Marine Area	Stream	Spawner escapement	Comments
--	Skokomish R.	758	Redd counts + AUC in Hunter Cr. INDEX
	N.F. Skokomish R.	405	Redd counts+ 4 redds in McTaggart
	S.F. Skokomish R.	158	Redd counts
	Total	1321	
12A	Little Quilcene R.	0	No Chinook observed
	Big Quilcene R.	0	No Chinook observed
	Total	0	
12B	Dosewallips R.	11	Redd counts + Rockybrook live/ dead observation
	Duckabush R.	5	AUC based on live fish observed snorkeling
	Hamma Hamma R. a/	273	AUC adjusted for broodstock + John Creek AUC
	Total	289	
12C	Dewatto R.	12	AUC
	Lilliwaup Cr.	7	AUC
	Total	19	
12D	Tahuya R.	0	No Chinook observed
	Union R.	4	Trap
	Total	4	
<b>Hood Canal total</b>		<b>1633</b>	

a/ Hamma natural escapement = 161, broodstock = 21, John Ck = 91

#### 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 each river have been regularly surveyed in the Dosewallips and Duckabush since 1998, but few adults have been observed. Current escapement estimates are derived from a combination of counts of live Chinook adults and Chinook redds.

In the Hamma Hamma River, most of the Chinook spawning area is currently being surveyed. Since 1998, escapement was estimated from counts of cumulative new redds and/or from live Chinook using the area-under-the curve (AUC) method. A cooperative supplementation program was initiated in 1995 to rebuild Chinook abundance.

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).

During 2011, spawner surveys were conducted by WDFW 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 289 adults: 11, 5, and 273 Chinook in Dosewallips, Duckabush, and Hamma Hamma rivers, respectively. During 2011, 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, few Chinook were present and the escapement estimates for Dosewallips and Duckabush rivers are considered good.

The Dosewallips River was surveyed from RM 0 to RM 2.3, RM 3.6 to RM 6.7, and RM 7 to RM 11; Rockybrook Creek, a tributary, was surveyed from RM 0 to RM 0.3. Three Chinook redds, 2 live and 1 dead Chinook were observed and the escapement estimate is 11 Chinook in the Dosewallips River during 2011. The Duckabush River was surveyed from RM 0 to RM 2.6, RM 4.8 to RM 6, and snorkel surveyed from RM 2.6 to 4.2; Hatchery Creek, a tributary, was surveyed from RM 0 to RM 0.1. Three Chinook redds and 4 live adults were observed and the escapement estimate is 5 Chinook in the Duckabush River during 2011. The Hamma Hamma River was surveyed from RM 0.3 to RM 1.8; John Creek, a tributary, was also accessible to Chinook and was surveyed from RM 0 to RM 1.6. The AUC escapement estimate is 182 Chinook in the Hamma Hamma (which includes 21 Chinook collected for broodstock) and 91 Chinook spawned in John Creek. Total escapement to the Hamma Hamma River system is estimated as 273 Chinook during 2011.

The FRAM pre-season escapement estimate was 142 Chinook in Mid-Hood Canal during 2011 (FRAM 1811) while actual escapement was 289 Chinook. The escapements to the Dosewallips River and Duckabush River were low as anticipated.

To better assess natural Chinook and chum production and productivity in Mid-Hood Canal rivers, a screw trap was installed on the Hamma Hamma River beginning in 2002 and a screw trap was installed on the Duckabush River beginning in 2008.

#### 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 17 (where Cushman Dam blocks further access). Natural escapement estimates are based on counts of Chinook redds in index areas 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). In addition, escapement estimates are made for Vance Creek and Hunter Creek. Since 2008, surveys have been conducted outside the index reaches from RM 2.2 to RM 5.5 in the South Fork, and are included in the total escapement estimate.

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. A cumulative new redd count for each section of the river was tabulated at the end of the season and multiplied by 2.5 fish per redd 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 2011, however, Chinook were able to access the South Fork Skokomish throughout the season.

During 2011, total estimated spawner escapement is 1,321 Chinook in the Skokomish River system. Spawner escapement is comprised of 758 Chinook in the mainstem Skokomish (including 98 Chinook in Hunter Creek), 405 Chinook in the North Fork Skokomish, and 158 Chinook in the lower (RM 0 to RM 5.5) South Fork Skokomish.

The 2011 FRAM preseason escapement prediction was 1,413 Chinook (FRAM 1811).

#### Hood Canal Chinook Mark Sampling

Mass marking has been implemented for Hood Canal hatchery Chinook, including releases from George Adams Hatchery, Hoodsport Hatchery, and Endicott Ponds. The proportion of all Hood Canal hatchery Chinook released that was either tagged and/or marked has incrementally increased since brood year 2003. For example, about 33%, 48%, 75%, 85% and 95% of brood year 2003 through brood year 2007 releases, respectively, were either tagged and/or marked. In addition, all of the Chinook released from the Hamma Hamma supplementation program were tagged and/or marked. These hatchery Chinook will return to Hood Canal predominately as age 3 and age 4 fish from 2006 through 2011.

Coded-wire tag (CWT) data and age and sex composition data have been routinely collected for Chinook returning to George Adams Hatchery since 1988 and Double Index tag groups of Chinook have been released since 1998.

More intensive sampling of Chinook on the natural spawning grounds has been done since 1998. During 2011, 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 and Lilliwaup rivers during 2011.

Of the 106 Chinook sampled in Hood Canal rivers during 2011, 95 Chinook were adipose-marked and, of these, 18 Chinook had CWTs. Twenty-one unmarked Chinook sampled in 2011 had CWTs. We sampled 4.5% of Chinook spawner escapement in the Skokomish River, 15.6% of the Mid-Hood Canal Chinook spawner escapement (in the Hamma Hamma, Duckabush, and Dosewallips rivers), and had an overall sampling rate of 6.5% in all Hood Canal rivers combined (Table 36).

Jacks are not included in Chinook spawner escapement estimates in Hood Canal, but few jacks were sampled during 2011.



The proportion of hatchery fish in the spawning escapement will be estimated based on age composition in the escapement, sampling rate of the spawning escapement, and the proportion of hatchery production releases that was marked and/or tagged from BY 2005 (age 5), BY 2006 (age 4), and BY 2007 (age 3). Preliminary estimates of hatchery fish in the spawning escapement are also made based only on the total number of tags and marks recovered.

In the Skokomish River system during 2011, 52 of 60 (86%) Chinook sampled were adipose-marked (Table 37). A preliminary estimate is that spawning escapement in the Skokomish River was comprised of about 88% hatchery-origin Chinook and 12% natural-origin Chinook.

In Mid-Hood Canal, releases from the Hamma Hamma River supplementation program are 100% otolith marked and all Chinook carcasses were sampled for otoliths during 2011. In 2011, 38 of 43 (88%) Chinook sampled in the Hamma Hamma River were otolith-marked. Preliminary estimates are that spawning escapement was comprised of 88% supplementation (hatchery)-origin Chinook and 12% natural-origin Chinook in the Hamma Hamma River. During 2011, 0 Chinook were sampled in the Duckabush and 1 unmarked/untagged Chinook was sampled in the Dosewallips. Preliminary estimates are that spawning escapement for Mid-Hood Canal Chinook is comprised of 13% natural-origin and 87% hatchery-origin Chinook.

Table 36. Spawner escapement and carcass sampling results for Hood Canal streams, 2011.

Mgmt Unit	River	Spawner escapement	Chinook sampled		Tagged 1/			Untagged 1/			Unk. tagged 2/			Totals	
			Number	%	AD	NM	Unk	AD	NM	Unk	AD	NM	Unk	CWTs recovered	AD-clips observed
Skokomish	Mainstem Skokomish R.	758	31	4.1%	1	0	0	21	4	0	5	0	0	1	27
	N.F. Skokomish R.	405	19	4.7%	1	0	0	14	2	1	0	1	0	1	15
	S.F. Skokomish R.	158	10	6.3%	0	0	0	10	0	0	0	0	0	0	10
	<b>Skokomish River total</b>	<b>1,321</b>	<b>60</b>	<b>4.5%</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>45</b>	<b>6</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>52</b>
12A	Big Quilcene R.	0	0	0%	0	0	0	0	0	0	0	0	0	0	0
	Little Quilcene R.	0	0	0%	0	0	0	0	0	0	0	0	0	0	0
12B	Hamma Hamma R.	273	43	15.8%	15	21	1	1	5	0	0	0	0	36	16
	Duckabush R.	5	0	0.0%	0	0	0	0	0	0	0	0	0	0	0
	Dosewallips R.	11	2	18.2%	0	0	0	0	1	1	0	0	0	0	0
	<b>Mid-Hood Canal total</b>	<b>289</b>	<b>45</b>	<b>15.6%</b>	<b>15</b>	<b>21</b>	<b>1</b>	<b>1</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>36</b>	<b>16</b>
12C	Dewatto R.	12	1	8.3%	0	0	0	0	1	0	0	0	0	0	0
	Lilliwaup R.	7	0	0.0%	0	0	0	0	0	0	0	0	0	0	0
12D	Tahuya R.	0	0		0	0	0	7	1	0	0	0	0	0	7
	Union R.	4	0	0.0%	1	0	0	14	3	0	5	0	0	1	20
<b>Hood Canal total</b>		<b>1,633</b>	<b>106</b>	<b>6.5%</b>	<b>18</b>	<b>21</b>	<b>1</b>	<b>67</b>	<b>17</b>	<b>2</b>	<b>10</b>	<b>1</b>	<b>0</b>	<b>39</b>	<b>95</b>

1/ AD = adipose fin-clipped; NM = no mark; Unk = unknown; natural escapement = 253, brood stock = 21;

## 4.5 Strait of Juan de Fuca

### Dungeness

Since 1986, surveys have been conducted throughout the spawning season from RM 0.0 to 18.8 in the mainstem Dungeness, and from RM 0 to 5.0 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 2011, 207 redds (518 adults) were counted in the Dungeness and 7 redds (17 adults) were counted in the Gray Wolf for a total of 214 redds (535 adults). There were an additional 114 adults removed from the river and used for brood stock. An additional 9 brood stock were pre-spawn mortalities, and there were 7 mortalities at the Dungeness Hatchery, bringing the total estimated return to the river to 665, below the FRAM projected escapement of 884. 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. Because the forecasts for Strait of Juan de Fuca Chinook are based solely on average recent returns, they did not account for this reduction in production.

There were 214 carcasses sampled for scales and checked for CWTs. The majority of the adults sampled for scales and CWTs were collected for broodstock. Based on the CWT results and scale samples analyzed, the preliminary HOR/NOR composition for RY2011 was 84.5% HOR and 15.5% NOR. The age of the HOR Chinook for RY2011 consisted of 49.5% age 3, 46.4% age 4, 4.0% age 5, and no age 6. The age of the NOR Chinook consisted of 35.8% age 3, 42.0% age 4, 22.2% age 5, and no age 6. We recovered a total of 156 CWT Chinook during the season by the following age groups: 81 (age 3), 68 (age 4), and 7 (age 5). No age 2 Chinook carcasses were observed during the season.

#### Elwha River

Chinook spawning in the Elwha is limited to the 4.8 miles below the dam, with most natural spawning concentrated between RM 2.8 and 4.4. Adult escapement in the mainstem is estimated by producing an AUC estimate of redd-days, which is divided by an assumed 21-day redd life to estimate total redds. That total is added to the number of redds counted in the 1-mile long Hunt's Road side channel index surveyed by the Lower Elwha Klallam Tribe. This redd total is multiplied by 2.5 to estimate total adults. We had to estimate the proportion of visible redds observed after September 23, 2011 due to the poor viewing conditions in the lower river because of the work being done on the lower dam removal project. A historical redd timing curve was used to estimate the proportion that would have spawned after September 23. For RY2011, the estimated number of natural spawning Chinook below the lower dam was 843. Ten adult Chinook, 7 males and 3 females, were trucked and released by hatchery personnel upstream of the dam bringing the total natural spawners in the river to 853. An additional 830 Chinook were removed from the river by gaff and used as brood stock for the hatchery program. Other brood stock collections included 69 Chinook that volunteered into the hatchery trap, 41 collected from the Elwha weir and /or transferred from the Lower Elwha Hatchery. In addition, there were 41 trap mortalities and 29 males killed and surplus to the river. The terminal run size to the river was 1,863 Chinook, higher than the FRAM prediction of 1,589.

WDFW field staff collected 993 otolith samples from Elwha Chinook in 2011. Otoliths were collected to help distinguish between hatchery and wild fish based on the presence or absence of otolith marks. Of the 993 samples, 904 had an otolith mark present (91.3%) and 86 (8.7%) had no otolith mark present. The remaining 3 samples could not be read for presence or absence of marks. Seventy-three of the sampled Chinook were coded-wire

tagged. Of these, 7 were age 5, 12 were age 4, 53 were age 3, and 1 was an age 2. The preliminary results indicate the HOR and NOR to be 92% and 8%, respectively.

## Hoko

WDFW and Makah Fisheries staff conduct foot surveys to count redds in the mainstem between river miles 2.8 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 one peak survey in the mainstem Hoko River from RM 2.8 to RM 3.4 and six surveys from RM 3.4 to 10.2 during the 2011 return year. Makah Fisheries Management (MFM) surveyed the mainstem Hoko upstream of RM 10.2 and the Hoko tributaries. Survey conditions were poor after the November 11 survey due to high water. We believe the poor survey conditions did not impact escapement estimates in the lower river due to historical spawning timing and the low numbers of fish and redds observed prior to the high water.

Redd counts are multiplied by 2.5 adults/redd to estimate natural escapement. The 2011 Chinook terminal run size was estimated to be 1,504 adults, higher than the FRAM prediction of **1,397**. The escapement estimates for the upper mainstem Hoko River (RM 10.1 to 21.7) and all tributaries and lower mainstem Hoko River (RM 2.8 to 10.1), were 270 and 988, respectively. LEK staff observed 7 redds or 18 adults in the Little Hoko River. The total number of natural spawners in the river was 1,275. MFM staff collected 224 adult Chinook plus 5 jacks for broodstock and scale samples. Of the 224 brood stock collected, 112 were males and 112 were females.

The age of the HOR Chinook for RY2011 consisted of 4 (1.0%) age 2, 42 (9.9%) age 3, 372 (87.9%) age 4, 5 (1.2%) age 5, and no age 6 and age 7s. The age of the NOR Chinook consisted of 0 (0.0%) age 2, 64 (5.9%) age 3, 954 (88.3%) age 4, 63 (5.8%) age 5, no age 6s and age 7s.

## 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. Rates from 2010 summarized below were based on the most recent and best accounting of landed catch, from the TOCAS/LIFT database, and samples sizes queried from the RMIS database. Sampling rates in commercial fisheries generally exceeded the objective (Table 37), with 27,765 Chinook sampled for CWT, compared to total catch of around 91,278. Areas 5, 12C and 13A were the only areas with significant catches and sampling rates below 20%. Two areas had CWT sample sizes larger than the total catch (10D and 13C). The most likely explanation for this is that catch from mixed areas was unknowingly sampled as catch from a single area. All marine area recreational fisheries were sampled at rates between 10% and 45% for the year (Table 38). A total of 9,280 were sampled from an estimated 28,309 caught.

Table 37. Chinook coded-wire tag sampling rates for commercial fisheries in 2010 (calendar year).

	4B	5	7	7A	7B	7C	7D	77C
Catch	1046	1575	2863	3898	9106	9434	241	624
Sample	324	148	821	1303	2553	2933	0	164
Rate	31.0%	9.4%	28.7%	33.4%	28.0%	31.1%	0.0%	26.3%

	8	78C/D	8A	8D	78G
Catch	27	2188	26	2860	2
Sample	14	1487	1	809	0
Rate	51.9%	68.0%	3.8%	28.3%	0.0%

	9	10	10A	10D	10E	10F	80B	81B	81C
Catch	23	9	15	516	2481	5	555	2866	114
Sample	0	0	3	525	914	1	351	1421	54
Rate	0.0%	0.0%	20.0%	101.7%	36.8%	20.0%	63.2%	49.6%	47.4%

	13	13A	13C	13D	13F	83D	9A
Catch	74	2313	576	163	3399	22003	49
Sample	0	13	715	57	0	7330	14
Rate	0.0%	0.6%	124.1%	35.0%	0.0%	33.3%	28.6%

	12	12A	12B	12C	12H	82G
Catch	1	49	8	3768	8627	9654
Sample	0	0	0	634	1978	2111
Rate	0.0%	0.0%	0.0%	16.8%	22.9%	21.9%

Table 38. Chinook coded-wire tag sampling rates for marine recreational fisheries in 2010 (calendar year).

Catch Area	Catch	# Sampled	Sample Rate
Area 5 - West SJF	6,461	2,360	36.5%
Area 6 - East SJF	2,673	1,022	38.2%
Area 7 - San Juan Islands	3,551	957	27.0%
Area 8.1 - Skagit Bay	240	102	42.5%
Area 8.2 - Port Gardiner	659	233	35.4%
Area 9 - Admiralty Inlet	5,651	1,838	32.5%
Area 10 - Central Puget Sound	3,388	1,309	38.6%
Area 11 - Central Puget Sound	4,330	1,257	29.0%
Area 12 - Hood Canal	652	128	19.6%
Area 13 - South Puget Sound	704	74	10.5%

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## **Appendices**

### **Appendix 1. 2011-2012 Co-Managers' List of Agreed Fisheries (May 1, 2011 – April 30, 2012)**

*Craig Bowley 5/13/11*  
*[Signature] 5/13/11*

# **2011-12 Co-Managers'**

# **List of Agreed Fisheries**

**(May 1, 2011 – April 30, 2012)**



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(Bracketed and bolded language signifies areas where some unresolved issues remain. Additional Co-manager discussions will occur prior to the fisheries to resolve these remaining issues.)

**Part I. Treaty/Non-Treaty OCEAN Fisheries (All fisheries modeled in FRAM #1811 (Chinook) & #1116 (Coho))**

Treaty Troll Quota	41,000 Chinook; 42,000 coho
Non-treaty TAC	64,600 Chinook (non mark selective equivalent of 61,800); 80,000 coho.
NT Troll TAC	30,900 Chinook; Mark Selective Fishery impacts associated with a landed catch of 12,800 coho.
Recreational TAC	33,700 Chinook (includes non selective quota of 28,900 and Mark Selective Fishery impacts associated with a landed catch of 4,800 Chinook), and Mark Selective Fishery impacts associated with a landed catch of 67,200 coho.

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

5/1-6/30	Chinook directed fishery with sub quota of 19,750 Chinook. May 1 through June 30 or attainment of 19,750 Chinook sub-quota, whichever comes first. All salmon except coho. If the Chinook quota for the May-June fishery is not fully utilized, the excess fish cannot be transferred 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 sub quota of 21,250 Chinook <u>or</u> quota of 42,000 coho. Chum release 8/1-9/30. July 1 through September 15, or attainment of 21,250 Chinook or 42,000 coho, whichever comes first. All salmon.

**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 20,600	All salmon except coho with 20,600 Chinook quota; Open May 1-June 30, seven days per week. An in-season conference call will occur when it is projected that 13,700 Chinook have been landed to consider modifying the open period and adding landing and possession limit. Mandatory 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 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
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	the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi.
7/1 thru earliest of 9/15 or pre-season Chinook sub-quota of 10,300 or Mark Selective Fishery quota of 12,800 coho.	Open Friday through Tuesday. Landing and possession limit of 50 Chinook and 50 marked coho per vessel per open period north of Leadbetter Point or 50 Chinook and 50 marked coho south of Leadbetter Point. All salmon except no chum retention north of Cape Alava, Washington in August and September (all retained coho must have a healed adipose fin clip). Mandatory Yelloweye Rockfish Conservation Area, Cape Flattery and Columbia Control Zones closed. Grays Harbor Control Zone closed in August and September. 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 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.

### 1.3 Non-Treaty Recreational

#### Area 1-4: U.S./Canada border to Cape Falcon (Oregon)

6/18-6/25 (4,800 Mark Selective Fishery Chinook guideline)	Open seven days per week; 2 fish per day; all salmon except coho. All retained Chinook must have a healed adipose fin clip; Chinook minimum size limit 24 inches. Closed waters: east of a true north-south line running through Sail Rock. 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 1: Leadbetter Point to Cape Falcon (Oregon)

6/26-9/30 (33,600 Mark Selective Fishery coho quota)	Open seven 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: 7,400; 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

8/1-8/28	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 sockeye, chum, and unmarked coho. Barbed hooks allowed.
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8/29-9/30	Open 7 days/week; 2 salmon per day. Coho minimum size 16 inches; retained coho must have a healed adipose fin clip. Barbed hooks allowed.
10/1-12/31	Open 7 days/week; 6 fish per day, 2 adults (minimum size 12 inches); retained coho must have a healed adipose fin clip. Release all salmon other than Chinook and hatchery coho. Barbed hooks allowed.
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 unmarked Chinook.
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. Barbed hooks allowed.

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

6/26-9/18 (24,860 Mark Selective Fishery coho sub quota)	Open Sun-Thurs; 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: 16,900. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon. Grays Harbor control zone closed beginning August 1.
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**Area 2-1 (east of line from Leadbetter Point to Cape Shoalwater): Willapa Bay**

6/18-7/31	Open concurrent with Area 2, when Area 2 is open for salmon. Area 2 rules apply.
8/1-1/31	6 fish limit, 3 adults; 12" min size limit. Release wild Chinook and chum.

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

West of Buoy 13 line 7/1- 7/31	Closed.
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 7/1-9/15	Closed for salmon through 9/15.
East of Buoy 13 line 9/16-11/30	2 fish limit, 2 adults, 12" min size limit, release Chinook and chum.

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

8/16-1/31	6 fish limit, 4 adults; 12" min size limit.. Release wild Chinook.
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**Area 3: Cape Alava to Queets River**

6/26-9/18 (1,700 Mark Selective Fishery coho sub quota)	Open seven days per week; 2 fish per day, only one of which may be a Chinook plus one additional pink salmon; retained coho must have a healed adipose fin clip; Chinook minimum size limit 24 inches, coho minimum size 16 inches; Chinook guideline: 1,350 In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.
La Push Late Season Area 9/24-10/9	(50 coho sub quota; 50 Chinook sub quota) Fishery restricted to the area north of 47°50'00" N latitude and south of 48°00'00" N latitude. Open 7 days/wk. Other regulations as described above.

**Area 4: U.S./Canada border to Cape Alava and east to Sekiu River**

6/26-9/18 (6,990 Mark Selective Fishery coho sub quota)	Open seven days per week; 2 fish per day, only one of which may be a Chinook, plus one additional pink salmon. Chum non-retention during August and September. Retained coho must have a healed adipose fin clip; Chinook minimum size limit 24 inches and coho minimum size 16 inches; Chinook guideline: 3,200; 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 July 1-Sept 30</b> inside the area bounded by a line from Kydaka Point to Shipwreck Point. 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 4A: Makah Bay Treaty Evaluation Marine Set Net Fishery**

Chinook	Trty	Open 8/14 through 9/17 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 by the Makah Tribe and WDFW.
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**Part II. PUGET SOUND including STRAIT OF JUAN de FUCA and SAN JUAN ISLANDS fisheries (All fisheries modeled in FRAM #1811 (Chinook) & #1116 (Coho))**

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

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

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

5/1-6/15	Closed
6/16 - 9/30	Open for salmon, chum release; Freshwater Bay, south of Angeles Pt./ Observatory Pt. line closed; Pt. Angeles Hbr. W. of line from tip of Ediz Hook to ITT Rayonier Dock closed; Hoko Bay closed inside the area bounded by a line from Kydaka Point to Shipwreck Point; 1,000 foot closure around stream mouths; Area 6 closed east of a line true north from Green Point.
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, 2011 through April 15, 2012, or when the catch reaches the harvest ceiling of 8,500 Chinook, whichever comes first. A lower number was modeled as per agreement among the co-managers. The modeled number does not impose a management obligation on this fishery, nor does it establish a precedent or obligation for management of this fishery in future years.  1,000-foot closures around stream mouths. Hoko Bay closed, inside the area bounded by a line from Kydaka Point to Shipwreck Point and Freshwater Bay, south of Angeles Pt./Observatory Pt. line closed.
4/16-4/30	Closed

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

Chinook	Open for setnet gear only, 6/19 through 8/13; 7 days a week; Hoko Bay closed, inside the area bounded by a line from Kydaka Point to Shipwreck Point and Freshwater Bay, south of Angeles Pt./ Observatory Pt. line closed. 1,000-ft. closure around stream mouths.
Sockeye/Pink	Start to be determined by Fraser River Panel. The Co-managers have identified the following management actions to control by-catch of Chinook. Estimated by-catches 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 by-catch in

	<p>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 by-catch in this fishery exceeds 1,300, the Tribes will consider management actions to limit the Chinook by-catch, such as time or area restrictions, while continuing the priority objective of harvesting sockeye and pink salmon. If in-season the fishery is projected to result in a total Chinook by-catch 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 10/8; 1,000 ft. closure around stream mouths. The gillnet catch number modeled will be used as a management guideline and should not be greatly exceeded.</p>
Chum	<p>Open for gillnets, starting at 6 days per week (days may be added if effort is low), 10/9 through 11/12; 1,000-foot closure around stream mouths.</p>

#### Area 5 Recreational

5/1-6/30	Closed
7/1-8/15	2 fish limit, plus 2 additional pink salmon (Chinook 22" min size); unmarked Chinook, unmarked coho, and chum release. South of the Kydaka Pt./Shipwreck Pt. line – closed to salmon angling.
8/16-9/18	2 fish limit, plus 2 additional pink salmon; Chinook, unmarked coho, and chum release. South of the Kydaka Pt./Shipwreck Pt. line – closed to salmon angling.
9/19-9/30	2 fish limit; Chinook and chum release. South of the Kydaka Pt./Shipwreck Pt. line – closed to salmon angling.
10/1-10/31	Closed
11/1-11/30	2 fish limit, 1 Chinook (Chinook 22" min size).
12/1-2/15	Closed
2/16-4/10	1 fish limit (Chinook 22" min size).
4/11-4/30	Closed

#### Area 6 Recreational

5/1-6/30	Closed
7/1-8/15	2 fish limit, plus 2 additional pink salmon, (Chinook 22" min size); unmarked coho, chum, and Chinook release; except W. of true N/S line through "2" buoy near tip of Ediz Hook retention of

	marked Chinook allowed. 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. Dungeness Bay closed to salmon angling.
8/16-9/30	2 fish limit, plus 2 additional pink salmon; Chinook, unmarked coho, and chum release. South of Angeles Pt./Observatory Point line - closed to angling. Pt. Angeles Hbr. W. of a line from the tip of Ediz Hook to ITT Rayonier Dock – closed to salmon angling. Dungeness Bay closed to salmon angling.
10/1-10/31	2 fish limit, 1 Chinook (Chinook 22" min size). South of Angeles Pt./Observatory Point line – closed to angling. Pt. Angeles Hbr. W. of a line from the tip of Ediz Hook to ITT Rayonier Dock – closed to salmon angling. Sequim Bay south of a line from the south end of Gibson Spit to the west end of Travis Spit - closed to salmon angling. Discovery Bay south of a line from the Gardiner Boat Ramp to Beckett Point - closed to salmon angling. (see: Dungeness Bay Recreational below.)
11/1 - 2/15	Closed
2/16 - 4/10	1 fish limit (Chinook 22" min size). Dungeness Bay closed to salmon angling.
4/11 - 4/30	Closed

## 2.2 Strait of Juan de Fuca Terminal Areas

### Area 6D Dungeness Bay Net

Chinook	All	Closed
Pink	All	Closed
Coho	Trty	Open 9/21 through 10/29; additional openings possible based on in-season catch composition data; 9/21 through 10/10, Chinook and chum release and gillnets may fish 7 am to 7 pm only, gillnets must be attended to by fisher; 1,500 ft closure around mouth of Dungeness River.
	Ntrty	Open Wk 39 (wb 9/18) through Wk 43 (wb 10/16) for skiff gillnet gear; 7AM – 7PM, 3 days first week starting 9/21 per SCSCI, then 5 days each week (M-F); Chinook and chum release by cutting ensnaring meshes; 1,500 ft. (1/4 nautical mile) closure around each river mouth. Additional openings possible in wb 10/23 based on in-season information.
Chum	All	Closed



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

Chinook	Trty	Closed
Pink	Trty	Closed
Coho	Trty	Starting 10/16; subsistence fishing 7 days/wk, commercial fishing up to 3 days/wk, to be determined in-season, for coho only, and will be restricted to areas below the Dungeness hatchery intake using species selective (non-gillnet) gear.
Chum	Trty	Closed

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

Chinook	Trty	Closed except Ceremonial Harvest of 5 fish in July.
Coho	Trty	Open 9/11 through 11/5; days per week to be determined in-season.
Chum	Trty	Closed

**Dungeness Bay Recreational**

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

**Dungeness River Recreational**

(mouth to hatchery intake pipe at RM 11.3)	10/16 - 12/31	4 fish limit, coho only; 12" min size.
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**Elwha River Recreational**

(mouth to Aldwell Lake Dam)	3/1 – 9/30	Closed to all fishing.
	10/1 – 2/28	Trout and other game fish open.
	10/1 – 11/15	6 fish limit, coho only; no more than 4 adults; 12" min. size

**Hoko River Recreational**

(mouth to cement bridge (mile 7.0) on Hoko/Ozette Hwy.)	All year	Closed to salmon.
	6/1 – 3/15	Trout and other game fish. (Fly fishing only 9/1 – 10/31)

All other STRAIT OF JUAN DE FUCA REGION freshwater recreational closed to salmon angling.

## 2.3 San Juan Islands/Point Roberts Area

### Areas 6, 7, & 7A Net

Chinook	All	Closed
Sockeye	Trty	Schedule to be determined. The Co-managers have identified the following management actions to track and control by-catch of Chinook. Estimated by-catches are best estimates and are not quotas. 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 by-catch 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 by-catch 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 by-catch 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. 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. Purse seine brailing and use of recovery box required with Chinook, coho, and chum NR. Reef net unmarked coho, chum, and unmarked Chinook NR. Reef net fishers may retain marked 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 3,636 total Chinook (120% of pre-season estimate).
Pink	Trty	Purse seine and gill net: schedule dependent upon Fraser Panel. See Chinook by-catch in-season actions description in sockeye section above.
	Ntrty	Schedule to be determined. All vessel operators must complete best fishing practices certification prior to fishing. Purse seine brailing and use of recovery box required with Chinook, coho, and chum NR. Reef net chum, unmarked Chinook, and unmarked coho NR. See Chinook by-catch in-season actions description in sockeye section above.
Coho	Trty	Closed

	Ntrty	Reef net: 7 days/wk beginning at end of Fraser Mgmt through chum mgmt wk 46 (wb 11/6); 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	Starting 10/10 through 11/14; fishing pattern to be determined by co-manager discussion prior to October 10.
	Ntrty	PS and GN open week 42 (wb 10/9) through wk 46 (wb 11/6), fishing pattern to be agreed by co-manager discussion prior to Oct 10. Dependent upon update of run status from CDFO. Purse seine brailing required, Chinook and coho NR; GN Chinook and coho NR, live box, and limited soak time restrictions in wk 42. Reef nets open from end of Fraser Panel management through wk 46 (wb 11/6), 7 days per week. Release requirements for reef nets stated for coho management period apply. 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) by permit only. Bellingham Bay closed 4/1 – 4/30.

**Area 7 Recreational**

5/1-6/30	Closed
7/1-7/31	2 fish limit, 1 Chinook (Chinook 22" min size) plus 2 additional pink salmon; 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 (Chinook 22" min size) plus 2 additional pink salmon; release unmarked coho, chum; 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 8/1-8/15; Samish Bay closed to salmon angling.
10/1-10/31	2 fish limit, 1 Chinook; release unmarked coho; Samish Bay closed to salmon angling 10/1-10/15.
11/1-11/30	Closed
12/1-4/30	2 fish limit, (Chinook 22" min size), release unmarked Chinook. Bellingham Bay closed to salmon angling 4/1 – 4/30.

#### 2.4 Nooksack/Samish Terminal Region

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

Chinook/Pink	Trty	<p>Areas 7B, 7C, &amp; 7D: August 1 through September 3 (Wks 32-36), open weekly 4 PM Sunday to 4 PM Friday, except week 32 opens Monday 4 PM ; 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 4:00 PM Sunday – 4:00 PM Wednesday (August 1- August 31) and 4:00 PM Sunday – 4:00 PM Thursday (September 4 – September 15) south to a line from Oyster Creek to Fish Point on Samish Island; fishing pattern: 4,5,5,5,5. 6 ½" mesh in 7B, off reservation areas and 7C except when open for sockeye in 7 and 7A. 7C remains open on the same terms and schedule through September 18 with 6 ½ minimum mesh.</p> <p>Areas 7B (5" min mesh) and 7D on reservation: July 24 through September 3 (Wks 31-36) open Sunday 4 PM through Saturday 4 PM, fishing pattern: 6, 6, 6, 6, 6, 6.</p> <p>No fishing from 12:01AM September 1 to 11:59PM September 3 in Area 7B west of a line from Point Francis (48°41'42"N, 122°36'40"W) to the red and green buoy southeast of Point Francis (48°40'22"N, 122°35'30"W), then to the northernmost tip of Eliza Island (48°39'37"N, 122°35'45"W), then along the eastern shore of the island to a point intersecting a line drawn through Eliza Rock Light (48°38'35"N, 122° 34'40"W) and Fish Point (48°34'35"N, 122° 29'45"W) and then southeastward along that line to Fish Point. The waters of Indian Slough remain open south of a line from a tower located on March Point (48°28'23"N, 122° 32'57"W) to the Spire on the eastern shore of Padilla Bay at Bayview (48°29'05"N, 122° 28'32"W) for Treaty fishers.</p>
	Ntrty	<p>Areas 7B &amp; 7C: Wks 34 (wb 8/14)- 36 (wb 8/28); GN pattern beginning wk 34: 3,4,3 ; PS pattern beginning wk 34: 1,1,1; PS coho NR.</p>
Coho	Trty	<p>7C: On October 9<sup>th</sup> conduct a Chinook clearance test. If Chinook have cleared, and there is a harvestable surplus of coho, then open a coho fishery Sunday 4:00 PM – Wednesday 4:00 PM (October 9-October 26); fishing pattern 3,3,3</p>

		<p>Areas 7B and 7D: September 4-October 22 (Wks 37-43), open 4:00PM Sunday – 4:00PM Saturday. Fishing pattern 6,6,6,6,6,6. Except no fishing from 12:01AM September 4 to 11:59PM September 6 in Area 7B west of a line from Point Francis (48°41'42"N, 122°36'40"W) to the red and green buoy southeast of Point Francis (48°40'22"N, 122°35'30"W), then to the northernmost tip of Eliza Island (48°39'37"N, 122°35'45"W), then along the eastern shore of the island to a point intersecting a line drawn though through Eliza Rock Light (48°38'35"N, 122° 34'40"W) and Fish Point (48°34'35"N, 122° 29'45"W) and then southeastward along that line to Fish Point. The waters of Indian Slough remain open south of a line from a tower located on March Point (48°28'23"N, 122° 32'57"W) to the Spire on the eastern shore of Padilla Bay at Bayview (48°29'05"N, 122° 28'32"W) for Treaty fishers.</p>
		<p>7A on reservation fishery: September 19 through October 16 (Wks 39-42). Open weekly 4 PM Sunday through 4 PM Wednesday. Fishing Pattern: 3,3,3,3.</p>
	Ntrty	<p>Area 7B: Wks 37 (wb 9/4)-Wk 43 (wb 10/16); GN fishing pattern: 5,5,7,7,7,7,7 (24 hrs for all days); PS fishing pattern: 1,3,7,7,7,7,7. Closure for all NT GN openings during the month of September, in the waters of Area 7B west of a line from Point Francis (48°41'42"N, 122°36'40"W) to the red and green buoy southeast of Point Francis (48°40'22"N, 122°35'30"W), then to the northernmost tip of Eliza Island (48°39'37"N, 122°35'45"W), then along the eastern shore of the island to a point intersecting a line drawn though through Eliza Rock Light (48°38'35"N, 122° 34'40"W) and Fish Point (48°34'35"N, 122° 29'45"W) and then southeastward along that line to Fish Point. Non-Treaty purse seines fishing in this area must release coho.</p>
Chum	Trty	<p>Areas 7B &amp; 7D: October 23 – December 17 (Wks 44-51); open weekly 4:00 PM Sunday-4:00 PM Wednesday; 3,3,3,3,3,3,3,3.</p>
	Ntrty	<p>Area 7B: Wks 44 (wb 10/23)-Wk 49 (wb 11/27); 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.</p>

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

NOTE: Nooksack River Tribal commercial fishery openings will be 00:01 a.m. (Lummi openings at 4:00 p.m.) and will close at 4:00 p.m. (concurrent with Lummi), on a weekly basis, with the exception of the off-reservation coho fishery, which will open and close at the hours listed below.

Chinook/Pink	April 1 – June 15	April and May limited ceremonial and subsistence fishery will be managed for a total catch of 150 Chinook, with an estimated impact of 17 NOR Chinook. The fishery will occur in the north fork between the railroad trestle just down river from the Highway 9 Bridge and the Mosquito Lake Road Bridge (RM 36.6 to 40.8), the Nooksack River between Nugents Corner and the railroad trestle just down river from the Highway 9 Bridge (RM 30.8 and 36.6) and the Nooksack River between Slater Road bridge and the river mouth (between RM 0.0 and 3.5). A Southern U.S. management objective is in effect for Early Nooksack Chinook during this second year of the 4 year Puget Sound Chinook Harvest Management Plan.
	8/1- 9/10 (wks 32-37)	Open 4 PM Sunday and close 4 PM Saturday, except wk 32 open Monday 4 PM to Wednesday 4 PM. Fishing pattern: 2,6,6,6,6,6. The river is divided into five zones during this period. These zones open on subsequent weeks, proceeding upriver, to protect migrating spring Chinook.
Coho	9/4-10/22 (wks 37-43)	Open weekly Sunday 4 PM through Saturday 4 PM. Fishing Pattern: 6,6,6,6,6,6. The area extending from the confluence of the North and South Forks downstream to a marker behind the Nooksack Tribal Works Building will not be open during the early portion of the coho management period, remaining closed prior to Sept 11.
Chum	11/3-4	Subsistence harvest
	10/23 - 12/17 (Wks 44 - 51)	Commercial. Open weekly Sunday 4 PM through Wednesday 4 PM. 3 days/wk. 3,3,3,3,3,3,3.

**Bellingham Bay Terminal Area Recreational**

5/1-8/15	Closed to salmon angling.
8/16-10/31	4 fish limit, 2 Chinook (Chinook 22" min size); Samish Bay closed to salmon angling thru 10/15.
11/1-3/31	Same as Area 7.
4/1-4/30	Closed to salmon angling.

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

(from Lummi Indian Reservation boundary to Hwy 544 Bridge at Everson	7/16-8/31	Daily limit 4 pink salmon only.
	9/1-12/31	Daily limit 2 plus 2 additional coho. Release wild Chinook thru 9/30.
(from Hwy 544 Bridge at Everson to yellow marker at the FFA high school barn in Deming)	9/1 – 12/31	2 fish limit, plus 2 additional coho. Release wild Chinook thru 9/30.
(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
(from confluence of North and South forks to Maple Creek on North Fork)	10/1 – 11/30	2 fish limit, plus 2 additional coho

**Nooksack River Recreational, South Fork**

(from mouth to Skookum Creek)	10/1 – 12/31	2 fish limit, plus 2 additional coho. Release chum.
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**Samish River Recreational**

(from mouth to Thomas Rd. Bridge)	8/1-11/30	2 fish limit, 12" min size. Release unmarked coho. All species-night closure and anti-snagging rule 8/1-11/30.
(from Thomas Rd. Bridge to I-5 Bridge)	8/1 – 11/30	2 fish limit, 12" min size. Release unmarked coho. All species-night closure and anti-snagging rule 8/1-11/30.

**Dakota Creek Recreational**

(mouth to Giles Road Bridge)	10/1 – 12/31	2 fish limit, 12" min size.
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**Whatcom Creek Recreational**

(mouth to yellow markers below	8/1 – 12/31	6 fish/2 adult limit, 12" min size. All Species – night closure and anti-snagging rule 8/1-12/31.
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foot bridge below  
Dupont St. in  
Bellingham)

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

## 2.5 Skagit Terminal Region

### Skagit Bay (Area 8) Net

Note: Fishing schedules for Skagit Bay and Skagit River are pre-season projections. Schedules may be changed in-season as necessary to meet management objectives.

Chinook	Area 8 – Trty	<u>Swinomish fishing pattern:</u> wk 19 (wb 5/1) thru wk 21 (wb 5/15); 1, 1, 1. <u>Upper Skagit fishing pattern:</u> wk 20 (wb 5/8) thru wk 21 (wb 5/15); 1, 1.
Sockeye	Area 8 – Trty	<u>Swinomish fishing pattern:</u> wk 25 (wb 6/12) thru wk 29 (wb 7/10); 1, 3, 7, 5, 1. <u>Upper Skagit fishing pattern:</u> wk 27 (wb 6/26) thru wk 28 (wb 7/3); 1, 1.
	Area 8 - Ntrty	Closed
Pink	Trty	<u>Swinomish fishing pattern:</u> wk 34 (wb 8/14) thru 37 (wb 9/4); 2, 2, 5, 6. Schedule after ISU dependent on ISU. <u>Upper Skagit fishing pattern:</u> wk 35 (wb 8/21) thru 38; (wb 9/12); 2.167, 3.167, 2.167, 1.167. Schedule after ISU dependent on ISU.
	Area 8 - Ntrty	Wk 35 (w/b 8/21) – 36 (w/b 8/28); PS NR for CK, CO, SO, and CH; PS fishing pattern 2, 2; GN fish daylight hours; GN fishing pattern 2, 2.
Coho	Trty	Terminal Treaty HR target 20%. If ISU changes abundance status, HR may be modified following co-manager discussions.
	Area 8 – Trty	<u>Swinomish fishing pattern:</u> wk 39 (wb 9/18) thru wk 41 (wb 10/2); 3, 2, 2. <u>Upper Skagit fishing pattern:</u> wk 40 (wb 9/25) thru wk 43 (wb 10/16); 1.5, 1.167, 1.167, 1.167.
	Area 8 - Ntrty	Closed
Chum Test	Area 8	1 boat at Jetty 1 day/wk 44 (wb 10/23) & 45 (wb 10/30) and 1 boat in Bay 1 day/wk 44 (wb 10/23) & 45 (wb 10/30).

Chum	Area 8 - Trty	<u>Swinomish fishing pattern</u> : No preseason harvestable. Placeholder modeled schedule wk 46 (wb 11/6); 1. Fishery dependent on ISU and harvestable fish. <u>Upper Skagit fishing pattern</u> : No preseason harvestable.
	Area 8 - Ntrty	Closed. May open pending co-manager agreement on ISU that indicates harvestable runsizes.

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

Chinook	Ceremonial and Subsistence – 280 fish total Swinomish, Sauk-Suiattle, and Upper Skagit Tribes.	
	Area 78C	<u>Swinomish and Sauk-Suiattle Tribes fishing pattern</u> : wk 19 (wb 5/1) thru wk 21 (wb 5/15); 1, 1, 1. <u>Upper Skagit fishing pattern</u> : wk 20 (wb 5/8) thru wk 21 (wb 5/15); 1, 1.
	Area 78D	<u>Upper Skagit fishing pattern</u> : wk 20 (wb 5/8) thru wk 21 (wb 5/15); 1, 1.
Sockeye	Area 78C	<u>Swinomish and Sauk-Suiattle Tribes fishing pattern</u> : wk 25 (wb 6/12) thru wk 29 (wb 7/10); 1, 3, 7, 5, 1. <u>Upper Skagit fishing pattern</u> : wk 27 (wb 6/26) thru wk 28 (wb 7/3); 1, 1.
	Area 78D	<u>Upper Skagit fishing pattern</u> : wk 27 (wb 6/26) thru wk 28 (wb 7/3); 1, 1.
Pink	Area 78C	<u>Swinomish and Sauk-Suiattle Tribes fishing pattern</u> : wk 34 (wb 8/14) thru 37(wb 9/4); 2, 2, 5, 6. Schedule after ISU dependent on ISU. <u>Upper Skagit fishing pattern</u> : wk 35 (wb 8/21) thru 38 (wb 9/11); 2.167, 3.167, 2.167, 1.167. Schedule after ISU dependent on ISU.
	Area 78D	<u>Upper Skagit fishing pattern</u> : wk 35 (wb 8/21) thru 38 (wb 9/11); 2.167, 3.167, 2.167, 1.167. Schedule after ISU dependent on ISU.
Coho	Terminal Treaty HR target 20%. If ISU changes abundance status, HR may be modified following co-manager discussions.	
	Area 78C:	<u>Swinomish and Sauk-Suiattle Tribes fishing pattern</u> : wks 39 (wb 9/18) thru wk 41 (wb 10/2); 3, 2, 2. <u>Upper Skagit fishing pattern</u> : wk 40 (wb 9/25) thru wk 43 (wb 10/16); 1.5, 1.167, 1.167, 1.167.
	Area 78D	<u>Upper Skagit fishing pattern</u> : wk 40 (wb 9/25) thru wk 43 (wb 10/16); 1.5, 1.167, 1.167, 1.167.

Chum	Area 78C	<u>Swinomish and Sauk-Suiattle Tribes fishing pattern:</u> No preseason harvestable. Placeholder modeled schedule wk 46 (wb 11/6); 1. Fishery dependent on ISU and harvestable fish. <u>Upper Skagit fishing pattern:</u> No preseason harvestable.
	78D	<u>Upper Skagit fishing pattern:</u> No preseason harvestable.
River Test	Chinook	(Blakes) wk 19 (wb 5/1) thru wk 35 (wb 8/21); 1 boat, 6 hours/wk.
	Sockeye	(Area 78D-3) wk 23 (wb 5/29) thru wk 30 (wb 7/17); 1 boat, 4 hrs/wk.
	Coho	(Blakes & Spudhouse) wk 34 (wb 8/14) thru wk 45 (wb 10/30) 2 boats, 12 hours/wk; Area 78D-3 wk 35 (wb 8/21) thru wk 44 (wb 10/23) 12 hours/wk.
	Chum	One boat at Blakes 1 day/wk 44 (wb 10/23) and wk 45 (wb 10/30).

**Swinomish Channel Treaty Net (Ntrty net closed)**

Coho	No separate openings. Area opens during Area 8 openings.
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**Area 8-1 Recreational**

5/1-7/31	Closed
8/1-9/30	2 fish limit, plus 2 additional pink, Chinook release.
10/1- 10/31	2 fish limit, Chinook release.
11/1 – 4/30	2 fish limit, Chinook 22" min size, release unmarked Chinook.

**Baker River/Lake Recreational**

(mouth to Hwy 20 Bridge)	July	Dependent on ISU. Potential fishery starting date to be determined. 2 fish limit, sockeye only, 12" min. size.
From Hwy 20 Bridge upstream to Dam	July	Dependent on ISU. Potential fishery starting date to be determined. 2 fish limit, sockeye only, 12" min. size.
Baker Lake	July - August	Dependent on ISU. Potential fishery start date to be determined. 4 fish limit, sockeye only, 12" min. size.

**Cascade River Recreational**

(mouth to Rockport-Cascade Road Bridge)	6/1 – 7/15	4 fish limit, only 2 may be adults, marked Chinook only, 12" min. size. Co-managers will consult on harvest guidelines and fishery may close early.
	9/16 – 11/30	4 fish limit, coho only, 12" min size.

### Skagit River Recreational

(mouth to Memorial Hwy. Bridge (Hwy 536 at Mt. Vernon))	8/1 – 12/31	3 fish limit, plus 1 additional pink, 12" min size, release chum and Chinook.
(From Memorial Hwy Bridge to Gilligan Creek)	8/1 – 12/31	3 fish limit, plus 1 additional pink, 12" min size, release chum and Chinook.
(From Gilligan Creek to Dalles Bridge at Concrete)	8/16 – 12/31	3 fish limit, plus 1 additional pink, 12" min size, release chum and Chinook. All Species – night closure and anti-snagging rule 7/1 - 11/30.
(From Dalles Bridge at Concrete to Hwy 530 bridge at Rockport)	9/16 – 12/31	3 fish limit, plus 1 additional pink, 12" min size, release chum and Chinook. All species – night closure and anti-snagging rule 7/1 through 11/30.
Hwy 530 bridge at Rockport to Cascade River Road	6/1-7/15	Daily limit 4 hatchery Chinook, only 2 adults.
	9/16-12/31	Daily limit 3 plus 1 additional pink. Release Chinook and chum.

**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	Wks 33 (wb 8/7) – 36 (wb 8/28); up to 5 days per week. Closed north of the line from Camano Head northeast to Tulalip Shores Point.
	Ntrty	Wk 34 (w/b 8/14) – 36 (w/b 8/28); PS NR for CK, CO, SO, and CH; PS fishing pattern 1, 2, 1; GN fish daylight hours; GN fishing pattern 1, 2, 1.

Coho	Trty	Wks 37 (wb 9/4) - Wk 42 (wb 10/9) up to 5 days per week. Update fishery through week 40. Manage for CCMP breakpoints and rates.
	Ntrty PS	Wk 39 (wb 9/18) – Wk 40 (wb 9/25): PS limited participation (2 boats per day): Chinook, chum NR, fishing pattern: 1,1. PS limited to area north of a line from the Clinton ferry dock to the Mukilteo ferry dock during Wk 39.
	Ntrty GN	Wks 40 (wb 9/25) GN fishing pattern: 2; GN fish night hours.
Chum	Trty	Evaluation Fishery, wks 43 (wb 10/16) -45 (wb 10/30): Port Susan closed; Max 2000 chum (incidental chum caught in previous treaty 8A fisheries included). Dependant on evaluation fishery, wk 46 (wb 11/6) - Wk 48 (wb 11/20), manage for Stillaguamish and Snohomish harvest rates and minimum escapement goals
	Ntrty	Closed. May open pending co-manager agreement on ISU indicating increased runsize.

**Area 8D Net**

Chinook	Trty	BS, RH, GN gear outside Tulalip Bay may be open during the following periods: 5/1 – 6/2      12:01 AM Sun – 11:59 PM Sat 6/5 – 8/27     12:01 PM Mon – 11:59 PM Thu 8/28 – 9/17    12:01 AM Mon – 11:59 PM Fri  Setnets inside Tulalip Bay may be open during the following periods: 5/1 – 9/19     12:01 AM Sun – 11:59 PM Sat
	Ntrty	Closed (see recreational SAF)
Coho	Trty	Wk 39(wb 9/18) – Wk 45 (wb 10/30); BS, RH, GN gear outside Tulalip Bay open Sun, Mon, Thu, Fri; open to target Tulalip hatchery coho.
	Ntrty	Wk 39 (wb 9/18)-Wk 45 (wb 10/30); PS Chinook NR; PS fishing pattern: 1,1,1,1,1,2,1; GN fish each night Sunday through Thursday night (5,5,5,5,5,5); also open daylight hours Tuesdays and Wednesdays (2,2,2,2,2,2). Closed east of the line from Mission Point to Hermosa Point.

Chum	Trty	Wk 46 (wb 11/6) - Wk 52 (wb 12/18); open to target Tulalip hatchery chum. 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 11/6)-Wk 48 (wb 11/20); PS fishing pattern: 2,1,1; 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 as necessary to ensure egg take requirements are met.

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

Chinook	Wk 27 (wb 6/26)- Wk 39 (wb 9/18) C&S fishery; max catch of 25 Chinook.
Pink	Wk 33 (wb 8/7) – Wk 39 (wb 9/18), up to 5 days per week.
Coho	Wk 37 (wb 9/4) - Wk 43 (wb 10/16); up to 5 days per week.
Chum	Closed

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

Chinook, Pink, Coho, Chum	Closed
Coho Test	Closed

**Area 8-2 Recreational**

5/1-7/31	Closed
8/1-9/30	2 fish limit, plus 2 additional pink salmon, Chinook release.
10/1 – 10/31	Daily limit 2, release Chinook. Port Susan closed.
11/1 – 4/30	2 fish limit, Chinook 22" min size, release unmarked Chinook.

**Tulalip Special Area Recreational Fishery**

Same as Area 8-2 Recreational, except during the period 6/3-9/25:	6/3-9/5	Open 12:01 AM Friday – 11:59 AM Monday each week. Closed June 19. Open within Tualip Special Area boundaries only. Closed to all angling east of the line from Mission Point to Hermosa Point. 2 fish limit salmon plus 2 additional pink salmon (Chinook 22" min. size).
	9/10 – 9/25	Open Saturday and Sunday each week. Open within Tualip Special Area boundaries only. Closed to all angling east of the line from Mission Point to Hermosa Point. 2 fish limit salmon plus 2 additional pink salmon (Chinook 22" min. size).

**Snohomish River Recreational**

(mouth to confluence of Skykomish and Snoqualmie rivers, including all channels)	8/16 – 12/31	3 fish limit, plus 1 additional pink salmon, 12" min. size. Release Chinook and chum. All species – night closure and anti-snagging rule 8/1 – 11/30.
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**Snoqualmie River Recreational**

(mouth to Plum Access)	9/1 – 12/31	3 fish limit, plus 1 additional pink salmon, 12" min size. Release Chinook and chum. All species-selective gear rules 6/1-11/30, except motors allowed; night closure 9/1-11/30. Closed waters – within Puget Power tunnels at falls, and within 50' of any point on Puget Power's lower Plant building #2 (north bank).
Plum Access to Falls	9/1-12/31	Daily limit 3 coho only.

**Skykomish River Recreational**

(From mouth to Lewis St. Bridge in Monroe)	6/1-7/31	Daily limit 2 hatchery Chinook only.
	8/16 – 12/31	3 fish limit, plus 1 additional pink salmon. 12" min size. Release Chinook and chum. Fishing from any floating device prohibited 11/1-2/28 from the boat ramp below Lewis Street Bridge at Monroe to 2500' downstream. All species - night closure and anti-snagging rule 8/1-11/30.
(From Lewis St. Bridge in Monroe to Wallace River)	6/1 – 7/31	2 fish limit, 12" min size, marked Chinook only. All species - night closure and anti-snagging rule 6/1-11/30. Managed for hatchery broodstock. Evaluation by co-managers by June 30 about possibility of earlier fishery closure.

	9/1 – 12/31	3 fish limit, plus 1 additional pink salmon, 12" min size. Release Chinook and chum. All species - night closure and anti-snagging rule through 11/30.
(From Wallace River to the forks)	9/1 – 12/31	3 fish limit, plus 1 additional pink salmon, 12" min size. Release Chinook and chum. All species – night closure and anti-snagging rule 8/1–11/30. Closed waters – from 1500' upstream to 1000' downstream of Reiter Ponds outlet 6/1 to 8:00 a.m. 8/1 and within this 2,500' section, fishing from any floating device within this area prohibited 8:00 AM 8/1-2/28.

**Wallace River Recreational**

Mouth to 200' upstream of water intake of salmon hatchery	9/16 – 11/30	3 fish limit, plus 1 additional pink salmon, 12" min size. Release chum and Chinook. Fishing from any floating device prohibited 11/1-2/28.
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**Stillaguamish River Recreational**

(river and all sloughs downstream of Marine Drive	9/1 – 12/31	2 fish limit, plus 2 additional pink salmon, 12" min size. Release Chinook and chum. All species-night closure and anti-snagging rule 8/1-11/30.
(Marine Drive upstream to forks)	9/1 - 12/31	2 fish limit, plus 2 additional pink salmon, 12" min size. Release Chinook and chum. All Species-night closure 8/1-11/30 and selective gear rules except motors allowed 6/1-11/30. Closed waters – from water control structure/barrier dam (downstream of I-5) 200' downstream.

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 700 Chinook as agreed upon by those Tribes with U&A in Area 9, (PS and Hook & Line, release all chum 8/1 – 9/30).
Chum	Research	Wk 43(wb 10/18) –Wk 47(wb 11/15) research fishery to develop stock composition/timing information. Research catch quota of 1,200 chum. Details of research program based on agreement developed in 2005.
Chum	Trty	No commercial fishery, unless prior agreement by all affected Tribes and WDFW.
	Ntrty	Closed



**Area 9 Recreational**

5/1-7/15	Closed
7/16-8/31	2 fish limit; plus 2 additional pink salmon, Chinook 22" min size, release unmarked Chinook, and chum. Closed south and west of a line from Foulweather Bluff to Olele Point, except angling allowed from shore between Hood Canal Bridge and the northern boundary of Salsbury Point Park, daily limit 2 salmon, plus 2 additional pink salmon, release Chinook and chum.
9/1-9/30	2 fish limit, plus 2 additional pink salmon, release Chinook and chum.
10/1-10/31	2 fish limit, release Chinook
11/1-11/30	2 fish limit, release unmarked Chinook (Chinook 22" min size).
12/1-1/15	Closed
1/16-4/15	2 fish limit, Chinook 22" min size, release unmarked Chinook.
4/16 – 4/30	Closed

**Edmonds Pier Recreational**

Year-Round	2 fish limit, 1 Chinook (22" min size), plus 2 additional pink salmon 7/1 – 9/30, release chum 8/1-9/30.
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### 3.0 South Sound Region (All fisheries modeled in FRAM #1811 (Chinook) & #1116 (Coho))

#### 3.1 Area 10 sub-region

##### Area 10 Net

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

Chinook		Closed
Sockeye	Trty	Fishery dependent upon ISU (Ballard lock counts)
	Ntrty	Closed
Pink	Trty	<p>Suq - Wks 31(wb 7/24) – 36(wb 8/28), Maximum of 5 days/wk, 2 PS, retention of Chinook prohibited, release chum North of a line from President Point due East to landfall, all waters within 1800 feet of shoreline closed; Chinook encounters limited to 400.</p> <p>Tul – Wks 34 (wb 8/14) – Wks 36 (wb 8/28) Maximum of 5 days/wk, 3-4 RH, Chinook and chum non-retention (unless species impaired). Chinook total mortality limited to 132, coho mortality limited to 250. All waters within 1800 ft of shoreline closed. Fishery monitoring will include observers and fisheries enforcement. <b>[Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983)].</b></p>
	Ntrty	<p>Wks 35 (wb 8/21) – 36 (wb 8/28); PS limited participation (4 boats/day); fishing pattern 2,1; Brailing and live boxes required; NR for CK, CO, SO, and CH; GN limited participation (4 boats/day); fishing pattern 2,1; Live boxes and limited soak times required; NR for CK, CO, SO, and CH; observers required on vessels. Fishery will close if 200 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.</p>
Coho	Test	Gillnet: Wks 37 (wb 9/4, -Wk 39 (wb 9/18); 3 boats, 3 sites; fishing pattern: 2,2,2

	Trty	Fishery based on ISU beginning Wk 37(wb 9/4). Treaty allocation based on intertribal sharing agreement. Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983).
	Ntrty	Closed
Chum	Test	Purse Seine: Wks 41 (wb 10/2)-Wk 46 (wb 11/6); 1 site, fishing pattern: 1,1,1,1,1,1.
	Trty	Treaty allocation based on intertribal sharing agreement; Wks 41 (wb 10/2) – Wk 48 (wb 11/20) fishing pattern – ISU dependent; Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983).
	Ntrty	Wks 43 (wb 10/16) - 48 (wb 11/20); PS Chinook and coho NR; PS fishing pattern: 1,2,1,2,1,1; GN fishing pattern: 2,2,2,2,2,2. ISU Dependent. Area east of a line from Four Mile Rock south to Alki Pt will be closed.

**Area 10A Treaty Net - That portion of Elliott Bay east of the line from Pier 91 to the light at Duwamish Head to the 1000 foot radius around both the Duwamish River (80B) East and West waterways.**

Chinook	Trty Test	Gillnet: Wks 30 (wb 7/17) – Wk 32 (wb 7/31); 7/20, 7/27, 8/3 (Wednesday); 5 fishing sites (one boat per site).8 PM to 8 AM.
	Trty	WK 33 & 34 (wb 8/7 & 8/14): Dependent on Green River Chinook ISU, consistent with the Puget Sound Chinook Harvest Management Plan.
Pink	Trty	Wk 36 (wb 8/28) – Wk 37 (wb 9/4) Fishery will open Aug 28; (5 days/week Sunday – Friday).
Coho		Wk 38 (wb 9/11 – Wk 45 (wb 10/30) fishing pattern: 5 days per week (Sun – Fri).
Chum		Wk 46 (wb 11/6) – Wk 47 (wb 11/13); fishing pattern: 5 days per week (Sun – Fri). Wk 48 (wb 11/20) fishing pattern: (Sun – Wed).

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

Chinook	Wk 33 – 34	WK 33 & 34 (wb 8/7 & 8/14): Dependent on Green River Chinook ISU, consistent with the Puget Sound Chinook Harvest Management Plan.
Pink	Wk 35 only	Wk 35 (wb 8/21) Species composition fishery (SCF) on lower river (up to 1 <sup>st</sup> Avenue Bridge) begins 8/25; (5 sites); If the Chinook criteria is met or pink predominate, fishery will open Wk 36 (wb 8/28) – 37 (wb 9/4): fishing pattern 5 days per week (Sun – Fri).

Coho	Wk 38 – Wk 45	Closed until Chinook clear or coho predominate. Clearance fishery on lower river (up to 16 <sup>th</sup> Avenue Bridge) begins Wk 37 (wb 9/4); (6 sites); If Chinook clearance is met or coho predominate, fishery will open Wk 38 (wb 9/11); starting Wk 39 (wb 9/18), fishery will open up to Boeing St. Bridge. Starting Wk 41 (wb 10/2) fishery will open up to Hwy 99 Bridge; fishing pattern 5 days per week (Sun – Fri). The clearance fishery will occur in Week 37 if the Pink fishery does not extend through Week 37.
Chum	Wks 46 -Wk 48	Wk 46 (wb 11/6)-Wk 47 (wb 11/13); fishing pattern: 5 days per week (Sun – Fri).Wk 48 (wb 11/20) fishing pattern: (Sun – Wed).

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

Chinook	Wks 30 (wb 7/17)-Wk 38 (wb 9/11); fishing pattern: 7days/wk. Possible extension for Sinclair Inlet
Coho	On-Reservation only; Wks 38 (wb 9/11)-Wk 43 (wb 10/16); Gillnet/beach seine; 7 days/wk.
Chum	Wks 43 (wb 10/16)-Wk 50 (wb 12/4); schedule dependent upon ISU.

**Lake Washington System (includes lake, ship canal, & Lake Sammamish)**

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

Sockeye	Dependent upon ISU (lock counts). Potential fishery beginning Wk 28 (7/3).	
Chinook	Dependent on ISU and co-manager agreement.	
Coho	The coho fisheries in the four following areas are dependent upon the ISU on Sept. 11 (if lock counts project run size < 10,000 coho entering the lake, then no coho fishery):	
	Lower ship canal (below Ballard Locks)	Closed until Chinook clearance as seen in lock counts; anticipated pattern 5-7 days/wk dependent on in-season information, with a potential start date for fisheries beginning Wk 38 (9/11).
	Upper ship canal (above Ballard Locks):	Fishing pattern 5 days/wk (Sun – Fri).
	North end Lake Washington (North of Hwy. 520 bridge):	Starting Wk 40 (wb 9/25): fishing pattern 5 days/wk (Sun – Fri).

### Lake Sammamish Treaty Net

Chinook and Coho	Fisheries will be based on ISU from the Ballard Lock counts.
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### Area 10 Recreational

5/1-5/31	Closed
6/1-6/30	Catch-and-release in waters N of Meadow Pt./Pt. Monroe line.
7/1-7/15	2 fish limit, plus 2 additional pink salmon, Chinook release.
7/16-8/31	2 fish limit, plus 2 additional pink salmon, Chinook 22" min size, release unmarked Chinook and release chum beginning 8/1.
9/1-9/30	2 fish limit, plus 2 additional pink salmon, release Chinook and release chum through 9/15.
10/1-1/31	2 fish limit, release unmarked Chinook (Chinook 22" min size).
2/1-4/30	Closed
	Shilshole Bay (East of Meadow Point/West Point line) closed 7/1-8/31.
	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 for indicated openings identified in "Elliott Bay Recreational" section below.
	Inner Elliott Bay (E of Pier 91/Duwamish Head line) closed to salmon angling 7/1-8/31 except for indicated openings identified in "Elliott Bay Recreational" section below. Elliott Bay fishing piers open; see below.
	Special gear restrictions in Duwamish Waterways area when open.

### Area 10 Piers Recreational

Seacrest Pier, Pier 86, Waterman Pier, Bremerton Boardwalk, Illahee State Park Pier	Year-Round	2 fish limit, 1 Chinook (22" min size), plus 2 additional pink salmon 7/1 – 9/30, release chum 8/1-9/15.
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### Elliott Bay Recreational SAF

5/1 – 6/30	Same as Area 10
7/1-8/31	Chinook fishery dependent on agreed ISU of Green River Chinook abundance sufficient to meet the escapement goal, consistent with the Puget Sound Chinook Harvest Management Plan.
7/1-8/18	Closed pending ISU.

8/19-8/21, and 8/26-28	Open E of Alki to West Point line and west of the Spokane St Bridge, weekly 12:01 AM Friday through 11:59 PM Sunday. 2 fish limit, plus 2 additional pink salmon, release Chinook and chum. Bait prohibited. Hooks must measure less than ½" from point to shank.
8/29-8/31	Closed
9/1-4/30	Same as Area 10.

**Sinclair Inlet Recreational SAF**

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; 2 fish limit, plus 2 additional pink salmon, (Chinook 22" min size), release unmarked Chinook, release chum 8/1-9/15.
10/1-4/30	Same regulations as Area 10.

**Green River Recreational**

(1 <sup>st</sup> Ave South Bridge to Old Hwy.99/Tukwilla Intl. Blvd.)	8/20-8/31	Daily limit 6. No more than 3 adult coho and chum in total may be retained. Release Chinook. Bait prohibited. Only 1 single-point hook may be used. Hook must measure less than ½" from point to shank. Night closure.
	9/1 – 12/31	Daily limit 6. No more than 3 adult coho and chum in total may be retained, 12" min size, release Chinook. All species-night closure and anti-snagging rule Sept. 1-Nov. 30. Fishing from any floating device prohibited 11/1-2/15.
(Old highway 99/Tukwilla Intl. Boulevard to I- 405)	8/20-8/31	Daily limit 6. No more than 3 adult coho and chum in total may be retained. Release Chinook. Bait prohibited. Only 1 single-point hook may be used. Hook must measure less than ½" from point to shank. Night closure.
	9/1 – 12/31	Daily limit 6. No more than 3 adult coho and chum in total may be retained, 12" min size, release Chinook. All species-night closure and anti-snagging rule Sept. 1-Nov. 30. Fishing from any floating device prohibited 11/1-2/15.
(I-405 to the S. 277 <sup>th</sup> Bridge in Auburn)	9/1-9/30	Daily limit 6. No more than 3 adult coho and chum in total may be retained. Release Chinook. Bait prohibited. Only 1 single-point hook may be used. Hook must measure less than ½" from point to shank. Night closure.

	10/1 – 12/31	Daily limit 6. No more than 3 adult coho and chum in total, 12" min size, release Chinook. All species-night closure and anti-snagging rule 10/1-11/30. Fishing from any floating device prohibited 11/1-2/15.
(S. 277 <sup>th</sup> Bridge to Auburn Black Diamond Rd Bridge)	9/16-10/15	Daily limit 6. No more than 3 adult coho and chum in total may be retained. Release Chinook. Bait prohibited. Only 1 single-point hook may be used. Hook must measure less than 1/2" from point to shank. Night closure.
	10/16 – 12/31	Daily limit 6. No more than 3 adult Coho and chum in total may be retained, 12" min size, release Chinook. All species-night closure and anti-snagging rule 10/16-11/30. Fishing from any floating device prohibited 11/1-2/28.
(from Auburn-Black Diamond Rd Bridge to Tacoma Headworks Dam)	11/1 – 12/31	Daily limit 6. No more than 3 adult Coho and chum in total may be retained, 12" min size, release Chinook. All species-night closure and anti-snagging rule 8/1-11/30. Closed waters-within 150' of the Palmer Ponds outlet rack and within 150' of the mouth of Keta (Crisp) Creek.

The 2011/2012 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: Jan. 15
	S. 277 <sup>th</sup> Bridge to Tacoma Headworks Dam: Jan. 31

**Soos Creek Recreational**

	Closed.
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**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.
North of Hwy 520 Bridge	9/16 – 10/31	4 fish limit, coho only, 12" min size

**Lake Sammamish Recreational**

8/16 – 11/30	4 fish limit, only 2 Chinook, 12" min size, release sockeye. Closed: waters within 100 yards of the mouth of Issaquah Creek are closed to salmon fishing.
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All other SOUTH SOUND AREA 10 REGION freshwater: Closed to salmon angling.

### 3.2 Area 11 Subregion

#### Area 11 Net

Pink	Trty:	Commercial fishery open beginning Wk 31 (wb 7/24) – Wk 34 (wb 8/14) 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 200 Chinook or 400 Coho are reached or the end of week 34.
Chinook	All	Closed
Coho	Trty:	Commercial fishery open beginning Wks 37 (wb 9/4)- Wk 41 (wb 10/2); ISU dependent; gillnets 7 days/wk, could close any time. Beach seine daylight hours only, 7 days/wk.
	Ntrty:	Closed
Chum	Trty:	Commercial fishery open Wks 42 (wb 10/9)-Wk 49 (wb 11/27); gillnets 7 nights/wk, could close at anytime. Beach seine daylight hours only, 7 days/wk.
	Ntrty	Wks 43 (wb 10/16) - 48 (wb 11/20); PS Chinook and coho NR; PS fishing pattern:1,2,1,2,1,1; GN fishing pattern: 2,2,2,2,2,2. ISU dependent.

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

Chinook	Closed
Coho	Commercial fishery open Wks 37 (wb 9/4)-Wk 42 (wb 10/9); 3 nights/wk
Chum	Commercial fishery open Wks 46 (wb 11/6)- Wk 53 (wb 12/25) 3 nights/wk.

#### Puyallup River (Area 81B) Puyallup and Muckleshoot Treaty Net (Ntrty net closed)

Chinook	Spring	Ceremonial and Subsistence 5/1 – 6/30
	Fall	Closed
Coho	Commercial fishery Wks 36 (wb 8/28)-Wk 42 (wb 10/9) fishing pattern: 1,2,2,2,3,3,3.	
Chum	Test fishery Wks 43 (wb 10/16)-Wk 46 (wb 11/6) 1 day/wk, drift net only.	
Winter Chum	Commercial fishery Wks 46 (wb 11/6) – Wk 53 (wb 12/25) total days yet to be determined in steelhead management plan.	

#### White River Treaty Net

Sp. Chinook	Ceremonial and subsistence fisheries.
Pink/Coho/Chum	Fishing pattern 7 days/wk.



**Area 11 Recreational**

5/1-5/31	Closed	
6/1-6/30	2 fish limit (Chinook 22" min. size), release unmarked Chinook; Commencement Bay (E. of Cliff House Restaurant/Sperry Ocean Dock line) closed to salmon angling.	
7/1-9/30	2 fish limit (Chinook 22" min. size), plus 2 additional pink salmon, release unmarked Chinook. Commencement Bay (E. of Cliff House Restaurant/Sperry Ocean Dock line) closed to salmon angling through 7/31.	
10/1-10/31	2 fish limit, (Chinook 22" min size).	
11/1-12/31	2 fish limit, 1 Chinook (Chinook 22" min size).	
1/1-1/31	Closed	
2/1-4/30	2 fish limit (Chinook 22" min size), release unmarked Chinook.	
Dash Point Dock, Point Defiance Boathouse Dock, Les Davis Pier, Des Moines Pier and Redondo Pier	Year-Round	2 fish limit, 1 Chinook (22" min size), plus 2 additional pink salmon 7/1 – 9/30.

**Puyallup River Recreational:**

(from Freeman Road (82 <sup>nd</sup> Ave E) to Carbon River)	8/1 – 12/31	6 fish/2 adult limit, plus 2 additional adult pink, 12" min size, release unmarked adult Chinook. All species – single point barbless hooks required 8/1-11/30.
(from 11 <sup>th</sup> St. Bridge to Freeman Road (82 <sup>nd</sup> Ave E)	8/16 – 12/31	Closed August 28, and 29 and September 4, 5, 6, 11, 12, and 13. 6 fish/2 adult limit, plus 2 additional adult pink, 12" min size, release unmarked adult Chinook. All species – single point barbless hooks required 8/1-11/30.

**Carbon River Recreational**

(mouth to Voight Creek)	9/1 – 11/30	6 fish/4 adult limit, no more than 2 adult Chinook; 12" min size, release unmarked adult Chinook, and release chum. All species night closure, anti-snagging rule, and single point barbless hooks 8/1-11/30.
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All other SOUTH SOUND AREA 11 REGION freshwater recreational Closed to salmon angling

### 3.3 Area 13 Subregion

<b>Fox Island/Ketron Island (Area 13)</b>		
Chinook	Treaty:	8/1-9/17, 7 days/wk
	Ntrty:	Closed
Coho	Treaty:	9/17-10/22, 7 days/wk
	Ntrty:	Closed
Chum	Treaty:	Closed unless opened by Medicine Creek Treaty Tribes' agreement
	Ntrty:	Closed
<b>Sequalitchew [N. Solo Pt. to Luhr Beach (Area 13) Treaty Net (Ntrty net closed) (Fishery pending agreement by all affected Tribes and the State.)</b>		
Chinook	Two days a week. Wk 33 – Wk 38. Beach seine only. Release wild Chinook.	
Coho	Three days a week. Wks 39 – 45. Beach seine only. Release wild Chinook.	
Chum	Closed]	
<b>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.</b>		
Chinook	8/1-9/17, 7 days/wk, open in sections.	
Coho	9/18-10/22, 7 days/wk, in-season monitoring to meet hatchery escapement need.	
Chum	10/23-12/3, 7 days/wk	
<b>Chambers Bay (Area 13C) Treaty Net<sup>1</sup> (Ntrty net closed)</b>		
Chinook	Wks 31 -Wk 41; 4 days/wk. Beach seines Sunday noon to Tuesday noon. Set nets Wednesday noon to Friday noon.	
Coho	Wks 42 -Wk 44; 2 days/wk. Beach seines Sunday noon to Monday noon. Set nets Monday noon to Tuesday noon.	
Chum	Wks 45)-Wk 48; 4 days/wk. Beach seines Sunday noon to Tuesday noon. Set nets Wednesday noon to Friday noon.	
<b>Area 13D Treaty Net (Ntrty net closed)</b>		
Chinook	7/15-9/9 or earlier date dependent on in-season management needs; 7 days/wk	
Coho	9/10-10/31 or earlier date dependent on in-season management needs.	
<b>Peale Pass (13D-3)</b>	7 days/wk	

<b>Pickering Pass (13D-2)</b>	7 days/wk
<b>Dana Pass (13D-1)</b>	7 days/wk
<b>Southern Case (13D-4)</b>	7 days/wk
Chum	Open approximately 10/23; 2-3 days per week; managed weekly by updates (~10/11).
<b>Area 13E Net</b>	Closed to all fishing
<b>Budd Inlet (Area 13F) Treaty Net (Ntrty net closed)</b>	
Chinook	7/15-9/9 or earlier date dependent on in-season management needs; 7 days/wk
Coho	Closed
Chum	Open approximately 11/6, 2-3 days per week, managed by weekly in-season updates
<b>Eld Inlet (Area 13G) Treaty Net (Ntrty net closed)</b>	
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
<b>Totten Inlet (Area 13H) Treaty Net (Ntrty net closed)</b>	
Chinook	7/31-9/9; schedule dependent on in-season data
Coho	Closed
Chum	Open approximately 10/8, 2-3 days per week; managed by weekly escapement updates
<b>Little Skookum Inlet (Area 13I) Treaty Net (Ntrty net closed)</b>	
Chinook	7/31-9/10; schedule dependent upon in-season data
Coho	Closed
Chum	Open approximately 12/1, 2-3 days per week; managed by weekly escapement updates
<b>Hammersley Inlet (Area 13J) Treaty Net (Ntrty net closed)</b>	
Chinook	7/31-9/9 or earlier date dependent on in-season management needs
Coho	Closed
Chum	Open approximately, 9/18-12/25, 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 9/18-12/25; 2-3 days/wk; managed by weekly escapement updates

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

Chinook	Two days a week during the following weeks: Wks 29 (wb 7/10) through 36 (wb 8/28). Closed wks 37, 38, and 39. Pilot Tangle Net Study – two days a week, Wks 33 (wb 8/7) through Wks 38 (wb 9/11).
Coho	Wk 40 (wb 9/25) not open. Wks 41 (wb 10/2) through Wks 47 (wb 11/13); 3 days/wk.
Chum	Proposed schedule: Wks 48 (wb 11/20)-Wk 5 (wb 1/22/2012); 3, 4 days/wk; per annual Nisqually River chum/steelhead management plan.

**McAllister Creek (Area 83F) Treaty Net (Ntrty net closed)**

Chinook/Pink	Wks 27 (wb 6/26)-Wk 40 (wb 9/25); 3 days/wk
Coho	Wks 41 (wb 10/2)-Wk 48 (wb 11/20); 3-4 days/wk
Chum	Proposed schedule: Wks 49 (wb 11/27)-Wk 5 (wb 1/22/2012); 4 days/wk per annual Nisqually River chum/steelhead management plan.

**Area 13 Recreational**

5/1-6/30	2 fish limit (Chinook 22" min. size), release unmarked Chinook. Minter Creek mouth closed.
7/1-9/30	2 fish limit (Chinook 22" min. size), release unmarked Chinook and unmarked coho. Minter Creek mouth closed through 9/30; Lower Budd Inlet closure zone 7/16-10/31.
10/1-10/31	2 fish limit, release unmarked coho (Chinook 22" min size). Lower Budd Inlet closure zone 7/16-10/31.
11/1-12/31	2 fish limit, 1 Chinook (Chinook 22" min size).
1/1-4/30	1 fish limit, (Chinook 22" min size). Minter Creek mouth closure begins 4/16.

**Fox Island Pier Recreational**

Year-Round	2 fish limit, 1 Chinook (22" min size); 7/1-10/31 release unmarked coho.
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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/2 adult limit, 12" min size, release unmarked 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/2 adults limit, 12" min size, release coho.
(upstream of Henderson Blvd Bridge)	7/1 – 10/15	6 fish/2 adults limit, 12" min size, release coho, selective gear rules.

**Kennedy Creek Recreational**

(mouth to northbound Hwy. 101 Bridge)	10/1 – 11/30	6 fish/2 adults limit, 12" min size, release unmarked coho, barbless hooks required. Night closure and anti-snagging rule 10/1-12/31.
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**McAllister Creek Recreational**

(mouth to Olympia-Steilacoom Rd Bridge)	7/1 – 11/30	6 fish/2 adult limit, 12" min size. All species – night closure and anti-snagging rule 8/1-11/30.
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**McLane Creek Recreational**

(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
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**Minter Creek Recreational**

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(mouth to 50' downstream of hatchery rack)	11/1 – 12/31	4 fish limit, 12" min size, chum only.
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**Nisqually River Recreational**

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(mouth to the military tank crossing bridge, one mile upstream of the mouth of Muck Creek)	7/1-10/31	6 fish/3 adult limit, only 2 adults may be any combination of coho, and chum. 12" min. size, release unmarked Chinook. All species – night closure and anti-snagging rule 8/1-11/30.
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	11/1-1/31	6 fish/2 adult limit; 12" min. size; release unmarked Chinook. All species night closure and anti-snagging rule 8/1-11/30.
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All other SOUTH SOUND AREA 13 REGION freshwater recreational closed to salmon angling.

## 4.0 Hood Canal Region (All fisheries modeled in FRAM #1811 (Chinook) & #1116 (Coho))

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

Treaty: 1,000 feet 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 7/17-8/31; 5 days/wk; release chum 8/1-8/31. Open wb 7/17 – 8/24 for gillnets 5 days/wk; restricted to 7" min mesh starting 8/1.
		Area 12H: Open wb 7/17 through 9/24; hook and line gear continuous; beach seines daylight hours Tues and Thur each week; possible in-season modifications; Chum release.
	Ntrty	Closed
Pink	All	Same as Chinook openings.
Coho	Trty:	Area 12: Open 9/25 through 10/15 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 10/22 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.
		Area 12C: Open 10/1 through 10/22 for gillnets; with 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; beach seines for Coho (release all Chum through 9/30) may start no earlier than 9/21. Both gear types may fish 7 days/wk when open.
	Area 12D (west of Madrona Pt. - local name): Open for gillnets no earlier than 10/1. Weekly schedules identical to Area 12C.	
	Ntrty:	Closed

Chum	<b>ISU dependent on co-manager agreement.</b>	
	Trty:	Area 12: Open 10/16 through 11/20; 7 d/wk
		Area 12B: Open 10/23 through 11/20; 7d/wk
		Area 12C: Open 10/23 through 11/27; 7d/wk.
		Area 12D: Closed.
	Area 12H: Hook and line gear open from 10/18 through 12/5; beach seines open Tuesday and Thursday of each week. Then Monday and Wednesday for the week beginning 11/13; possible in-season adjustments to 3 days/wk. Starting 11/1, hatchery escapement control measures will go into effect.	
Ntrty:	Area 12, 12B. Fisheries scheduled for Wks 43 (wb 10/16) through wk 47 (wb 11/13): PS Chinook NR; fishing pattern: <b>[1,2,1,2,1; GN fishing pattern: 2,2,2,2,2, daylight hours]</b>	
	Area 12C. Fisheries scheduled for Wks 46 (wb 11/6) through wk 48 (wb 11/20): PS Chinook NR; <b>[PS fishing pattern: 2,1,1; GN fishing pattern: 2,2,2</b>	
	<b>Area 12H: BS (Hoodsport Hatchery Zone) fishery in wks 46 – 48 pending discussions with the Co-Managers.]</b>	
	Area 12D Closed	
<b>Port Gamble (Area 9A)</b>		
Chinook	All	Closed
Coho	Trty:	Open 8/21 through 10/29; 7 days/wk; gillnet only.
	Ntrty:	Open Wks 35 (wb 8/21) - 44 (wb 10/23) GN and skiff GN, both gears limited to 100 fathoms length and 60 meshes in depth; 7 days/wk; Chinook NR; Chum NR through 9/30; release fish not to be retained 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 10/30 through 12/3; 7days/wk; gillnet only.
	Ntrty:	Closed



<b>Quilcene / Dabob (Area 12A)</b>		
Coho	Trty:	Open 8/21 through 10/15; 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. Beach seine advance notification required prior to fishing.
	Ntrty:	Beach seine open wks 35 (wb 8/21) – 40 (wb 9/25); Limited participation (4 permits/day); CK and CH NR; fishing pattern 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 10/16 through 11/20, South of an E-W line through Pt. Whitney.
	Ntrty:	Closed
<b>Skokomish River (Area 82G) Treaty (Ntrty net closed)</b>		
Treaty fishing seasons have not yet been determined. [The Skokomish Tribe will develop an evaluation fishery from the mouth of the Skokomish River to the HWY 106 Bridge, to assess Summer Chum incidence during the Tribal Chinook fishery. The study design will be reviewed by the co-managers before implementation. Impacts to Chinook will be absorbed in the Tribal Chinook fishery by adjustment of days fished above the HWY 106 Bridge.]		
Note: Hook and line gear and beach seines release chum through 10/15.		
Chinook	[Open 8/01 through 9/17; no more than 4 days/wk; closed to gillnets below SR 106.]	
Coho	Open 9/18 through 11/12; 7 days/wk. Closed to gillnets below SR 106 through 9/30.	
Chum	Open 11/13 through 12/3; 7 days/wk.	
<b>Big Quilcene River (Area 82F) Treaty (Ntrty net closed)</b>		
Coho	Openings to be determined in-season, for Coho only, from 9/1 through 10/16. Closed below Rodgers St. From Rodgers 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	
<b>Misc. Hood Canal Rivers (Dosewallips, Duckabush, Hamma Hamma, Tahuya, Dewatto, Union)</b>		
All species	Closed to commercial harvest.	

<b>Area 12 Recreational</b>		
5/1-6/30		Closed
7/1-8/31		North of Ayock Pt. – Closed to salmon angling except see Quilcene/Dabob Bay Recreational below.
9/1-10/15		North of Ayock Pt. (including Quilcene/Dabob Bay) – 4 fish limit, coho only.
7/1-10/15		South of Ayock Pt. - 4 fish limit, 2 Chinook(Chinook 22" min size); release chum.
10/16-12/31		4 fish limit, 1 Chinook (Chinook 22" min size). Closed in Tarboo Bay north of Broad Spit.
1/1-1/31		Closed
2/1-4/30		2 fish limit (Chinook 22" min size), release unmarked Chinook
<b>Quilcene/Dabob Bay Recreational</b>		
5/1-8/15		Same as Area 12
8/16-8/31		4 fish limit, coho only.
9/1-4/30		Same as Area 12
<b>Hoodsport Hatchery Zone Recreational</b>		
Same as Area 12 except:		
7/1-12/31		4 fish limit, no minimum size, only 2 Chinook greater than 24"; chum release 7/1-10/15; night closure.
<b>Dewatto River Recreational</b>		
(mouth to Dewatto-Holly Rd. Bridge)	10/1 – 10/31	2 fish limit, 12" min size, coho only. Selective Gear Rules, night Closure.
<b>Dosewallips River Recreational</b>		
(mouth to Hwy. 101 Bridge)	11/1 – 12/15	2 fish limit, 12" min size, chum only
<b>Duckabush River Recreational</b>		
(mouth to Mason Co. PUD #1 overhead electrical distribution line)	11/1 – 12/15	2 fish limit, 12" min size, chum only
<b>Quilcene River Recreational</b>		
(from Rodgers St. to Hwy 101 Bridge)	8/16 – 10/31	4 fish, 12" min size, coho only. Only 1 single point barbless hook may be used. Only fish hooked inside the mouth may be retained. Night closure.

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**Skokomish River Recreational**

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Recreational seasons have not yet been determined.

(mouth to Hwy. 101 Bridge)	8/1 – 9/30	[2 fish limit, 12" min size, release chum and unmarked Chinook. All Species-night closure, anti-snagging rule, and single point barbless hooks required through 11/30. Terminal gear (hooks, weights, lures or baits) and line must not be within 25' of Tribal gillnets. Closed upstream of Highway 106 bridge Mondays through September 12, except September 5.]
	10/1 – 12/15	6 fish/4 adult, 12" min size, release Chinook and release chum through 10/15. All Species-night closure, anti-snagging rule, and single point barbless hooks required through 11/30. Terminal gear (hooks, weights, lures or baits) and line must not be within 25' of Tribal gillnets.

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**Tahuya River Recreational**

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(mouth to marker 1 mile above N. Shore Rd. Bridge)	10/1 – 10/31	2 fish limit, 12" min size, coho only. Selective Gear rules, night closure.
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All other HOOD CANAL REGION freshwater recreational closed to salmon angling.

## **Appendix 2. Summary Results for Nisqually Tangle Net Pilot Study**

## Summary of Results for Nisqually Tangle Net Pilot Study

A pilot study was conducted by the Nisqually Tribe to examine the mortality of adult Chinook salmon captured and released from tangle nets. Both drift and set tangle nets were used to capture Chinook returning to the Nisqually River from 10-August through 14-September, 2011. The majority of marked Chinook (those with a clipped adipose fin) were tagged with a jaw tag and marked with an opercular punch. Unmarked Chinook were not tagged and were immediately released.

All released Chinook were assigned one of four conditions on release:

1. Lively, not bleeding
2. Lively, bleeding visible
3. Lethargic, not bleeding
4. Lethargic, bleeding visible.

### Results

Catch:

Table 1 summarizes the catch of marked and unmarked Chinook and the condition of the released fish, by gear type, for each day of the study. A total of 206 Chinook were caught during the 13 days that nets were fished. About 80% of the total catch was by the drift tangle net. Only 13% of the Chinook caught had an adipose fin (were unmarked), the rest had a clipped adipose fin (marked). About 60% of the catch occurred on the three days of tagging conducted between 24-August and 2-September (Figure 1).

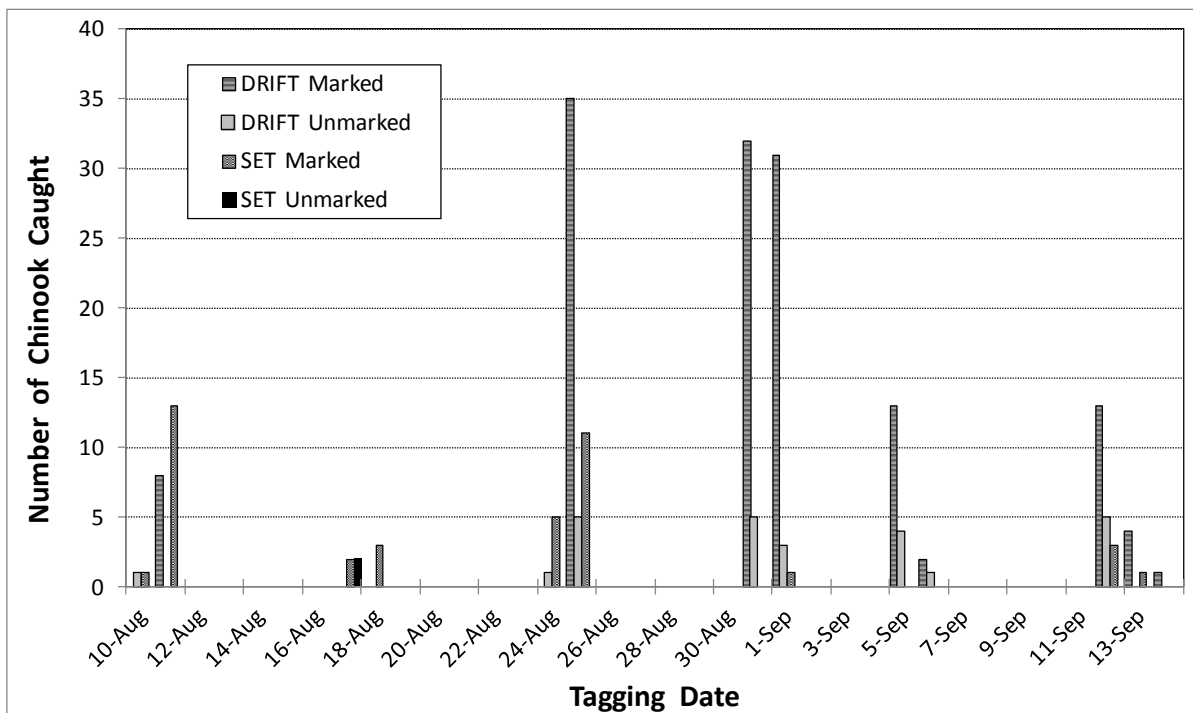


Figure 1: Number of marked and unmarked Chinook caught each sample day in 2011.

### Summary of Results for Nisqually Tangle Net Pilot Study

Table 1: Summary of Chinook catch, and release conditions of jaw-tagged and unmarked fish released, by gear type.

Tagging Date	Total Number Sets	Total Number Caught	# Marked Tagged by Condition					Number of Mortalities	# Unmarked Release by Condition					Number of Mortalities
			1	2	3	4	Total		1	2	3	4	Total	
<b>DRIFT TANGLE NET ONLY</b>														
10-Aug	17	1					0	0	1				1	0
11-Aug	17	8	1	4	2		7	1					0	0
17-Aug	4	0					0	0					0	0
18-Aug	2	0					0	0					0	0
24-Aug	11	1					0	0	1				1	0
25-Aug	13	40	29		5	1	35	0	4		1		5	0
31-Aug	40	37	27	1	4		32	0	5				5	0
1-Sep	44	34	26	1	4		31	0	3				3	0
5-Sep	10	17	11		2		13	0	3			1	4	0
6-Sep	2	3	1		1		2	0	1				1	0
12-Sep	23	18	11		1	1	13	0	4			1	5	0
13-Sep	13	4	3		1		4	0					0	0
14-Sep	16	1	0		1		1	0					0	0
<b>Totals</b>	<b>212</b>	<b>164</b>	<b>109</b>	<b>6</b>	<b>21</b>	<b>2</b>	<b>138</b>	<b>1</b>	<b>22</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>25</b>	<b>0</b>
<b>SET TANGLE NET ONLY</b>														
10-Aug	1	1	1				1	0					0	0
11-Aug	2	13	9	1	2		12	1					0	0
17-Aug	2	4	2				2	0	2				2	0
18-Aug	1	3	1		1	1	3	0					0	0
24-Aug	3	5	3		2		5	0					0	0
25-Aug	2	11	7		2		9	2					0	0
31-Aug	0	0					0	0					0	0
1-Sep	1	1	1				1	0					0	0
5-Sep	0	0					0	0					0	0
6-Sep	0	0					0	0					0	0
12-Sep	2	3	3				3	0					0	0
13-Sep	1	1	1				1	0					0	0
14-Sep	0	0					0	0					0	0
<b>Totals</b>	<b>15</b>	<b>42</b>	<b>28</b>	<b>1</b>	<b>7</b>	<b>1</b>	<b>37</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

## Summary of Results for Nisqually Tangle Net Pilot Study

### Condition of Released Chinook:

For both gears combined, 78% of the ad-clipped Chinook and 88% of the unmarked Chinook released were categorized as condition 1 (lively with no visible bleeding). There was not a significant difference between the drift and set tangle nets (Fisher's Exact test,  $P = 0.881$ ) in the distribution of tags released among the condition categories (Figure 2).

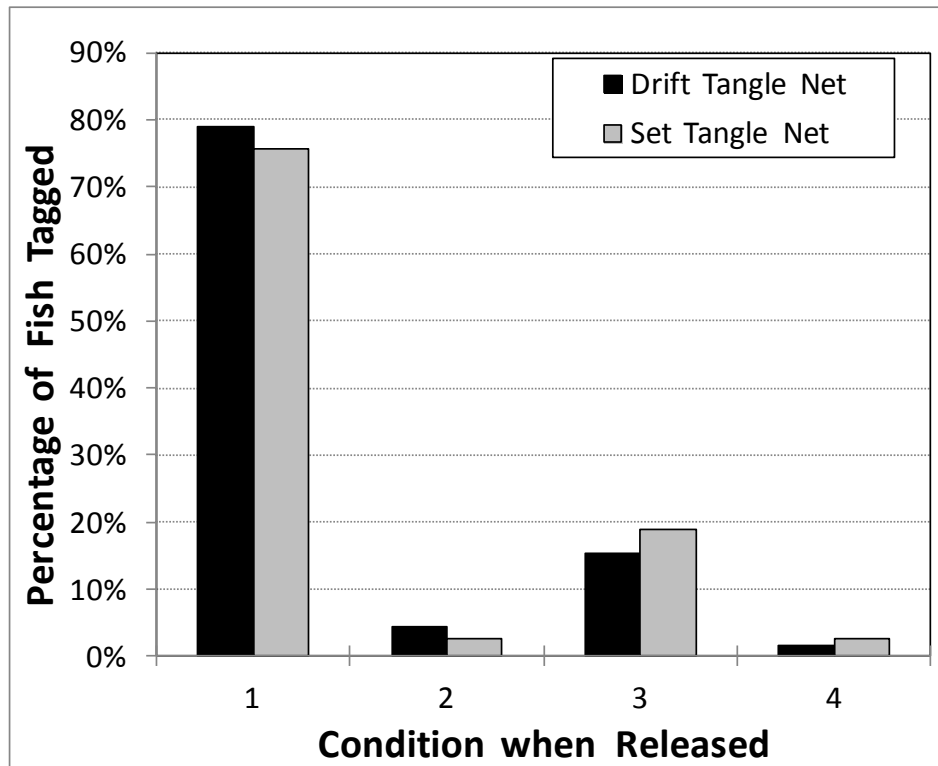


Figure 2: Comparison of the percentage of jaw-tagged Chinook released in each condition category for drift and set tangle nets.

### Immediate Mortalities:

Immediate mortality is mortality that occurred in the net before retrieval or after the fish was brought to the boat. All immediate mortalities were marked (ad-clipped) Chinook. A total of 4 of the 206 Chinook handled (1.9%) were classified as immediate mortalities. Of the three Chinook that were dead on retrieval two of them had been killed by seals. Three of the four immediate mortalities were in the set net gear (including the two killed by seals). Both of the non-seal mortalities occurred on the second day of tagging and might be related to the tagging crew refining their methods for processing the captured fish.

## Summary of Results for Nisqually Tangle Net Pilot Study

### Tag Recoveries:

Of the 175 jaw tags released, a total of 81 tags (46.3%) were either voluntarily returned or recovered in surveys directed at sampling the Tribal commercial catch and escapement to the holding ponds at Clear Creek and Kendall Creek hatcheries. The probability of a tag being recovered was influenced by the date of release and there was a general decline in the probability of recovery as the season progressed (Figure 3). The black line in the figure shows this trend for those days when more than 10 jaw tags were released. Overall about 43% of the drift net releases and 57% of the set net releases were recovered (Table 3); the recovery rates for the two gears were not significantly different (Fisher's Exact test,  $P = 0.194$ ).

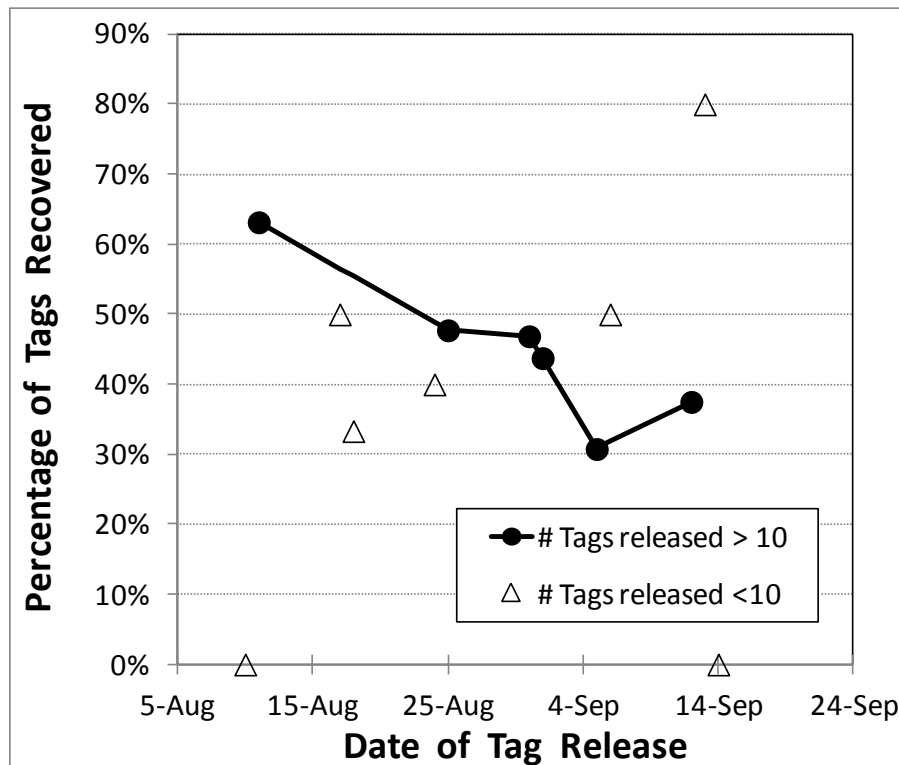


Figure 3: Percentage of tags released on each sample day that were eventually recovered.

There was no evidence that the condition of the released Chinook influenced probability of recovery (Figure 4). When condition categories 2, 3, and 4 are pooled to provide an adequate sample size their recovery rate (47%) is nearly the same as for condition 1 (46%). The relatively high recovery percentage for the pooled category for set nets is due to 6 of the 7 tagged Chinook categorized as condition 3 for the set nets being recovered (Table 2).



### Summary of Results for Nisqually Tangle Net Pilot Study

Table 2: Summary of release and recovery data for jaw-tagged Chinook, by gear type.

Tagging Date	# Tagged by Condition from Drift Net					Number Recovered	% Recovered	# Tagged by Condition from Set Net					Number Recovered	% Recovered
	1	2	3	4	Total			1	2	3	4	Total		
10-Aug					0	0		1				1	0	0.0%
11-Aug	1	4	2		7	4	57.1%	9	1	2		12	8	66.7%
17-Aug					0	0		2				2	1	50.0%
18-Aug					0	0		1		1	1	3	1	33.3%
24-Aug					0	0		3		2		5	2	40.0%
25-Aug	29		5	1	35	17	48.6%	7		2		9	4	44.4%
31-Aug	27	1	4		32	15	46.9%					0	0	
1-Sep	26	1	4		31	13	41.9%	1				1	1	100.0%
5-Sep	11		2		13	4	30.8%					0	0	
6-Sep	1		1		2	1	50.0%					0	0	
12-Sep	11		1	1	13	3	23.1%	3				3	3	100.0%
13-Sep	3		1		4	3	75.0%	1				1	1	100.0%
14-Sep	0		1		1	0	0.0%					0	0	
<b>Totals</b>	109	6	21	2	138	60	43.5%	28	1	7	1	37	21	56.8%
<b># Recovered</b>	49	1	10	0	60			14	1	6	0	21		
<b>% Recovered</b>	45.0%	16.7%	47.6%	0.0%	43.5%			50.0%	100%	85.7%	0.0%	56.8%		

## Summary of Results for Nisqually Tangle Net Pilot Study

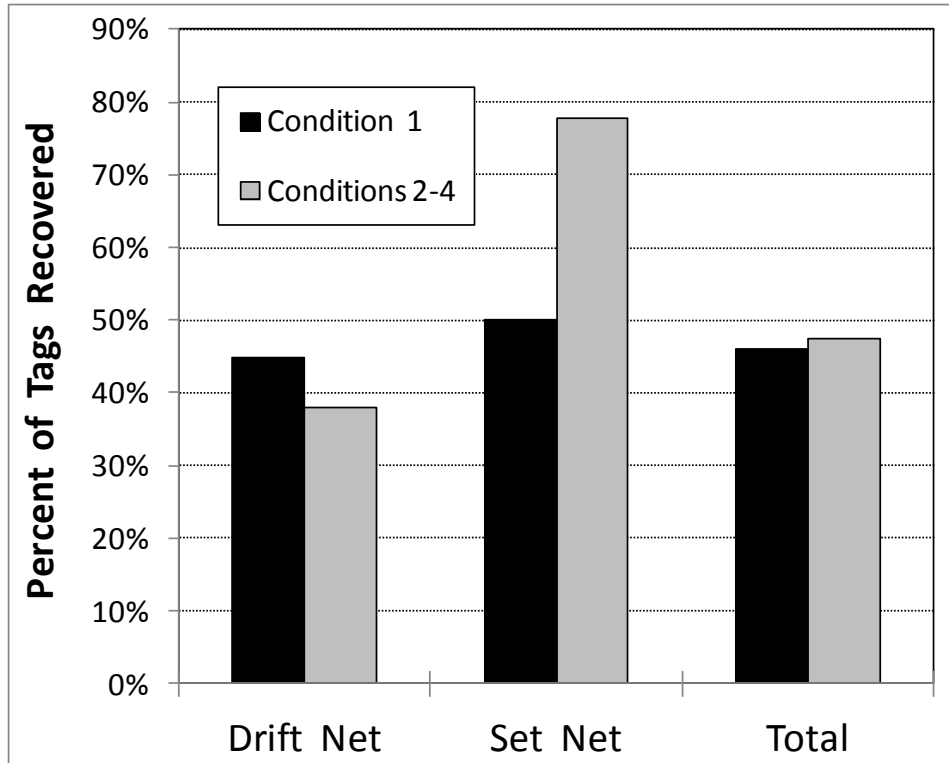


Figure 4: Comparison of the percentage of tags recovered by condition category and gear type..

### Expanded Tag Recoveries:

The previous analyses only used recoveries for which there was a tag physically recovered. There were several recoveries where the opercular punch was observed but no tag recovered. For these recoveries we have no information on the date of tagging, gear used to capture the fish for tagging, or condition of the fish on release. These recoveries can be included for the estimate of the minimum survival rate experienced by tagged fish. There were four additional recoveries of Chinook with only an opercular punch.

There were five primary recovery strata in 2011:

1. Sport fishery – These were a mix of tags voluntarily returned and tags recovered during creel surveys.
2. Commercial fishery – Estuary and upriver commercial catches were sub-sampled for tags during random sampling surveys to recover CWTs. There were also voluntary recoveries from commercial fishers.
3. Hatchery ponds – Holding ponds at Clear Creek and Kalama Creek Hatcheries were essentially censused and all returning Chinook were inspected for a jaw tag or opercular punch.
4. Spawning ground surveys – Spawning grounds in the upper Nisqually watershed were surveyed for CWTs and Chinook carcasses were examined for tags during the surveys.
5. Out-of-area recoveries – There was one tag recovery from outside the Nisqually system from a Chinook that had apparently entered the system, been caught and tagged, and then left the system. It is not known whether this was a Nisqually-origin Chinook or a stray from another system.

## Summary of Results for Nisqually Tangle Net Pilot Study

The commercial catch surveys were random samples and the number of Chinook caught by the estuary and upriver fisheries is known so recoveries from these surveys can be expanded to account for the unsampled portion of the catch. However, the expanded number would include voluntary recoveries. Therefore, we used the maximum of the total tags recovered plus opercular-punched only fish or the expanded number of tags in our final calculations in order to not double count any tags.

Table 3 summarizes the recovery information for each recovery stratum. The majority of the recoveries of tagged or opercular punch only Chinook were from the hatchery ponds (64%). The only expansion of recoveries currently possible is from the commercial catch sampling. 0.22% of the fish randomly sampled from the commercial catch were tagged or marked (8/3,589). Therefore, the estimate of the total number of tags present in the commercial catch is 25 ( $0.223 \times 11,158 = 24.9$  or 25 tags). Since the expanded number is greater than the voluntary recoveries plus survey recoveries (20) it is used in the survival rate calculations. This is the only number with an associated variance. The variance was estimated using the formula for the variance of a binomial proportion multiplied by a constant (C) where  $p$  = the proportion of the fish sampled that were tagged or marked:

$$Var(p \times C) = C^2 \times \frac{p \times (1 - p)}{n - 1}$$

where  $n$  = number of fish sampled. This results in a variance estimate of 77.2. Using the normal approximation, with the variance for the commercial catch as the only source of error for the estimate, results in a 95% confidence interval of 73 to 107 tags recovered.

A similar exercise could be conducted for the sport fishery sampling, unfortunately the sample data from the creel surveys and an estimate of the total catch were not available at this time.

Table 3: Summary of tag recoveries (including opercular punched only fish) by recovery stratum.

Recovery Stratum	Tags Recovered		Number Opercular Punch Only Observed	Number Fish Sampled	Number Fish Possible	Total Recoveries
	Voluntary (non-random)	During Sampling				
Sport Fishery	5	4	1			10
Commercial Fishery	12	7	1	3,589	11,158	25 <sup>a</sup>
Hatchery Ponds	0	52	2	13,015	13,015	54
Spawning Ground Surveys	0	0				0
Out of Area	1					1
<b>Totals</b>	<b>18</b>	<b>63</b>	<b>4</b>			<b>90</b>

<sup>a</sup> See text for explanation.

## Summary of Results for Nisqually Tangle Net Pilot Study

### Minimum Survival Estimate:

Based on the 90 recoveries and its 95% confidence interval, the estimated minimum survival rate is 51.4% (95% CI = 41.6% to 61.2%). This should be viewed as a minimum estimate as it does not account for:

- Drop-out of tagged fish from the Nisqually system. The single tag recovery by a Squaxin Island fisher indicates that some tagged fish may have left the system. The Nisqually tagging project was not widely publicized and, although we expect we would have heard about any additional jaw tags recovered outside the system, Chinook catches and escapements outside the Nisqually system were not carefully examined for opercular punches if a tagged fish had lost its jaw tag and left the system.
- Spawning ground recoveries. Although no tagged fish were found during surveys of spawning areas in the Upper Nisqually, the possibility of the presence of fish with lost tags and opercular punches only in these areas exists. Because 2011 was a pink salmon year, there were large numbers of pink salmon carcasses in most spawning areas which hindered the discovery and careful inspection of Chinook salmon carcasses.
- There might have been some mortality induced by the jaw tagging itself. Although an attempt was made to measure tag induced mortality it was not successful due to the difficulty in holding fish.
- Tag loss. There was a small degree of tag loss as evidenced by the recovery of four opercular punch only fish. Although Chinook were carefully inspected for opercular punches by the sport fishery creel surveys, the commercial catch sampling surveys, and the surveys of the holding ponds, additional tagged fish that had lost their tag may have been captured in the sport fishery and elsewhere but were not recognized.

### Days Between Release and Recovery:

The 81 physical tag recoveries allow us to examine how long tagged Chinook survived between release and recovery. Recoveries from the hatchery holding ponds have to be separated into those that were sampled while still alive versus those that were sampled as mortalities. Because the holding ponds were not sampled on a daily basis, the exact date of death for the mortalities in the pond is unknown, therefore, only the tags recovered from sampled live fish are used in this analysis. Table 4 summarizes basic statistics for the days between release and recovery for each recovery stratum. The average number of days between release and recovery was approximately four weeks (27.4 days, range 3 to 62 days). Figure 5 shows the distribution of days between release and recovery for these 64 recoveries. About 67% of the tag recoveries had 20 or more days between release and recovery.

Table 4: Summary of the number of days between tag release and recovery by recovery stratum.

Recovery Stratum	Sample Size	Number of Days		
		Min.	Max.	Mean
Hatchery Pond (live)	35	24	62	39.4
Treaty Commercial	19	3	33	9.4
Sport Fishery	9	9	32	20.2
Out-of Area	1	13	13	13.0
Total	64	3	62	27.4

## Summary of Results for Nisqually Tangle Net Pilot Study

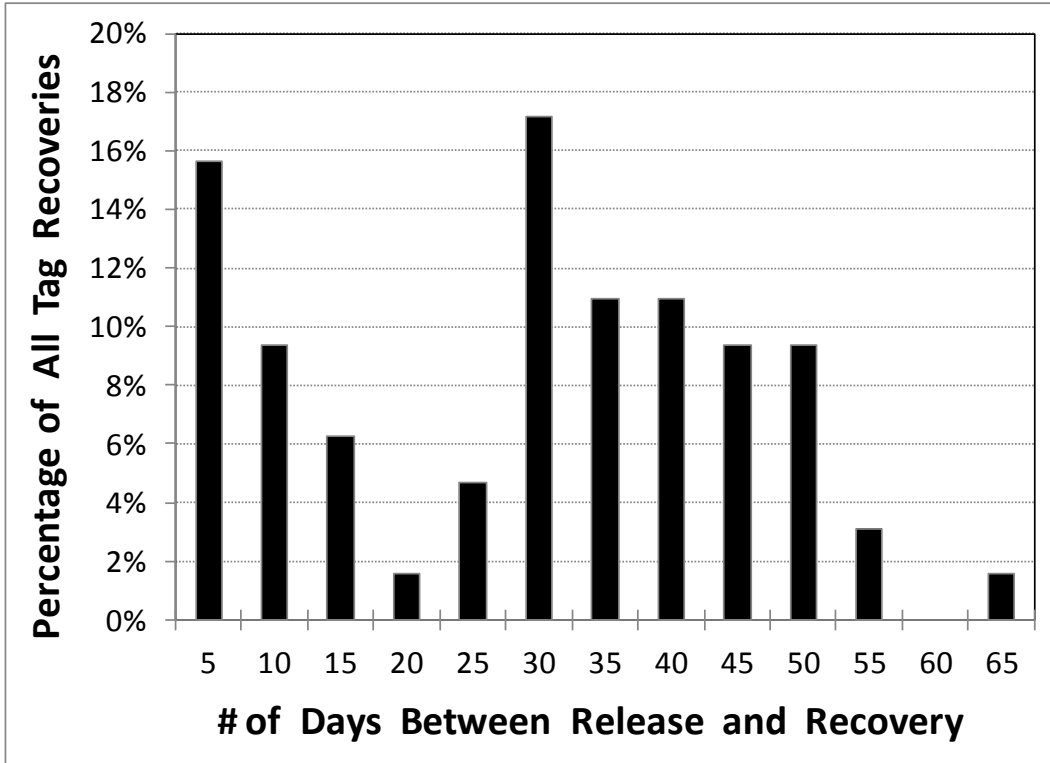


Figure 5: Distribution of the number of days between tag release and recovery for 64 tag recoveries.