

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

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

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Annual Report  
The 2024-2025 Fishing Season

October 2025

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## Executive Summary

This annual report on the Puget Sound Chinook Comprehensive Harvest Management Plan summarizes harvest information about commercial salmon fisheries occurring between May 15, 2024 and May 14, 2025, and Chinook spawning escapement in 2024. It also includes harvest information relevant to the 2023-2024 non-treaty sport fishing seasons where Chinook retention was allowed and a review of the coded wire tag sampling rates in marine sport salmon fisheries during calendar year (January-December) 2023.

Commercial Chinook catch in Puget Sound pre-terminal and terminal fisheries was lower than projected pre-season in most fisheries except for some select terminal areas targeting terminal hatchery runs (i.e. Bellingham Bay, Tulalip Bay, Gorst Creek, Chambers Bay, and Skokomish River) as well as the Strait of Juan de Fuca winter troll fishery.

Marine and freshwater landed recreational Chinook catch in fisheries where Chinook retention was allowed, based on catch record cards and creel, in the 2023-2024 season was estimated at 53,099 compared to the pre-season projection of 54,019. Creel survey-based estimates of catch in 2024-2025 summer mark-selective recreational fisheries in Areas 5, 6, 7, 9, 10, and 11 are included in this report. Total encounter estimates for intensively monitored 2024-25 summer marine area selective fisheries are presented and compared to pre-season projections for these areas.

Escapement for summer/fall management units were generally greater than projected. Exceptions to this include Hoko, Cedar, Puyallup, and Mid-Hood Canal fall Chinook. Escapements for all spring-run management units exceeded projects with the exception of White River spring Chinook.

Coded-wire tag sampling rates for calendar year 2023 commercial fisheries exceeded 20% in most areas although San Juan Islands, North Hood Canal (9A, 12, 12A, 12B), Hoodspout, Skokomish River, 8A, 8D, 10F, 10G, 13A and F, and Strait of Juan de Fuca Troll were below 20% fishery. Sampling rates for marine recreational fisheries exceeded the 10% objectives in all areas except sport areas 8.1 and 8.2.

# 1 Introduction

The Puget Sound Chinook Harvest Management Plan (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 and that of the Terms and Conditions in the 2024 Harvest Biological Opinion (WCRO-2024-00942) by assessing the performance and effectiveness of tribal and non-tribal fishery management actions adopted for the most recent management year, May 15, 2024 through May 14, 2025. Included in this report are:

- Management objectives for the 2024-2025 management year (May 15, 2024 through May 14, 2025)
- Projected and actual commercial landed catch in Puget Sound and descriptions of fisheries for the 2024-2025 management year
- Projected and actual landed catch for 2024 Puget Sound recreational fisheries where Chinook retention was allowed and creel surveys were conducted as well as for 2023 Puget Sound recreational sport fisheries where Chinook retention was allowed.
- Estimates of total encounters for 2024 summer Chinook mark-selective fisheries and non-landed mortality for commercial fisheries with Chinook non-retention where data are available.
- Projected and actual 2024 spawning escapements for nearly all, except Nooksack spring Chinook, Puget Sound Chinook populations with details on estimation methods and surveys. For Nooksack Spring Chinook escapement estimates, details are provided for 2023 escapements.
- Summaries of biological sampling of spawning escapement and estimates of contributions of hatchery- and natural-origin spawners where available.
- Coded-wire tag sampling rates for commercial and recreational fisheries in calendar year 2023 (January to December 2023).

## 1.1 Management Objectives

General management objectives for Puget Sound Chinook populations, including Exploitation Rate Ceilings (ERCs), Critical Exploitation Rate Ceilings (CERC's), Upper Management Thresholds (UMTs), and Low Abundance Thresholds (LATs) were implemented in 2024 (Table 1-1). The final pre-season FRAM model run (Chin2724) highlighted the rates that were used as the ceilings for each Management Unit (MU) in 2024, and the projected exploitation rates and escapements for each unit (Table 1-2).

Pre-season fishery planning for 2024-2025 fisheries projected that natural spawning escapement would fall below the Low Abundance Thresholds (LAT) for the Nooksack early, Skagit summer/falls, Snohomish, and Mid-Hood Canal MUs, so CERC's were implemented for those units. Escapement projections for other MUs exceeded their LAT's.

Table 1-1. 2024 Puget Sound Chinook Harvest Management Objectives.

Management Unit	ER Ceiling	Critical ER Ceiling	Low Abundance Threshold
Nooksack			
North Fork		10.9% SUS	400 <sup>a</sup>
South Fork			200 <sup>a</sup>
Skagit summer / fall	52%	15% SUS	7,844 <sup>a</sup>
Upper Skagit summer			2,200 <sup>a</sup>
Sauk summer			400 <sup>a</sup>
Lower Skagit fall			900 <sup>a</sup>
Skagit spring	36%	10.7% SUS	1,024 <sup>a</sup>
Upper Sauk			130 <sup>a</sup>
Cascade			170 <sup>a</sup>
Suiattle			170 <sup>a</sup>
Stillaguamish	9% SUS UM /14% SUS M.	Co-manager discussion	900 <sup>b</sup>
Snohomish	9.3% SUS	8.3% SUS	3,250 <sup>a</sup>
Skykomish			2,015 <sup>a</sup>
Snoqualmie			1,132 <sup>a</sup>
Lake Washington Cedar River	500 Escapement (15% PT SUS)	12% SUS	200
	2,744 Escapement (15% PTSUS)		
Green		12% SUS	1,098
White River spring	22% SUS	15% SUS	400
	1,170 Escapement (15% PT SUS)		
Puyallup fall		15% SUS	468
Nisqually	47%	50% Reduction of SUS ER	6,300
Skokomish	50%	12% PTSUS	1,300 aggregate; 800 natural
Mid-Hood Canal <sup>c</sup>			200
Dungeness	10% SUS	6% SUS	500
Elwha	10% SUS	6% SUS	2,000
Western SJDF	10.6% SUS	6.3% SUS	500

<sup>a</sup>Abundance Thresholds are NOR specific.

<sup>b</sup>Stillaguamish LAT is terminal runsize and does not account for terminal fishery impacts.

<sup>c</sup> The exploitation rate for mid-Hood Canal Chinook in Puget Sound marine fisheries will be the exploitation rate associated with achieving the management objectives for the 14 other management units within the Puget Sound Chinook ESU. Mid-Hood Canal freshwater fisheries directed at Chinook salmon will be closed.

Table 1-2. Management guidelines implemented and projected exploitation rates and escapements for Puget Sound Chinook Management Units for 2024 – 2025 pre-season planning (FRAM Chin2724).

Management Unit	ERC or CERC implemented	Projected ER	Projected Escapement
Nooksack	10.9% SUS	10.9% SUS	361 <sup>a</sup>
Skagit summer fall	15% SUS	14.9% SUS	9,043 <sup>a</sup>
Skagit spring	36% Total	25% Total	1,375 <sup>a</sup>
Stillaguamish	9% UM SUS/14% M SUS	9%UM SUS/14% M SUS	983 <sup>b</sup>
Snohomish	8.3% SUS	8% SUS	2,603 <sup>a</sup>
L. Washington (Cedar)	500 Escapement / 15% PT SUS	12.4% PT SUS	658
Green	2,744 Escapement / 15% PT SUS	12.4% PT SUS	3,562
White	22% SUS	17.1% SUS	2,237
Puyallup	1,170 Escapement / 15% PT SUS	12.4% PT SUS	3,082
Nisqually	47%	45.5%	8,564
Skokomish	50%	49.7%	2,812
Mid Hood Canal <sup>c</sup>			13
Dungeness	10% SUS	4.1% SUS	1,255
Elwha	10% SUS	4.6% SUS	2,961
Western SJDF	10.6% SUS	1.7% SUS	3,125

<sup>a</sup> NOR specific escapement estimates.

<sup>b</sup> Stillaguamish LAT is forecasted terminal runsize and does not account for terminal fishery impacts.

<sup>c</sup> The exploitation rate for mid-Hood Canal Chinook in Puget Sound marine fisheries will be the exploitation rate associated with achieving the management objectives for the 14 other management units within the Puget Sound Chinook ESU. Mid-Hood Canal freshwater fisheries directed at Chinook salmon will be closed.

## 2 Commercial Harvest

This chapter provides post-season estimates of Chinook catch and release mortalities for Puget Sound commercial fisheries, catch from tribal ceremonial and subsistence (C&S) fisheries, and test or research fisheries. Catch is projected pre-season through modeling of the fishery regime, which is developed and agreed upon in the Pacific Fisheries Management Council (PFMC) and North of Cape Falcon (NOF) forums, using the Fishery Regulation Assessment Model (FRAM). The 2024–25 List of Agreed Fisheries (<https://nwifc-fisherinesservices.s3.amazonaws.com/wp/wp-content/uploads/20240822110900/2024-2025-LOAF-Final-Reduced-Size.pdf>) describes salmon fisheries for all areas of Puget Sound and ocean fisheries off the Washington coast. The final pre-season projections of catch under this regime were made in FRAM run number Chin2724.

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

Non-treaty troll, treaty troll, and recreational catches in Washington coastal fisheries north of Cape Falcon were less than their expected quotas (Table 2-1). Comparisons of projected and actual Puget Sound catch are provided for two pre-terminal areas (Strait of Juan de Fuca and San Juan Islands), and six regional terminal areas (Nooksack/Samish, Skagit, Stillaguamish/Snohomish, South Puget Sound, Hood Canal, and Strait of Juan de Fuca). General information is presented for the 2024–25 fisheries, including in-season management actions that deviated from the pre-season plan, and explanations for differences in projected and actual catch.

Table 2-1. Projected and actual Chinook net and troll catch, including release mortalities from selective net fisheries, in waters of the Washington coast and Puget Sound fisheries in 2024.

Fishery	Projected	Actual
Washington ocean non-treaty troll	41,000	36,672
Washington ocean recreational	41,000	21,999
Washington ocean treaty troll	42,500	18,110
Puget Sound pre-terminal net & troll total		
Strait of Juan de Fuca troll	3,262	10,243
Strait of Juan de Fuca net	513	591
PSC Test Fishery		--
San Juan Islands net <sup>a</sup>	6,403	357
San Juan Islands/Bell. Bay C&S		
Nooksack-Samish terminal net	18,816	20,787
Skagit terminal net	5,033	4,455
Stillaguamish-Snohomish net	4,391	6,931
South Puget Sound terminal net	34,268	29,770
Hood Canal terminal net	28,824	23,883
Strait Tributaries terminal net	3	4

<sup>a</sup> includes non-retention mortality in NT purse seine fishery: Total non-retained Chinook observations per observed set, summed, multiplied by total effort (sets), and multiplied by agreed to mortality rates for adult and juvenile Chinook.

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

Treaty net fisheries in the Strait of Juan de Fuca and the San Juan Islands caught 591 and 329 Chinook, respectively. Catch in the Strait of Juan de Fuca primarily occurred during the Chinook set net fishery while catch in the San Juan Islands area occurred during the Fraser River Chum salmon directed fishery.

Non-treaty fisheries targeting Fraser chum salmon in Areas 7 and 7A landed 8 Chinook during the reef net fishery and an estimated 20 Chinook release mortalities during the purse seine fishery in 2024. Reef net fishery allowed the retention of marked Chinook while targeting Chum salmon. Because non-tribal purse seines are required to release all Chinook, release mortality estimates are calculated using available data from on-water by-catch monitoring (Reported in detail below in Table 2-8 and Table 2-9).

The treaty troll fishery in the Strait of Juan de Fuca (SJD), exclusive of catch in Area 4B when it was managed under PFMC quotas, caught 10,243 Chinook. Three thousand four hundred three Chinook were caught during the summer SJD troll fishery while 6,840 were caught during the winter SJD troll fishery.

## 2.2 Nooksack/Samish Terminal Area

### Treaty Spring Chinook Ceremonial and Subsistence Fishery

The Lummi Nation conducted fishing with tangle-net gear from during the 2024 season along with limited community C&S openings. Total landed catch was 414 hatchery-origin Chinook and 14 natural-origin Chinook with an additional 29 natural-origin and 45 HOR Chinook salmon encountered and released. Applying the expected release mortality rate of 30% to the encounters results in nine NOR and 14 HOR estimated mortalities. The total encounter of NORs (n=43, including released and retained, adult and jack fish) was lower than the pre-season projection of 85 NOR adults. Genetic results for all released NORs are not currently available to determine population origin nor possible assignment to Skookum Hatchery broodstock parentage.

A commercial fishery for Lummi Sea Pond early Chinook hatchery returns was prosecuted in 2024. A total of 6 Chinook, all HORs, were harvested in that fishery in 2024. The preseason projection was for 190 Chinook.

In 2024, the Nooksack Tribe conducted a permit only, subsistence fishery as well as a ceremonial fishery. A total of 145 Chinook were caught in the traditional C&S fisheries and all were sampled. One hundred thirty-seven of the 145 Chinook were determined to be hatchery-origin based on adipose-fin marks, CWT detections, or otolith results. Of the eight NORs, five were determined to be NF/MF origin, two were SF origin, and one was a fall-run origin. Given the fall-origin NOR retention, the Nooksack Tribe harvested one fewer early-run Chinook salmon than expected pre-season.

The Tribes 2024 total NOR mortality is estimated to be 30 early-run NORs, pending additional analysis of remaining biological samples. The pre-season projection was 34 NOR mortalities (rounded up).

Table 2-2. Expected and observed Chinook catches in the Nooksack/Samish terminal area, 2024.

Area	Management Period	Projected	Actual
7B, 7C, 7D, Treaty net <sup>1</sup>	Chinook, Coho, Chum	8,601	9,631
7B, 7C Non-treaty net	Chinook, Coho, Chum	6,484	8,864
Nooksack River Treaty net	Early Chinook, May-Jun <sup>2</sup>	2,476	602
	Fall Chinook, Aug-Oct	1,254	1,690

<sup>1</sup> Includes 7A on-reservation catch during coho management.

<sup>2</sup> Includes Lummi Bay fishery targeting returns to Lummi Sea Ponds and in-river selective net release mortalities.

### Fall Chinook, Coho, and Chum Fisheries

The tribal fall Chinook fishery in Bellingham Bay (Area 7B) and Lummi Bay (7D) operated as planned from August 1<sup>st</sup> through September 6<sup>th</sup> and in Samish Bay (7C) from August 1<sup>st</sup> through September 20<sup>th</sup>, with a catch of 6,469 Chinook. The Coho fishery operated as planned from

September 8<sup>th</sup> through October 26<sup>th</sup>, with an incidental harvest of 3,162 Chinook. During the 7A on-reservation Coho fishery from September 1<sup>st</sup> through October 2<sup>nd</sup>, zero Chinook were incidentally harvested. No Chinook were harvested incidentally during the chum fishery. The total fall Chinook catch of 9,631 for Areas 7B, 7C, and 7D was greater than the preseason projection of 8,601 (Table 2-2).

The non-treaty fishery in Area 7B and 7C landed 8,864 Chinook from August through October, more than the pre-season projection of 6,613. Twenty-five Chinook were forecasted to be landed during the Chum fishery with zero landed.

Fisheries for fall Chinook, Coho, and Chum salmon in the Nooksack River occurred as planned from August 1 – September 7, September 8 – October 26, and October 29 – December 13, respectively. The total Chinook catch was 1,690, more than the projected catch of 1,254 fish; 1,039 were caught during the Chinook period and 651 during the Coho fishery. No Chinook were harvested during the Chum period.

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

**Spring Chinook Fisheries:** Tribal commercial fisheries in the Skagit terminal area directed at hatchery spring Chinook were conducted in 2024 as scheduled preseason, although adjusted in timing and duration in response to ESA, tribal, and environmental needs. A total of 153 wild and 2,838 hatchery spring Chinook were encountered and retained in these directed spring Chinook fisheries. The final pre-season modeled projections in the Skagit terminal harvest rate model that feeds into Chinook FRAM 2724 were 192 wild and 3,258 hatchery spring.

An additional 10 wild spring Chinook and seven hatchery spring Chinook were harvested incidentally in directed Sockeye fisheries, compared to 13 wild spring Chinook and 13 hatchery spring Chinook projected preseason.

A total of zero wild and three hatchery spring Chinook were harvest in tribal ceremonial and subsistence (C&S) spring Chinook fisheries, compared to seven wild and 103 hatchery expected pre-season.

Total spring Chinook mortalities across all of these tribal commercial and C&S fisheries were 163 wild and 2,848 hatchery fish, compared to the pre-season modeled 212 wild and 3,374 hatchery mortalities.

**Summer/Fall Chinook Fisheries:** No treaty commercial fisheries directed at summer/fall Chinook were scheduled in the Skagit terminal area for 2024. However, as anticipated, incidental harvest of summer/fall Chinook occurred in the Sockeye and Coho fisheries. The Sockeye and Coho fisheries were adjusted from the preseason schedule as noted in Table 2-3 due to in-season management needs and intertribal sharing agreements. The Upper Skagit Tribe required Chinook non-retention during several weeks of their Coho fishery, as noted in the table, using a 52.4% release mortality rate for gillnets. Total summer/fall Chinook encounters in these fisheries were 1,141 fish, and associated mortalities were 903 fish, compared to the pre-season expectation of 1,017 mortalities based on the Skagit terminal harvest rate model spreadsheet that feeds Chinook FRAM 2724.

There was no tribal ceremonial and subsistence (C&S) harvest of summer/fall Chinook in 2024, so C&S harvest was zero compared to 80 modeled pre-season.

Total summer/fall Chinook mortalities across all of these tribal commercial and C&S fisheries were 903 in these fisheries, compared to the pre-season expectation of 1,071 based on the Skagit terminal harvest rate model that feeds into Chinook FRAM 2724.

**Terminal Area Test Fisheries:** A suite of Skagit terminal area test fisheries targeting steelhead, Chinook, Sockeye, Coho, and Chum were conducted by the Skagit tribes in 2024. Some weeks of these fisheries were adjusted or cancelled, as noted in Table 2-3, in response to weather, flow concerns, or staffing issues. A total of 19 Chinook were encountered in the new Area 78D-2 tangle-net SONAR test. All were released in vigorous condition, but a 30% release mortality rate was applied, so six release mortalities were estimated for that test fishery. A total of 22 wild spring Chinook, 110 hatchery spring Chinook, and 410 summer/fall Chinook mortalities occurred in the suite of test fisheries. The pre-season expectation of mortalities in the test fisheries was 27 wild spring Chinook, 34 hatchery spring Chinook, and 316 summer/fall Chinook.

**Summary:** Overall, a total of 185 wild spring Chinook, 2,958 hatchery spring Chinook, and 1,313 summer/fall Chinook fishery related mortalities occurred in treaty commercial, C&S, and test fisheries. The preseason expected mortalities based on the Skagit terminal harvest rate model that feeds into Chinook FRAM 2724 were 239 wild springs, 3,408 hatchery springs, and 1,387 summer/falls.

Table 2-3. Skagit terminal area projected and actual hatchery and wild Chinook catches for Skagit terminal area tribal fisheries in 2024. Weekly projections were made by plugging the FRAM Chin2724 terminal run sizes into the Skagit weekly harvest rate model, so totals may differ slightly from FRAM.

Fishery	Preseason Projected			Post-season Observed/Estimated			Difference	
	Schedule	Encounters	Mortality	Schedule	Encounters	Mortality	Encounters	Mortality
<b>Test:</b>								
Chinook	1 site, wks 19-35	98	98	Wks 21-25, 29-34	66	66	-32	-32
Sockeye	3 sites: Area 3: wks 23-30; Area 2 SONAR: wks 23-30 (ck release); Blakes: wks 24-29	94	65	Area 3 wks 23-30; Area 2 SONAR wks 25-31 (ck release); Blakes none	98	85	4	20
Coho	3 sites: Blakes wks 34 - 45, Area 3 wks 34-42, Spudhouse wks 35-44	211	211	Blakes wks 34-43; Area 3 wks 35-37,39,41,43; Spudhouse wks 35-41	315	315	104	104
Chum	3 sites, wks 44-45	0	0	Bay wks 44-45, no Jetty/Blakes	0	0	0	0
Steelhead	2 sites, wks 8-18	6	3	Wks 8-17	76	76	70	73
<b>Area 8/78C Spring Chinook Fishery Swinomish Tribe:</b>								
Week 17	3 days	162	162	Same	191	191	29	29
Week 18	7 days	379	379	Same	480	480	101	101
Week 19	7 days	248	248	3 days	511	511	263	263
Week 20	5 days	253	253	3 days	304	304	51	51
Week 21	4 days	146	146	None	0	0	-146	-146
<b>Area 78P Spring Chinook Fishery Sauk-Suiattle Tribes:</b>								
Wk 19-28	Wk 19: 5 days; Wks 20-21: 7 days/wk; Wk 22-28: 3 days/wk	1,200	1,200	Wk 19: 1.416 days; Wk 20: 2.958 days; Wk 21: 4.3 days; Wk 22-25: 3.5 days/wk; Wk 26: 2.83 days	801	801	-399	-399
<b>Area 78C/78D Spring Chinook Fishery Upper Skagit Tribe:</b>								
Week 18	0 day	0	0	1.167 day	359	359	359	359
Week 19	1.167 day	297	297	2 days	186	186	-111	-111
Week 20	1.167 day	423	423	1.167 day	158	158	-265	-265
Week 21	1.167 day	342	342	0 day	0	0	-342	-342
<b>Area 8/78C/78D/78P Chinook C&amp;S Fishery Swinomish, Sauk-Suiattle, Upper Skagit Tribes:</b>								
Sum/Fall-Spring Chin.	As needed	190	190	As needed	3	3	-187	-187
<b>Areas 8/78C Sockeye Fishery Swinomish Tribe:</b>								
Week 25	2 days	5	5	Same	34	34	29	29
Week 26	5 days	28	28	3.79 days	111	111	83	83
Week 27	5 days	48	48	A8: 4.413 days; A78C: 0.5 day	20	20	-28	-28
Week 28	5 days	67	67	A8: 4.625 days; A78C: 2.75 days	38	38	-29	-29
Week 29	4 days	87	87	A8: 0 days; A78C: 0.33 days	6	6	-81	-81
<b>Area 78D/78O Sockeye Fishery Swinomish Tribe:</b>								
Week 27	None	0	0	0.708 days	0	0	0	0
Week 28	1 day	2	2	1.458 days	4	4	2	2
Week 29	1 day	2	2	2.25 days	3	3	1	1
Week 30	None	0	0	None	0	0	0	0
Week 31	None	0	0	None	0	0	0	0

Areas 78C/78D/78O Sockeye Fishery Upper Skagit Tribe:								
Week 27	1 day	44	44	2.292 days	84	84	40	40
Week 28	1 day	77	77	2.458 days	194	194	117	117
Week 29	0.417 day	32	32	None	0	0	-32	-32
Areas 8/78C Coho Fishery Swinomish Tribe:								
Week 38	None	0	0	None	0	0	0	0
Week 39	3 days	65	65	3 days	6	6	-59	-59
Week 40	3.5 days	25	25	3.5 days	12	12	-13	-13
Week 41	3 days	2	2	2.67 days	0	0	-2	-2
Week 42	None	0	0	1.75 days	0	0	0	0
Areas 78P Coho Fishery Sauk-Suiattle Tribe:								
Wks 36-43	Wks 36-37: 7 days/wk; Wks 38-43: 3 days/wk	300	300	Wk 36: 1.416 days; wk 37: 7 days; wk 38-42: 3 days; wk 43: 2.8 days	38	38	-262	-262
Areas 78B Coho Fishery Sauk-Suiattle Tribe:								
None	None	0	0	None	0	0	0	0
Areas 78C/78D Coho Fishery Upper Skagit Tribe:								
Week 38	None	0	0	1.167 days	87	87	87	87
Week 39	None	0	0	2 days (Ck non-retention)	247	139	247	139
Week 40	1 day	132	132	2.25 days (Ck non-retention)	247	129	115	-3
Week 41	1.25 days	72	72	0 days	0	0	-72	-72
Week 42	2 days (Ck non-retention)	54	28	1 day (Ck non-retention)	27	14	-27	-14
All Terminal Area Chum Fishery Swinomish, Upper Skagit Sauk-Suiattle Tribes:								
None	None	0	0	None	0	0	0	0
Total Skagit Terminal Area:		<b>5,091</b>	<b>5,033</b>		<b>4,706</b>	<b>4,455</b>	<b>-385</b>	<b>-579</b>

## 2.4 Stillaguamish/Snohomish Terminal Area

The tribal net fishery in Area 8A was open for the 2024/2025 fishing season for Ceremonial Chinook and commercial Coho salmon fisheries. Eleven Chinook salmon were landed in July for ceremonial and subsistence needs while none were harvested during the Coho directed fishery (Table 2-4). Non-treaty commercial fishing in Area 8A was closed for the 2024-2025 season.

Tribal Chinook catch in Area 8D occurred from May through August, with most of the catch occurring during June and July. Total 8D catch was 6,912, including 1,627 for ceremonial or subsistence purposes (Table 2-4). Tribal Chinook catch was greater than projected in area 8D.

Non-treaty commercial Coho-directed gillnet fishery was scheduled in Area 8D from September through October during the 2024-25 season and no Chinook were projected to be impacted and none were landed.

The Stillaguamish Tribe harvested five Chinook for ceremonial purposes from the Stillaguamish River in 2024 along with three incidental Chinook harvested during the Coho salmon fishery in September (Table 2-4).

Table 2-4. Projected (FRAM Chin2724) and actual Chinook net fishery harvest in the Stillaguamish – Snohomish terminal area in 2024.

Area		Projected	Actual
8A Commercial	Treaty	10	0
	Treaty C&S	Up to 100	11
	Ntrty	--	--
8A Test		N/A	--
8D	Treaty Comm.	4,254	5,285
	Treaty C&S		1,627
	Ntrty Comm.	0	0
Stillaguamish R. Net	C&S/Coho	27	8

## 2.5 South Puget Sound Terminal Areas

### Marine Areas 9, 10, 10E & 11

The Coho salmon test fishery in area 10 was not implemented in 2024. The Chum salmon test fishery at Apple Cove Point (Area 9) incidentally caught a total of 39 Chinook (**Error! Reference source not found.**), below the estimated 118.

During the Chum directed non-treaty purse seine and gill net fisheries in area 10 and 11 had an estimated two Chinook release mortalities along with 28 harvested Chinook based on fish tickets. There were an estimated 23 Chinook release mortalities associated with the area 11 non-treaty test fishery. The treaty Coho and Chum salmon fisheries in Area 10 harvested 24 Chinook. Fisheries directed at Chinook salmon in Area 10E harvested 5,985 fish (**Error! Reference source not found.**). No Chinook were harvested during either the Coho or Chum fishery in area 10E.

Twelve Chinook salmon were harvested in Area 9 for C&S purposes.

### Lake Washington

There were no Chinook directed fisheries in Lake Washington, the Ship Canal, or North Lake Washington. Sockeye returns to Lake Washington were insufficient to allow any directed fisheries. The Muckleshoot Tribe conducted a C&S fishery in the Lake Washington Ship Canal in 2024 which harvested 711 Chinook. Incidental Chinook catch during the Coho fishery in Lake Union, and the upper and lower Ship Canal harvested 206 Chinook. The Muckleshoot Tribe conducted a Coho directed commercial fishery in North Lake Washington with a total by-catch of 410 Chinook. The Coho directed fisheries in Lake Sammamish incidentally harvested zero Chinook salmon.

The Lake Washington warm water test fishery, conducted by the Muckleshoot Tribe was prosecuted in spring (May-June) of 2024. Monthly reports were provided separately to NOAA for this research.

### Elliott Bay/Duwamish River

The Chinook test fishery in Area 10A harvested 243 Chinook in 2024. A Chinook-directed commercial fishery occurred in Area 10A and the Duwamish River, with 277 and 2,195

Chinook salmon, respectively. In 10A, there were 115 Chinook caught in September during the Coho directed fishery by Muckleshoot Indian Tribe and Suquamish Tribe. In the Duwamish River, 36 Chinook were caught during the Coho test fishery to determine Chinook clearance. During the Coho directed fishery in the Duwamish River, 1,951 Chinook were caught incidentally as well as 78 Chinook caught during the Chum directed fishery.

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

Ceremonial and subsistence fisheries in the Puyallup River caught 162 adult spring Chinook salmon. Based on fisheries sampling data, an additional 65 fall-run Chinook, were taken during the spring C&S fishery. The Muckleshoot Tribe had an additional spring Chinook C&S fishery in the White River which caught 281 spring Chinook. Besides the 65 fall Chinook taken during the spring C&S, no other fall Chinook C&S fisheries occurred. The pre-season projected C&S catch was 613.

Fall Chinook catch was 3,643 during the Chinook directed fishery. The Coho fishery in the Puyallup and White River occurred from management week 37 (September 5<sup>th</sup>) to management week 42 (October 10<sup>th</sup>) and incidentally harvested 1,263 Chinook salmon, mostly during early September (**Error! Reference source not found.**).

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

The Chinook fishery in Carr Inlet (13A) caught 2,295 Chinook (**Error! Reference source not found.**), in August and early September (weeks 32 – 36). Pre-season projected catch was 2,181. This fishery targets Minter Creek Hatchery Chinook returns where no natural origin fish are returning to spawn. The Coho fishery in 13A incidentally harvested three Chinook, with a preseason expectation of 21.

The Chinook fishery at Chambers Bay (13C) occurred between July 26 through October 10 with 1,560 Chinook harvested (**Error! Reference source not found.**). The preseason catch projection was 983.

Chinook directed fisheries in Budd Inlet (13F) occurred from mid-July through early-September; total catch was 4,031. Chinook caught incidentally during the Coho fishery (Week 37-40) in 13D totaled 26 fish. Five hundred sixty-four Chinook were caught during the Fox Island (Area 13) Coho fishery. The total preseason catch projection for all areas was 2,906.

### **Nisqually River**

The treaty non-selective commercial fishery in the Nisqually River harvested an estimated 3,056 Chinook, excluding jacks, but including fish for Ceremonial and Subsistence purposes, with a pre-season projected commercial catch, excluding jacks, of 4,650 (**Error! Reference source not found.**).

The selective gill net fishery in the Nisqually River harvested 480 Chinook salmon during the 2024 fishery with an estimated additional six mortalities after release.

Table 2-5. Projected and actual Chinook catch in 2024 South Puget Sound net fisheries.

Area	Management Period	Projected	Actual
Area 9/10/11	Coho (A10 – Test)	0	0
	Chum (A9 – Test)	118	39
	A9 (Trty. C&S + Chum)	500	12
	Trty Coho/Chum (A10/11)	16	24
	NT Chum (A10/11)	117 <sup>a</sup>	53 <sup>a</sup>
Area 10E	Treaty Chinook/coho/chum	3,315	5,985
Area 10A	Chinook (test/C&S)	855	243
	Chinook/Coho/Chum	653	392
Duwamish River	Chinook/Coho/Chum	8,101	4,224
	Coho (Test/C&S)		36
L Washington/Ship Canal	Sockeye/Coho/ C&S	1,313	1,327
	Test/Research	N/A	–
Lake Sammamish	Chinook/Coho	1	0
Puyallup River	Spring/Fall C&S	613	227 <sup>b</sup>
	Chinook/Coho	6,673	4,152
White River	Spring/Fall C&S	– <sup>c</sup>	281
	Coho	–	754
Areas 13, 13D-K	Chinook/Coho/Chum	2,906	4,621
Area 13A	Chinook/Coho/Chum	2,201	2,298
Areas 13C/Chambers	Chinook	983	1,560
Nisqually River	Chinook/Coho	5,754	3,542 <sup>b</sup>
McCallister Cr.	Chinook	180	0

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

<sup>b</sup> Adult (Age 3+) catch only, does not include jacks.

<sup>c</sup> White River C&S Projected harvest is incorporated in the Puyallup River Spring/Fall C&S catch of 613 fish.

## 2.6 Hood Canal

Tribal Chinook directed fishing in 12C occurred as planned from August 4 through August 21 with a catch of 4,698. Twenty-two Chinook were landed in 12C during the Coho directed fishery in October. In marine catch area 12B, 423 Chinook were harvested while seven Chinook were landed in Marine Area 12 during the tribal Chinook directed fishery.

Tribal Chinook harvest in the Hoodspout Hatchery Zone (12H) was 5,566 and occurred from July 25 through September 19. Catch was less than the preseason expectation of 12,671.

Tribal Chinook troll fishery in areas 12/12B had zero effort so no Chinook were landed in 2024.

Chinook harvest in the Skokomish River occurred as planned from August 5 (wb 8/4) through August 29 (wb 8/25) landing 8,719 fish. One Chinook was harvested during the Coho directed fishery in October. Chinook harvest also occurred in Purdy Creek (tributary of Skokomish River that feeds the George Adams Hatchery) to access Chinook returning to George Adams Hatchery each Saturday from July 13 through August 10 landing 514 fish.

In Port Gamble (Area 9A), 85 Chinook were harvested, primarily in mid-August to mid-September during Coho fisheries.

Non-treaty commercial fisheries in the Hoodspout Zone (12C) harvested 4,362 Chinook salmon (Table 2-6). There were no Chinook landed in other non-treaty fisheries in Hood Canal in 2024 (Table 2-6 and Table 2-9).

Table 2-6. Pre-season projected and observed catch of Chinook in Hood Canal terminal area net fisheries in 2024.

Area	Target Species	Projected	Actual
(12, 12B-12D, 9A) (T)	Chin, Coho, Chum	4,190	5,235
(12-12C, 9A) (NT)	Chum, Coho	16	0 <sup>a</sup>
(12, 12B) Troll (T)	Chinook, Coho	—	—
12A Net (T)	Coho	54	1
12H Net (T)	Chinook, Chum	12,671	5,566
12C Hoodspout Zone Net (NT)	Chinook, chum	5,000 <sup>b</sup>	4,362
Skokomish River (82G) (T)	Chin, Coho, Chum	6,893	8,719
(82J) (T)	<i>Chinook</i>		514
	Total	28,824	23,883 <sup>c</sup>

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

<sup>b</sup> The co-managers pre-season agreement for 5,000 as modeled in CHIN2724.

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

## 2.7 Strait of Juan de Fuca

Due to the continued depressed status of Chinook populations, terminal fisheries in the Dungeness River were closed or provided very limited fishing opportunity, with no Chinook harvested in 2024. Four Chinook were harvested for Ceremonial and Subsistence purposes in the Elwha River (Table 2-7 and Elwha Escapement description Section 4.12).

The non-treaty Area 6D (Dungeness Bay) skiff gillnet coho directed fishery was projected to impact zero Chinook as modeled in FRAM 2724 and none were encountered in 2024.

Table 2-7. Projected and actual catches of Chinook in Strait of Juan de Fuca terminal net fisheries in 2024.

Terminal Area	Projected	Actual
Area 6D & Dungeness River Treaty	0	0
Area 6D Non-Treaty	0	0
Elwha River Treaty (C&S)	3	4
Hoko River Treaty	0	0

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

## 2.8 Non-Treaty Commercial Monitoring and Total Mortality

Since non-treaty vessels are required to release non-target species in many fisheries, WDFW conducts on-water monitoring to provide data on encounters of non-target species. Summaries of observer data for 2024 are presented in Table 2-8. Expanded estimates of total mortality, where available, were presented above in the summaries for individual fisheries, and are summarized and compared to pre-season expectations below in Table 2-9.

Table 2-8. Commercial fishery observation data for 2024 Puget Sound non-treaty salmon net fisheries. Data collected by on-board fishery observers represented as cumulative catch composition by total sets observed. These data are observed encounters and does not represent total mortalities.

Area	Gear type	# sets observed	Chinook	Coho	Sockeye	Pink	Chum	Steelhead
7	PS	3	0	180	0	0	2,112	0
7A	PS	46	14	688	0	0	5,483	0
8A	PS	Closed						
10	PS	49	0	455	0	0	220,737	0
11	PS	48	1	46	0	0	17,763	0
12	PS	9	0	73	0	0	33,244	0
12B	PS	27	0	203	0	0	118,508	0
6D	GN	4	0	6	0	0	0	0
7	GN	0	0	0	0	0	0	0
7A	GN	1	0	1	0	0	1	0
10	GN	0	0	0	0	0	0	0
11	GN	0	0	0	0	0	0	0
12	GN	3	0	2	0	0	314	0
12B	GN	5	0	1	0	0	156	0

Table 2-9. Total pre-season projected and post-season estimated Chinook mortality (landed + released) in Puget Sound non-treaty commercial salmon fisheries in 2024.

Area	Total Mortality	
	Projected	Actual
6D	0	0
7/7A	1,656	28
7B/7C	6,613	8,864
8	N/A	Closed
8A	N/A	Closed
8D	0	0
10/11	117	53
12-12C/9A	15	0
12C Hoodsport	5,000	4,362

### 3 Recreational Harvest

This chapter summarizes expected recreational catch in Puget Sound marine waters and freshwater tributaries for the 2024-2025 management year and presents catch estimates available from Chinook MSF that were intensively monitored using creel during 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 where Chinook retention was allowed are not yet available. Since complete Chinook MSF and NS catch estimates were not available for all areas in the annual report covering the previous management cycle, projected and actual recreational Chinook MSF and NS catches for the 2023-2024 management year are also

included here, except for winter MSFs in marine catch area 13, which only account for catch through March 31, 2024.

### **3.1 2023-2024 Recreational Chinook MSF and NS Catch**

Mark-selective and non-selective Recreational Chinook harvest in 2023-2024, estimated from preliminary Catch Record Card (CRC) data through March 31, 2024, and creel estimates where available, was 52,925 fish, compared to a preseason projection of 54,019. The CRC estimates are preliminary and subject to revision. Projected and actual catches for individual fisheries are shown in Table 3 1. Estimates of total mortality in mark-selective fisheries, for those fisheries where estimates are available, are presented in reports available by searching for “mark-selective” at <https://wdfw.wa.gov/publications>.

Table 3-1. Projected (FRAM 2023) and actual (preliminary, where available) Chinook catches in Puget Sound Chinook MSF and NS recreational fisheries during the summer of 2023-and winter of 2024 seasons.

Area/Fishery	Projected	Actual
Area 5-6		
Area 5 Summer MSF	3,906	3,540
Area 5 Winter MSF	1,400	472
Area 6 Summer MSF	7,258	5,429
Area 6 Winter MSF	Closed	--
Other		
Strait Tributaries		
Area 7		
Summer MSF	2,181	2,082
Winter MSF	Closed	--
Nooksack/Samish FW	12,445	13,774
NF Nooksack Spring Chinook	Closed	--
Area 8-1 & 8-2		
Winter MSF	Closed	--
Skagit River		
Spring MSF	621	724
Area 8D SAF	643	1,118
Stillaguamish River	2.5	0
Snohomish River		
Skykomish MSF	87	16
Area 9		
Summer MSF	4,300	4,564
Winter MSF	Closed	--
Area 10		
Summer MSF	3,566	3,416
Winter MSF	515	2,203
Area 11		
Summer MSF	4,802	1,808
Winter MSF	250	543
Area 10E SAF	367	297
Lake Sammamish	1	21
Area 10A SAF	841	1,029
Green River	1,095	734
Puyallup River		
Carbon R MSF	772	1,355
Puyallup R MSF	1,571	2,110
Area 13		
Summer MSF	2,763	2,935
Winter MSF	396	381 *
Chambers Cr	19	41
Nisqually	1,924	2,208
Deschutes	5	82
Area 12		
Summer MSF	2,288	2,043
Winter MSF	Closed	--
Skokomish River	Closed	--

\* All CRC estimates of catch through 3/31/2023

### **3.2 2024-2025 Recreational Chinook MSF Catch**

Projected Chinook catches for 2024-2025 recreational Chinook MSF fisheries are listed in Table 3-2. The recreational fishing regime included Chinook mark selective fisheries (MSF) for portions of the year in Marine Areas 5 through 13 and in several rivers. WDFW conducted intensive sampling and monitoring of Chinook summer MSFs in Marine Areas 5, 6, 7, 9, 10 and 11 which provided the estimates in Table 3-2. Brief summaries of Chinook catch and encounters resulting from summer sampling programs are included below. The analysis of 2024-2025 winter fisheries is still in draft form, and reports summarizing the information have not been created. When complete, this analysis will be made available on the WDFW publications website at <https://wdfw.wa.gov/publications>. Searching for “mark-selective” on that page will return links to individual reports.

For Chinook mark-selective fisheries without intensive sampling and/or creel data available, catch will be estimated using CRC data and data from baseline dockside sampling of marine fisheries. Baseline sampling provides data on catch per unit effort (CPUE), species composition, as well as CWT and biological sampling data. For freshwater fisheries, catch estimates are made using CRC data, unless creel studies were conducted, and harvest estimates are available. For marine fisheries, species-specific catch estimates are made using CRC estimates of total catch, combined with species composition data obtained from the baseline sampling program. These estimates will be included in the 2025 annual report.

Table 3-2. Projected (FRAM 2724) and actual (preliminary, where available) Chinook MSF catches in Puget Sound recreational fisheries during the 2024-2025 season.

Area/Fishery	Projected	Actual
Area 5-6		
Area 5 Summer MSF	3,506	2,865
Area 5 Winter MSF	1,411	
Area 6 Summer MSF	7,258	6,267
Area 6 Winter MSF	Closed	
Other		
Strait Tributaries		
Area 7		
Summer MSF	2,181	2,187
Winter MSF	Closed	
Nooksack/Samish FW	9,389	
NF Nooksack Spring Chinook	Closed	
Area 8-1 & 8-2		
Winter MSF	Closed	
Skagit River		
Spring MSF	691	
Area 8D SAF	746	
Stillaguamish River	3	
Snohomish River		
Skykomish MSF	Closed	
Area 9		
Summer MSF	3,967	3,723
Winter MSF	22	
Area 10		
Summer MSF	3,166	3,458
Winter MSF	531	
Area 11		
Summer MSF	4,802	3,014
Winter MSF	250	
Area 10E SAF	367	
Lake Sammamish	200	
Area 10A SAF	613	
Green River	654	
Puyallup River		
Carbon R MSF	1,047	
Puyallup R MSF	1,622	
Area 13		
Summer MSF	2,763	
Winter MSF	396	
Chambers Cr	25	
Nisqually	1,533	
Deschutes	5	
Area 12		
Summer MSF	2,537	
Winter MSF	Closed	
Skokomish River	Closed	

### 3.2.1 Marine Area 5 Summer MSF

The 2024 season was the 22nd consecutive year of summer mark-selective fishing in Marine Area 5. The fishery was scheduled preseason, from July 1 through August 15. The Chinook season closed early to Chinook retention from August 1-15 after meeting the legal-sized encounter fishery control. This was based on in-season estimates of legal-size encounters.

WDFW conducted an intensive fishery monitoring program, a Full Murthy design, during the Area 5 mark selective fishery. Sampling activities included dockside creel sampling, on-the-water effort surveys, test fishing, and efforts to distribute and collect voluntary trip reports (VTRs) from the angling public. An enhanced Salmon Trip Report (STR) program and test fishing were 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 (2024).

For Area 5, WDFW estimates that 2,865 Chinook were landed, compared to preseason projections of 3,506 (Table 3 3).

Table 3-3. Comparison of modeled (FRAM 2724) and estimated total Chinook encounters for the 2024 Area 5 summer Chinook MSF.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	8,198	2,538	5,660	25
	AD	12,668	4,001	8,667	3,481
	Total	20,866	6,539	14,327	3,506
	% Marked	61	61	60	99
Estimated (Creel) Encounters	UM	5,941	3,283	2,658	8
	AD	13,758	3,127	10,631	2,857
	Total	19,698	6,410	13,289	2,865
	% Marked	70	49	80	100

### 3.2.2 Marine Area 6 Summer MSF

The 2024 season was the 22nd consecutive year of summer mark-selective fishing in the sub-area of Marine Area 6 west of Ediz Hook. The fishery was open for the entirety of the season that was planned preseason, from July 1 through August 15.

WDFW's Puget Sound Sampling Unit (PSSU) implemented an intensive monitoring program, Full Murthy, using an aerial design in Marine Area 6 east of Ediz Hook throughout the season to collect the data needed to estimate key parameters characterizing the fishery and its impacts on unmarked salmon. Sampling activities included intensive dockside creel sampling, aerial surveys, test fishing and collection of voluntary STRs from the angling public when possible. The fishery control for this Area was based on the preseason prediction of total legal-sized Chinook salmon encountered. Detailed descriptions of the sampling program and results are available in WDFW (2025).

For Area 6, WDFW estimates that 6,267 Chinook were landed, compared to preseason projections of 7,258 (Table 3 4).

Table 3-4. Comparison of modeled (FRAM 2724) and estimated total Chinook encounters for the 2024 Area 6 sub-area summer Chinook MSF.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	5,477	2,863	2,614	29
	AD	15,571	8,310	7,261	7,229
	Total	21,048	11,173	9,875	7,258
	% Marked	74	74	74	100
Estimated (Creel) Encounters	UM	2,842	2,340	501	19
	AD	11,533	7,020	4,513	6,248
	Total	14,375	9,360	5,014	6,267
	% Marked	80	75	90	100

### 3.2.3 Marine Area 7 Summer MSF

The 2024 season was the 9<sup>th</sup> year of summer mark-selective Chinook fishing in Marine Area 7. In 2024, Area 7 was scheduled to open Thursday through Saturday July 18-20 only with additional days to be added in-season if fishery controls allow. After the initial three-day opener, three additional days were added in-season, July 26, August 4, and August 13.

WDFW conducted intensive fishery monitoring activities, using a Full Murthy aerial design during Area 7 mark selective fishery. Sampling activities included intensive dockside creel sampling, aerial surveys, test fishing, and collection of VTRs from the angling public. Detailed descriptions of the sampling program and results are available in WDFW (2025).

For Area 7, WDFW estimates 2,187 Chinook were landed, compared to preseason projections of 2,181 (Table 3 5).

Table 3-5. Comparison of modeled (FRAM 2724) and estimated total Chinook encounters for the 2024 Area 7 summer Chinook MSF.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	3,845	2,976	869	30
	AD	3,745	2,473	1,272	2,151
	Total	7,590	5,449	2,141	2,181
	% Marked	49	45	59	98.6
Estimated (Creel) Encounters	UM	1,528	1,273	255	10
	AD	3,395	2,462	934	2,178
	Total	4,923	3,735	1,188	2,187
	% Marked	69	66	79	100

### 3.2.4 Marine Area 9 Summer MSF

In 2024, a recreational MSF occurred for the 18<sup>th</sup> consecutive summer in Marine Area 9. Area 9 was scheduled to open Thursday through Saturday, July 18-20 only with additional days to be decided in-season if fishery controls allow. After the initial three-day opener, one additional day was added in-season and open to Chinook retention on August 4.

As in previous years, WDFW’s Puget Sound Sampling Unit (PSSU) implemented an intensive monitoring program, a Full Murthy design in Area 9 during the summer season to collect the data needed to provide in-season catch estimates and to estimate key parameters characterizing the fishery and its impacts on unmarked salmon. Sampling activities included intensive dockside creel sampling, on-the-water effort surveys, test fishing, and collection of VTRs from the angling public. Detailed descriptions of the sampling program and results are available in WDFW (2025).

An estimated 3,723 Chinook were landed in Area 9, compared to a preseason projection of 3,900 (Table 3.6).

Table 3-6. Comparison of modeled (FRAM 2724) and estimated Chinook encounters for the 2024 Area 9 summer Chinook MSF.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	2,731	1,090	1,641	11
	AD	10,176	4,470	5,706	3,889
	Total	12,907	5,560	7,347	3,900
	% Marked	79	80	78	100
Estimated (Creel) Encounters	UM	3,722	2,155	1,567	21
	AD	7,052	4,114	2,938	3,703
	Total	10,774	6,269	4,506	3,723
	% Marked	65	66	65	99

### 3.2.5 Marine Area 10 Summer MSF

In 2024, a recreational MSF occurred for the 17<sup>th</sup> consecutive summer in Marine Area 10. The summer recreational MSF was planned preseason to open Thursday through Saturday July 18-20 only, with additional days added if fishery controls allow. After the initial three-day opener, additional days were added in-season and open to Chinook retention on July 25-27, August 4, and August 11-12, 2024.

WDFW’s Puget Sound Sampling Unit (PSSU) implemented an intensive monitoring program, Full Murthy design in Area 10 throughout the season to collect the data needed to estimate key parameters characterizing the fishery and its impacts on unmarked salmon. Sampling activities included intensive dockside creel sampling, on-the-water effort surveys, test fishing, and collection of VTRs from the angling public. Detailed descriptions of the sampling program and results are available in WDFW (2025).

An estimated total of 3,458 Chinook were landed during this fishery, compared to the pre-season projection of 3,166 (Table 3 7).

Table 3-7. Comparison of modeled (FRAM 2724) and estimated Chinook encounters for the 2024 Area 10 summer Chinook MSF.

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	2,614	904	1,710	18
	AD	8,385	3,618	4,767	3,148
	Total	10,999	4,522	6,477	3,166
	% Marked	76	80	74	99
Estimated (Creel) Encounters	UM	3,236	1,275	1,961	20
	AD	6,961	3,824	3,138	3,438
	Total	10,197	5,099	5,099	3,458
	% Marked	68	75	62	109

### 3.2.6 Marine Area 11 Summer MSF

In 2024, a recreational MSF occurred for the 18<sup>th</sup> consecutive summer in Marine Area 11. During the spring time frame, Marine Area 11 fishery was to open Wednesdays through Saturdays beginning June 5. The fishery continued as scheduled through June 15. Due to low catch rates, this fishery opened seven days per week beginning Sunday, June 23. This regulation continued through the end of June. WDFW also implemented a summer Chinook MSF in Marine Area 11 with a preseason schedule to open July 18-20, then opened 7 days/week August 1 through September 30. In-season evaluation of fishery controls allowed an additional opener on July 25-27.

WDFW’s Puget Sound Sampling Unit (PSSU) implemented an intensive monitoring program, a Full Murthy design in Area 11 throughout the season to collect the data needed 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 (2025).

An estimated total of 3,014 Chinook were landed during this fishery, compared to the pre-season projection of 4,802 (Table 3.8).

Table 3-8. Comparison of modeled (FRAM 2724) and estimated Chinook encounters for the 2024 Area 11 summer Chinook MSF (rounded).

Data Source	Group	Total Encounters	Legal	Sublegal	Landed Only
FRAM Encounters	UM	2,938	1,250	1,688	25
	AD	12,319	5,491	6,828	4,777
	Total	15,257	6,741	8,516	4,802
	% Marked	81	81	80	99
Estimated (Creel) Encounters	UM	2,264	679	1,585	20
	AD	5,961	3,395	2,565	2,995
	Total	8,225	4,075	4,150	3,014
	% Marked	72	83	62	99

### 3.2.7 North Fork Nooksack Spring Chinook MSF

In 2024, the recreational spring Chinook MSF was closed.

## 4 Spawning escapement

This section compares natural Chinook escapement estimates for 2024 with pre-season escapement projections, and management thresholds. Due to simplicity of reporting whole numbers, rounding errors may account for slight differences in total and sub-totals.

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

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

Escapements for available spring-run Chinook management units were all above projected estimates, except for White River spring Chinook salmon.

For summer/fall populations, escapements were greater than projected for all management units, except the Hoko River, Cedar River, Puyallup River, and Mid-Hood Canal fall-runs. Escapements for these MUs were less than forecasted abundance.

Table 4-1. Pre-season projections and preliminary post-season estimates of 2024 Puget Sound Chinook escapement.

Management Unit		NOR	HOR	Total	Projected (FRAM 2724)
Nooksack	NF			N/A	29 <sup>1</sup>
	SF			N/A	332 <sup>1</sup>
Skagit spring	Suiattle	645		645	381 <sup>1</sup>
	Cascade	278		278	178 <sup>1</sup>
	Sauk	1,353		1,353	815 <sup>1</sup>
	Total spring	2,276		2,276	1,375 <sup>1</sup>
Skagit summer/fall	Sauk summer	595			317 <sup>1</sup>
	Upper Skagit summer	7,808			6,838 <sup>1</sup>
	Lower Skagit fall	1,578			1,369 <sup>1</sup>
	Total summer/fall	9,981		9,981	9,043 <sup>2</sup>
Stillaguamish	Total	834	433	1,267 <sup>3</sup>	836
Snohomish	Skykomish	3,040	1,307	4,347	1,919 <sup>1</sup>
	Snoqualmie	1,369	877	2,246	684 <sup>1</sup>
	Total	4,409	2,184	6,593	2,603 <sup>1</sup>
Lake Washington	Cedar	341	302	643	658
Green		2,373	3,271	5,644	3,562
Puyallup		834	1,526	2,361	3,082
White		1,671	243	1,914 <sup>4</sup>	2,237 <sup>4</sup>
Nisqually		804	8,600	9,404 <sup>5</sup>	8,564
Skokomish		353	2,960	3,313	2,812
Mid Hood Canal	Dosewallips			0	
	Duckabush			2	
	Hamma Hamma			1	
	Total			3	13
Dungeness		569	1,205	1,774 <sup>6</sup>	1,255
Elwha		619	3,537	4,156 <sup>7</sup>	2,961
Hoko		697	1,792	2,489	3,125

1. Natural-origin only.

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

3. Includes NORs and HORs collected for broodstock (n=128) from the North Fork which are part of the FRAM Projection.

4. Includes NORs, HORs, 1,149 vent-clipped acclimation pond, and 231 fall NOR adult fish trucked and released upstream of Mud Mountain. Actual spawning escapement is unknown but likely lower due pre-spawn mortalities from trap and haul and other environmental effects. Uncertainty exists around the NOR estimate as there is no ability to validate USACOE sampling.

5. Includes 1,215 (1,003 NOR's and 212 HOR's) volitional spawners, as well as hatchery rack return of 6,869.

6. Includes 109 fish removed from the river for use as broodstock.

7. TRS estimated from SONAR. Includes adult fish collected for broodstock. Estimate does not include jacks.

## 4.1 Nooksack River Early Chinook

Nooksack River early (spring) Chinook escapement estimates are summarized by population (North and Middle Fork (NF/MF) and South Fork (SF)) and account for all spawners of each population regardless of where they spawn in the Nooksack Basin (i.e. accounting for each population of spawners in both the NF/MF and SF basins). Escapement estimates are carcass-based for the NF/MF basin and redd-based for the SF basin. Population assignments are made for each individual carcass observed by using a combination of genetic, external mark, CWT, and otolith biological data collected during surveys. For unmarked, or putative wild fish, genetic stock assignments are the primary means to assign probable population for each individual.

### North/Middle Fork early (spring) Chinook

The North and Middle Forks of the Nooksack River originate from Mount Baker glaciers and are typically turbid with moderate or lower flows during summer due to glacial melt. Co-managers have modified their escapement methods as needed, depending on the survey conditions to reflect what they believe to be the most accurate estimates. The 2023 spawning ground escapement estimates are presented here.

Because of the unpredictability of redd viewing conditions during spring Chinook spawning seasons (mid-July through late-September) within the North and Middle Forks and their tributaries, a carcass-based methodology is used instead of a redd-based methodology. This methodology was developed from five years of surveys with good substrate visibility (1991, 1992, 1995, 1996, 2000) which enabled annual cumulative redd counts. Redd counts in those years were multiplied by 2.5 fish per redd to estimate basin population abundances. The carcass counts in each of those five years was then expanded to match the respective redd-based population abundance estimates. The average expansion needed in those five years was 3.48 fish per carcass enumerated to match the redd-based estimates.

Beginning in 2005, an alternative method was developed in the Middle Fork. From 2005 through 2008, water flows and good viewing conditions enabled the spawning ground surveys to enumerate a high percentage of total redds in the river. As a result, co-managers shifted to a redd based methodology for those four years, expanding total enumerated redds by 2.5 adults per redd in the Middle Fork and applying the 3.48 fish per carcass expansion factor only to the North Fork carcass counts during those years.

Beginning in 2009 and continuing through 2023, visibility was lower in the Middle Fork which limited redd detection efficiency during the early Chinook spawning season. As a result, co-managers adjusted the Middle Fork escapement methodology to account for these less-than-optimal viewing conditions. A Middle Fork-specific carcass expansion factor was calculated in a method similar to the North Fork; by expanding carcass counts observed during 2005 through 2008 when good viewing conditions were present during the spawning season. The total number of redds was multiplied by 2.5 fish per redd to estimate total spawners and then divided by the number of carcasses observed resulting in a 1.91 average expansion factor per observed carcass. The carcass expansion factor of 1.91 continues to be used for Middle Fork surveys due to persistent limited redd visibility.

From 2013-2023, Peat Bog Creek and Bear Creek (tributaries to the Middle Fork) also showed higher carcass counts than prior to 2013. Therefore, during this period, carcass counts from all tributaries to the Middle Fork that are surveyed were enumerated but not expanded. Surveys were frequent and the unexpanded tributary carcass counts were considered to reflect total Chinook more accurately, given consistent low flow and clear water conditions.

Beginning in 2010 and continuing through 2023, another significant change in early Chinook escapement estimate methodology was applied in Kendall Creek, a tributary to the North Fork. The change resulted in carcasses observed in Kendall Creek and Kendall Slough no longer being expanded, and instead were considered to be total counts. Unexpanded counts were considered to more accurately reflect total abundance in this area. The prior assumption was that the Kendall Creek and Slough carcass enumerations should be expanded by 3.48, like all other North Fork carcasses. High densities in this limited area and frequent surveys resulted in co-managers no longer expanding these near-hatchery spawners.

Starting in 2016, co-managers began using genetic-based stock assignments to apportion total basin escapement estimates to different genetic stocks present in the system. Tissues are collected from all carcasses sampled to genetically assign individuals to one of the three Nooksack baseline stocks using probability estimates: South Fork early returning Chinook, North/Middle Fork early returning Chinook, or Samish/Nooksack fall Chinook. The DNA results from the natural origin return (NOR) carcasses were applied to apportion the estimated total NORs in the North/Middle Fork basin to one of the three genetic baseline stocks. As such, the North/Middle Fork Chinook escapement estimates are the number of naturally spawning natural-origin early-timed North/Middle Fork chinook and Kendall Creek Hatchery origin Chinook in the Nooksack forks, including those within the South Fork (see next section and Table 4-3). Further, hatchery origin (HOR) fish were identified based on adipose fin clip marks, otolith marks, and/or CWT presence and subsequently assigned to their respective hatchery stock origin. These data are used to estimate respective hatchery contributions.

The 2023 NF/MF Chinook escapement estimate is 1,269 in the North Fork and Middle Fork basins (125 NORs and 1,144 HORs; Table 4-2), plus an additional 92 in the South Fork basin (10 NORs and 82 HORs; Table 4-3). There were an additional 15 pre-spawn mortalities (PSMs) in the South Fork (1 NOR and 14 HORs; Table 4-4). Both NF/MF NOR and HOR escapement were higher than in any of the previous 5 years (Appendix A).

Table 4-2. Early timed Chinook spawning escapements for the 2023 return year within the North Fork and Middle Fork Basins. South Fork early NOR and HOR spawning escapement in the North/Middle Fork basins are additional to those within the South Fork basin

Year	North/Middle Fork Nooksack Basins					
	NF/MF NOR	Kendall HOR	SF NOR	SF HOR	Fall NOR	Fall HOR
2023	125	1,144	80	1,300	6	15

### **South Fork Nooksack early (spring/summer) Chinook**

The South Fork watershed is a non-glacial system and the summer low flow visibility is much better than in the North and Middle Forks, although visibility can deteriorate after fall rain freshets begin. The South Fork escapement methodology is a redd-based estimate instead of carcass-based. Escapement estimates are calculated by multiplying the total number of redds observed by 2.5 adults per redd.

From 2017 through 2021 the methodology applied the following assumptions:

- 1) All redds are accurately counted in all geographic spawning areas utilized.
- 2) No spawning Chinook after October 8 are early returning Chinook.
- 3) Chinook that spawn through October 8 die within 1 week (by October 15).

Prior to 2017, assumption #3 only included redds that were built through September 30 and carcass recoveries through October 7. However, coded-wire tag (CWT) recoveries and DNA results indicated spawning occurred later than was understood when the escapement estimates were much smaller, and Nooksack co-managers agreed to amend the assumption.

Beginning in 2022, the Nooksack co-managers agreed to consider final population assignments to carcasses recovered to determine a carcass and/or redd cutoff dates. Recent data results indicated confirmed South Fork early Chinook were being recovered past historical cutoff dates, so carcass recoveries may reasonably indicate when the cutoffs should be. In 2022, the co-managers agreed to include all redds through October 14 and all carcasses recovered through October 21 based on a review of the biological sample results. In 2023, we included all redds through October 13 (the date of the last flagged redd on SF surveys) and all carcasses through October 23.

Starting in 2016, co-managers began using genetic-based stock assignments to apportion South Fork basin escapement estimates to Chinook stocks known to occur in the basin. DNA is collected from all carcasses in order to assign individuals to one of the three Nooksack baseline stocks using probability estimates: South Fork early Chinook, North/Middle Fork early Chinook, or Samish/Nooksack fall Chinook. The DNA stock assignment results are then used to apportion the redd-based South Fork escapement estimate to each of the three baseline genetic stocks.

Hatchery origin (HOR) fish are identified based on adipose fin clip marks, otolith marks, and/or CWT presence and subsequently assigned to their respective hatchery stock origin. Furthermore, because the WDFW Molecular Genetics Lab (Lab) staff has genotyped the adult broodstock spawned for the Skookum Hatchery chinook program, they are able to use parentage-based molecular techniques to identify individual offspring that had a single parent and both parent assignments of hatchery chinook broodstock. From 2017 through 2023, the Lab used this parentage-based technique for field sampled carcasses which assigned to the South Fork baseline but did not have field observed indicators recorded that identified them as hatchery-origin fish (primarily CWTs). The Lab recommended that Nooksack co-managers consider individuals as South Fork HORs that assigned as offspring of two hatchery broodstock parents if spawning records were consistent or at least were spawned on the same date. Therefore, these individuals are included as South Fork HORs instead of South Fork NORs. As of brood-year 2017, the Skookum hatchery program now otolith marks all South Fork Skookum hatchery releases. Starting with return year 2022, all returning HORs are otolith marked and we no longer assess stock assignments based only on genetic parentage-based assignments for natural escapement purposes. As such, the South Fork Chinook escapement estimates are the number of naturally spawning NOR early-timed South Fork Chinook and Skookum Creek HOR Chinook in the Nooksack basin, including those within the North/Middle Forks (see previous section and Table 4-2).

The 2023 South Fork Chinook escapement estimate was 1,402 in the South Fork basin (136 NORs and 1,266 HORs; Table 4-3) and 1,380 in the North Fork basin (80 NORs and 1,300 HORs; Table 4-2).

Table 4-3. Early timed Chinook spawning escapements for the 2023 return year in the South Fork basin. North Fork early NOR and Kendall Creek HOR spawning escapement in the South Fork basin are in addition to those spawning within the North/Middle Fork basins.

Year	South Fork Basin					
	SF NOR	SF HOR	NF/MF NOR	NF/MF HOR	Fall NOR	Fall HOR
2023	136	1,266	10	82	7	32

Pre-spawn mortalities (PSM) were not included in South Fork basin escapement estimates. Recent years have seen substantial Chinook mortality events during warm summer periods in the South Fork Nooksack. In 2021, the Nooksack co-managers observed an unprecedented pre-spawn mortality event where over 2,000 Chinook died before they had the chance to

spawn in the South Fork basin. This led to a total of 2,432 pre-spawn mortalities in the South Fork over the course of the spawning season. This was a raw count of Chinook carcasses that did not show any evidence of spawning, and was likely an underestimate, given that it wasn't logistically feasible to sample every carcass before they deteriorated or were carried downstream.

It was not feasible to fully sample every carcass during the 2021 PSM event, so Lummi staff employed a subsampling scheme to determine which carcasses would be fully sampled. All data collected would be the same for both sampled and subsampled groups, except fully sampled fish would include additional biological data such as: fin clip for genetics, CWT extraction (if present), otoliths, and scales. Fork length and sex were collected for most subsampled fish but not all. All unmarked & untagged fish (putative NORs) were fully sampled and not subject to the subsampling scheme. On the first day of the PSM event in 2021 that saw several hundred carcasses in a small area, Lummi staff subsampled 1 in 5 from each group based on mark status (Groups were: ad-clipped only, ad-clipped + CWT, and CWT only). After the first day, Lummi staff changed to a 1 in 10 subsampling scheme to be able to better handle the PSM event and still be able to gather representative data from each group. This 1 in 10 scheme was generally used during any survey where staff estimated there were >100 carcasses present. Notes on PSM observations and subsampling scheme used were included in survey data sheets. The same subsampling scheme was employed throughout 2023 in the South Fork, with a 1 in 10 rate applied in each instance where subsampling PSMs was necessary.

There were environmental variables that likely played a role in the PSM event including a "heat dome" event in late June 2021 that saw local temperatures above 100°F over several days and consistent low-flow, high water temperature conditions throughout the South Fork basin. These cumulative stressors led to the proliferation of several pathogens (*Flavobacterium columnare*, *Ichthyophthirius multifiliis*, and freshwater diatoms) that were confirmed by a WDFW senior veterinarian who performed necropsies on carcasses of 4 PSM Chinook.

In 2023, the South Fork basin continued to exhibit high water temperature and low flow conditions throughout the spawning season that were likely tied to the increased prevalence of pre-spawn mortalities. At the USGS Saxon Bridge gage (USGS ID 1221000), temperatures were routinely above the 16°C TMDL temperature goal for seasonal salmonid spawning conditions between July and September, with a maximum observation of 23.4°C in mid-August (Figure 1). River discharge was also below the minimum instream flow goal of 300 cfs (WAC 173-501-030(1)); August 1 – October 14) from August through late-September (Figure 2). These conditions generally matched trends from 2022, though flows did increase significantly in late September compared to the previous year.

The escapement estimate is an expanded value based on the number of redds, while the PSM carcasses are raw counts, and thus not directly comparable. However, it is important to compare the raw number of PSM carcasses relative to all recovered carcasses to when considering impacts to the populations. In 2023, there were 669 PSMs that accounted for 51.1% of all recovered carcasses (n = 1,309 total) in the South Fork basin (Table 4-4). While 543 were confirmed to be at least partially spawned, 97 were of unknown spawn status.

Table 4-4. Early timed Chinook pre-spawn mortality (PSM) raw counts for the 2019-2023 return years in the South Fork basin.

Year	South Fork Basin Pre-spawn Mortalities						% of Total Carcasses
	SF NOR	SF HOR	NF/MF NOR	NF/MF HOR	Fall NOR	Fall HOR	
2019	2	30	0	1	0	0	13.4%
2020	1	34	0	1	0	4	11.5%
2021	41	2,292	2	82	4	11	86.9%
2022	29	1,026	1	27	2	8	49.7%
2023	16	638	1	14	0	0	51.1%

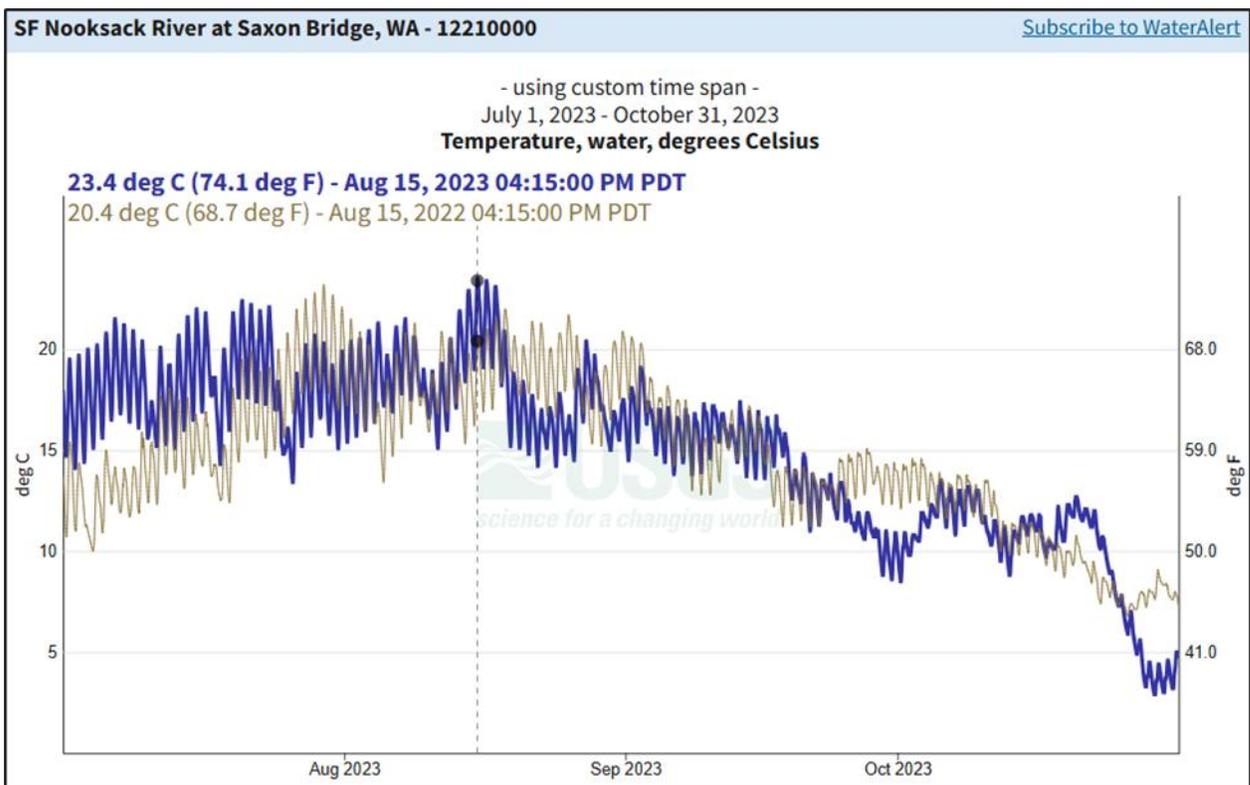


Figure 4-1. Water temperatures measured at the USGS Saxon Bridge gage from July – October, 2023 (blue) compared to July – October, 2022 (tan).



Figure 4-2. Discharge (cfs) measured at the USGS Saxon Bridge gage from July – October, 2023 (bold red) compared to July – October, 2022 (light red).

## 4.2 Skagit River

### Background

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

Escapements were calculated based on cumulative total redd counts expanded by 2.5 fish per redd. A variety of methods are used to enumerate total redds dependent on population and location and are based on either total new redd counts, total visible redd counts, linear regression predictions, or a combination of methods. During spawning ground surveys, Chinook carcasses were sampled for fork length, sex, scales, and presence or absence of a hatchery mark. We also electronically sampled Chinook carcasses for coded wire tags (CWT) and collected CWT present snouts.

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

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

## Methods and Results

### Suiattle River Spring Chinook

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

Surveys were conducted from July 30 through October 14. The survey goal was to cover each index every 7 -10 days to ensure all redds were enumerated. The indexes included all known spawning habitat for each tributary and the survey was performed on foot and wading the stream. The logjam that had been a passage barrier on Buck Creek in previous years (approximately RM 1.2) remained in 2024. The logjam continues to be a total passage barrier with no live Chinook or Chinook redds observed upstream of the logjam. A total of 258 redds were observed in 2024.

A total of 60 Suiattle spring Chinook carcasses were observed, and 51 were collected and sampled; 3 carcasses were adipose clipped, of which 1 was tagged. The other 48 carcasses were unmarked and untagged. The season total redd count was 258 (Table 4-5).

Table 4-5. Suiattle River spring Chinook 2024 spawning ground survey redd counts. This table includes only observed redds.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>*1</sup>	Redds
Big Creek	3.0723	Foot	0.0-0.6	7.8	27
Tenas Creek	3.0761	Foot	0.0-0.5	9.6	15
Straight Creek	3.0797	Foot	0.0-0.1	15.1	8
Buck Creek	3.0813	Foot	0.0-1.7	18.1	45
Circle Creek	3.0892	Foot	0.0-0.2	18.4	0
Lime Creek	3.0897	Foot	0.0-0.5	20.8	6
Downey Creek	3.0919	Foot	0.0-2.1	24.4	139
Sulfur Creek	3.0973	Foot	0.0-0.9	26.3	18
Milk Creek	3.1022	Foot	0.0-0.1	28.6	0
Total redds					258

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

The preliminary 2024 Suiattle River Spring Chinook escapement estimate was 645 fish (rounded). All data and estimates of escapement were preliminary at the time of reporting.

### Upper Cascade River Spring Chinook

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

Surveys of all known spawning habitat occurred from August 12 through October 7. Mainstem surveys were conducted by foot or pontoon boat depending on the stream features of the index. Historically this survey interval for this population was one pass every 10-14 days, but to find and sample more carcasses, surveys of these reaches occurred up to twice per week in 2024. One pass would focus on redds and carcasses, the next pass would focus only on carcasses.

A total of 41 carcasses were observed and 35 were able to be collected and sampled in the upper Cascade spring Chinook area in 2024. A total of 19 carcasses were unmarked and untagged Chinook, of which 12 could not have tag status confirmed due to predation (head was not present). There were 4 adipose clipped Chinook carcasses sample, of which 2 were tagged, 1 was adipose clipped only, and 1 had unknown tag status due to predation.

Surveyors located 111 redds in 2024 (Table 4-6). The 2024 upper Cascade River spring Chinook spawning escapement estimate was 278 fish. All data and estimates of escapement were preliminary at the time of reporting.

Table 4-6. 2024 Cascade River spring Chinook redd counts.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>1</sup>	Redds
Cascade River	3.1411	Foot	8.1-9.0	18	16
Marble Creek	3.1451	Foot	0.0-0.3	0	0
Cascade River	3.1411	Foot/Raft	9.0-12.4	46	47
Cascade River	3.1411	Foot	12.4-15.8	45	25
Cascade River	3.1411	Foot	15.8-18.6	32	21
Kindy Creek	3.1528	Foot	0.0-0.5	0	0
North Fork Cascade River	3.1605	Foot	0.0-0.1	0	2
South Fork Cascade River	3.1411	Foot	0.0-0.5	0	0
<b>Total redds:</b>					<b>111</b>

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

### Upper Sauk River Spring Chinook

This population spawns in the mainstem Sauk River and in the North and South Fork Sauk Rivers. Mainstem spawning has been documented between RM 31.0 to the forks at RM 39.7. A high gradient section of the Sauk River beginning 0.9 river miles downstream of the White Chuck River is an assumed barrier to Sauk *summer* Chinook and the beginning and lowest point of spawning of Upper Sauk River *spring* Chinook. Spawning in the North Fork Sauk occurs from the forks to an impassable falls 1.6 RM upstream. Spawning in the South Fork Sauk has been documented from the forks upstream to approximately RM 5.0, upstream of the area known as Monte Cristo Lake. However, spawning in the South Fork River upstream of RM 2.9 has only been documented once and was after a substantial flow increase from rain.

WDFW surveyed upper Sauk River spring Chinook spawning areas from August 14 through October 9. The survey interval goal was to survey all indexes upstream of the White Chuck River every 7-10 days by foot or pontoon boat. The index below the White Chuck River was surveyed by helicopter with a goal of a survey every two weeks; this reach is too treacherous to raft or walk. A total of 167 Sauk River spring Chinook carcasses were observed and 132 were recovered and sampled. A total of 119 carcasses sampled were unmarked and untagged fish and 1 carcass that was unmarked but not electronically sampled for CWT. There were 6 carcasses with adipose fin clips and untagged, 3 were clipped and tagged, and 3 carcasses with unknown mark or tag status due to compromised tissue. There were 538 redds located upstream of the White Chuck

River by ground-based surveys, and 3 (rounded) AUC estimated redds downstream of the White Chuck River in the section surveyed by helicopter (Table 4-7).

The 2024 upper Sauk River spring Chinook preliminary escapement estimate was 1,353 fish. All data and estimates of escapement were preliminary at the time of reporting.

Table 4-7. Upper Sauk River spring Chinook redd counts from 2024 spawning ground surveys.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>*1</sup>	Redds
Sauk River	3.0673	Flight	31.0-31.9	31.0	3
Sauk River	3.0673	Foot/Float	31.9-34.5	31.9	195
Sauk River	3.0673	Foot/Float	34.5-37.8	34.5	250
Falls Creek	3.1182	Foot	0.0-0.2	34.9	0
Sauk River	3.0673	Foot/Float	37.8-39.7	37.8	9
South Fork Sauk River	3.1204	Foot	0.0-2.9	0.0	47
North Fork Sauk River	3.0673	Foot	39.7-40.1	39.7	19
North Fork Sauk River	3.0673	Foot	40.1-41.3	40.1	18
Total redds (rounded):					<b>541</b>

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

### Skagit Summer Chinook

Skagit River summer Chinook spawn in the mainstem of the Skagit River from the mouth of the Sauk River at RM 67.2 to the Seattle City Light Powerhouse at Newhalem at RM 94.3. Spawning also occurs in tributary streams with suitable flow and spawning habitat. Tributaries were surveyed by foot or pontoon boat at an interval of every seven days to ensure all redds were enumerated before redd life expired.

Tributary surveys covered most of the known spawning area except for some limited spawning known to occur above the tributary index areas in years of high abundance, and in some other tributaries which have infrequent spawning activity. Skagit summer Chinook tributary spawning surveys occurred regularly from September 9 through October 25 (Table 4-8).

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

A total of 293 Skagit summer Chinook carcasses were observed, and 281 carcasses were recoverable and sampled; 239 carcasses were unmarked and untagged wild Skagit summer Chinook, 11 carcasses were marked and untagged, 23 were marked and tagged, and 1 was unmarked and tagged.

We observed 440 Skagit summer Chinook redds in the tributaries and estimated 2,683 redds in the mainstem reaches.

The expected 2024 escapement of Skagit River summer Chinook was 7,808 fish (rounded). All data and estimates of escapement were preliminary at the time of reporting.

Table 4-8. Skagit summer Chinook redd counts from 2024 spawning ground surveys.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>1</sup>	Redds
Goodell Creek	3.1867	Foot	0.0-1.3	92.9	17
Falls Creek	3.1780	Foot	0.0-0.4	4.0	0
Bacon Creek	3.1774	Foot	0.0-4.2	82.9	153
Diobsud Creek	3.1750	Foot	0.0-1.3	80.7	46
Cascade River	3.1411	Foot/Float	0.0-4.2	78.1	145
Illabot Creek	3.1346	Foot	0.0-2.6	71.6	79
Total redds:					440

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

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

### Lower Sauk River Summer Chinook

These fish spawn from the mouth of the Sauk River to approximately RM 31.0 (0.9 RM downstream of the White Chuck River). The only documented tributary spawning has occurred in Dan Creek (WRIA 3.1079) but due to frequent low flows this has been intermittent. Spawning is surveyed on the mainstem by helicopter flights; the lower Sauk River is too wide, too braided, and spawning is too sparsely distributed to be effectively surveyed by foot or pontoon boat. Surveys of Dan Creek began September 19 and continued through October 24 but no Sauk summer Chinook redds or carcasses were observed (Table 4-9).

Weather and stream conditions were generally favorable for aerial surveys of the mainstem Sauk summer Chinook indexes. An estimated total of 238 redds were enumerated in the mainstem throughout spawning. The 2024 escapement estimate was 595 Sauk summer Chinook (rounded).

A total of 27 Sauk summer Chinook carcasses were recovered and sampled. There were 24 carcasses recorded as unmarked and untagged wild Sauk summer Chinook, 2 were marked and tagged, and 1 was unmarked but tagged. All data and estimates of escapement were preliminary at the time of reporting.

Table 4-9. Lower Sauk River summer Chinook redd counts from 2024.

Stream	WRIA	Survey method	Reach (RM)	Location <sup>1</sup>	Redds by method		
					Foot surveys	AUC	Linear regression
					Actual	Estimated	Predicted
Sauk River	3.0673	Flight	0.0-13.2	0.0	27		
Sauk River	3.0673	Flight	13.2-21.1	13.2	189		
Dan Creek	3.1079	Foot	0.0-0.8	16.8	0	N/A	N/A
Hilt Creek	3.0678	Foot	0.0-0.5	0.6	0	N/A	N/A
Sauk River	3.0679	Flight	21.1-31.0	21.1	22		
Grand total redds from all methods (rounded):					0	238	0

<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 River Fall Chinook

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

Skagit fall Chinook spawning surveys began September 12 and continued through November 8 (Table 4-10). A total of 29 carcasses were observed, of which 25 were able to be collected and sampled. There were 16 carcasses recorded as unmarked and untagged fish, 2 were marked and untagged, 1 was marked and tagged, and tag status of 6 unmarked carcasses could not be determined due to carcass condition. Four helicopter flight redd surveys were conducted in the mainstem and tributary surveys were conducted by foot every seven to fourteen days. Tributary surveys identified 124 redds, and these were summed with 507 AUC estimated mainstem redds from the four aerial surveys. Total redd counts were multiplied by 2.5 fish per redd to calculate escapement.

The 2024 escapement estimate of Skagit River fall Chinook was 1,578 fish (rounded). All data and estimates of escapement were preliminary at the time of reporting.

Table 4-10. Lower Skagit River fall Chinook redd counts from 2024 spawning ground surveys.

Stream	WRIA	Survey method	Reach (RM)	Redds
Skagit River	3.0176	Flight	24.5-56.5	296
Skagit River	3.0176	Flight	56.5-67.2	211
Hansen Creek	3.0265	Foot	3.0-4.5	0
Day Creek	3.0299	Foot	0.0-2.2	37
Jones Creek	3.0332	Foot	0.0-1.3	2
Grandy Creek	3.0337	Foot	0.0-1.4	23
Alder Creek	3.0359	Foot	0.0-1.6	8
O'Toole Creek	3.0365	Foot	0.0-0.2	19
Mill Creek	3.0375	Foot	0.0-0.2	1
Pressentin Creek	3.0385	Foot	0.0-0.4	31
Finney Creek	3.0392	Foot	0.0-7.0	1
Jackman Creek	3.0626	Foot	0.0-0.7	0
EF Nookachamps Creek	3.0230	Foot	3.5-5.1	2
Total Redds				631

### 4.3 Stillaguamish River

The Stillaguamish River basin has two populations of Chinook distinguished by genetic characteristics: summers and falls. These two populations overlap in spawn timing and distribution with both populations spawning in both forks of the Stillaguamish River. The summer stock is a composite of natural and hatchery-origin supplemental production with most of the spawning occurring in the North Fork Stillaguamish and its major tributaries, including Boulder River and Deer, Grant, French, and Squire Creeks. The fall stock is a composite of

natural and hatchery-origin supplemental production with most of the spawning primarily in the mainstem and South Fork Stillaguamish Rivers, in Pilchuck, Jim, and Canyon creeks, and in the North Fork Stillaguamish River. Escapement is currently estimated for North Fork and South Fork Stillaguamish Rivers rather than summer and fall populations of Chinook.

Escapement estimates for Stillaguamish Chinook were calculated by multiplying the cumulative redd count by 2.5 and by incorporating the transgenerational genetic mark recapture (tGMR) correction factor. This is an annual provisional estimate. The GMR correction factor is a multiplier resulting from regression analysis of redd-based escapements compared to tGMR-based escapement estimate results from the years 2008 through 2022. The tGMR-based escapement estimates are considered more accurate than redd-based estimates and can be produced with statistical confidence intervals (whereas redd-based estimates cannot) but are not available until the following year. The tGMR estimates require genetic sampling of adult non-pre-spawn carcasses in the fall and of young-of-the-year juvenile fish the following spring. When the final tGMR escapement estimate is completed, it then replaces the initial redd-based tGMR corrected (provisional) result. Since 2008, Chinook redds found in the North and South Forks have been individually counted during periodic foot or raft surveys using the marked redd census method. Prior to 2008, redd counts in the North and South Forks were estimated using area under the curve methodology based on aerial surveys of North and South Fork mainstem reaches as well as ground-based surveys of tributary streams. Aerial surveys continue to provide redd count data for the lower mainstem and upper South Fork. Since 2008, the Stillaguamish Tribe Department of Natural Resources has provided ground coverage of the North Fork Stillaguamish River from its mouth to river mile (RM) 30.0. WDFW staff surveyed the remaining known Chinook spawning areas in the Stillaguamish basin.

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

### **North Fork Stillaguamish summer and fall Chinook**

North Fork Stillaguamish Chinook spawning surveys covered most of their known distribution. Surveyed areas were the North Fork from RM 0.0 to 34.4 and North Fork tributaries including Squire, Segelson, French, Brooks, and Grant creeks, and Boulder River. Escapement was estimated using expansion of cumulative redd counts (2.5 fish per redd) from raft and foot surveys and then multiplying by the tGMR correction factor. Survey conditions for counting Chinook in the North Fork Stillaguamish were generally good to excellent throughout the spawning period. The first redds were detected on August 20th in the North Fork, and last one was detected October 25th in the North Fork Stillaguamish. A total of 276 Chinook redds were counted on the North Fork Stillaguamish in 2024 (Table 4-11). The redd-based escapement estimate was 692 fish (Table 4-11). The tGMR-adjusted provisional escapement estimate is 865 fish (NOR 577, HOR 288). An additional 128 fish (NOR 74, HOR 54) were taken for hatchery broodstock and were not included in the tGMR adjusted provisional escapement estimate but are included the ETRS (extreme terminal runsize) and origin proportioning for the watershed.

Table 4-11. North Fork Stillaguamish summer and fall Chinook redd counts in 2024.

<b>Stream</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	60	150
North Fork	5.0135	Foot/Float	14.3-30.0	168	420
North Fork	5.0135	Foot/Float	30.0-34.4	35	88
Grant Creek	5.0156	Foot	0.0-0.4	3	8
Deer Creek	5.0173	Foot	0.0-6.0	0	0
Brooks Creek	5.0215	Foot	0.0-0.1	2	5
Boulder River	5.0229	Foot	0.0-2.9	6	15
French Creek	5.0246	Foot	0.0-3.0	1	3
Squire Creek	5.026	Foot	0.0-4.0	0	0
Brown Creek	5.0265	Foot	0.0-1.0	0	0
<b>Total Redds</b>				<b>276</b>	
<b>Redd-based Escapement Estimate</b>					<b>692</b>
<b>GMR adjusted EE (provisional)</b>					<b>865</b>

**South Fork and Mainstem Stillaguamish summer and fall Chinook**

South Fork and Mainstem Stillaguamish summer and fall Chinook escapement in 2024 was estimated by expansion of cumulative redd counts (2.5 fish per redd) from aerial, foot, and raft surveys. Areas surveyed were the Mainstem between the juvenile trap (near the town of Silvana and the confluence at Arlington (river miles 6.0 to 17.8), the South Fork from the confluence to Granite Falls (river miles 17.8 to 34.7), and Canyon, Jim, Siberia, and Pilchuck creeks. River miles 34.7 to 55.1 include Granite Falls and Robe Canyon and are rarely surveyable due to poor visibility from turbidity and limited return for the effort required to conduct surveys there. No Chinook redds were observed in the upper SF in 2024. The mainstem aerial index reach, from mouth (RM 0.0) to the forks (RM 17.8), was flown twice in 2024, September 12 and September 26.

A total of 87 Chinook redds were found in the Mainstem Stillaguamish and South Fork Stillaguamish River and tributaries in 2024 (Table 4-12). The redd-based escapement estimate was 219 adult fish, which expanded to 274 (NOR 183, HOR 91) adult fish with the application of the tGMR correction factor (Table 4-12).

Table 4-12. South Fork and Mainstem Stillaguamish summer and fall Chinook redd counts in 2024.

<b>Stream Reach</b>	<b>WRIA</b>	<b>Method</b>	<b>Reach (RM)</b>	<b>Redds</b>	<b>Escapement</b>
Mainstem	5.0001	Flight	6.0-17.8	17	43
South Fork	5.0001	Foot/Float	17.8-34.7	58	145
South Fork (upper)	5.0001	Foot	34.7-65.0	0	0
Pilchuck Creek	5.0062	Foot/Float	0.0-6.2	2	5
Jim Creek	5.0322	Foot/Float	0.0-4.1	9	23
Siberia Creek	5.0324	Foot	0.0-0.4	0	0
Canyon Creek	5.0359	Foot	0.0-0.5	1	3
<b>Total Redds</b>				<b>87</b>	
<b>Redd-based Escapement Estimate</b>					<b>219</b>
<b>GMR adjusted EE (provisional)</b>					<b>274</b>

**Carcass sampling and escapement composition**

WDFW and Stillaguamish Tribe Natural Resources staff conducted spawning ground survey work and carcass sampling in the North and South Forks of the Stillaguamish River and their tributaries. Stillaguamish Tribal staff also sample the broodstock collected from the spawning grounds for hatchery production. Tribal staff focused their Chinook carcass sampling efforts in the North Fork between the mouth and Swede Heaven Bridge (RM 0.0 to 30.0) and WDFW staff focused on the remaining spawning grounds in the watershed. In total, 290 complete carcasses (status of both adipose fin and CWT was determined) were sampled in the Stillaguamish River; 128 in broodstock collection, 162 combined in the North Fork and South Fork reaches (Table 4-13). The sampling rates of Chinook carcasses, not including those with unknown mark dispositions, were 14.2% for the spawning grounds and 100% for the broodstock. These rates were calculated by dividing the number of carcasses sampled by the escapement estimate (tGMR EE) for each sampling location.

Escapement of Chinook by origin (hatchery origin recruits – HOR, and natural origin recruits – NOR) was determined in a two-step process. First, the proportion of HOR carcasses of the total complete carcasses is calculated. This rate is applied to the spawning ground tGMR adjusted provisional escapement estimate. Second, after the HOR rate is applied to the spawning ground escapement estimate, the brood stock fish by origin are added to the corresponding escaped, or natural spawners, by origin. For 2024, a total of 162 intact carcasses were found and sampled on the spawning grounds. An additional 5 incomplete carcasses, without heads, were also found but were not included in origin proportioning because they could not be sampled for coded-wire tags (CWTs). Of the 162 complete carcasses, 54 (33.3%) were determined to be of hatchery origin. HOR/NOR sample proportions applied to the tGMR provisional adjusted escapement of 1,139 results in 379 HOR adults and 759 NOR adults. Then the number of hatchery origin adults known in the broodstock (54) are added to the estimated spawning ground hatchery adults (380), for a watershed escapement hatchery proportion of 34.3%. This methodology is used due to the reduced sampled sizes on the spawning grounds and differences in timing of broodstocking that can in some years cause the broodstock samples to weight the total proportion in a magnitude not reflective of the returning population (Table 4-13). Total escapement in 2024 was 433 HOR, 379 natural spawners and 54 used for hatchery production, and 834 NORs, 760 natural spawners and 74 used for hatchery production.

Table 4-13. Stillaguamish Chinook sample proportions and HOR:NOR composition in 2024.

	Sampled	Sampled Hatchery	Sampled Natural	% Hatchery	% Natural	GMR Esc EST	% Sampled
GMR Adjusted EE1	162	54	108	33.3%	66.7%	1,139	14.2%
Broodstock (NF)	128	54	74	42.2%	57.8%	128	100.0%
Stillaguamish Totals				34.3%	65.7%	1,267	

**4.4 Snohomish River**

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

Escapement estimates of naturally spawning Chinook salmon returning to the Snohomish watershed are calculated from cumulative redd counts made from physical surveys of their spawning grounds, and from counts of adult fish passed at Sunset Falls. Additionally, redd estimates for non-surveyed reaches on Raging River, North Fork Tolt River and Cherry Creek were expanded based on redds per mile of adjacent surveyed reaches. Survey methods included ground-based walking and float surveys, as well as aerial surveys conducted from a helicopter. Ground counted redds were monitored using marked-redd-census methodology. Ground surveys were done at a frequency of seven to ten days, to not miss new redds. Redds in ground-surveyed reaches were enumerated, marked with a GPS waypoint, and flagged to prevent re-counting on subsequent surveys. Aerial surveys were conducted on the Snohomish, Skykomish, North Fork Skykomish and Snoqualmie rivers at target intervals of two weeks. Aerial surveys provided total visible redd counts and were plotted against survey date for the area-under-curve (AUC) method yielding total redd days. Total redd days were then divided by the assumed standard 21-day redd life to yield the estimated cumulative redds from aerial surveyed reaches. The cumulative redd count was then expanded by 2.5 (fish per redd) to estimate escapement, less Sunset Falls. The live count of Chinook passed above the trap at Sunset Falls on the South Fork of the Skykomish was added to redd-based total for the total escapement estimate. Additionally, in some reaches where there was poor redd visibility and carcass counts exceeded redd-based estimates, the carcass counts were added to the overall escapement instead of redd-based expansions (Wallace River, Elwell, Olney, Proctor, Bridal Veil, and lower Tokul creeks). Carcasses encountered were sampled for scales, DNA, CWT, adipose fin mark status, and otoliths. Hatchery and natural fractions determined from these samples are applied to the redd-based escapement estimates for each sub-watershed and summed to estimate total hatchery- and natural-origin Chinook escapements for each population and the basin total.

### **Skykomish summer/fall Chinook**

Spawning ground surveys were conducted throughout the known spawning distribution of Skykomish summer/fall Chinook. Survey reaches were the mainstem Snohomish and Skykomish rivers, Pilchuck, Sultan, and Wallace rivers, Woods, Elwell, Bridal Veil, Olney, and Proctor creeks, and in the North and South forks of the Skykomish River.

Survey conditions were good for most of the spawning season. Normal fall rains came at the end of October that interrupted survey coverage, but overall frequency and number of surveys was acceptable. For the most part, survey intervals were kept at seven to ten days. Five aerial surveys were flown on the mainstem Snohomish, Skykomish, and North and South Fork Skykomish rivers at two-week intervals between mid-September and mid-November.

A total of 1,568 Chinook redds were found in the Skykomish River, its tributaries, and in the Pilchuck River in 2024 (Table 4-14). The spawning escapement estimate for the Skykomish population (including Sunset Falls trap counts) was 4,347 adult fish (3,040 NOR, 1,307 HOR; Table 4-16). An additional 6,733 adult hatchery-origin fish (including 71 jacks) and 175 adult and 2 jack natural-origin fish recruited to Wallace River Hatchery and were included in the hatchery escapement and not this natural escapement estimate. Total adult NOR Skykomish escapement (natural spawning + broodstock collection) was 3,217 Chinook.

Table 4-14. Skykomish summer/fall Chinook redd counts and escapement, 2024.

Stream Reach	WRIA	Method	Reach (RM)	Redds	Escapement
Snoh-Sky (Mainstems)	7.0012	Float/Flight	13.2-51.5	802	2,005
NF Skykomish	7.0982	Foot/Flight	0.0-13.5	193	483
SF Sky (Sunset Falls)	7.0012	Trap/Haul	51.5-up		423
Pilchuck River	7.0125	Foot/Float	2.0-26.5	95	238
Woods Creek	7.0826	Foot/Float	0.0-3.5	21	53
Elwell Creek	7.0865	Foot	0.0-1.0	3	8
Sultan River	7.0881	Foot/Float	0.0-9.7	376	941
Wallace River (lower)	7.094	Foot/Float	0.0-4.4	28	70
Wallace River(upper)	7.094	Foot/Float	4.4-7.3	19	48
Olney Creek	7.0946	Foot	0.0-0.6	0	0
Proctor Creek	7.097	Foot	0.0-0.4	0	0
Bridal Veil Creek	7.1248	Foot	0.0-0.4	31	78
<b>Total Redds</b>				<b>1,568</b>	
<b>Escapement</b>					<b>4,347</b>

#### Snoqualmie summer/fall Chinook

The escapement estimates for Snoqualmie fall Chinook were made using cumulative redd counts from helicopter, 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 mid-September to early-November. Survey conditions were good for monitoring Chinook spawning until the end of October when fall rainstorms significantly increased stream flows, delaying or preventing some surveys.

In 2024, 2,246 Chinook were estimated to have escaped to the Snoqualmie Basin based on a total count of 898 redds (Table 4-15). Based on carcass sampling results, the escapement estimate is composed of 1,369 NORs and 877 HORs (Table 4-16).

Table 4-15. Snoqualmie fall Chinook redd counts and escapement by reach, 2024.

<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	202	505
Snoqualmie River (Upper)	7.0219	Float	32.9-39.6	242	605
Cherry Creek	7.0240	Foot	1.8-3.5	1	3
Tolt River (Lower)	7.0291	Foot/Float	0.0-6.0	154	385
Tolt River (Upper)	7.0291	Foot/Float	6.0-8.9	48	120
NF Tolt River	7.0291	Foot	8.9-11.3	40	100
SF Tolt River	7.0302	Foot	0.0-2.3	15	38
Raging River	7.0384	Foot	0.0-4.6	59	148
Raging River (Upper)	7.0384	Foot	4.6-13.2	54	134
Tokul Creek (Lower)	7.044	Foot	0.0-0.3	81	203
Tokul Creek (Upper)	7.044	Foot	0.3-0.6	2	5
<b>Total Redds</b>				<b>898</b>	
<b>Escapement Estimate</b>					<b>2,246</b>

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

Field staff sampled 935 complete Chinook carcasses (status of CWT, otolith mark, and adipose fin mark are known) within the Snohomish basin. Additionally, adipose fin and CWT status was determined for 55 live Chinook passed at Sunset Falls. In total, the Chinook carcass sampling rate on the spawning grounds and at Sunset Falls was 15.0% (Table 4-16). This was calculated by dividing the number of carcasses and live fish sampled by the escapement estimate.

Escapement of Chinook by origin (hatchery or natural) was determined by applying ratios of hatchery marked/ tagged carcasses and unmarked carcasses to the escapement estimate by reach groupings and to live fish sampled at Sunset Falls (Table 4-16). Hatchery contribution estimates were stratified by subbasin or aggregated subbasins to derive the annual estimates of natural- and hatchery- origin escapement and strata totals were added together as described in Rawson, Kramer and Volk (2001). This allows the calculation of hatchery origin recruits (HOR) and natural origin recruits (NOR) for escapement reaches where sample sizes were small or no sampling occurred.

Table 4-16. Snohomish Chinook carcass sampling and escapement composition in 2024.

Stratum	Escapement	No. Hatchery	No. Natural	% Hatchery	% Natural	Number Sampled	Percent Sampled
Skykomish	2,066	451	1,615	21.83%	78.17%	197	9.5%
Bridal Veil	561	330	231	58.82%	41.18%	119	21.2%
SF Sky *	423	92	331	21.82%	78.18%	55	13.0%
Pilchuck River	238	75	163	31.58%	68.42%	19	8.0%
Sultan River	941	263	678	28.00%	72.00%	100	10.6%
Wallace River	118	96	22	81.03%	18.97%	58	49.2%
<b>Skykomish Population</b>	<b>4,347</b>	<b>1,307</b>	<b>3,040</b>	<b>30.07%</b>	<b>69.93%</b>	<b>548</b>	<b>12.6%</b>
Snoqualmie	2,038	710	1,328	34.84%	65.16%	310	15.2%
Tokol	208	167	41	80.30%	19.70%	132	63.5%
<b>Snoqualmie Population</b>	<b>2,246</b>	<b>877</b>	<b>1,369</b>	<b>39.05%</b>	<b>60.95%</b>	<b>442</b>	<b>19.7%</b>
<b>Snohomish Total</b>	<b>6,593</b>	<b>2,184</b>	<b>4,409</b>	<b>33.13%</b>	<b>66.87%</b>	<b>990</b>	<b>15.0%</b>

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

**Key for Grouped Stratum and Populations:**

**Skykomish Population:**

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

Sultan: Sultan River

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

Pilchuck: Pilchuck River

Wallace: Wallace River (Upper and Lower)

**Snoqualmie Population:**

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

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

## 4.5 Cedar River

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

In 2024, a total of 257 Chinook redds were observed in the Cedar River during the spawning season (including the surveyed area upstream from Landsburg Dam and including two small tributaries below Landsburg, Rock and Taylor). Of the Chinook redds, 256 were observed in the Cedar River mainstem (211 below Landsburg Dam and 45 above), and 1 was observed in the small tributaries to the Cedar River. Expansion of 2.5 Chinook per redd resulted in the estimated escapement of 643 (Table 4-1). Carcass surveys in the Cedar River indicated that 53% of the naturally spawning adult Chinook were natural origin (unclipped) and 47% were hatchery origin (clipped).

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

The Sammamish Chinook population is composed of naturally spawning Chinook in the Big Bear/Cottage Lake Creek watershed and in the Issaquah Creek watershed downstream of Issaquah Hatchery. Chinook natural escapement to the Sammamish River/ North Lake Washington tributaries in 2024 was estimated at 2,360.

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

The Bear Creek/Cottage Creek area was surveyed weekly during the 2024 spawning season. The escapement estimate was 144 Chinook. Of these, 103 were estimated in the Bear Creek mainstem, and 41 were estimated in Upper and Lower Cottage Creek. Carcass surveys in the Big Bear/Cottage Lake system indicated that 14% of the naturally spawning adult Chinook were natural origin and 86% were hatchery origin.

## **Issaquah Creek System**

Issaquah Creek is surveyed weekly from the Issaquah Hatchery (located at river mile 3.0), downstream to SE 56th St. (located at river mile 1) 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 2024 spawning season, and total escapement was estimated at 2,216 Chinook. This estimate includes 2,152 in the mainstem below the hatchery, and 64 from the East Fork. Carcass surveys in the Issaquah Creek system indicated that 6% of the naturally spawning adult Chinook were natural origin and 94% were hatchery origin.

Chinook escapement to Issaquah Hatchery in 2024 was 8,257 (8,032 adults and 225 jacks); of which 164 adults and 3 jacks were intentionally released upstream to spawn in upper Issaquah Creek.

## **4.6 Green River**

Beginning in 2009, Muckleshoot (MIT) and WDFW Biologists agreed to the spawning ground survey protocol to conduct weekly counts of all new Chinook redds in all survey-able reaches of the Green River and Newaukum Creek. It is assumed that all new Chinook redds are identified in four of the six sections of the mainstem Green River. The escapement methodology uses season total redd counts without adjustment. At the conclusion of the spawning season, the observed number of redds in these sections of the river is known with zero assumed variance. There may be observational error in these sections or spawning outside these sections. However, these factors operate in all sampling programs and are not included in any variance estimates.

New Chinook redds were counted weekly, requiring three days per week to complete by boat, and twice during the season from an aerial survey in the mainstem river between River Mile (RM) 25.4 to 48.5 (Lower River (counted every other week), Middle River, and Lower Gorge)

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

A rigorous surveying schedule began on September 4 and continued through November 7; visibility was generally excellent, and no surveys were suspended because of high flows. Redd counts from Metzler Side Channel were conducted on September 24, October 19, and October 23. These counts were added to the weekly counts for the Middle River. The weekly number of redds counted in each section, was summed, without adjustment, to produce the season total redd count by section.

On October 2 and 16, a count of visible redds in each reach was made by helicopter in all 6 sections, encompassing the entire "spawnable area" of the mainstem river between RM 25.4 and approximately RM 60.4. Pending amenable weather conditions, flights were timed to coincide with the historical peak of natural Chinook spawning activity which typically occurs the first or second week in October. Flight scheduling was limited by availability of the helicopter and weather and river conditions.

In 2024, there were two sections of the mainstem Green River not surveyed weekly using boat surveys but were surveyed during aerial surveys, the "Gorge" RM 48.5 to 56.2 and "Hwy 167 to Transfer Shack", RM 25.1 to 26.7 (a sub-section of the "Lower River" section). Ground to air ratios (G/A) from adjacent sections were used to expand aerial redd counts in these two sections to season totals. A G/A was calculated using the total season redd counts from boat surveys in the "Lower Gorge" section, RM 44.3 to 48.5, divided by the number of redds enumerated during the aerial survey conducted in this section. This G/A was then multiplied to the aerial redd count in the Gorge section to expand to a season total redds for the Gorge section. This same process is used to expand the aerial count in the Hwy 167 to Transfer Shack section, but uses the G/A calculated from redd data collected in the "Lower River" section, see Table 4-17 and Table 4-18.

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

Post season analysis of the season totals indicates that peak spawning activity varied by section, but was generally highest during the late September to the first week of October (Table 4-17). By the end of surveys, the week of October 13, 94.3% of the redds (1,917 of 2,033) observed during boat and foot spawning ground surveys were complete.

Table 4-17. Chinook redd counts from foot and boat surveys of the Green River in 2024.

Section	Week <sup>1</sup>										Total
	1-Sep	8-Sep	15-Sep	22-Sep	29-Sep	6-Oct	13-Oct	20-Oct	27-Oct	3-Nov	
Headworks	1	1	40	171	322	217	81	17	15	1	866
Lower Gorge	-	3	0	6	25	54	32	11	2	0	133
Middle River	-	2	10	66	158	301	87	55	12	2	693
Lower River <sup>1</sup>	-	-	5	-	99	-	29	-	0	-	133
Newaukum Creek	-	0	12	61	72	62	0	1	-	-	208
Total	1	6	67	304	676	634	229	84	29	3	2,033

<sup>1</sup>An aerial survey on October 2 was used to estimate 3 redds for the survey season in the Hwy 167 to transfer shack reach.

Table 4-18. Aerial survey counts of Chinook redds in the Green River, 2024.

Section	Week <sup>1</sup>										Total
	1-Sep	8-Sep	15-Sep	22-Sep	29-Sep	6-Oct	12-Oct	20-Oct	27-Oct	3-Nov	
Headworks	-	-	-	-	197	-	182	-	-	-	379
Gorge	-	-	-	-	55	-	44	-	-	-	99
Lower Gorge	-	-	-	-	33	-	35	-	-	-	68
Middle River	-	-	-	-	220	-	238	-	-	-	458
Lower River	-	-	-	-	122	-	49	-	-	-	171
Hwy 167- Transfer Shack	-	-	-	-	2	-	0	-	-	-	2
Total	-	-	-	-	629	-	548	-	-	-	1,177

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

The season total redds from the Middle River was 661 redds plus 32 from MSC, 133 from the Lower Gorge, 866 from the Headworks, and 133 in the Lower River plus 3 in the Hwy 167-Transfer Shack reach. The G/A ratio for the Lower Gorge was 4.03 (133/33) resulting in a calculated 222 redds for the “Gorge”. A total of 2,050 redds were counted or calculated in the mainstem Green River, including MSC, by census. In Newaukum Creek, the season total redds for the section “400<sup>th</sup> to Whitney Hill Bridge” was 101 and for the section “Whitney Hill Bridge” to mouth” was 107, totaling 208 redds in Newaukum Creek.

Applying the constant 2.5 Chinook/redd (1.5 males:1.0 female), an estimate of 5,644 naturally spawning Chinook was generated for the Green River Basin. Based on carcass sampling, it is estimated that 2,373 are estimated to be natural origin and 3,271 are hatchery origin.

During the season, 419 adults and 0 jacks that returned to the Soos Creek Hatchery were ventral fin-clipped by the Muckleshoot Indian Tribe, hauled upstream, and released in the mainstem. Although duration of survival and spawning success of these fish may be variable, any redds created by these fish would have been counted during surveys, meaning that they are included in the natural spawning escapement estimate.

River flows during the 2024 Chinook spawning season were low to moderate throughout the season, and no surveys had to be suspended because of high flows (Table 4-19).

Table 4-19. Average weekly discharge (cfs) at three locations on the Green River (Palmer USGS Gage 12106700, Auburn USGS Gage 12113000, and Newaukum Creek USGS Gage 12108500) in 2024. Weekly discharges are 7-day averages of mean daily discharge beginning with the day listed.

USGS Gauge	Week									
	1-Sep	8-Sep	15-Sep	22-Sep	29-Sep	6-Oct	13-Oct	20-Oct	27-Oct	3-Nov
Palmer	219	215	267	331	330	320	353	455	581	572
Auburn	343	340	413	464	464	456	486	594	827	786
Newaukum Creek	13	14	14	12	12	13	17	16	35	27

### Carcass sampling

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

A total of 642 carcasses were sampled for standard biological data by Green River crews in 2024. Of these, 398 were identified with hatchery origin marking, 26 double index tags (DIT), 11 CWT plus adipose clipped (AD), and 361 AD. Carcass sampling indicates that 62% were of hatchery origin as indicated by the presence or absence of an adipose fin or CWT tag (Table 4-20 and Table 4-21).

Table 4-20. Summary of Chinook biological sampling in the Green River, 2024.

Section	Biological Samples	Adipose Clipped	Thermal Marks	MIT Tags <sup>1</sup>	CWT <sup>2</sup> & Ad-Clipped	
					Ad-Clipped	DIT <sup>2</sup>
Headworks	334	217	0	0	4	0
Lower Gorge	32	10	0	5	0	2
Middle River	148	50	0	16	4	18
Lower River	14	5	0	0	1	1
Metzler Side Channel	1	0	0	0	0	0
<b>SubTotal: River</b>	<b>529</b>	<b>282</b>	<b>0</b>	<b>21</b>	<b>9</b>	<b>21</b>
Newaukum: 400th to Whitney Hill Br	30	20	0	1	0	1
Newaukum: Whitney Hill Br to Mouth	83	59	0	0	2	4
<b>SubTotal: Newaukum</b>	<b>113</b>	<b>79</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>5</b>
<b>Grand Total:</b>	<b>642</b>	<b>361</b>	<b>0</b>	<b>22</b>	<b>11</b>	<b>26</b>

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

<sup>2</sup> CWT: Coded wire tag present (unconfirmed); DIT: (Double Index Tag) Adipose fin present, coded wire tag present.

Table 4-21. Coded wire tag sampling, thermal mark analysis of otoliths<sup>1</sup>, and origin of natural Chinook spawners<sup>2</sup> in the Green River, 2024.

	Sampled						Unmarked		AD Clipped		Unknown Origin <sup>3</sup>	
	Number	NOS	HOS	Unknown Origin <sup>3</sup>	CWT	No CWT	DIT	No CWT	CWT	No CWT	CWT	No CWT
Green River	529	217	312	0	30	499	21	217	9	282	0	0
Newaukum Creek	113	27	86	0	7	106	5	27	2	79	0	0
Green River Basin Total	642	244	398	0	37	605	26	244	11	361	0	0

<sup>1</sup>From 2014 through 2019, Chinook released from the Palmer Hatchery were thermal marked but not adipose fin clipped. Starting in 2020, Chinook were adipose fin clipped and thermal marked when water supply was sufficient (2021-2022).

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

<sup>3</sup>Unknown origin = otoliths not analyzed for thermal mark or adipose fin presence unknown

## 4.7 White River

The escapement estimate for White River Spring Chinook is derived from trap counts at the Army Corps of Engineers' Mud Mountain Dam Fish Passage Facility (FPF), and hatchery returns to the White River Hatchery (WRH). Off-site propagation of White River Spring Chinook also occurs at the Minter Creek/Hupp Springs Hatchery and returns to that facility are recorded separately. Under ideal conditions, the FPF allows sampling and enumeration of all fish transported to the upper White River watershed. During odd years when Pink salmon return and during years of relatively high Coho returns, sampling is limited, particularly during the latter part of the Chinook run. Consequently, the proportions of hatchery and natural-origin spring and fall Chinook transported above the dam once sampling wraps up are uncertain. Records of trap and haul operations conducted in the absence of state or tribal fisheries managers are a subject of ongoing concern.

The number of adult Chinook transported upstream of the Mud Mountain Dam in 2024 was 657 natural-origin (NORs) and 1,014 acclimation pond (AP) Chinook (Table 4-22). The number of adults sampled at the WRH and at the FPF prior to the termination of sampling was 2,826. Of these, 854 were NORs, 889 were hatchery origin (HORs), and 1,083 were AP recruits. NORs are assumed to be primarily spring Chinook although based on DNA analysis, fall-run Chinook and potential hybrids have been passed. NORs made up 30% and APs made up 38% of the sampled adult Chinook. At the FPF, the ratios of coded wire tagged, non-coded wire tagged, and vent clipped fish among sampled adults were applied to un-sampled adults passed upstream to estimate the origin of unsampled adults. Based on the extrapolation there were 185 unsampled NOR adults, 169 HOR adults, and 66 AP adults. The total adult return was 3,246 Chinook, and the split out for each component of the population was 1,039 NORs, 1,058 HORs, and 1,149 AP recruits. Based on DNA sampling, 808 of the total NOR Chinook classified as spring Chinook and 231 were fall Chinook. In addition, 185 of the adult NORs were taken to the White River Hatchery for use as broodstock.

Table 4-22. Estimated number NOR and Acclimation Pond Chinook salmon hauled upstream of Mud Mountain Dam in 2024. Results are a combination of sampled and un-sampled adults at the FPF.

Origin	Adults	Jacks	Totals
Wild (NOR)	657	179	835
Acclimation Pond	1,014	330	1,344
<b>Totals</b>	<b>1,671</b>	<b>508</b>	<b>2,179</b>

There are two hatchery programs for White River spring Chinook: Minter Creek/Hupp Springs program and the White River Hatchery. The Minter Creek/Hupp Springs program was initiated in the mid-1970's in response to steep declines in population abundance. The spring Chinook program was subsequently expanded following completion of the Muckleshoot Tribe's White River Hatchery in 1989. In 2024, escapement to the Minter Creek/Hupp Springs hatchery was 1,090 adults and 85 jacks. Escapement to the White River Hatchery in 2024 was 815 adults and 18 jacks. These fish were either collected at the FPF or volunteered to the WRH trap on the north side of the diversion dam. An additional 243 adults and 196 jacks were passed above Mud Mountain Dam that originated from the White River Hatchery program. These fish were identified through CWT sampling.

## **4.8 Puyallup River**

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

In 2024, survey coverage was very good and a redd count based escapement estimate methodology was used. This methodology includes expanded redd count to spawner escapement using the standard 2.5 fish per redd, accounting for the assumed sex ratio of 1.5 males per female. Carcass sampling was used to determine the proportion of natural or hatchery origin spawning. The escapement estimate includes fall-timed Chinook spawning in the lower White River downstream of the Buckley diversion dam trap. These fish have been enumerated by PTF biologists through spawning ground surveys since 2002 but were not accounted for in escapement estimates prior to 2009.

### **South Prairie Creek**

Survey coverage of the South Prairie Creek (SPC) system was very good in 2024. The cumulative redd count of 343 in South Prairie Creek, expanded by 2.5, yields an escapement estimate of 858 spawners (317 NORs and 540 HORs). In Wilkeson Creek, the cumulative redd count of 100, expanded by 2.5, yielded an escapement estimate of 250 spawners (32 NORs and 218 HORs). The SPC sub-basin total spawning escapement estimate for 2024 is 1,108 spawners. This escapement is made up of 349 NORs and 758 HORs. Rounding error accounts for the slight differences in totals and sub-total.

### **Carbon River**

The Carbon River is influenced by glacial runoff most years during Chinook spawn timing and seldom allows suitable visibility to accurately observe Chinook redds. During years when visibility does not allow accurate redd accounting, escapement estimates are based on the relationship between SPC and Carbon River escapement in 1999, when there was an accurate redd count for the Carbon River. Carbon River reaches with complete data tracked the SPC spawn timing remarkably well. Therefore, reaches with incomplete data were expanded using the SPC spawn timing curve with a high degree of confidence. The 2024 SPC escapement, including Wilkeson Creek, utilized in the Carbon River escapement expansion is an adjusted area under the curve (AUC) escapement estimate accounting for the average even-year (1994-2023) ratio of redd-based escapement and live fish AUC estimate exclusively in SPC multiplied by the 2024 AUC live fish estimate for SPC sub-basin.

Survey conditions were not suitable on the Carbon River during the 2024 spawning period. Consistent with the last thirteen years, the 2024/1999 SPC AUC escapement ratio ( $1,371 / 1,422 = 0.964$ ) was applied to the 1999 Carbon River escapement (250) to estimate the 2024 value. This method estimated 241 Chinook spawning in the Carbon during 2024 ( $250 * 0.964 = 241$ ). Based on mark sampling ratios observed in South Prairie Creek, the escapement was made up of 89 NORs and 152 HORs.

### **Puyallup River Tributaries**

Aggregate escapement to Puyallup River tributaries in 2024 was estimated at 48 (Table 4-23). Based on mark sampling in these tributaries, 2 of these adults were NORs and 46 were HORs.

Table 4-23. Chinook escapement estimates for Puyallup River tributaries, 2024.

Tributary	Escapement
Fennel Creek (WRIA 10.0406)	5
Canyon Falls Creek (10.0410)	0
Kapowsin Creek (10.0600)	30
Clear Creek (10.0022)	13
Clarks Creek (10.0027)	0
<b>Tributary total</b>	<b>48</b>

### **Mainstem Puyallup River**

Chinook spawning escapement to the mainstem Puyallup River was estimated to be 84. This escapement comprised 31 NOR and 53 HOR Chinook, based on mark sampling ratios observed in mainstem tributaries.

As with the Carbon River, Puyallup River mainstem is influenced by glacial runoff making it impossible to accurately account redds most years. This was the case again in 2024. WDFW and PTF staff believe that mainstem spawning escapement is closely related to the tributaries (Fennel, Canyon Falls, Clear, Kapowsin, and Clarks creeks). Therefore, the 2024/1999 Puyallup tributary AUC ratio ( $48/113 = 0.4284$ ) was applied to the estimated 1999 Puyallup mainstem escapement (195) to estimate the 2024 escapement of 84 Chinook ( $195 * 0.4284 = 84$ ). The same even year (1994-2023) average AUC adjustment used for the Carbon River was applied to the Puyallup tributary AUC live-fish estimate to develop the 2024 Puyallup tributary AUC estimate for this analysis.

### **Lower White River**

The fall component of Chinook spawning in the lower White River and its tributaries, downstream of the Buckley trap, are included in the 2024 Puyallup River basin fall Chinook escapement estimate. Spawning ground surveys indicate that, in some years, a sizeable number of Chinook spawn in these areas.

Because both spring and fall Chinook spawn in the White River, the fall component in the lower White River and tributaries was identified by carcass 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 Chinook. 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 2024 was estimated to be 881 adults. This escapement is made up of 363 NORs and 518 HORs based on mark sampling ratios observed during spawning ground surveys.

#### **Total Puyallup Escapement**

The estimated total number of naturally spawning fall Chinook in the Puyallup basin in 2024 was 2,361. Based on carcass sampling, we estimated that 834 were NORs, and 1,526 were HORs. The estimate of NORs assumes the proportions of hatchery and natural origin spawners is the same in Puyallup River tributaries, the Puyallup River mainstem, South Prairie Creek, and the Carbon River.

### **4.9 Nisqually River**

Natural escapement to the Nisqually River in 2024 was estimated using a change in ratio methodology (Seber 1982). This method uses (1) the proportion of marked fish entering the river (as estimated by sampling tribal gillnet catch), (2) the total removals below the adult sampling location at RM 13 and proportion of those removals marked, and (3) the proportion of marked fish passing above the sampling location at RM 13 to estimate the total return to the river.

Total escapement to the spawning grounds and the hatcheries in the Nisqually River was estimated to be 9,404 adult Chinook salmon (Table 4-1) with a preliminary natural spawning escapement of 986. The spawning escapement was composed of 804 natural-origin and 182 hatchery-origin adult fish voluntarily escaping to the spawning grounds.

### **4.10 Hood Canal**

Natural Chinook escapement to the Skokomish River and Mid-Hood Canal rivers in 2024 were 3,313 and three, respectively (Table 4-24).

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

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

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

In the Hamma Hamma River, most of the Chinook spawning area is currently being surveyed. A cooperative supplementation program was initiated in 1995 to rebuild Chinook abundance. Prior to 1998, escapement had been estimated from counts of cumulative new redds and/or from live Chinook using the area-under-the curve (AUC) method. When returns increased as the result of supplementation, the AUC method was employed as the primary method of escapement estimation. However, since the supplementation program ended with the 2016 brood year, no supplementation-origin fish are now returning. Numbers have dropped to pre-

supplementation levels and estimation methods have reverted to those previously used at low abundances.

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 salmon redds unless Chinook are actively spawning and observed on redds. Pink salmon spawn predominately downstream of RM 6.7 on the Dosewallips, downstream of RM 2.6 on the Duckabush and throughout the reaches surveyed on the Hamma Hamma. Summer Chum salmon spawn predominately downstream of RM 3.6 on the Dosewallips, downstream of RM 2.6 on the Duckabush and throughout the reaches surveyed on the Hamma Hamma. It has been possible to count Chinook redds in the upper Dosewallips and Duckabush River reaches (especially in years without Pink salmon).

The WDFW conducted spawner surveys on the Dosewallips, Duckabush, and Hamma Hamma rivers every 7 to 10 days from late August or early September through October. The escapement estimate to all three systems combined was 3 adults: zero, two, and one Chinook in Dosewallips, Duckabush, and Hamma Hamma rivers, respectively (Table 4-24). During 2024, it is possible that some Chinook redds were not identifiable on the Dosewallips and Duckabush rivers in areas with summer Chum spawning. However, based on the number of Chinook redds and adults observed during surveys and carcasses recovered during intensive weekly surveys, very few Chinook were present and the escapement estimates for Dosewallips and Duckabush rivers are considered in line with the actual order of magnitude for very low numbers.

The Dosewallips River was surveyed from RM 0 to RM 2.3, RM 3.6 to RM 6.7, but not RM 7 to RM 11; Rockybrook Creek, a tributary, was surveyed from RM 0 to RM 0.3. No Chinook redds were identified and no live fish observations were made in the Dosewallips River during 2024. The Duckabush River was surveyed from RM 0 to RM 2.6, RM 4.8 to RM 6. Although no Chinook redds were conclusively identified, an estimate of two individual live adults was made based on observations made in September and October. 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 estimated total escapement to the Hamma Hamma River is one which is based on an AUC estimate in the mainstem. The FRAM pre-season escapement projection was 13 for the Mid-Hood Canal (FRAM 2724) while the estimated escapement is 3 Chinook. Escapements to the Dosewallips, Duckabush and Hamma Hamma rivers were low as anticipated.

### **Skokomish River**

Chinook spawning takes place in the mainstem Skokomish River up to the confluence with the South and North Forks at RM 9, in the South Fork (primarily up to RM 5.5), and in the North Fork from RM 9 to 15.7 where Little Falls once blocked further access. Natural escapement estimates have historically been based on counts of Chinook redds in the principal spawning habitat in the mainstem Skokomish (RM 2.2 to 9.0), North Fork (R.M. 9.0 to 15.6), and South Fork (R.M. 0 to 2.2). Since 2008, surveys have been conducted from RM 0 to RM 5.5 in the South Fork and included in the total escapement estimate.

In addition, escapement estimates are made for Vance Creek and Hunter Creek. However, dramatically increasing numbers of summer Chum spawning in the mainstem Skokomish since 2014 led the co-managers to re-evaluate the redd-based spawning methodology, and ultimately shift to a modified Area under the Curve (AUC) and redd accounting hybrid methodology applied elsewhere in Hood Canal. This change was necessary because summer Chum spawning has become so prolific and Chinook spawning has become increasingly concentrated in preferred habitat. These conditions lead to redd superimposition and difficulties in individual redd detection.

Live and dead adults, along with visible redds, were counted in Skokomish River index areas during foot and raft surveys (e.g., see Smith and Castle 1994). Surveys are conducted every seven to ten days. Historically, the fall Chinook survey season extended from early August through October, but with the first returns of North Fork spring Chinook, there is no break between steelhead survey season and Chinook season, now running from May through October or November when weather and river flows allow. Weekly instantaneous live fish counts for the mainstem above the 101 Bridge are used to calculate fish days, which are then divided by a stream life value of 14 days (the average difference between peak average live counts and peak average redd deposition) then combined with redd-based escapement estimates for the North and South forks to estimate total Chinook escapement.

The 2024 total estimated spawner escapement to the Skokomish River is 3,313 (Table 4-24). This total includes 1,750 in the mainstem Skokomish, 1,478 Chinook in the North Fork, and 85 Chinook in the lower (RM 0 to RM 5.5) South Fork Skokomish. These numbers were apportioned based on calculating a redd-based escapement estimate for the North and South forks where summer Chum spawning was limited, an AUC estimate from the mainstem above the 101 Bridge. The preseason escapement prediction was 2,812 (FRAM 2724).

Table 4-24. Summary of Chinook escapement to Hood Canal streams during 2024.

Area	Stream	Escapement	Comments
82 G/J	Skokomish R.	1,750	AUC based on live fish (MS03/MS04), due to large summer chum
	Hunter Cr.	NA	
	N.F. Skokomish R.	1,478	
	S.F. Skokomish R.	85	
Total		<b>3,313</b>	
12A	Little Quilcene R.	0	No Chinook observed
	Big Quilcene R.	0	No Chinook observed
Total		0	
12B	Dosewallips R.	0	No Chinook observed
	Duckabush R.	2	Peak live dead
	Hamma Hamma R. a/	1	AUC Hamma
Total		<b>3</b>	
12C	Dewatto R.	25	AUC
	Eagle Cr.	49	AUC
	Lilliwaup Cr.	13	AUC
Total		<b>87</b>	
12D	Tahuya R.	3	AUC
	Union R.	32	Trap
Total		<b>35</b>	
<b>Hood Canal total</b>		<b>3,438</b>	

### Mark Sampling

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

There has been more intensive sampling of Chinook on the spawning grounds since 1998. The Skokomish, Dosewallips, Duckabush, and Hamma Hamma rivers continue to be prioritized for

enhanced mark and CWT sampling, with WDFW also sampling Chinook carcasses for marks and CWTs on the Dewatto, Tahuya, and Lilliwaup rivers. Mark sampling also occurs in Hunter Creek and Purdy Creek (Skokomish Basin). The samples obtained from these streams are not included to calculate pHOS due to their likely bias toward hatchery Chinook based on their proximity to hatchery facilities.

Of the 1,182 Chinook sampled on the spawning grounds in Hood Canal rivers during 2024, 1,029 Chinook were adipose-clipped and 149 had CWTs. Another 101 unmarked Chinook were coded-wire tagged. We sampled 9.9% of the Chinook spawning escapement in the Skokomish River. In the Mid-Hood Canal rivers Chinook escapement, one fish was sampled in the Duckabush River, but none were sampled in the Hamma Hamma or Dosewallips rivers. Overall, the sampling rate was 30% for Mid-Hood Canal and 34.4% for all Hood Canal rivers combined (Table 4-25).

Jacks are not included in Chinook spawning escapement nor pHOS estimates in Hood Canal since escapement is based on adult (Age 3 to 5) abundance. However, they are sampled when encountered on the spawning grounds.

Estimates of hatchery contribution to the natural spawning escapement were made based on the total number of CWT tags and marks recovered (unmarked CWT's + adipose-clips). These estimates can be subject to clip error and tag detection rates for the returning brood years. Thus, the proportion of hatchery fish in the spawning escapement is also estimated by expanding adipose-clipped fish based on proportions of clipped fish released from each brood year, based on co-manager agreement. Age composition in the escapement, carcass sampling rate, and the proportion of hatchery production releases that were marked and/or tagged from BY 2019 (age-5), BY 2020 (age-4), BY 2021 (age-3), and BY 2022 (age-2).

In 2024 there was close agreement in the two aforementioned methods, with mark sampling-based pHOS weighted estimated as 89% and expanded clip pHOS of 87% in the Skokomish River system (Table 4-25 and Table 4-26). Neither estimate includes Purdy Creek or Hunter Creek samples because of the likely bias associated with hatchery mortality. Minor differences in sample size for the two methods is the result of fish with unreadable scales being excluded from the broodyear-based clip rate expansion. A total of 329 adult Chinook sampled in the Skokomish River system, 241 were adipose-marked (73%). Spawning escapement in the Skokomish River was comprised of about 89% hatchery-origin Chinook and 11% natural-origin Chinook based on unmarked, untagged status (Table 4-25). Also, the commercial sampling of the tribal gillnet fishery in the mainstem was composed of 99.7% hatchery-origin (Ad Marked and DIT) Chinook and 0.29% natural-origin Chinook. It should be noted that unmarked, untagged fish may escape into the system undetected and could contribute to estimates of natural-origin fish. Unmarked, untagged fish recovered at the hatchery are PIT tagged then released in the mainstem above the hatchery tributary but subsequently have returned to the hatchery with an apparent homing behavior. Otherwise, the substantial carcass recovery sample size along with the strong escapement, likely reflect robust estimates of HOR/NOR estimates for the Skokomish River in 2024.

Hatchery releases into the Hamma Hamma concluded with the last brood year release in 2014 making 2018 the last year Age 4 adults returned to the Hamma from the supplementation program, and Age-5 Chinook from the last supplementation release would have returned in 2019. Since supplementation origin fish are no longer returning, otoliths are no longer collected. Any Chinook carcasses encountered will continue to be 100% sampled for sex, length, scales, mark status, and coded wire tag. However, very few carcasses are recovered, due the low numbers of Chinook combined with scavenging and predation. From 2020 through 2022, snorkeling was also being employed to monitor for ad-clipped fish. However, snorkeling activities are currently on hold pending WDFW policy.

Because so few carcasses were recovered from the Duckabush and Dosewallips rivers, a long term HOR average for the Hamma Hamma (18%) was applied to the 2024 escapements (Table 4-255). Of the 3 fish estimated to have spawned in the MHC tributaries, we estimate all were NOR. However, the low carcass recovery sample size along with the extremely low escapement, highlight the uncertainty in the 2024 Mid-Hood Canal HOR/NOR estimates.

Table 4-25. Chinook salmon spawner escapement origin based on carcasses sampled for marks and coded-wire tags (CWTs) in Hood Canal rivers, 2024.

Mgmt Unit and River	Spawner escapement	Chinook sampled		Tagged 1/			Untagged 1/			Unk. tagged 2/			Totals				pHOS (weighted)	
		Number	%	AD	NM	Unk	AD	NM	Unk	AD	NM	Unk	CWTs recovered	AD-clips observed	Rate 5/	HOR		NOR
Skokomish																		
Mainstem	1,750	158	9.0%	3	11	3	114	20	3	3	1	0	17	120	0.86	1,513	237	
Hunter	NA	838	NA	31	72	0	730	5	0	0	0	0	103	761	0.99	NA	NA	
North Fk	1,478	168	11.4%	6	17	3	125	11	2	2	2	0	26	133	0.92	1,362	116	
South Fk	85	3	3.5%	0	1	0	2	0	0	0	0	0	1	2	1.00	85	0	
<b>Skokomish River total</b>	<b>3,313</b>	<b>1,167</b>	<b>35.2%</b>	<b>40</b>	<b>101</b>	<b>6</b>	<b>971</b>	<b>36</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>0</b>	<b>147</b>	<b>1,016</b>	<b>0.97</b>	<b>2,960</b>	<b>353</b>	<b>0.89</b>
<b>Skokomish Total w/o Hunter</b>	<b>3,313</b>	<b>329</b>	<b>9.9%</b>	<b>9</b>	<b>29</b>	<b>6</b>	<b>241</b>	<b>31</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>0</b>	<b>44</b>	<b>255</b>	<b>0.90</b>	<b>2,960</b>	<b>353</b>	<b>0.89</b>
12A																		
Big Quilcene R.	0	0	0.0%	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	
Little Quilcene R.	0	0	0.0%	0	0	0	0	0	0	0	0	0	0	0	NA			
12B																		
Hamma Hamma R. 3/	1	0	0.0%	0	0	0	0	0	0	0	0	0	0	0	0.15	0	1	
Duckabush R. 4/	2	1	50.0%	0	0	0	0	1	0	0	0	0	0	0	0.15	0	2	
Dosewallips R. 4/	0	0	0.0%	0	0	0	0	0	0	0	0	0	0	0	0.15	0	0	
<b>Mid-Hood Canal total</b>	<b>3</b>	<b>1</b>	<b>33.3%</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.15</b>	<b>0</b>	<b>3</b>	
12C																		
Dewatto R.	25	9	36.0%	1	0	0	8	0	0	0	0	0	1	9	1.00	25	0	3
Eagle Creek	49	1	2.0%	0	0	0	1	0	0	0	0	0	0	1	1.00	49	0	
Lilliwaup R.	13	2	15.4%	0	0	0	2	0	0	0	0	0	0	2	1.00	13	0	
12D																		
Tahuya R.	3	2	0.0%	1	0	0	0	1	0	0	0	0	1	1	0.50	2	2	
Union R. 2/	32	0	0.0%	0	0	0	0	0	0	0	0	0	0	0	0.66	21	11	
<b>Hood Canal total</b>	<b>3,438</b>	<b>1,182</b>	<b>34.4%</b>	<b>42</b>	<b>101</b>	<b>6</b>	<b>982</b>	<b>38</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>0</b>	<b>149</b>	<b>1,029</b>	<b>0.89</b>	<b>3,070</b>	<b>368</b>	

1/ AD = adipose fin-clipped; NM = no mark; Unk = unknown

2/ Visual detection only live fish at the trap

3/ Based on ad-clip detections during snorkel survey

4/ SOR for Hamma applied due to low sample size

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

natural escapement = 368

hatchery escapement = 3070

Table 4-26. Chinook salmon spawner escapement origin based on carcasses sampled for marks and coded-wire tags (CWTs) in Hood Canal rivers, 2024.

Water Year	Skokomish, MS, NF, SF, Vance, and Hunter				
	2024				
	Age				Total
	21	31	41	51	
Mark rate	0.866	0.872	0.869	0.862	
ADB	0	3	3	0	
ADNB	17	88	63	8	
ADUkn	0	0	0	0	
ADNH	0	0	0	0	
Total ad-clipped	17	91	66	8	165
expanded	20	104	76	9	189
UMB	1	5	16	1	
UMNB	1	3	25	2	
UMNH	0	0	0	0	
Total no clip	2	8	41	3	
Adjusted	-1	-5	31	2	
Total mark status known	19	99	107	11	217
<b>Proportion Hatchery Origin Spawners (pHOS)</b>					<b>0.871</b>

\*Excluding fish < 49cm in sample  
 AD = Adipose-clipped (marked)  
 UM = Unmarked  
 NB = no CWT detected  
 B = CWT detected  
 NH = No head

## 4.11 Dungeness

Escapement Estimation:

Since 1986, surveys have been conducted by ground surveys throughout the spawning season from RM 0.5 to 18.7 in the mainstem Dungeness, and from RM 0.0 to 5.1 in the Gray Wolf mainstem (Figure 4-3) to generate cumulative redd counts for the season. Surveys begin in mid-August and end mid to late-October. Chinook temporal and spatial spawning distribution are documented by recording GPS waypoints for each redd observed by WDFW and JSKT fisheries staff. Files are shared between the agencies and maps are created by GIS specialists to show redd locations throughout the basin, with downloading shapefiles into ArcGIS and Google Earth Pro kmz file.

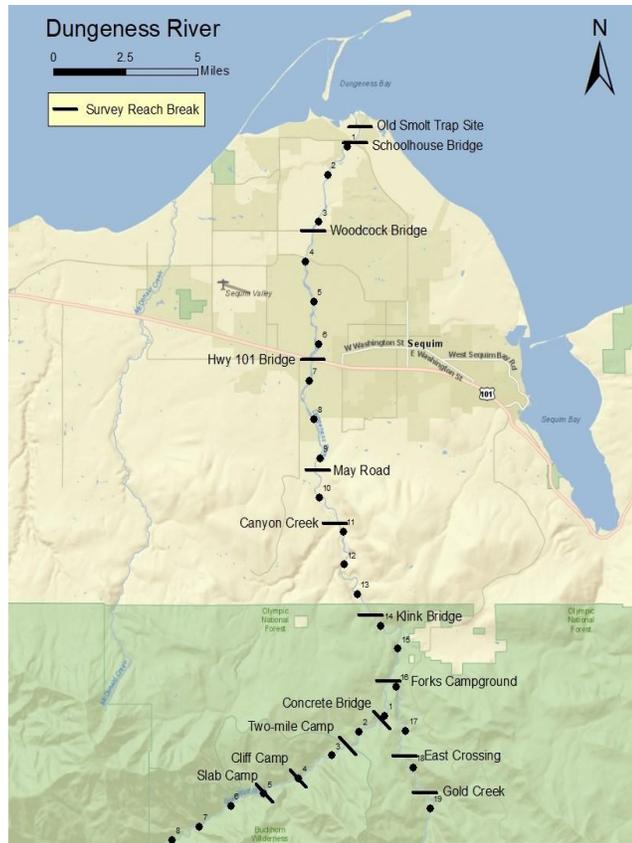


Figure 4-3 Dungeness basin survey index reaches.

The total Chinook redd count in the Dungeness basin for return year (RY) 2024 was 666. The lower basin (defined as RM 0.5- RM 10.8) count was 580 (87.10%), the upper basin (defined as RM 10.8- RM 18.7) count was 69 (10.35%), and the Gray Wolf River (RM 0.0-6.1) count was 17 (2.55%) (Table 4-27, Figure 4-4).

The total number of new redds observed is multiplied by 2.5 (1 female plus 1.5 males per redd) to estimate total number of spawning adults (Smith and Castle 1991, Orrell, 1977). In 2024, 649 Chinook redds were counted in the Dungeness (an estimated 1,623 adults) and 17 redds (an estimated 43 adults) were counted in the Gray Wolf for a total of 1,665 adults (rounded). There were an additional 109 adults trapped and netted from the river for the hatchery broodstock program, of which 15 were pre-spawn mortalities at Hurd Creek. The total estimated Chinook adult return to the river was 1,774.

Table 4-27. The number, density, distribution, and proportion of Chinook redds and estimated adults in the Dungeness and Gray Wolf rivers system in 2024.

Stream and section	Reach Number	Lower River mi.	Upper River mi.	Total length (mi)	2024 Redds	2024 Redds/mi.	2024 Adult est.	2024 Adults/mi.	2024 Redd Proportion	1998-2023 Avg. Redds/mi
<b>Lower Dungeness River (RM 0.5-RM 10.8)</b>										
Mouth to Woodcock Bridge	1	0.5	3.3	2.80	251	89.64	628	224.11	0.377	12.94
Woodcock Bridge to Hwy 101	2	3.3	6.4	3.10	173	55.81	433	139.52	0.260	15.41
Hwy 101 to Taylor Cut-Off - May	3	6.4	9.2	2.80	111	39.64	278	99.11	0.167	15.03
Taylor Cut-Off - May to Canyon Ck.	4	9.2	10.8	1.60	45	28.13	113	70.31	0.068	17.69
<b>Total</b>				<b>10.30</b>	<b>580</b>		<b>1,450</b>		<b>0.871</b>	
<b>Upper Dungeness River (RM 10.8-RM 18.7)</b>										
Canyon Creek to Clink Bridge	5	10.8	13.8	3.00	29	9.67	73	24.17	0.044	5.91
Clink Bridge to Forks Campground	6	13.8	15.8	2.00	20	10.00	50	25.00	0.030	5.85
Forks Campground to East Crossing	7	15.8	17.5	1.70	17	10.00	43	25.00	0.026	5.27
East Crossing to Gold Creek	8	17.5	18.7	1.20	3	2.50	8	6.25	0.005	1.89
<b>Total</b>				<b>7.90</b>	<b>69</b>		<b>174</b>		<b>0.104</b>	
<b>Gray Wolf River (RM 0.0-RM 6.1)</b>										
Mouth to RM 1.0 Bridge	9	0.0	1.0	1.00	14	14.00	35	35.00	0.021	5.54
RM 1.0 Bridge to Above 2 Mile Camp	10	1.0	2.5	1.50	3	2.00	8	5.00	0.005	2.85
Above 2 Mile Camp to Cliff Camp	11	2.5	4.0	1.50	0	0.00	0	0.00	0.000	0.27
Cliff Camp to Slab Camp -Suppl. Surveys	12	4.0	5.1	1.10	0	0.00	0	0.00	0.000	0.21
Slab Camp and upstream 1 mile -Suppl. Surveys	13	5.1	6.1	1.00	0	0.00	0	0.00	0.000	0.00
<b>Total</b>				<b>6.10</b>	<b>17</b>		<b>43</b>		<b>0.026</b>	
<b>Dungeness Basin Grand Total</b>				<b>24.30</b>	<b>666</b>		<b>1,665</b>		<b>1.000</b>	

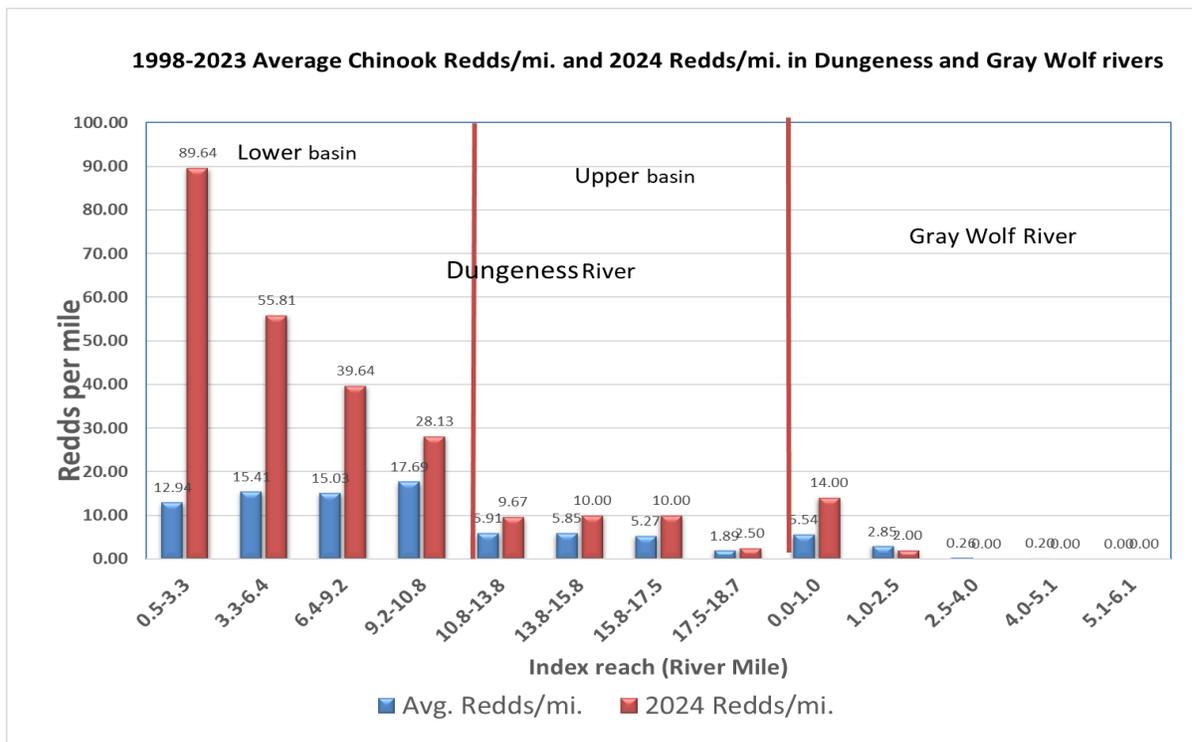


Figure 4-4. Redd densities.

Since 1986, the Dungeness River Chinook total returns (HOR+NOR) have ranged from 50 in 1997, to 1,774 in 2024, and has averaged 499. The recent 5-year average total return is 1,015 and the recent 10-year average is 854. The 19-year average for NOR and HOR returns (years for which NOR and HOR returns were discerned) were 210 (30.43%) and 482 (69.6%), respectively. The recent 5-year average of NOR and HOR total returns were 371 (36.5%) and

644 (63.5%), respectively. The Chinook returns from 1986 to 2005 that could not be identified by origin and were labeled as “Unknown” (Figure 4-5).

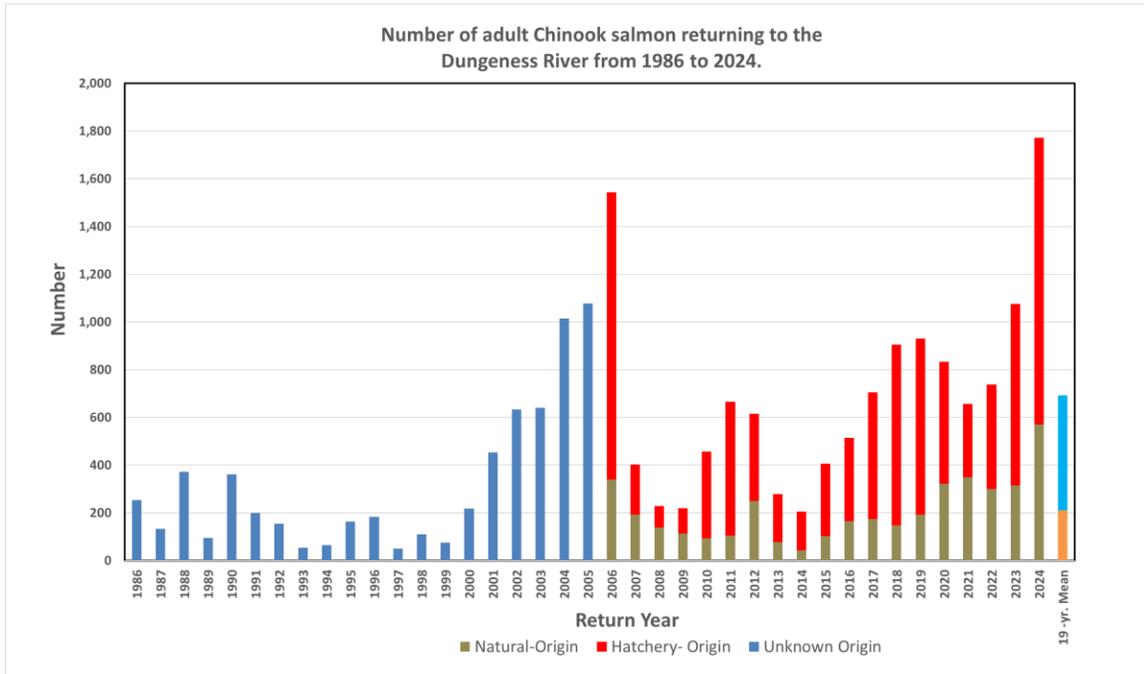


Figure 4-5. Estimated Number of Chinook salmon returning to the Dungeness basin from 1986 to 2024. The adults are broken into hatchery and natural origin in years where this data is available.

### CWT Recoveries

Marking strategy for hatchery Chinook programs in the Dungeness River is to coded-wire tag all production and starting with broodyear 2020, left ventral fin clip the Captive Brood portion of the total production. Broodyear releases contributing to the 2024 return had a tag rate of over 98 percent.

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

We sampled 317 carcasses, of which 109 were broodstock collection, including mortalities, and 208 were natural spawners in the river. Of the total number of carcasses sampled, 203 of 317 (64.03%) were tagged (Table 4-28).

Table 4-28. The number of CWT recoveries from Dungeness River Chinook salmon collected from broodstock collections and on spawning ground surveys (SGS) in the Dungeness and Gray Wolf rivers in 2024.

Recovery type	Carcass sample size	# Carcasses with CWT	Prop. Snouts detected with CWT	No. carcasses with no tag detected	Prop. no tag detected
Broodstock collection and mortalities	109	64	0.5872	45	0.4128
Spawning Ground Surveys (SGS)	208	139	0.6683	69	0.317
Total sample size	317	203	0.6404	114	0.3596

Based on the CWT results and scale samples analyzed, the preliminary NOR/HOR composition for Return Year (RY) 2024 is 569 (32.07%) NOR and 1,205 (67.93%) HOR. The ages of the NOR Chinook for RY2024 consisted of, 10.0% age-3<sub>1</sub>, 81.4% age-4<sub>1</sub>, 8.6% age-5<sub>1</sub>, and 0.0% age-6<sub>1</sub>. The ages of the HOR Chinook for RY2024 consisted of, 18.0% age-3<sub>1</sub>, 74.9% age-4<sub>1</sub>, 7.1% age-5<sub>1</sub>, and 0.0% age-6<sub>1</sub>. The ages of all Chinook for RY2024 combined were, 15.5% age-3<sub>1</sub>, 76.9% age-4<sub>1</sub>, 7.6% age-5<sub>1</sub>, and 0.0% age-6<sub>1</sub> (Table 4-29).

Table 4-29. Total number and percentages of adult, age-3, age-4, age-5, and age-6 HOR and NOR Chinook returns in 2024.

	<b>NOR</b>	<b>Percentage</b>	<b>HOR</b>	<b>Percentage</b>	<b>Total</b>	<b>Percentage</b>
Age-3	57	10.0%	217	18.0%	274	15.4%
Age-4	463	81.4%	901	74.9%	1,365	76.9%
Age-5	49	8.6%	86	7.1%	135	7.6%
Age-6	0	0.0%	0	0.0%	0	0.0%
<b>Total</b>	<b>569</b>	<b>100.0%</b>	<b>1,205</b>	<b>100.0%</b>	<b>1,774</b>	<b>100.0%</b>

From 2006 to 2024, the total Dungeness River Chinook NOR plus HOR returns ranged from 204 to 1,774 (Table 4-30). The number of NOR Chinook returns ranged from 43 to 569 and the number of HOR returns ranged from 90 to 1,205. Since RY2006, the numbers and percentages of NOR and HOR have averaged 209.8 (32.64%) NOR and 482 (67.36%) HOR, respectively. The percentages of HOR and NOR in the broodstock collection and natural spawners for RY 2006-2024 are documented in Table 4-30 and Figure 4-6.

Table 4-30. Total number of NOR and HOR natural spawners and broodstock collected in the mainstem Dungeness River for return years 2006-2024.

Return year	Natural spawners 1/ NOR	Natural spawners 1/ HOR	Natural spawners 1/ NOR+HOR	Broodstock collection 2/ NOR	Broodstock collection 2/ HOR	Broodstock collection 2/ NOR+HOR	Natural Spawners + Broodstock NOR	Percentage NOR Spawners + Broodstock	Natural Spawners + Broodstock HOR	Percentage HOR Spawners + Broodstock	Total returns NOR+HOR
2006	293	1,112	1,405	46	92	138	339	21.97%	1,204	78.03%	1,543
2007	146	159	305	47	51	98	193	47.89%	210	52.11%	403
2008	86	54	140	53	36	89	139	60.70%	90	39.30%	229
2009	71	57	128	42	50	92	113	51.36%	107	48.64%	220
2010	76	269	345	18	94	112	94	20.57%	363	79.43%	457
2011	83	452	535	21	109	130	104	15.64%	561	84.36%	665
2012	212	296	508	38	68	106	250	40.72%	364	59.28%	614
2013	46	122	168	31	79	110	77	27.70%	201	72.30%	278
2014	21	87	108	22	74	96	43	21.08%	161	78.92%	204
2015	65	200	265	37	105	142	102	25.06%	305	74.94%	407
2016	135	273	408	30	77	107	165	32.04%	350	67.96%	515 4/
2017	149	456	605	26	74	100	175	24.82%	530	75.18%	705
2018	127	661	788	20	97	117	147	16.24%	758	83.76%	905
2019	173	665	838	19	73	92	192	20.65%	738	79.35%	930
2020	294	439	733	27	70 + sunk	100	321	38.54%	512	61.46%	833
2021	312	246	558	37	61	98	349	53.20%	307	46.80%	656
2022	256	369	625	44	68	112	300	40.71%	437	59.29%	737
2023	282	666	948	32	95	127	314	29.21%	761	70.79%	1,075
2024	526	1,139	1,665	43	66	109	569	32.07%	1,205	67.93%	1,774
Mean	176.5	406.4	582.9	33.3	76.1	109.2	209.8	32.64%	482.3	67.36%	701.9

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

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

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

4/ Excludes 8 jacks

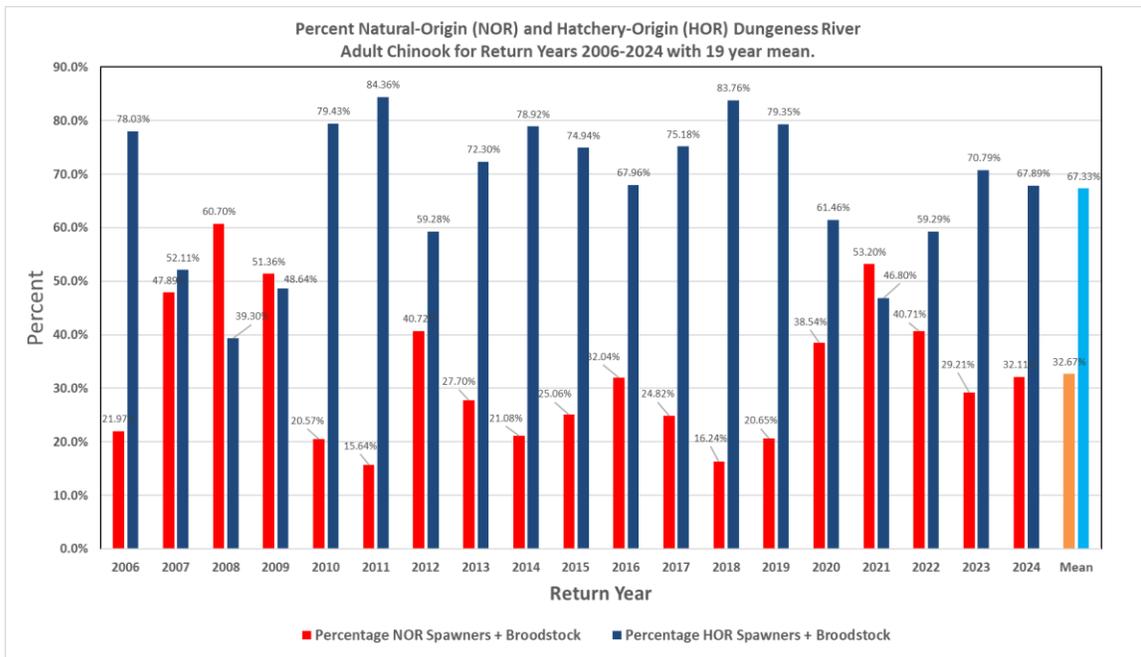


Figure 4-6. Percentages of NOR and HOR Dungeness River adult Chinook sampled from carcasses in broodstock collection and natural spawners in river for return years 2006-2024.

## **4.12 Elwha River**

The Elwha Dam removal project began in September 2011 and was completed by March 2012. The natural river flow was restored through the former Lake Aldwell. Prior to September 2012, Chinook spawning in the Elwha River was limited to the 4.8 miles below the dam with most natural spawning concentrated between RM 2.8 and 4.4. In August 2014, the Glines Canyon Dam was removed. Before dam removal, Chinook surveys were conducted by raft and foot surveys. SONAR technology is being used in the Elwha River as a method to improve enumeration of Chinook passage during the entire run from June through September as described in Denton et al (2025). This technology improved Chinook escapement estimates due to the difficulty of observing redds and fish in turbid water conditions caused by the removal of the two dams. Jacks are excluded from the SONAR estimate. The final SONAR estimate of 2024 Chinook total adult return to the river is 4,156 (95% CI, 3,854-4,658; Denton et al. 2025).

### ***Chinook Spawning Abundance and Distribution:***

An estimate of fish that spawned in the river (3,159) was calculated by subtracting fish collected for broodstock (888 WDFW hatchery and 105 LEKT hatchery) and fish harvested in ceremonial and subsistence fisheries (4 C&S) from the SONAR estimate of total adult run size (4,156; Table 4-31).

To determine the 2024 spatial distribution and density of Chinook redds in the Elwha River, the Lower Elwha Klallam Tribe (LEKT), Washington Department of Fish and Wildlife (WDFW), and Olympic National Park (ONP) personnel conducted extensive surveys during the peak spawning period (September 21) in the upper, middle, and lower watersheds. The Upper Elwha section is from Mills at rkm 21.5 to rkm 56.0, the Middle Elwha from Glines Power (rkm 21.1) to Aldwell North (rkm 7.9), and the Lower Elwha from Lower Dam (rkm 6.6) to Hunt Channel (rkm 2.0). Of 976 redds observed, 128 (13.1%) redds were in the Upper Elwha, 671 (68.8%) in the Middle Elwha, and 177 (18.1%) in the Lower Elwha. In addition to recording the number of redds, surveyors recorded the number of live and dead Chinook (Table 4-32, McHenry et al., 2024).

Table 4-31. Chinook broodstock collection, SONAR estimate of total adult return, and estimated number of natural spawning fish Elwha River in 2024.

<b>Capture method</b>	<b>No. Males</b>	<b>No. Females</b>	<b>Total adults</b>	<b>No. Jacks</b>	<b>Total adults plus jacks</b>
<b><u>WDFW Hatchery</u></b>					
Elwha Hatchery Trap Volunteers	89	15	104	38	142
River Collection Seining-Gill netting	286	194	480	0	480
Elwha River spawn (Gaff-Hook and line)	76	143	219	0	219
Gaff-Hook and line (Non-Viable Females)	0	144	144	0	144
Volunteers Returned to River to Spawn	-59	0	-59	-33	-92
<b>WDFW Broodstock collection</b>	<b>392</b>	<b>496</b>	<b>888</b>	<b>5</b>	<b>893</b>
<b><u>LEKT Hatchery</u></b>					
LEKT Hatchery Adult Chinook Trap	67	38	105	9	114
LEKT Hatchery Received from Netting	0	0	0	0	0
<b>LEKT Adult Broodstock collection</b>	<b>67</b>	<b>38</b>	<b>105</b>	<b>9</b>	<b>114</b>
<b>LEKT C&amp;S Harvest</b>			<b>4</b>		<b>4</b>
<b>SONAR adult estimate</b>			<b>4,156</b>		
<b>Estimated adult natural spawners in river /1</b>			<b>3,159</b>		

/1 Natural spawners = SONAR estimate of 4,156 minus adult WDFW broodstock collection of 888, LEKT broodstock collection of 105, and 4 C&S harvest = 3,159 (this calculation does not include jacks).

Data source: 2024 Elwha Hatchery broodstock collection numbers from Troy Tisdale, WDFW Hatchery Manager and Robert Blankenship LEKT Hatchery Manager. SONAR estimate from LEKT Tribe (Denton et al 2025).

Hatchery broodstock: total number of Chinook salmon collected for broodstock, including pond mortalities, gaffing from river and non-viable females.

Natural adult spawners= total number of Chinook salmon that spawn naturally, regardless of whether they are hatchery- or natural origin.

Table 4-32. Number of redds, redds/kilometer, and observations of live and dead Chinook salmon on the Elwha River by survey section, 2024 (McHenry et al. 2024). Rkm = River Kilometer.

Survey Reach	Rkm midpoint	No. Redds	Redds/km	Live Chinook	Dead Chinook
<b>Upper Elwha</b>					
Upper Watershed	49.9	0	0.0	0	0
Geyser Valley	30	0	0.0	1	0
Cat Creek	0.7	31	20.7	15	11
Boulder Creek	0.2	4	10.0	8	2
Mills	21.5	93	20.7	92	64
Lower Rica (up to Rkm 26)	26	0	0.0	0	0
<b>UE Subtotal</b>		<b>128</b>		<b>116</b>	<b>77</b>
		<b>(13.1%)</b>			
<b>Middle Elwha</b>					
Glines Powerhouse	19.1	53	66.2	59	21
Altaire Bridge	18.1	61	50.8	91	6
Elwha Ranger Stat.	17.8	90	45.0	108	46
Fisherman's Corner	16.1	79	71.8	59	33
ONP Boundary	14.9	39	22.9	17	20
McDonald Bridge	11.9	34	22.6	36	17
Little River	12.2	35	18.4	45	7
Indian Creek	12.1	86	45.3	105	73
Aldwell South	11.0	83	36.1	62	51
Aldwell North	8.8	111	46.2	197	13
<b>ME Subtotal</b>		<b>671</b>		<b>779</b>	<b>287</b>
		<b>(68.8%)</b>			
<b>Lower Elwha</b>					
Elwha Dam	6.1	20	25.0		
Hwy 112 Bridge	4.9	83	55.3		
County Bridge	3.2	52	27.4		
East Channel	1.1	22	9.5		
Hunt Road Channel	1.5	0	0.0		
<b>LE Subtotal</b>		<b>177</b>		<b>186</b>	<b>146</b>
		<b>(18.1%)</b>			
<b>Total</b>		<b>976</b>		<b>1,081</b>	<b>510</b>

### **Biological Sampling:**

WDFW, LEKT, and ONP personnel sampled carcasses using the methods described in Weinheimer et al (2015). Carcasses were sampled from naturally spawning fish in the mainstem river and from broodstock collected at the hatcheries. Carcasses were subsampled for fork length (cm), post-orbital hypural length (POH), sex, scales, otoliths, checked for clipped adipose fin, and a DNA fin clip was taken if fish gills showed a coloration of better than 50%. During each sampling day and after all samples were collected (sampled group), personnel tallied all remaining carcasses for sex, marks, and coded wire tags (non-sampled group). No scales, otoliths, or DNA were collected from this group. If a tag was detected in a fish, then the snout was removed, labeled, and bagged. For the 2024 season, a total of 178 and 94 Chinook broodstock were sampled at the WDFW Elwha and LEKT hatchery facilities, respectively. In addition, 293 carcasses were sampled in the river for a total of 565 carcasses were sampled for DNA, otoliths, scales, and checked for marks (adipose clips), and tag (CWT) presence or absence (Table 4-33Table 4-33).

Table 4-33. Number of Chinook carcasses sampled for DNA, otolith, and CWT in the Elwha River and broodstock collected for WDFW and LEKT Hatchery facilities 2024.

Sample Type/ Sex ID	Natural River Spawners-Carcass Surveys (CS)	Broodstock LEKT Hatchery	Broodstock Netted-River WDFW Hatchery	Broodstock RP (Floy Tags) WDFW Hatchery	Broodstock Collection-Volunteer WDFW Hatchery	Grand Total Chinook Sampled
<b>No. Chinook Sampled</b>						
<b>Female</b>	107	40	70	0	9	226
<b>Male</b>	125	40	64	1	13	243
<b>Total</b>	<b>232</b>	<b>80</b>	<b>134</b>	<b>1</b>	<b>22</b>	<b>469</b>

Hatchery-Origin Returns (HOR) are the total number of Chinook salmon whose parents were spawned in a hatchery, regardless of whether they themselves were spawned in hatchery or spawned naturally. Natural-Origin Returns (NOR) are the total number Chinook salmon whose parents spawned in the river, regardless of whether they themselves were spawned in hatchery or spawned naturally. Hatchery Origin Returns and Natural Origin Returns are determined after all the otolith samples have been analyzed and CWTs have been matched with individual fish. False CWT detections can occur and the number of CWT fish in the table could be lower. Fish that could not be aged because of unreadable scale samples may be aged from otolith marked samples or decoded tags. Hatchery Chinook production in the Elwha basin utilizes 100 percent otolith marking as part of the recovery program and only adipose fin clip coded-wire tags a small portion for origin and release group identification (Table 4-35). The number of sampled carcasses that are recorded as adipose still intact and no CWT present could have an otolith with hatchery production markings and thus do not necessarily constitute natural origin.

Table 4-34. Release and marking strategies of Elwha Chinook hatchery production from the WDFW and LEKT hatchery facilities BY 2017-2021 (RMIS Data).

BY	Sub-yearling Releases 1/						Yearling Releases 1/		
	OT/UM	OT/AD	OT/CWT	OT/AD/CWT	Total release	% AD	OT/UM	OT/CWT	% AD
2017	1,259,105	247	1,015	246,533	1,506,900	16.37%	7,337	193,663	0.0%
2018	2,975,302	973	498	248,525	3,225,300	7.73%	7,676	182,324	0.0%
2019	2,429,700	0	0	246,500	2,676,200	9.21%	9,003	188,997	0.0%
2020	652,454	4,096	3,171	242,625	902,400	27.34%	0	192,000	0.0%
2021	1,156,809	200	853	250,065	1,407,928	17.77%	415	192,585	0.0%

1/ OT – Otolith Marked  
 UM – Adipose intact  
 AD – Adipose Clipped  
 CWT – Coded-wire tagged.

**Broodstock Sampling:**

Biologists and technicians sampled broodstock (BS) carcasses on four different spawning days at both the WDFW and the LEKT hatcheries, September 3, 10, 17, and 24. Scales, otoliths, DNA, and mark and tag status were collected (Table 4-35). During the four spawning days, 45.55% of the fish spawned were sampled (178 of 382). For the entire broodstock season, WDFW Elwha Hatchery staff spawned 510 Chinook at the trap and 34.1% of these fish were sampled. At the Lower Elwha Klallam Hatchery, 94 Elwha Chinook were sampled by WDFW biologists and technicians (Table 4-35).

Table 4-35. Total number of female and male Chinook sampled during spawning operations on September 5, 12, 19, and 26, 2023 at the WDFW Elwha Hatchery facility.

<b>Broodstock Collection Method</b>	<b>Female</b>	<b>Male</b>	<b>Total (Male + Female)</b>
<b>Lower Elwha Klallam Hatchery</b>	<b>40</b>	<b>40</b>	<b>80</b>
September 5, 2023	7	10	17
September 12, 2023	14	10	24
September 19, 2023	<b>9</b>	<b>10</b>	<b>19</b>
September 26, 2023	<b>10</b>	<b>10</b>	<b>20</b>
<b>WDFW -Netting River</b>	<b>70</b>	<b>65</b>	<b>135</b>
September 5, 2023	19	15	34
September 12, 2023	21	19	40
September 19, 2023	20	20	40
September 26, 2023	10	10	20
<b>WDFW Netted River-RP Fish</b>	<b>0</b>	<b>1</b>	<b>1</b>
September 5, 2023	0	1	1
<b>Volunteer</b>	<b>9</b>	<b>13</b>	<b>22</b>
September 5, 2023	1	2	3
<b>September 12, 2023</b>	<b>4</b>	<b>4</b>	<b>8</b>
<b>September 19, 2023</b>	<b>4</b>	<b>6</b>	<b>10</b>
<b>WDFW Volunteer R.P.Fish</b>			
<b>September 12, 2023</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>Grand Total</b>	<b>119</b>	<b>118</b>	<b>237</b>
<b>Percentage Female and Male</b>	<b>50.2%</b>	<b>49.8%</b>	<b>100.0%</b>

**River Carcass Collections - Natural Spawners (HOR and NOR):**

WDFW, LEKT, and ONP biologists and technicians sampled carcasses from fish that spawned naturally in the river. Carcasses were sampled between September 3 and September 24, 2024. Based on redd numbers from previous spawning seasons, the period between September 21 and September 28 provided the best opportunity for the peak redd count and sampling carcasses. Of the 293 carcasses, 82.6% were sampled in the mainstem river and 17.4% were sampled in tributaries and 47.% (138) were females and 53% (155) males (Table 4-36).

Table 4-36. Number of female and male Chinook carcasses sampled in the mainstem Elwha River and tributaries by survey reach and date in 2024.

<b>Method River Carcass Survey (CS)</b>	<b>Female</b>	<b>Male</b>	<b>Total (Male + Female)</b>	<b>Proportion Sampled in Reach</b>
<b>Elwha Dam to Mouth</b>	<b>6</b>	<b>13</b>	<b>19</b>	<b>0.0648</b>
September 24, 2024	6	13	19	
<b>Gooseneck to Elwha Dam</b>	<b>4</b>	<b>4</b>	<b>8</b>	<b>0.0273</b>
September 25, 2024	4	4	8	
<b>Hwy 101 to Elwha Dam</b>	<b>6</b>	<b>5</b>	<b>11</b>	<b>0.0375</b>
September 22, 2024	6	5	11	
<b>Boat Launch to Gooseneck</b>	<b>5</b>	<b>9</b>	<b>14</b>	<b>0.0478</b>
September 13, 2024	5	9	14	
<b>Hwy 101 to Gooseneck</b>	<b>8</b>	<b>4</b>	<b>12</b>	<b>0.0410</b>
September 17, 2024	8	4	12	
<b>McDonald Gage to Hwy 101</b>	<b>11</b>	<b>4</b>	<b>15</b>	<b>0.0512</b>
September 10 & 19, 2024	11	4	15	
<b>NPS Boundary to McDonald Gage</b>	<b>14</b>	<b>17</b>	<b>31</b>	<b>0.1058</b>
September 11, 18, & 19, 2024	14	17	31	
<b>Fisherman's Corner to NPS Boundary/Gate</b>	<b>10</b>	<b>11</b>	<b>21</b>	<b>0.0717</b>
September 19, 2024	10	11	21	
<b>Ranger Station to Fisherman's Corner</b>	<b>15</b>	<b>23</b>	<b>38</b>	<b>0.1297</b>
September 18, 2024	15	23	38	
<b>Altaire Bridge to Top of Road Washout</b>	<b>2</b>	<b>4</b>	<b>6</b>	<b>0.0205</b>
September 11, 2024	2	4	6	
<b>Altaire Bridge to Ranger Station</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>0.0137</b>
September 18, 2024	2	2	4	
<b>Glines Canyon to Altaire Bridge</b>	<b>9</b>	<b>7</b>	<b>16</b>	<b>0.0546</b>
September 11 & 18, 2024	9	7	16	
<b>Rica Canyon to Glines Canyon</b>	<b>18</b>	<b>29</b>	<b>47</b>	<b>0.1604</b>
September 12, 18, & 25, 2024	18	29	47	
<b>Indian Creek</b>	<b>19</b>	<b>11</b>	<b>30</b>	<b>0.1024</b>
September 16, 17, 19, 23 & 27, 2024	19	11	30	
<b>Little River</b>	<b>7</b>	<b>10</b>	<b>17</b>	<b>0.0580</b>
September 19 & 26, 2024	7	10	17	
<b>Boulder Creek</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>0.0137</b>
September 12 & 18, 2024	2	2	4	
<b>Grand Total</b>	<b>138</b>	<b>155</b>	<b>293</b>	<b>1.0000</b>
<b>Percentage Female and Male</b>	<b>47.1%</b>	<b>52.9%</b>	<b>100.0%</b>	

### ***Broodstock and River Carcass Samples by Age and Sex***

Of the 293 carcass samples (CS) from the river, 226 had readable scales, 107 were females and 119 were males. Female age classes consisted of 5.61% age 3, 69.16% age 4, and 25.23% age 5. Males age classes consisted of 27.73% age 3, 61.35% age 4, and 10.92% age 5 (Table 4-37).

Of the 272 broodstock carcasses sampled 211 had readable scales, 99 were females and 112 were males. Female age classes consisted of 5.05% age 3, 73.74% age 4, and 21.21% age 5. Male age classes consisted of 8.93% age 2, 37.47% age 3, 50.89% age 4, 2.68% age 5 (Table 4-37).

Of the 565 total carcasses sampled, 437 had readable scales, 206 were females and 231 were males. Female age classes consisted of 5.34% age 3, 71.36% age 4, and 23.30% age 5. Male age classes consisted of 4.33% age 2, 32.47% age 3, 56.28% age 4, and 6.92% age 5. Combining the 437 readable scales for both sexes, the age classes consisted of 2.92 % age 2, 19.68% age 3, 63.38% age 4, and 14.65% age 5 (Table 4-37).

Table 4-37. Number and ages of female and male Chinook broodstock and river carcasses sampled in the hatchery and mainstem Elwha River in 2023.

<b>Collection Method and Scale Age</b>	<b>Female Total</b>	<b>Female Prop.</b>	<b>Male Total</b>	<b>Male Prop.</b>	<b>Female + Male Total</b>	<b>Female + Male Prop. By Age</b>
<b>River Carcass Survey (CS)</b>						
Age 2 <sub>1</sub>	0	0.0000	0	0.0000	0	0.0000
Age 2 <sub>2</sub>	0	0.0000	0	0.0000	0	0.0000
Age 3 <sub>1</sub>	3	0.0337	29	0.2685	32	0.1624
Age 3 <sub>2</sub>	0	0.0000	0	0.0000	0	0.0000
Age 4 <sub>1</sub>	64	0.7191	67	0.6204	131	0.6650
Age 4 <sub>2</sub>	5	0.0562	5	0.0463	10	0.0508
Age 5 <sub>1</sub>	15	0.1685	6	0.0556	21	0.1066
Age 5 <sub>2</sub>	2	0.0225	1	0.0093	3	0.0152
Age 6 <sub>1</sub>	0	0.0000	0	0.0000	0	0.0000
Age 6 <sub>2</sub>	0	0.0000	0	0.0000	0	0.0000
<b>Readable Scales</b>	89	1.0000	108	1.0000	197	1.0000
<b>Total (CS) Scales Sampled</b>	107		125		232	
<b>Broodstock Collection-Hatchery</b>	<b>Female Total</b>	<b>Female Prop.</b>	<b>Male Total</b>	<b>Male Prop.</b>	<b>Female + Male Total</b>	<b>Female + Male Prop. By Age</b>
Age 2 <sub>1</sub>	0	0.0000	1	0.0109	1	0.0051
Age 2 <sub>2</sub>	0	0.0000	1	0.0109	1	0.0051
Age 3 <sub>1</sub>	6	0.0577	31	0.3370	37	0.1888
Age 3 <sub>2</sub>	0	0.0000	0	0.0000	0	0.0000
Age 4 <sub>1</sub>	74	0.7115	49	0.5326	123	0.6276
Age 4 <sub>2</sub>	6	0.0577	6	0.0652	12	0.0612
Age 5 <sub>1</sub>	16	0.1538	3	0.0326	19	0.0969
Age 5 <sub>2</sub>	2	0.0192	1	0.0109	3	0.0153
Age 6 <sub>1</sub>	0	0.0000	0	0.0000	0	0.0000
Age 6 <sub>2</sub>	0	0.0000	0	0.0000	0	0.0000
<b>Readable Scales</b>	104	1.0000	92	1.0000	196	1.0000
<b>Total Hatchery Scales Sampled</b>	119		118		237	
<b>Carcass + Broodstock Collection</b>	<b>Female Total</b>	<b>Female Prop.</b>	<b>Male Total</b>	<b>Male Prop.</b>	<b>Female + Male Total</b>	<b>Female + Male Prop. By Age</b>
Age 2 <sub>1</sub>	0	0.0000	1	0.005	1	0.0025
Age 2 <sub>2</sub>	0	0.0000	1	0.005	1	0.0025
Age 3 <sub>1</sub>	9	0.0466	60	0.3000	69	0.1756

<b>Age 3<sub>2</sub></b>	0	0.0000	0	0.0000	0	<b>0.0000</b>
<b>Age 4<sub>1</sub></b>	138	0.7150	116	0.5800	254	<b>0.6463</b>
<b>Age 4<sub>2</sub></b>	11	0.0570	11	0.0555	22	<b>0.0560</b>
<b>Age 5<sub>1</sub></b>	31	0.1606	9	0.0450	40	<b>0.1018</b>
<b>Age 5<sub>2</sub></b>	4	0.0289	2	0.0100	6	<b>0.0153</b>
<b>Age 6<sub>1</sub></b>	0	0.0000	0	0.0000	0	<b>0.0000</b>
<b>Age 6<sub>2</sub></b>	0	0.0000	0	0.0000	0	<b>0.0000</b>
<b>Readable Scales</b>	193	1.0000	200	1.0000	393	<b>1.0000</b>
<b>Total Scales Sampled</b>	<b>226</b>		<b>243</b>		<b>469</b>	

***Mark/Unmark (fin clip) status, tag (CWT) presence/absence of Elwha Chinook broodstock and river carcasses in 2023.***

Results of the 565 Chinook carcasses sampled in 2024 (293 river and 272 hatchery broodstock at the WDFW and LEKT hatcheries) for mark status (fin clip) and Coded Wire tag presence (CWT) are in Table 4-38. Results are pending final review.

Table 4-38. Number and proportion, by mark/tag status, of female and male Elwha Chinook sampled during river carcass surveys (CS) and broodstock (BS) spawned at the Elwha hatcheries in 2024.

<b>Mark/Tag status</b>	<b>Carcass survey (CS)</b>	<b>Carcass survey (CS)</b>	<b>Carcass survey (CS)</b>	<b>Carcass survey (CS)</b>
Marked	Female	Male	Total	Proportion
AD+CWT	30	30	60	0.2048
AD Only	2	2	4	0.0137
Unmarked	Female	Male	Total	Proportion
CWT Only	8	4	12	0.0410
UM+NB	94	114	208	0.7099
Undetermined	Female	Male	Total	Proportion
UND+NB	2	1	3	0.0102
AD+UND	1	0	1	0.0034
UM+UND	1	4	5	0.0170
Total	138	155	293	1.0000
<b>Mark/Tag status</b>	<b>Broodstock (BS)</b>	<b>Broodstock (BS)</b>	<b>Broodstock (BS)</b>	<b>Broodstock (BS)</b>
Marked	Female	Male	Total	Proportion
AD+CWT	37	46	83	0.3051
AD Only	3	4	7	0.0257
Unmarked	Female	Male	Total	Proportion
CWT Only	16	5	21	0.0772
UM+NB	68	92	160	0.5882
Undetermined	Female	Male	Total	Proportion
UND+NB	0	0	0	0.0000
AD+UND	0	0	0	0.0000
UM+UND	0	0	0	0.0000
UND+CWT	1	0	1	0.0037
Total	125	147	272	1.0000
<b>Mark/Tag status</b>	<b>Carcass Survey + Broodstock</b>	<b>Carcass Survey + Broodstock</b>	<b>Carcass Survey + Broodstock</b>	<b>Carcass Survey + Broodstock</b>
Marked	Female	Male	Total	Proportion
AD+CWT	42	40	82	0.1748
AD Only	5	1	6	0.0128
Unmarked	Female	Male	Total	Proportion
CWT Only	18	21	39	0.0832
UMNB 1/	161	181	342	0.7292
Total	226	243	469	1.0000

### 4.13 Hoko

Washington Department of Fish and Wildlife (WDFW) and Makah Fisheries Management (MFM) staff conducted Chinook salmon Spawning Ground Surveys (SGS) in October 2024 to count live and dead Chinook and redds to estimate escapement. The mainstem Hoko River between river miles 2.8 and 10.1 were surveyed as index reaches and several tributaries and the upper Hoko mainstem from river miles 10.1 to 22.5 were surveyed as supplemental reaches in 2024. This represents the majority of Chinook spawning area in the Hoko basin. Tributaries that were surveyed include the Little Hoko River, a tributary to the lower mainstem, and Brownes, Herman, North Fork Herman, Ellis, Bear, and Cub creeks, which are tributaries to the upper mainstem (Figure 4-7).

Flow regimes in 2024 (Figure 4-8) were favorable for surveys conducted by both WDFW and MFM until October 19, when flows increased from approximately 115 cfs at noon on October

18 to a peak of 11,800 cfs at 6:15 PM on October 19. By the last survey on October 25, flows receded to 325 cfs and water visibility remained fair to poor the remainder of the season.

Figure 4-7. Map of the Hoko River watershed showing index and supplemental surveys markers for estimating Chinook spawning escapement in the mainstem Hoko River and its tributaries in October 2024.

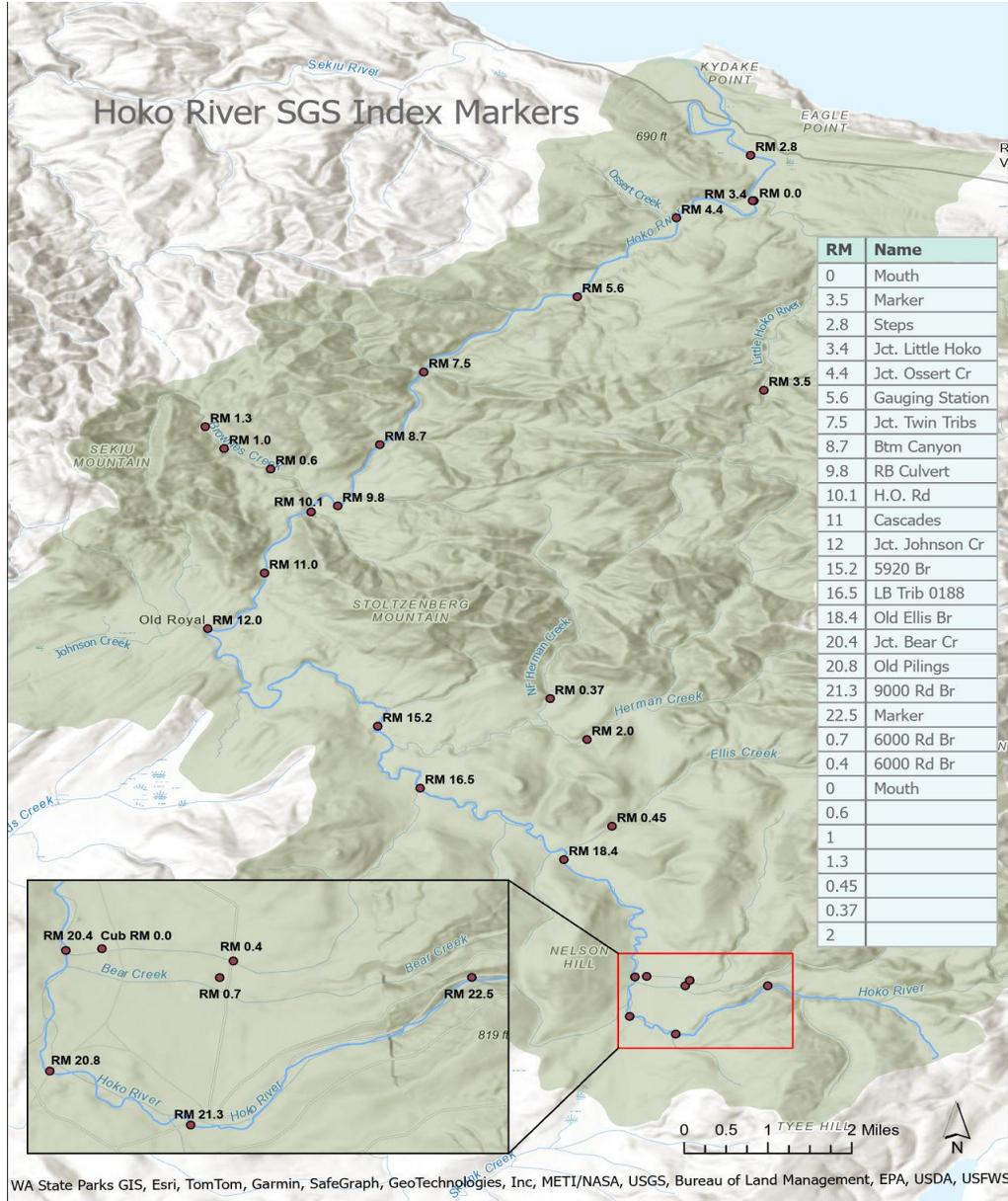
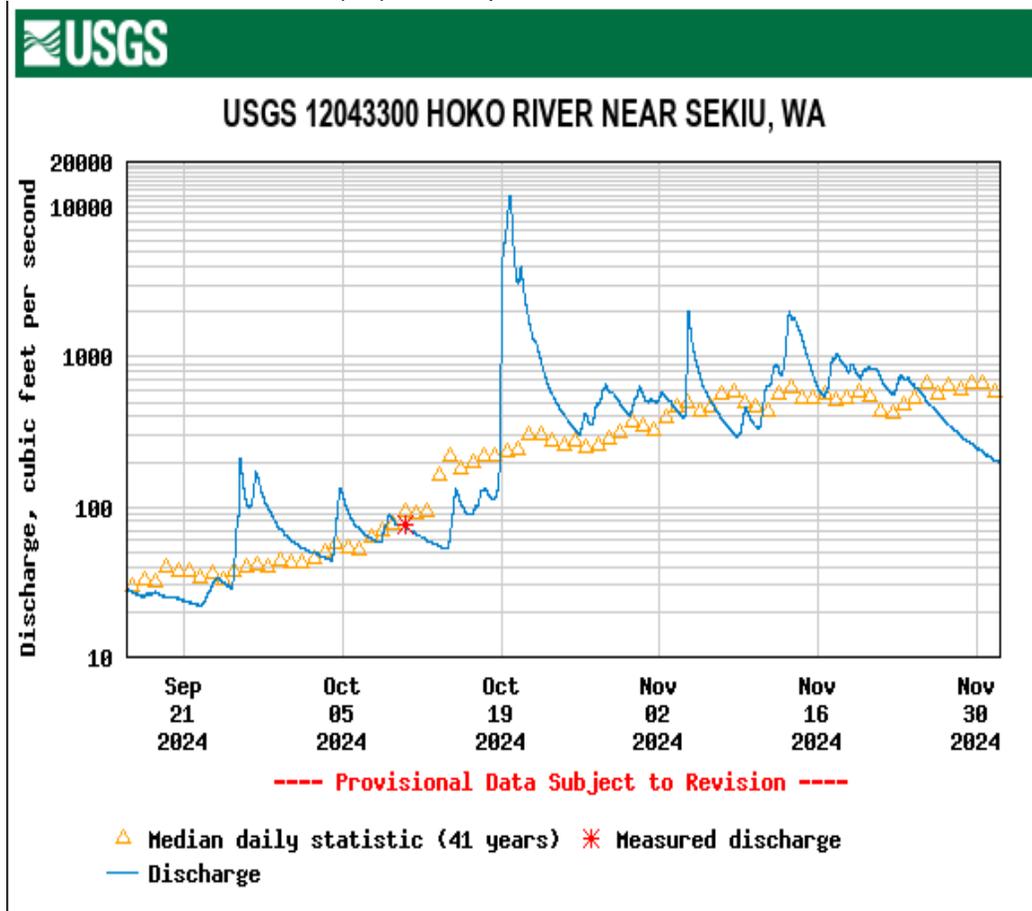


Figure 4-8. USGS Hoko River flows (cfs) from September 16 to December 15, 2024.



WDFW staff identified, flagged, and mapped the latitude and longitude coordinates (GPS) of newly constructed redds each survey. During Index surveys, data collected included fish species code (Species Code =1 for Chinook), Statistical Week, date surveyed, redd number for that survey date and section, the distance of the redd from flagging in approximate meters, and approximate length by width dimensions of each redd. During the 2024 Chinook spawning season, WDFW identified 650 redds for an estimate of 1,625 adults (650 redds x 2.5 adults per redd = 1,625 fish) (Table 4-39 and Table 4-40). The 2.5 adults per redd is equal to one female and 1.5 males per redd. The number and percentage of new redds in the lower mainstem from RM 2.8 to RM 10.1 by survey date were as follows: 1) October 1 (237, 36.46%) 2) October 8 (240, 36.92%) 3) October 15 (148, 22.77%), 4) October 25 and 29 (25, 3.85%). An additional 45 redds (113 adult fish) were counted by MFM staff in the tributaries, upper mainstem, and Little Hoko River (Table 4-41). Based on spawning ground survey data in 2024, a total of 1,738 Chinook (1,625 + 113 = 1,738) were enumerated on the spawning grounds.

Table 4-39. Chinook redd surveys in mainstem Hoko River from RM 2.8 to RM 10.1 by WDFW 2024.

Stream Name	Survey Date	End River Mile	Start River Mile	Total Live	Total Dead	New Redds
Hoko R (19.0148)	2024-10-01	RM 9.80	RM 10.10	663	2	88
Hoko R (19.0148)	2024-10-01	RM 7.50	RM 8.70	72	1	54
Hoko R (19.0148)	2024-10-01	RM 5.60	RM 7.50	39	0	49
Hoko R (19.0148)	2024-10-01	RM 4.40	RM 5.60	178	0	34
Hoko R (19.0148)	2024-10-01	RM 3.40	RM 4.40	24	0	11
Hoko R (19.0148)	2024-10-01	RM 2.80	RM 3.40	119	0	1
<b>Weekly Redd Total</b>				<b>1,095</b>	<b>3</b>	<b>237</b>
Hoko R (19.0148)	2024-10-8	RM 9.80	RM 10.10	1,025	39	134
Hoko R (19.0148)	2024-10-8	RM 7.50	RM 8.70	155	19	59
Hoko R (19.0148)	2024-10-8	RM 5.60	RM 7.50	83	12	34
Hoko R (19.0148)	2024-10-8	RM 4.40	RM 5.60	11	1	12
Hoko R (19.0148)	2024-10-8	RM 3.40	RM 4.40	0	0	1
Hoko R (19.0148)	2024-10-8	RM 2.80	RM 3.40	NS	NS	NS
<b>Weekly Redd Total</b>				<b>1,274</b>	<b>71</b>	<b>240</b>
Hoko R (19.0148)	2024-10-15	RM 9.80	RM 10.10	430	0	75
Hoko R (19.0148)	2024-10-15	RM 7.50	RM 8.70	46	19	36
Hoko R (19.0148)	2024-10-15	RM 5.60	RM 7.50	27	36	19
Hoko R (19.0148)	2024-10-15	RM 4.40	RM 5.60	14	9	13
Hoko R (19.0148)	2024-10-15	RM 3.40	RM 4.40	3	0	2
Hoko R (19.0148)	2024-10-15	RM 2.80	RM 3.40	2	0	3
<b>Weekly Redd Total</b>				<b>522</b>	<b>55</b>	<b>148</b>
Hoko R (19.0148)	2024-10-24	RM 9.80	RM 10.10	21	5	18
Hoko R (19.0148)	2024-10-24	RM 7.50	RM 8.70	10	2	5
Hoko R (19.0148)	2024-10-24	RM 5.60	RM 7.50	4	0	2
Hoko R (19.0148)	2024-10-29	RM 4.40	RM 5.60	0	0	0
Hoko R (19.0148)	2024-10-29	RM 3.40	RM 4.40	0	0	0
Hoko R (19.0148)	2024-10-29	RM 2.80	RM 3.40	NS	NS	NS
<b>Weekly Redd Total</b>				<b>35</b>	<b>7</b>	<b>25</b>
<b>Redd Grand Total from RM 2.8 - RM10.1</b>						<b>650</b>

Table 4-40. Observations of Chinook spawning activity during Coho redd surveys in upper mainstem Hoko River from RM 20.4 - RM 22.5, Bear Creek from RM 0.0-RM1.7, and Cub Creek RM 0.0-RM 1.1 by WDFW from October 30, 2024 to January 21, 2024.

Stream Name	Survey Dates	End River Mile	Start River Mile	Total Live	Total Dead	New Redds
Hoko R (19.0148)	1/	RM 20.4	RM 22.5	0	0	0
Bear Cr (19.0196)	1/	RM 0.0	RM 1.7	0	0	0
Cub Cr (19.0197)	1/	RM 0.0	RM 1.1	0	0	0
<b>Redd Grand Total from RM 20.4 – RM 22.5</b>				<b>0</b>	<b>0</b>	<b>0</b>

Table 4-41. Summary of Hoko River Chinook surveys by Makah Fisheries Management staff in 2024.

Stream Name	Survey Date	End River Mile	Start River Mile	Total Live	Total Dead	New Redds
Hoko River	2024-10-06	RM 9.00	RM 10.10	7	1	0
Hoko River	2024-10-14	RM 10.10	RM 11.00	8	0	5
Hoko River	2024-10-16	RM 13.00	RM 15.30	1	9	12
Hoko River	2024-10-17	RM 15.00	RM 18.00	1	1	11
Bear Creek	2024-10-25	RM 0.00	RM 0.66	0	0	1
Cub Creek	2024-10-25	RM 0.00	RM 0.37	0	0	0
Herman Creek	2024-10-17	RM 0.00	RM 2.00	0	0	0
Browns Creek	2024-11-02	RM 0.00	RM 1.00	28	37	13
Little Hoko R.	2024-10-15	RM 0.00	RM 3.50	0	0	3
<b>Total</b>				<b>45</b>	<b>48</b>	<b>45</b>

Based on the high percentage of redds in the vicinity of the hatchery (48.66%) and the extra males (674) and females (141) released back to the river to spawn naturally, an adjustment was estimated to account for possible duplication of redds (Table 4-42). See Hoko Brood Collection section for the method used to adjust for possible duplicate redd counts based on the date the river was surveyed and the date fish were released by the hatchery.

Table 4-42. Number of adult male and female Chinook that returned to the Makah Hoko Falls Hatchery Rack by date in 2024, fish that died before spawning, surplus, lethally spawned, and the number of male and female adults released back to the river to spawn naturally.

Date Footnote # /	Rack Count Total (Male/Female)	Mortality	Surplus	Lethal Spawne d	Returned to stream to spawn Male (M)	Returned to stream to spawn Female (F)	Total Returned to stream to spawn (Male + Female)	Total Current Inventory
9/20/2024	+ 645 (264 M / 381 F)	0	0	0	0	0	0	645
9/22/2024	0	(-2)	0	0	0	0	0	643
9/27/2024	+ 815 (672 M / 143 F)	0	(-230)	0	0	0	0	1,228
10/8/2024 1/	0	0	0	0	(-398)	(-5)	(-403)	825
10/9/2024	0	(-5)	0	(-118)	0	0	0	702
10/10/2024 2/	0	0	0	0	(-62)	(-1)	(-63)	639
10/11/2024 2/	0	0	0	0	(-50)	(-24)	(-74)	565
10/15/2024 3/	0	0	0	0	(-142)	(-97)	(-239)	326
10/17/2024	0	0	0	(-82)	0	0	0	244
10/23/2024	0	(-1)	(-1)	(-19)	0	0	0	223
10/24/2024 4/	0	0	(-105)	(-82)	(-22)	(-14)	(-36)	0
<b>2024 Totals 5/</b>	<b>1,460</b> <b>(936 M+524 F)</b>	<b>8</b>	<b>336</b>	<b>301</b>	<b>674</b>	<b>141</b>	<b>815</b>	<b>0</b>

Source: Joe Hinton, Hoko Falls Hatchery Manager-Makah Tribe. Negative numbers in parentheses (- #) are subtracted from previous current inventory number in Table 4-43. See Footnotes 1-5 details below.

1. On 10/8/2024, 398 males and 5 females were released back to the river to spawn naturally at hatchery. We assumed these females did not spawn on same date and time of the WDFW survey.
2. On 10/10/2024 and 10/11/2024, 112 males, and 25 females were released back to the river to spawn naturally at hatchery before WDFW surveyed on 10/15/2024.
3. On 10/15/2024, 142 males and 97 females were released at hatchery before WDFW surveyed on 10/15/2024. We assumed these females did not spawn on same date and time of the WDFW survey

4. On 10/24/2024, 22 males and 14 females were released the same day WDFW surveyed on 10/24/2024. We assumed these females did not spawn on same date and time of the WDFW survey
5. Of the 674 males and 141 females released back to river, we estimate only 26 redds (26 females+39 males) = 65 adults) could have theoretically been double counted. 30 females and 510 males were released between 10/8/2024 and 10/11/2024. Based on the percent redd visibility below, 87.2% of the 30 redds (26 redds) could have been visible on the 10/15/2024 WDFW survey (Table 4-43). Redds created by the 97 females on 10/15/2024 and 14 females released on 10/24/2024 would not have been counted by WDFW staff. We estimated 96.15% of the redds were made by October 24,2024 (Table 4-44).

### Hoko Chinook Broodstock Collection

For the 2024 Hoko Chinook broodstock season, 524 females, 936 males, and 16 jacks returned to the Hoko Falls Hatchery pond facility. All jacks were surplus for subsistence or river nutrient enhancement. Of the 1,460 total adult fish that returned to the pond, 158 females and 143 males were lethally spawned, 5 females and 3 males died in the hatchery, and 220 females and 116 males were surplus for subsistence use and river nutrient enhancement. Of the remaining adult fish, 141 females and 674 males were released back to the river to spawn naturally (Table 4-43); and total current inventory on hand by date (Table 4-42). Total number of Chinook released back to the river to spawn naturally is 815 with 750 Chinook that entered the hatchery and did not leave.

Table 4-43. Summary of RY 2024 Chinook returns to Makah Hoko Falls Hatchery.

<b>Sex</b>	<b>Rack count</b>	<b>Pond Mortality</b>	<b>Surplus</b>	<b>Lethal spawned (Viable)</b>	<b>Non-Viable Spawned</b>	<b>Returned to stream</b>
Female	524	5	220	158	0	141
Male	936	3	116	143	0	674
<b>Total adults</b>	<b>1,460</b>	<b>8</b>	<b>336</b>	<b>301</b>	<b>0</b>	<b>815</b>
Jack	16	0	16	0	0	0
<b>Total fish</b>	<b>1,476</b>	<b>8</b>	<b>354</b>	<b>301</b>	<b>0</b>	<b>815</b>

The estimated natural spawning Chinook escapement in the Hoko River basin in 2024 is 2,488. This is based on the number of redds enumerated in 2024 and an adjusted number of Chinook that entered the Makah Hoko Falls Hatchery and subsequently released back into the river to spawn naturally. An evaluation of the timing when redds were observed and the average redd life (duration redds are visible) determined that 65 Chinook released from the hatchery were probably accounted for during spawning ground surveys, see Footnote 5 above. Of the 815 Chinook that were released back to the river to spawn naturally, 65 were likely accounted for during spawning ground surveys. The natural spawning escapement is made up of the 1,738 fish accounted during spawning ground surveys plus 815 released from the hatchery to spawn naturally, minus the 65 accounted for during spawning ground surveys, (815 – 65 = 750) for a total of 2,488 natural spawners (1,738 + 750 = 2,488).

In addition to keeping track of weekly and cumulative new redds (Table 4-44), WDFW recorded the visibility of redds observed from previous surveys (Table 4-45).

Table 4-44. Number of new Chinook redds (NR), previous visible redds (PRV), visible redds (VR) =(NR+PVR), cumulative new redds (CNR), and percent visible redds (%VR) = (VCR/CNR) by stat week from RM 9.8-10.1 in the mainstem Hoko River near Makah Hoko Falls Hatchery in 2024.

Stat Week	Date surveyed	Lower River mi.	Upper River mi.	New Redds (NR)	Previous Visible Redds (PRV)	Visible Redds (VR) =(NR+PVR)	Cumulative New Redds (CNR)	Percent Visible Redds %VR=(VR/CNR)
40	10/1/2024	9.8	10.1	88	0	88	88	100.0%
41	10/8/2024	9.8	10.1	134	78	212	222	95.50%
42	10/15/2024	9.8	10.1	75	184	259	297	87.21%
43	10/24/2024	9.8	10.1	18	2	20	315	6.35%

Table 4-45. Number of new Chinook redds (NR), cumulative new redds (CNR), percent new redds and cumulative new redds by stat week from RM 2.8-10.1 mainstem Hoko River in 2024.

Stat Week	Date surveyed	Lower River mi.	Upper River mi.	New Redds (NR)	Cumulative New Redds (CNR)	Percent New Redds by Stat Week	Cumulative Percent New Redds (CNR) by Stat week
40	10/1/2024	2.8	10.1	237	237	36.46%	36.46%
41	10/8/2024	2.8	10.1	240	477	36.92%	73.38%
42	10/15/2024	2.8	10.1	148	625	22.77%	96.15%
43	10/24/2024	2.8	10.1	25	650	3.85%	100.00%
Total				650		100.00%	

The distribution and density of redds locations is provided in Table 4-46. These data indicate that the highest density of redds is located near the hatchery. The number and percentage of redds in each index section in the lower mainstem were as follows: 1) RM 9.8-10.1 (315, 48.65%) 2) RM 7.5-RM 8.7 (154, 23.68%) 3) RM 5.6-7.5 (104, 16.00%), 4) RM 4.4-5.6 (59, 9.08%), 5) RM 3.4-4.4 (14, 2.15%), and 6) RM 2.8-3.4, (4, 0.62%) Table 4-46.

Table 4-46. Total new Chinook redds and percentage of redds in lower mainstem Hoko River (WRIA 19.0148) index sections from RM 2.8 - RM 10.1 by WDFW in 2024.

2024 Survey Dates	Lower River mi.	Upper River mi.	New Redds Total	Percentage of Redds by Index Section
October 1, 8, 15, 24	9.8	10.1	315	48.56%
October 1, 8, 15, 24	7.5	8.7	154	23.69%
October 1, 8, 15, 24	5.6	7.5	104	16.00%
October 1, 8, 15, 29	4.4	5.6	59	9.08%
October 1, 8, 15, 29	3.4	4.4	14	2.15%
October 1, 15	2.8	3.4	4	0.62%
Totals			650	100.00%

### RY 2024 Adult Hoko Chinook Mark Sampling and Age Composition

Mark rates and ages of Hoko Chinook were determined from mark, scale samples, and CWTs recovered from broodstock spawned at the Hoko Falls Hatchery and carcasses of natural spawners in the river. WDFW staff sampled 53 of 322 (16.46%) of the river carcasses observed in the lower mainstem Hoko River for marks, scales, and tags (Table 4-47) and the remaining 269 (83.54%) carcasses for mark status only. Carcass sampling on the spawning grounds showed 22 of the 53 known mark and tag status carcasses were of hatchery origin, having either a clipped adipose fin or possess a CWT (41.51% mark/tag rate). Unfortunately,

with a double index tag group in the system, carcasses that were checked for mark status only, but not sampled for CWTs cannot be used to determine origin of spawners. The numbers of dead Chinook counted by survey dates and index sections are summarized in Table 4-48. The peak dead count was observed during the third survey of the season conducted on October 15, 2024 with 239 of 322 (74.22%) carcasses observed.

Table 4-47. Numbers of Adipose clipped, Unmarked, and Unknown mark status Chinook sampled for scales and CWT during spawning ground surveys by WDFW from RM 2.8-RM 10.1.

Mark-Tag Status	No. Female	No. Male	Total Sampled
AD Only = ADN	1	1	2
AD+CWT =ADB	9	5	14
CWT Only= UMB	2	3	5
Unmarked+ No CWT = UMNB	20	11	31
Unknown Mark + CWT = UNKB	1	0	1
<b>Sampled for fin clip only</b>			
<b>Total</b>	<b>33</b>	<b>20</b>	<b>53</b>

Table 4-48. Numbers of Adipose clipped, Unmarked, and Unknown mark status Chinook sampled for scales and CWT and Chinook not sampled for scales or CWT but checked for only mark status for RY 2024.

Stream Name	Statistical Week	Survey Date	End River Mile	Start River Mile	Total Dead	AD Sampled	UM Sampled	UNK Sampled	AD Not Sampled	UM Not Sampled	UNK Not Sampled	Sampled+ Not Sampled
Hoko R (19.0148)	40	2024-10-01	RM 9.80	RM 10.10	2	0	0	0	0	2	0	2
Hoko R (19.0148)	40	2024-10-01	RM 7.50	RM 8.70	1	0	1	0	0	0	0	1
Hoko R (19.0148)	40	2024-10-01	RM 5.60	RM 7.50	0	0	0	0	0	0	0	0
Hoko R (19.0148)	40	2024-10-01	RM 4.40	RM 5.60	1	0	0	0	0	0	1	1
Hoko R (19.0148)	40	2024-10-01	RM 3.40	RM 4.40	0	0	0	0	0	0	0	0
Hoko R (19.0148)	40	2024-10-01	RM 2.80	RM 3.40	0	0	0	0	0	0	0	0
<b>Total</b>					<b>4</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>4</b>
Stream Name	Statistical Week	Survey Date	End River Mile	Start River Mile	Total Dead	AD Sampled	UM Sampled	UNK Sampled	AD Not Sampled	UM Not Sampled	UNK Not Sampled	Sampled+ Not Sampled
Hoko R (19.0148)	41	2024-10-08	RM 9.80	RM 10.10	39	3	7	0	18	10	1	39
Hoko R (19.0148)	41	2024-10-08	RM 7.50	RM 8.70	19	3	7	0	5	2	2	19
Hoko R (19.0148)	41	2024-10-08	RM 5.60	RM 7.50	12	0	0	0	3	9	0	12
Hoko R (19.0148)	41	2024-10-08	RM 4.40	RM 5.60	1	0	0	0	0	1	0	1
Hoko R (19.0148)	41	2024-10-08	RM 3.40	RM 4.40	0	0	0	0	0	0	0	0
Hoko R (19.0148)	41	2024-10-08	RM 2.80	RM 3.40	0	0	0	0	0	0	0	0
<b>Total</b>					<b>71</b>	<b>6</b>	<b>14</b>	<b>0</b>	<b>26</b>	<b>22</b>	<b>3</b>	<b>71</b>
Stream Name	Statistical Week	Survey Date	End River Mile	Start River Mile	Total Dead	AD Sampled	UM Sampled	UNK Sampled	AD Not Sampled	UM Not Sampled	UNK Not Sampled	Sampled+ Not Sampled
Hoko R (19.0148)	42	2024-10-15	RM 9.80	RM 10.10	132	5	5	0	0	0	122	132
Hoko R (19.0148)	42	2024-10-15	RM 7.50	RM 8.70	66	1	8	1	21	33	2	66
Hoko R (19.0148)	42	2024-10-15	RM 5.60	RM 7.50	36	0	0	0	7	25	4	36
Hoko R (19.0148)	42	2024-10-15	RM 4.40	RM 5.60	5	0	5	0	0	0	0	5
Hoko R (19.0148)	42	2024-10-15	RM 3.40	RM 4.40	0	0	0	0	0	0	0	0
Hoko R (19.0148)	42	2024-10-15	RM 2.80	RM 3.40	0	0	0	0	0	0	0	0
<b>Total</b>					<b>239</b>	<b>6</b>	<b>18</b>	<b>1</b>	<b>28</b>	<b>58</b>	<b>128</b>	<b>239</b>
Stream Name	Statistical Week	Survey Date	End River Mile	Start River Mile	Total Dead	AD Sampled	UM Sampled	UNK Sampled	AD Not Sampled	UM Not Sampled	UNK Not Sampled	Sampled+ Not Sampled
Hoko R (19.0148)	43	2024-10-24	RM 9.80	RM 10.10	5	4	1	0	0	0	0	5
Hoko R (19.0148)	43	2024-10-24	RM 7.50	RM 8.70	2	2	0	0	0	0	0	2
Hoko R (19.0148)	43	2024-10-24	RM 5.60	RM 7.50	1	0	0	0	0	0	1	1
Hoko R (19.0148)	44	2024-10-29	RM 4.40	RM 5.60	0	0	0	0	0	0	0	0
Hoko R (19.0148)	44	2024-10-29	RM 3.40	RM 4.40	0	0	0	0	0	0	0	0
Hoko R (19.0148)	43	2024-10-24	RM 2.80	RM 3.40	0	0	0	0	0	0	0	0
<b>Total</b>					<b>8</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>8</b>
<b>Grand Total</b>					<b>322</b>	<b>18</b>	<b>34</b>	<b>1</b>	<b>54</b>	<b>82</b>	<b>133</b>	<b>322</b>

The estimated proportions of adult hatchery origin (HOR) and natural origin (NOR) Chinook which returned to the Makah Hoko Falls Hatchery and the Hoko River equals 2,233 (0.7125) and 901 (0.2875), respectively (Table 4-49). The age composition of HOR total spawners consisted of 303 age-3 (0.1357), 969 age-4 (0.4339), 961 age-5 (0.4304), and no age 6 and age 7 (0.00). The age composition of NOR total spawners consisted of 97 age 3 (0.1077), 428 age 4 (0.4750), and 376 age 5 (0.4173). The proportions of HOR and NOR spawners by age group, respectively were: age 3 (0.7575, 0.2425), age 4 (0.6936, 0.3064) age 5 (0.7188, 0.2812) and age 6 (0.000) (Table 4-50).

Table 4-49. Age and origin of broodstock and natural Chinook spawners in the Hoko River in 2024.

Brood	Returns to Hatchery				In-River Spawners				Total Spawners				HOR Proportion
	Age	by Origin		Totals	Age	by Origin		Totals	Age	by Origin		Totals	
		HOR	NOR			HOR	NOR			HOR	NOR		
2022	2	16	0	16	2	0	0	0	2	16	0	16	1.00
2021	3	188	54	242	3	115	43	158	3	303	97	400	0.76
2020	4	223	103	326	4	746	325	1,072	4	969	428	1,397	0.69
2019	5	30	47	77	5	931	329	1,260	5	961	376	1,337	0.72
2018	6	0	0	0	6	0	0	0	6	0	0	0	
2017	7			0	7			0	7	0	0	0	
	Unaged				Unaged				Unaged	0	0	0	
	<b>Totals</b>	<b>457</b>	<b>204</b>	<b>661</b>	<b>Totals</b>	<b>1,792</b>	<b>697</b>	<b>2,489</b>	<b>Totals</b>	<b>2,249</b>	<b>901</b>	<b>3,150</b>	<b>0.71</b>

Data sources: Ages from scale cards collected by Makah Fisheries Management survey staff and Hoko Hatchery staff, and WDFW survey staff. Scales analyzed by Andrew Claiborne, WDFW scale aging lab.

Data source: Hap Leon and Tiffany Petersen, Makah Fisheries Management.

Table 4-50. Numbers and proportions of HOR= Hatchery Origin and NOR=Natural Origin broodstock and natural Chinook spawners, by adult age groups 3, 4, 5, and 6 in the Hoko River for RY 2024, excluding jacks.

Total Age	Hatchery Origin-HOR	HOR Proportion	Natural-Origin-HOR	NOR Proportion	Total HOR+NOR	HOR+NOR Proportion
Age 3	303	0.757	97	0.2425	400	0.1276
Age 4	969	0.6936	428	0.3064	1,397	0.4458
Age 5	961	0.7188	376	0.2812	1,337	0.4266
Age 6	0	0.0000	0	0.0000	0	0.0000
Total	2,233	0.7125	901	0.2875	3,134	1.0000
Percent	0.7125		0.2875			

## Summary

The Return Year 2024 adult escapement estimate for Hoko Chinook was 2,489 (1,792 HOR + 697 NOR) spawning naturally in the river and 645 (441 HOR + 204 NOR) broodstock for a total terminal runsize (TRS) of 3,134 (2,233 HOR and 901 NOR), excluding 16 jacks (Table 4-49).

Continue working with MFM staff estimating redd counts in the heavily spawned areas in the lower mainstem Hoko River especially around the hatchery.

## 5 Coded-wire Tag Sampling

Commercial and recreational catch is sampled to recover coded-wire tagged Chinook and Coho. General objectives are to sample 20% of commercial catch in each area and week, and 10% of marine recreational catch in each area and month. Sampling rates for calendar year (January-December) 2023 are summarized below, and were based on catches reported by local biologists, and sample sizes queried from the RMIS database. Sampling rates of commercial fisheries in 2023 generally exceeded the 20% sampling objective although San Juan Islands (7/7A) North Hood Canal (9A, 12, 12A, 12B), Hoodspout, Skokomish River, 8A, 8D, 10F, 10G, 13A,F, and Strait of Juan de Fuca Troll were below 20% (Table 5-1). Marine area recreational fisheries were sampled at rates between 4.8% and 58.6% for the year (Table 5-2). Note that these data were updated just prior to completion of this report and will be validated and corrected as needed prior to submission to update the RMIS (Regional Mark Information System) database.

Table 5-1. Chinook coded-wire tag sampling rates for commercial fisheries in 2023 (calendar year).

Catch Area/River	Catch	# Sampled	Sample Rate
7-7A	15,023	661	13%
7B-7C-7D-Nooksack River	53	17	32%
Skagit River/Bay	4,667	2,520	54%
8A	346	32	9%
8D	3,236	547	17%
Stillaguamish River	4	4	100%
10	11	11	100%
10E	5,563	2,204	40%
10F	345	0	0%
10G	445	0	0%
10A	199	158	79%
Duwamish River	2,192	0	0%
Puyallup/White rivers	4,748	2,281	48%
Nisqually River	4,277	2,949	69%
McAllister Cr.	--	--	--%
13A	1,341	254	19%
13C	2,170	460	21%
13D-F	3,068	1,171	38%
9	53	0	0%
9A-12-12A-12B	330	1	>1%
12C	12,594	7388	59%
12H	17,132	0	0%
Skokomish River	6,006	0	0%
Purdy Creek	65	0	0%
Strait of JDF 4B-5-6 (Net)	858	0	0%
Strait of JDF 4B-5-6C (Troll)	571	0	0%

Table 5-2. Chinook coded-wire tag sampling rates for marine recreational fisheries in 2023.

Catch Area	Catch	# Sampled	Sample Rate
MARINE SPORT AREA 5	11,148	4,272	38.3%
MARINE SPORT AREA 6	11,174	6,550	58.6%
MARINE SPORT AREA 7	10,962	2,050	18.7%
MARINE SPORT PCA 8.1	42	2	4.8%
MARINE SPORT PCA 8.2	9,254	548	5.9%
MARINE SPORT AREA 9	10,744	2,756	25.7%
MARINE SPORT AREA 10	8,164	4,210	51.6%
MARINE SPORT AREA 11	3,748	1,596	42.6%
MARINE SPORT AREA 12	5,110	874	17.1%
MARINE SPORT AREA 13	6,786	710	10.5%

## 6 Literature Cited

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## 7 9-Year (2015-2023) Spawning Escapements

### Nooksack Early Management Unit.

Early timed Chinook spawning escapements for 2014 through 2022 return years within the North Fork and Middle Fork Basins. South Fork early NOR and HOR spawning escapement in the North/Middle Fork basins are additional to those within the South Fork basin.

Year	North./Middle Fork					
	NF NORs	Kendall HORs	SF NORs	SF HORs	Fall NORs	Fall HORs
2014	91	1,307	N/A	N/A	N/A	N/A
2015	401	1,316	N/A	N/A	N/A	N/A
2016	187	735	15	7	5	15
2017	88	1,811	41	39	6	23
2018	53	1,622	39	24	0	6
2019	32	831	10	79	11	1
2020	38	198	7	100	15	15
2021	55	985	59	313	24	23
2022	44	861	10	271	0	1

Early timed Chinook spawning escapements for 2014 through 2022 return years in the South Fork basin. North Fork early NOR and Kendall Creek HOR spawning escapement in the South Fork basin are in addition to those spawning within the North/Middle Fork basins.

Year	South Fork					
	SF Native NOR	SF HOR	N. Fk Early NOR	Kendall Cr. HOR	Fall NOR	Fall/other HOR
2014	22 (1)	10 (0)	56 (1)	99 (2)	11 (0)	10 (0)
2015	7 (0)	11 (0)	39 (0)	9 (0)	32 (0)	37 (0)
2016	319 (4)	302 (7)	179 (3)	32 (5)	86 (1)	39 (0)
2017	145 (4)	697 (55)	43 (4)	62 (8)	100 (4)	65 (4)
2018	369 (5)	896 (8)	49 (0)	65 (2)	50 (1)	97 (1)
2019	61 (2)	369 (30)	6 (0)	9 (1)	8 (0)	27 (0)
2020	243 (1)	1,085 (34)	45 (0)	67 (1)	30 (0)	10 (4)
2021	92 (41)	717 (2,292)	4 (2)	107 (82)	26 (4)	19 (11)
2022	275 (29)	2,679 (1,026)	9 (1)	98 (27)	31 (2)	11 (8)

Note: Numbers in parentheses represent additional pre-spawn mortalities encountered.

**Skagit Springs Management Unit.**

<b>Year</b>	<b>Upper Sauk</b>	<b>Suiattle</b>	<b>Upper Cascade</b>
2015	743	478	188
2016	1,502	648	295
2017	1,630	898	323
2018	1,603	645	128
2019	551	400	180
2020	938	396	115
2021	1,024	433	145
2022	2,542	535	410
2023	471	360	353

**Skagit Summer/Falls Management Unit.**

<b>Year</b>	<b>Upper Skagit</b>	<b>Lower Sauk</b>	<b>Lower Skagit</b>
2015	10,705	406	2,203
2016	15,423	1,044	2,921
2017	7,792	1,001	3,638
2018	8,602	378	1,923
2019	10,155	319	1,336
2020	9,599	341	869
2021	6,410	233	664
2022	12,005	733	4,585
2023	8,330	559	2,899

**Stillaguamish Management Unit.** Stillaguamish River escapement estimates for both summer and fall Chinook populations proportioned by HOR/NOR adult returns. Numbers in parentheses represent additional fish (both HOR and NOR) collected for brood-stock (BS) utilization.

<b>Year</b>	<b>MU Total</b>	
	<b>NOR (BS)</b>	<b>HOR (BS)</b>
2015	482 (61)	227 (68)
2016	702 (76)	351 (65)
2017	548 (76)	522 (65)
2018	199 (44)	767 (102)
2019	196 (28)	748 (103)
2020	333 (49)	517 (88)
2021	425 (61)	307 (45)
2022	780 (69)	915 (67)
2023	471 (57)	425 (79)

**Snohomish Management Unit.**

Year	Skykomish		Snoqualmie	
	NOR	HOR	NOR	HOR
2015	1,585	1,449	694	135
2016	2,363	1,422	1,013	355
2017	2,790	1,584	1,409	336
2018	2,259	789	823	339
2019	569	397	443	233
2020	1,975	747	804	407
2021	1,414	607	611	367
2022	2,789	1,565	861	420
2023	1,138	1,060	423	222

**Lake Washington Management Unit.**

Year	Cedar River		Sammamish River	
	NOR	HOR	NOR	HOR
2015	1,177	631	52	936
2016	609	436	102	1,145
2017	1,557	491	153	1,371
2018	671	142	84	575
2019	599	256	101	264
2020	277	236		
2021	607	356		
2022	662	233		
2023	426	234		

**Green River Management Unit.**

Year	NOR	HOR
2015	864	3,223
2016	2,566	7,497
2017	2,031	6,326
2018	2,177	4,714
2019	1,360	1,616
2020	1,967	2,333
2021	1,200	1,800
2022	2,117	3,470
2023	484	1,229

**Puyallup River Fall Management Unit.**

<b>Year</b>	<b>NOR</b>	<b>HOR</b>
2015	831	729
2016	713	1,822
2017	637	849
2018	486	1,833
2019	291	1,397
2020	542	1,208
2021	1,513	3,947
2022	1,175	2,532
2023	1,073	2,820

**White River Spring Management Unit.**

<b>Year</b>	<b>NOR</b>	<b>HOR</b>	<b>APP</b>
2015	360	472	736
2016	657	501	2,851
2017	686	2,953	2,749
2018	326	1,520	1,837
2019	344	588	2,013
2020	633	103	1,173
2021	706	2,090	1,552
2022	1,629	1,118	981
2023	924	1,220	924

**Nisqually River Management Unit.** HOR's on the spawning grounds include trucked fish in 2017, 2018, 2019, and 2021.

<b>Year</b>	<b>NOR</b>	<b>HOR</b>
2015	715	790
2016	796	168
2017	1,445	2,085
2018	435	1,850
2019	301	1,945
2020	472	100
2021	527	1,630
2022	543	2,939
2023	1,003	212

**Skokomish River Management Unit.**

Year	NOR	HOR	Total
2015	117	315	432
2016	179	1,163	1,342
2017			8,058
2018	103	2,356	2,459
2019	260	2,005	2,265
2020	69	2,052	2,061
2021	208	785	993
2022	930	4,465	5,395
2023	892	3,884	4,776

**Mid-Hood Canal Management Unit.**

Year	Hamma Hamma	Duckabush	Dosewallips
2015	236	20	3
2016	268	15	8
2017	365	2	7
2018	58	4	1
2019	18	3	0
2020	3	2	0
2021	3	2	3
2022	6	1	4
2023	5	3	2

**Dungeness River Management Unit.**

Return year	Natural Spawners <sup>1/</sup>			Broodstock Collection <sup>2/</sup>			Total Returns (Natural Spawners + Broodstock)		
	NOR	HOR	Total	NOR	HOR	Total	NOR	HOR	Total
2015	65	200	265	37	105	142	<b>102</b>	<b>305</b>	<b>407</b>
2016	135	273	408	30	77	115	<b>165</b>	<b>350</b>	<b>515</b>
2017	149	456	605	26	74	100	<b>175</b>	<b>530</b>	<b>705</b>
2018	127	661	788	20	97	117	<b>147</b>	<b>758</b>	<b>905</b>
2019	173	665	838	19	73	92	<b>192</b>	<b>738</b>	<b>930</b>
2020	297	436	733	26	74	100	<b>323</b>	<b>510</b>	<b>833</b>
2021	313	251	564	36	56	92	<b>349</b>	<b>307</b>	<b>656</b>
2022	256	369	625	44	68	112	<b>300</b>	<b>437</b>	<b>737</b>
2023	282	666	948	32	95	127	<b>314</b>	<b>761</b>	<b>1,075</b>

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

2/ Broodstock collection: Chinook that were collected in the river or returned to the hatchery and used for broodstock. Includes pre-spawned mortalities as well.

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

**Elwha River Management Unit.**

<b>Year</b>	<b>HOR/NOR</b>
2015	4,112
2016	2,628
2017	3,100
2018	7,107
2019	7,500
2020	3,250
2021	2,630
2022	3,998
2023	3,850

**Hoko River Management Unit.**

<b>Year</b>	<b>HOR/NOR</b>
2015	2,877
2016	1,324
2017	1,225
2018	1,943
2019	1,815
2020	2,122
2021	1,070
2022	N/A
2023	4,393