

**Puget Sound/North Coast
Recreational Discussion –
3/21/2019**



The background of the slide is a photograph of a fishing net on a boat. The net is made of dark mesh and is suspended over the water. The scene is set at sunset or sunrise, with a warm, orange glow on the horizon. The water is dark, and the sky is a mix of orange and grey. The net is the central focus, with its mesh pattern clearly visible. The boat's structure is partially visible on the right side.

Outline of Presentation

- **Salmon Management Framework**
 - North of Falcon
- **Forecasts**
- **Management Objectives**
- **Challenges for 2019-20 seasons**
- **Public Comment**
- **Salmon Trip Report/MSF discussion**

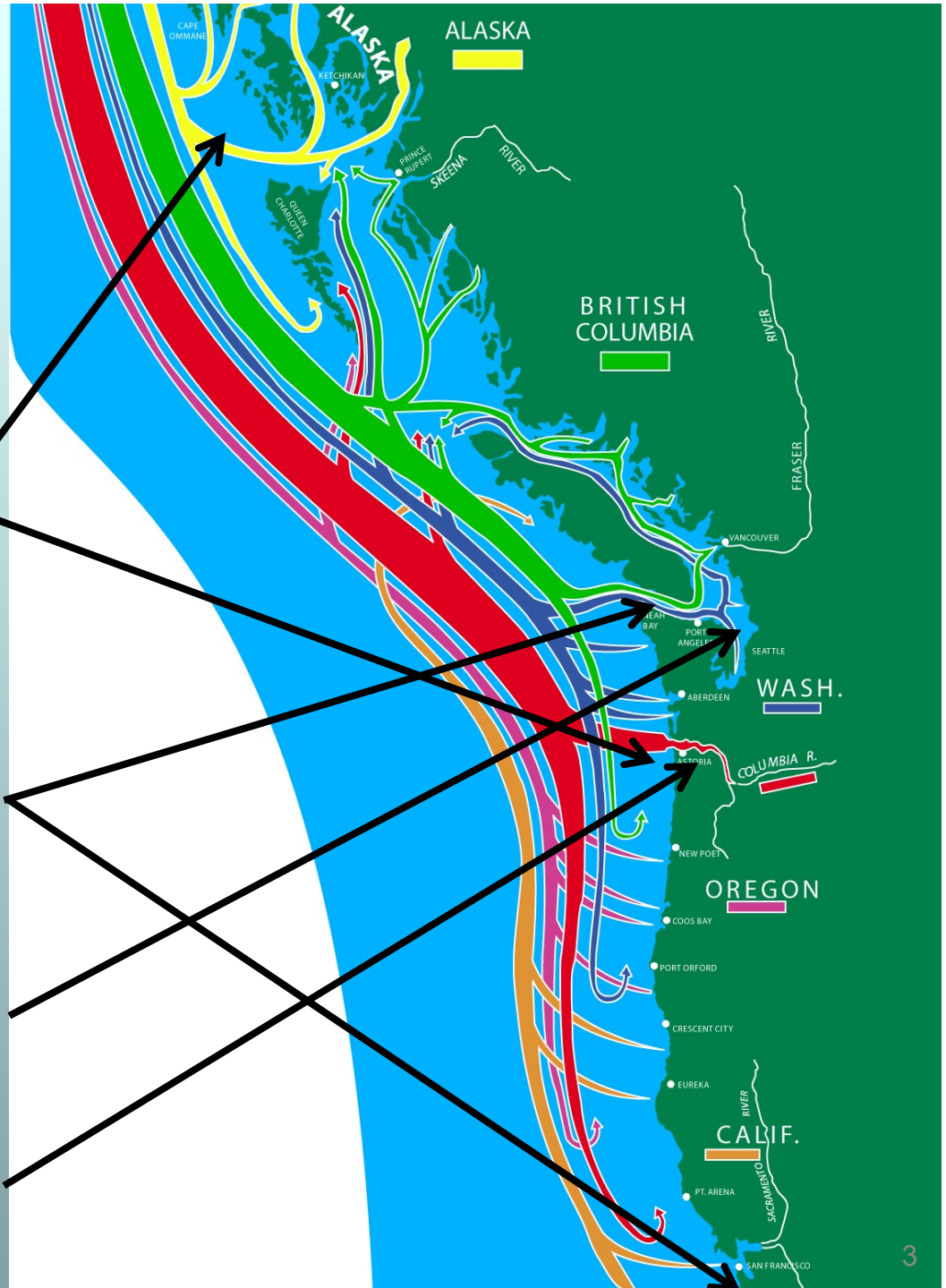
Complex, multi-jurisdictional processes

Pacific Salmon Treaty

Pacific Fishery Management Council

U.S. v Washington

U.S. v Oregon



Puget Sound Comanagement framework

- Puget Sound Salmon Management Plan (1985)
- Hood Canal Salmon Management Plan (1986)
- Stipulation on Mass Marking (1997)
- Comprehensive Coho Management Plan (1998)
- Puget Sound Chinook Harvest Management Plan (2004, 2010, 2019?)
- Summer Chum Salmon Conservation Initiative (2000)
- Equilibrium/Future Brood Document
- Annual List of Agreed Fisheries
- Annual watershed management plans / MOUs
- Misc. MOU's

North of Falcon Process

1. Forecast the abundance of each stock.
2. Determine if there is a harvestable surplus.
3. Propose fisheries - predict what we will catch.
4. Model fisheries to determine which stocks are of conservation concern, constraining fisheries.
5. Negotiate with tribes and other states for fair sharing of catch and stocks that are constraining.
6. Final agreed-to State and Tribal salmon fisheries (ocean, Puget Sound) are described in the "List of Agreed Fisheries" document.

Puget Sound Chinook Forecast Comparisons

Basin	Wild		
	2018	2019	Comparison
Hoko	1,071	1,438	1.34
Dungeness	89	282	3.17
Elwha	238	333	1.40
Nooksack springs	202	248	1.23
Skagit springs	2,317	2,003	0.86
Skagit summer/falls	13,340	13,825	1.04
Stillaguamish	487	378	0.78
Snohomish	3,460	3,744	1.08
Lake Washington	1,461	1,063	0.73
Green	2,110	4,833	2.29
Puyallup	672	1,724	2.57
White River springs	528	573	1.09
Nisqually	586	824	1.41
Skokomish	3,338	3,800~	1.14
Mid Hood Canal	358	285	0.80
Total (others included)	30,451	32,372	1.06

Puget Sound Chinook Forecast Comparisons

Basin	Hatchery		
	2018	2019	Comparison
Hoko	398	1,233	3.10
Dungeness	707	657	0.93
Elwha	4,931	7,066	1.43
Nooksack springs	4,782	5,808	1.21
Skagit springs	4,262	4,113	0.97
Skagit summer/falls	303	309	1.02
Stillaguamish	1,063	566	0.53
Snohomish	6,508	7,225	1.11
Lake Washington	4,761	4,266	0.90
Green	21,321	20,961	0.98
Puyallup	11,778	13,007	1.10
White River springs	3,301	1,623	0.49
Nisqually	28,514	20,223	0.71
Skokomish	31,250	37,160	1.19
Total (others included)	242,230	231,736	0.96

Puget Sound Coho Forecast Comparisons

Basin	Wild		
	2018	2019	Comparison
Dungeness	505	2,290	4.53
Elwha	718	1,363	1.90
other Strait	7,168	8,800	1.23
Nooksack/Samish	20,574	25,133	1.22
Skagit	59,196	57,933	0.98
Stillaguamish	18,950	23,820	1.26
Snohomish	65,925	62,600	0.95
Lake Washington	2,018	2,770	1.37
Green	3,320	3,001	0.90
Puyallup	4,964	9,349	1.88
Nisqually	1,268	4,816	3.80
Deschutes	59	574	9.73
Skokomish	1,334	11,015	8.26
other Hood Canal	59,770	40,616	0.68
Total (others included)	308,704	293,980	0.95

Puget Sound Coho Forecast Comparisons

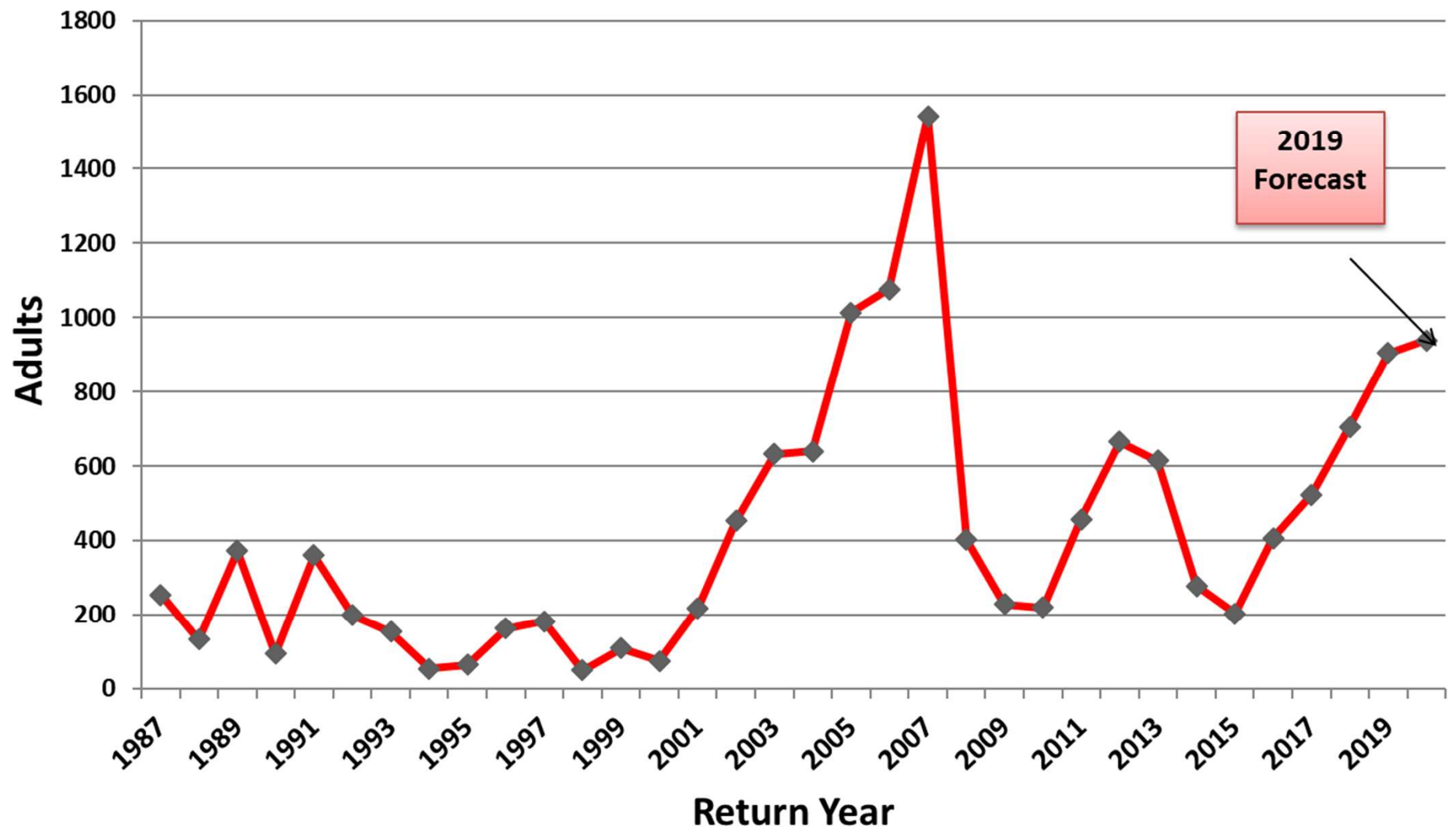
Basin	Hatchery		
	2018	2019	Comparison
Dungeness	9,087	9,760	1.07
Elwha	242	4,230	17.48
Nooksack/Samish	61,256	59,790	0.98
Skagit	13,101	9,917	0.76
Stillaguamish	0	2,234	
Snohomish	7,092	7,709	1.09
Lake Washington	12,984	10,790	0.83
Green	48,032	68,680	1.43
Puyallup	17,985	32,220	1.79
Nisqually	952	10,298	10.82
SS Hatchery	24,010	50,880	2.12
Skokomish	20,690	20,510	0.99
other Hood Canal	62,285	66,020	1.06
Total (others included)	307,975	416,319	1.35

Puget Sound Pink Forecast Comparisons

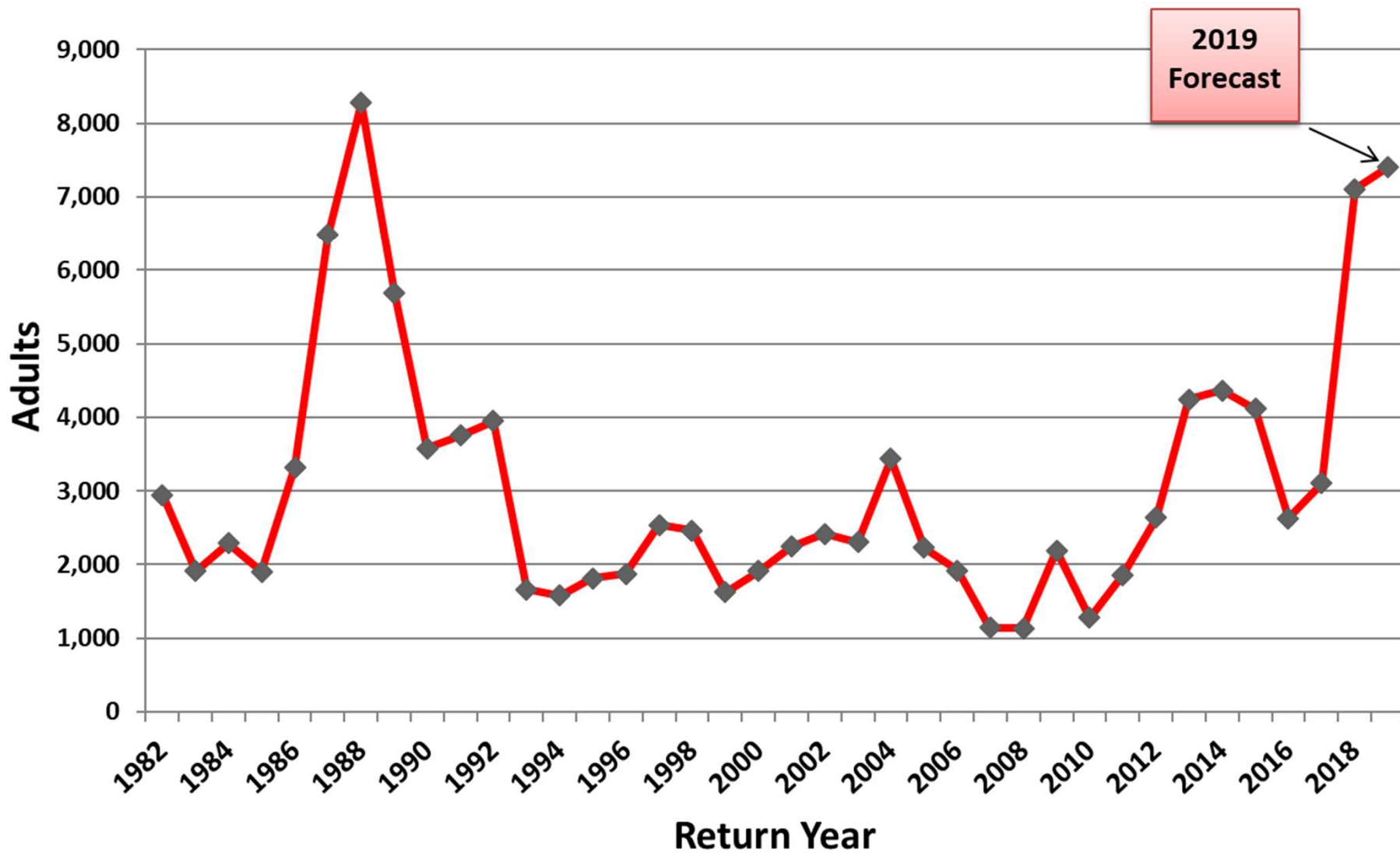
Basin			
	2017	2019	Comparison
Nooksack	96,218	24,476	0.25
Skagit	85,600	114,769	1.34
Stillaguamish	40,205	47,919	1.19
Snohomish	171,632	128,362	0.75
Green	118,689	141,130	1.19
Puyallup	382,301	47,905	0.13
Nisqually	21,463	25,380	1.18
Hood Canal	229,440	70,675	0.31
Strait of Juan de Fuca	3,655	7,629	2.09
Total (others included)	1,150,522	608,388	0.53

2017 actual return was 510,857 or 44% of what was forecasted

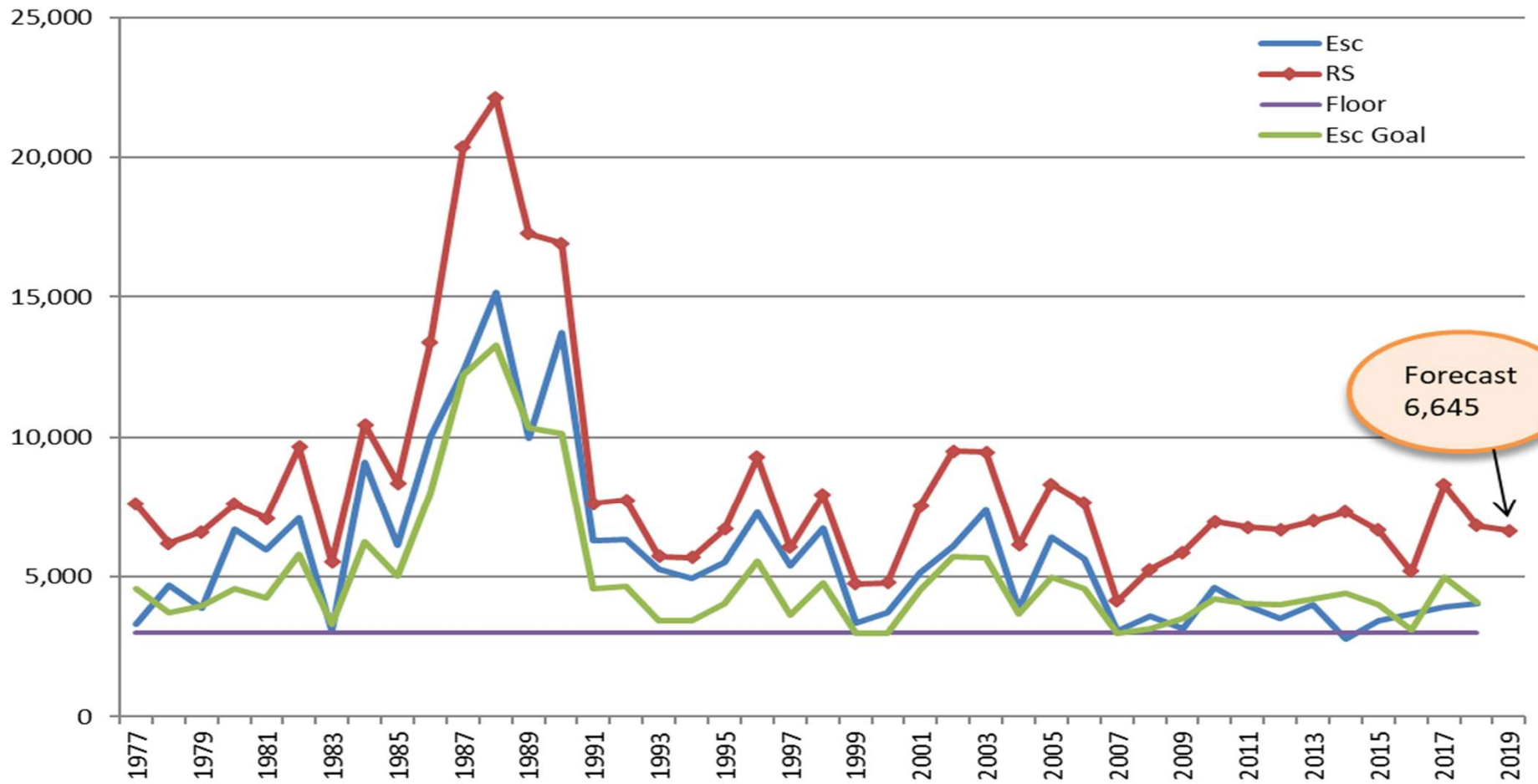
Dungeness Chinook Adult Returns, 1986-2018



Elwha Chinook Adult Returns, 1982-2018

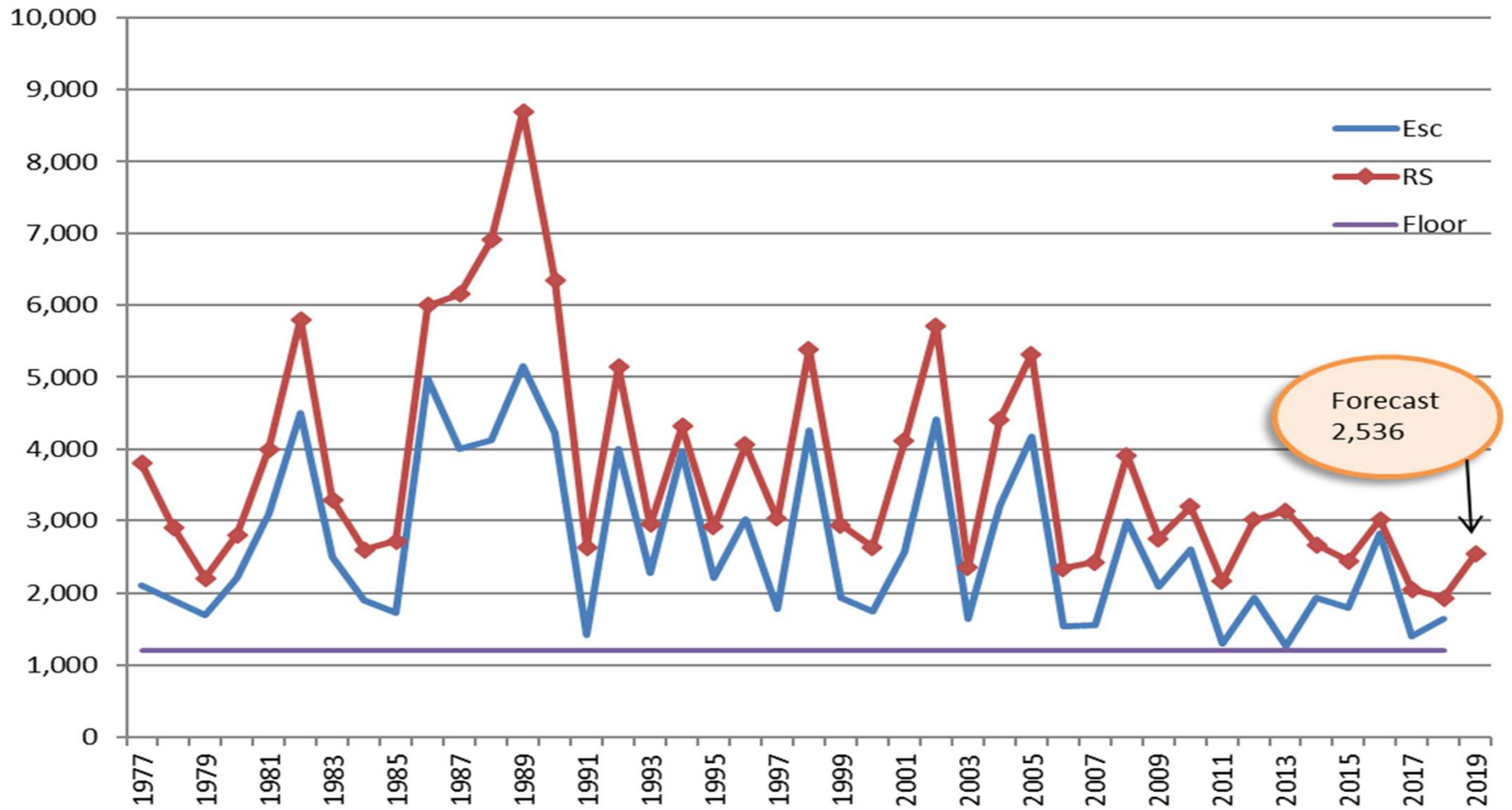


Quillayute Fall Chinook

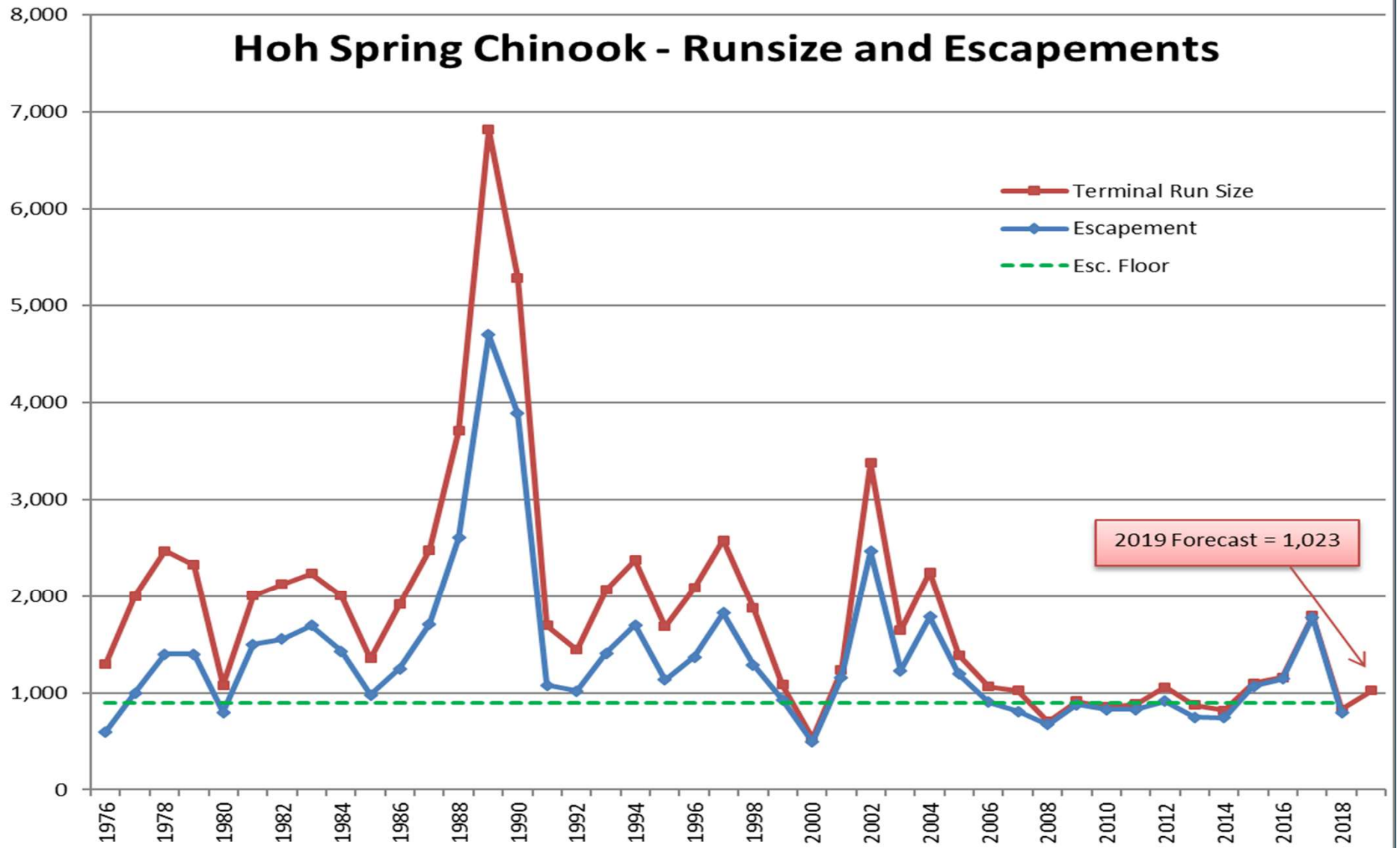


Forecast
6,645

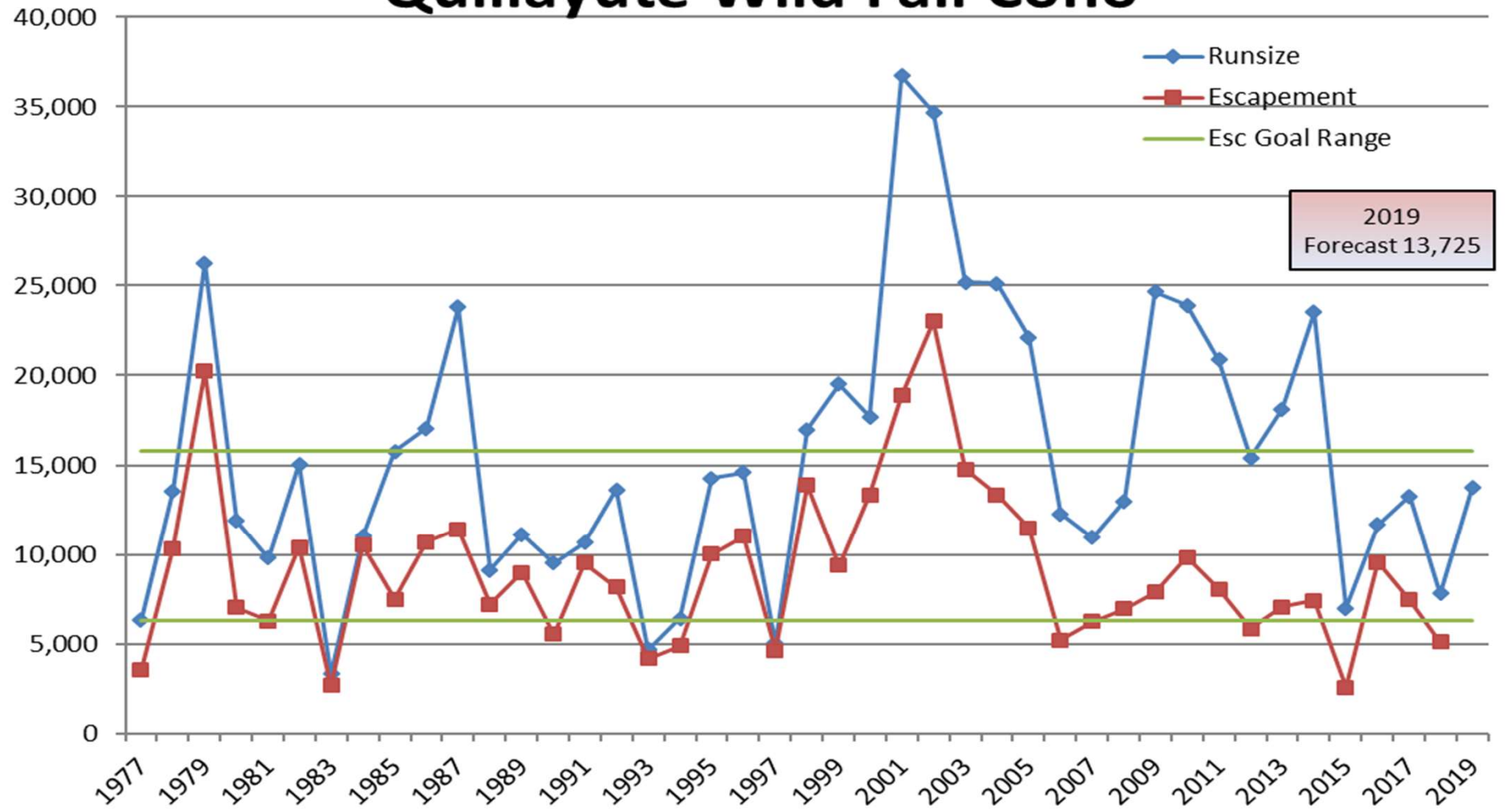
Hoh Fall Chinook



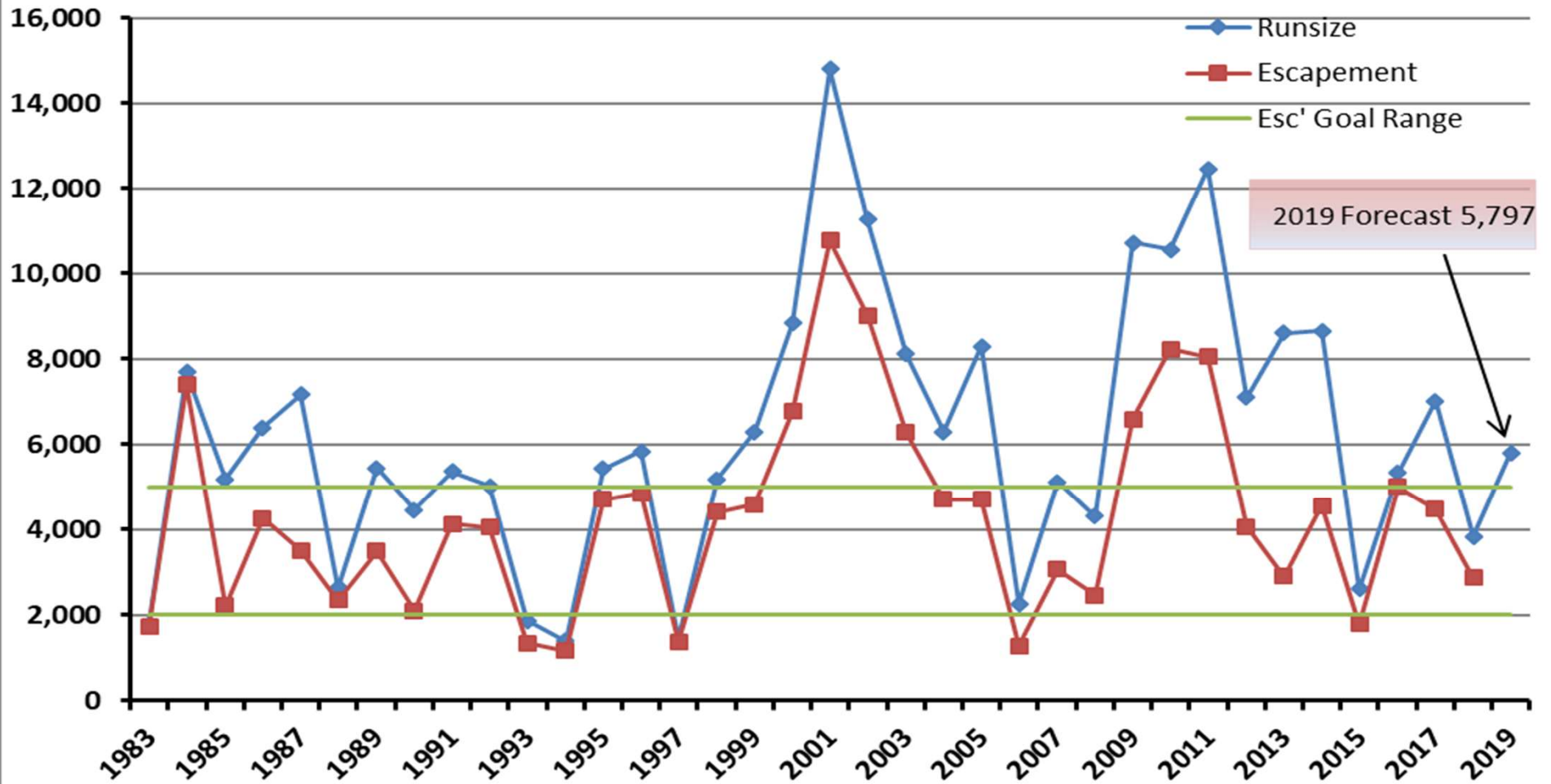
Hoh Spring Chinook - Runsize and Escapements



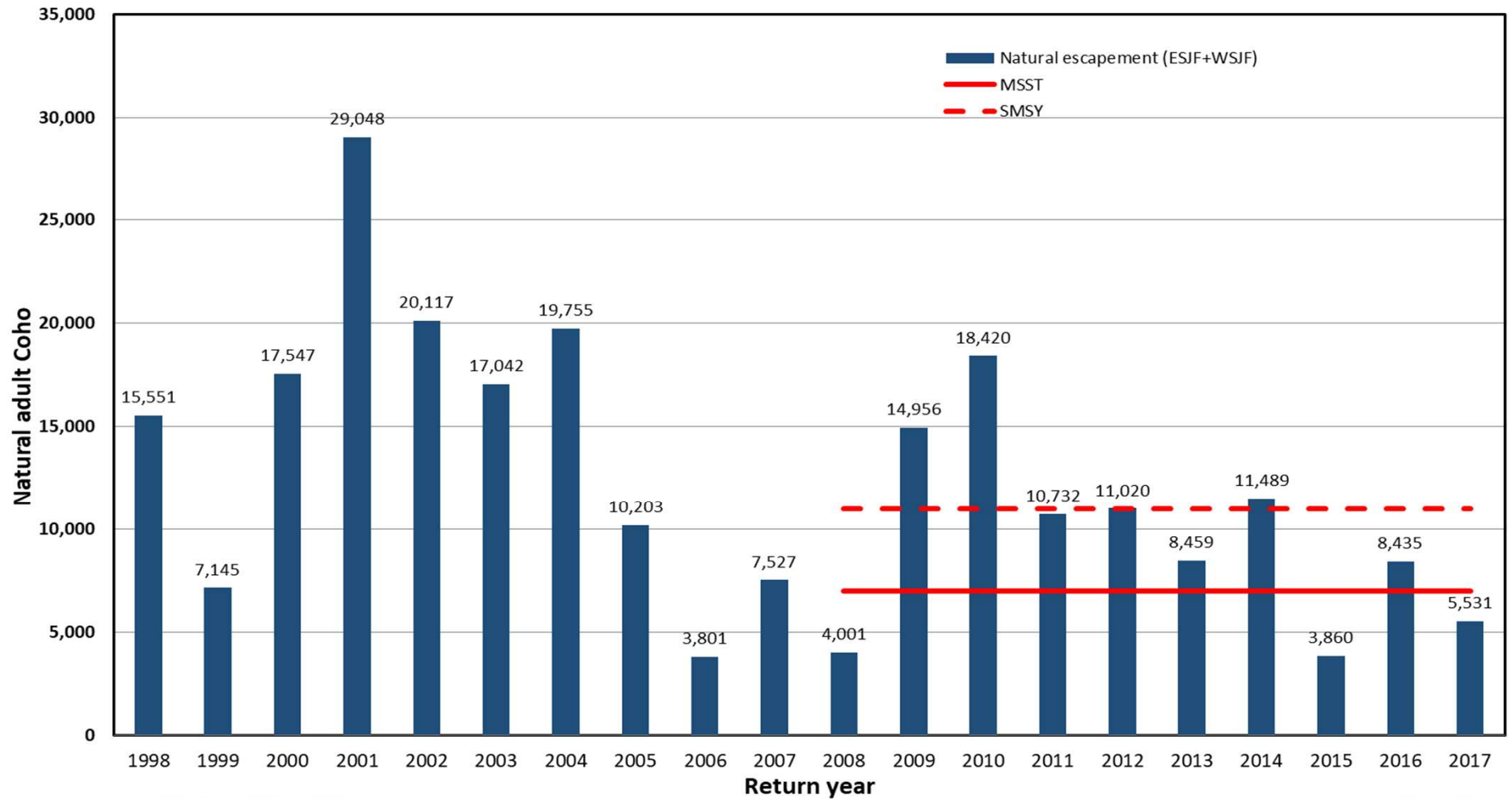
Quillayute Wild Fall Coho



Hoh Wild Coho



Wild Adult Coho Spawning Escapement Estimates for Strait of Juan de Fuca from 1998-2017



Chinook Management Objectives

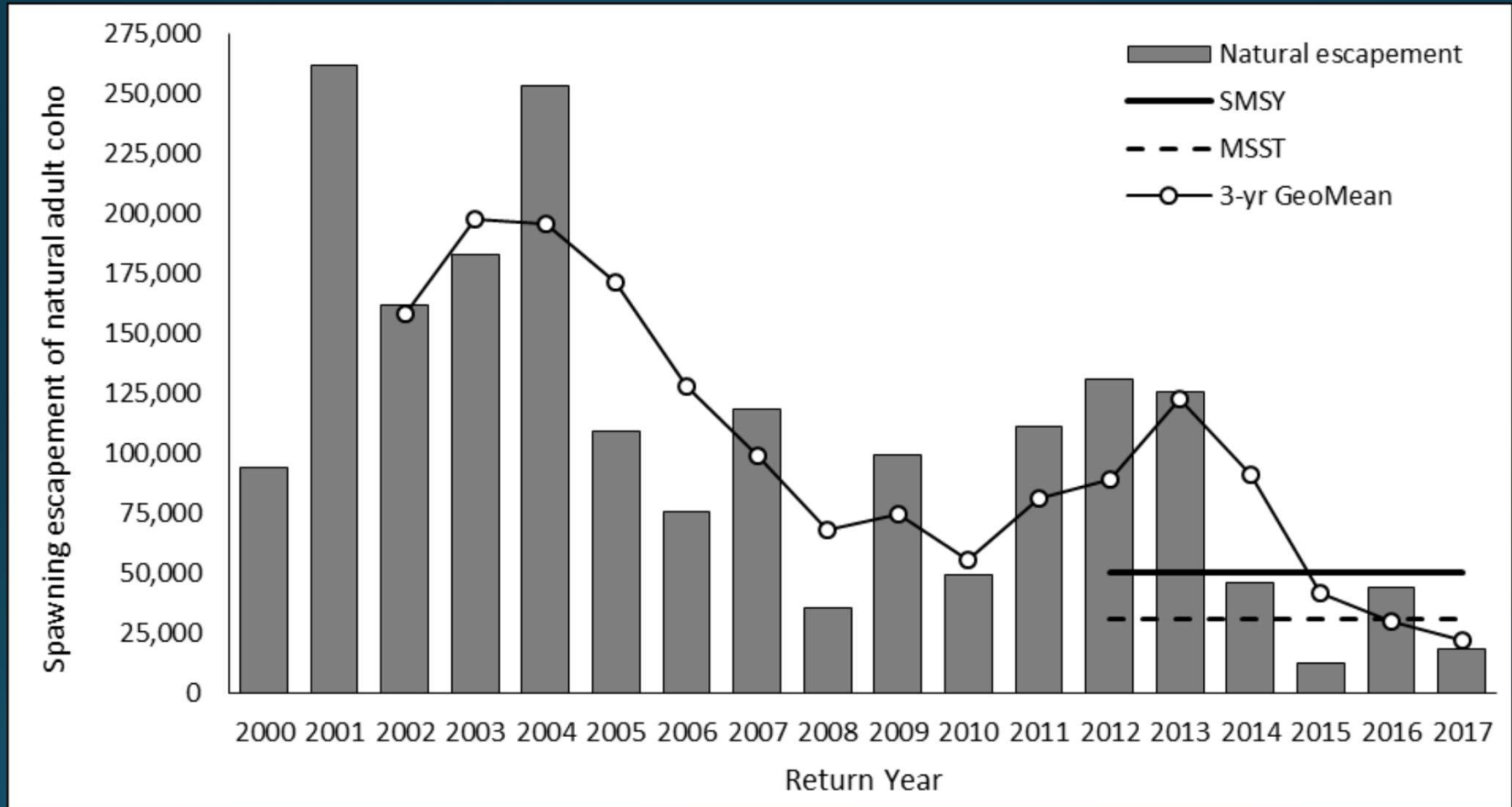
Management Unit	NMFS Guidance/Co-Manager Proposal
Nooksack Spring	10.5% SUS ER
Skagit Summer/Fall	48% Total ER
Skagit Spring-run	37.5% Total ER
Stillaguamish River	24% Total / 8% SUS max
Snohomish River	21% Total
Lake Washington	500 Escapement (13% PT SUS)
Green River	2,003 Escapement (13 PT SUS)
White River Spring-run	22% SUS
Puyallup	1,170 Escapement (13% PT SUS)
Nisqually	49% Total (47% + 2% exp selective fishery)
Skokomish fall-run	50% total
Mid Hood Canal	12% PT SUS
Dungeness	10% SUS
Elwha	10% SUS

Coho Management Objectives

2019

Puget Sound Wild Management Units	2019 Adult Forecast Ocean Age 3	2019 Assigned FMP Status	Total ER Ceiling
Strait of Juan de Fuca	8,800	Critical	10% SUS
Hood Canal	40,140	Low	45%
Skagit	57,933	Low	35%
Stillaguamish	23,820	Normal	50%
Snohomish	62,200	Low	40%
Thompson (Fraser Rv)	-	Low	10% SUS

Snohomish Coho Protection



Recreational Challenges-2019

- Timely agreement (1yr ESA coverage)
- Chinook management objectives
 - Constraining stocks
 - Chinook: Stillaguamish, Nooksack early, Mid Hood Canal, Lake Washington, Green, Puyallup
 - Coho: Straits Tribs, Snohomish
- Meaningful angler opportunity-time on the water
- Skokomish
- Additional Orca protection

Ideas that have already been presented

- **Bubble fishery in lower Area 11 in May or Open Area 11 in May.**
- **Return of June resident Coho season Area 10**
- **Later start or additional Chinook time in Area 10 in the summer.**
- **Elliot Bay Chinook fishery**
- **Minter Creek expanded opportunity**
- **NS Coho opportunity in the straits and Area 9.**

Public Comment

On-line commenting – March-April

<http://wdfw.wa.gov/fishing/northfalcon/>

Puget Sound Sport Fishing Advisory Group

<http://wdfw.wa.gov/about/advisory/pssfag/>

Public Meetings

~~March 6-12 PFMC (Ocean Options) Vancouver, WA~~

~~March 19 – NOF #1, OB2 Olympia 9:00 am~~

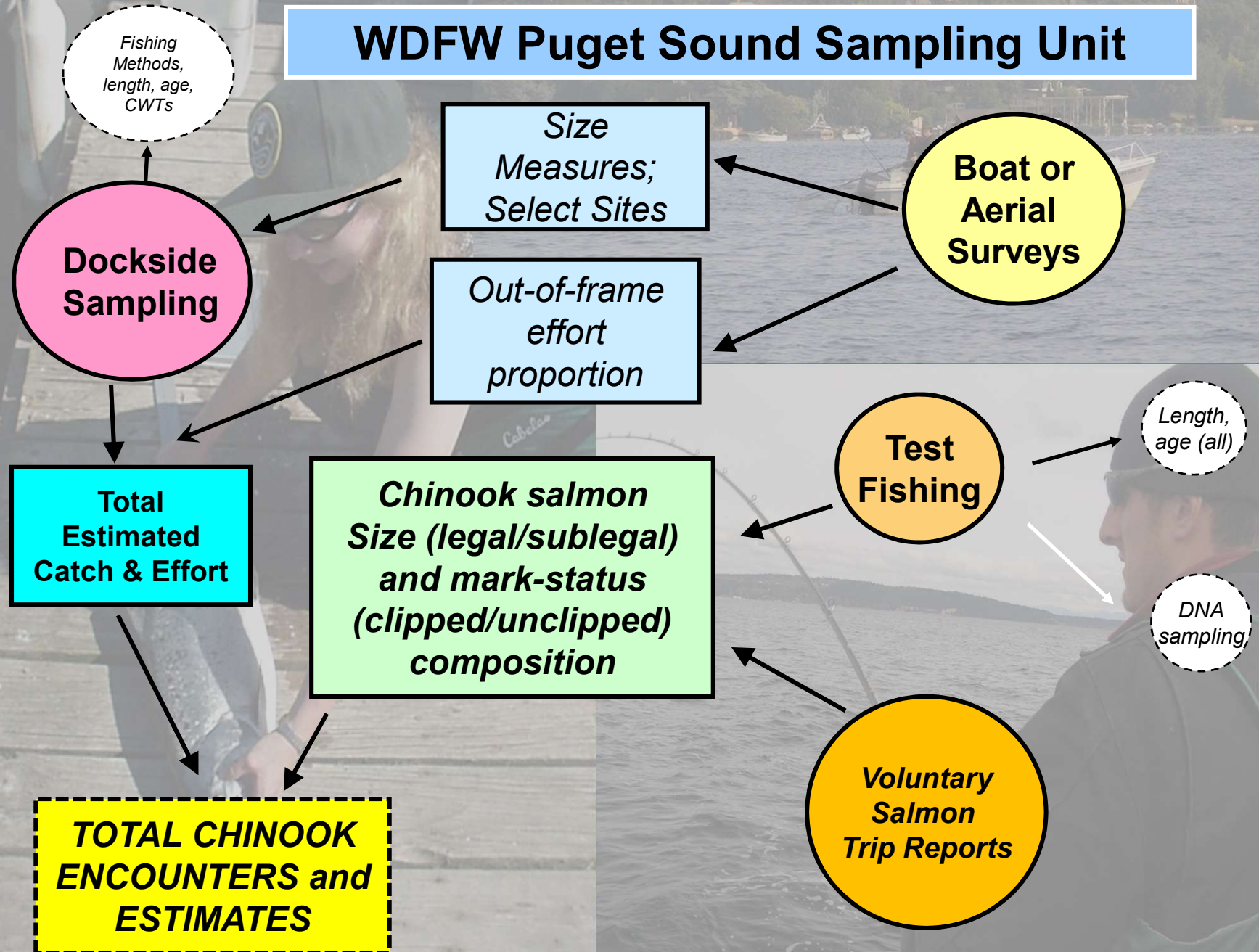
March 21 – Sequim Trinity Church, 6:30 pm

March 27 – Mill Creek WDFW, 6 pm

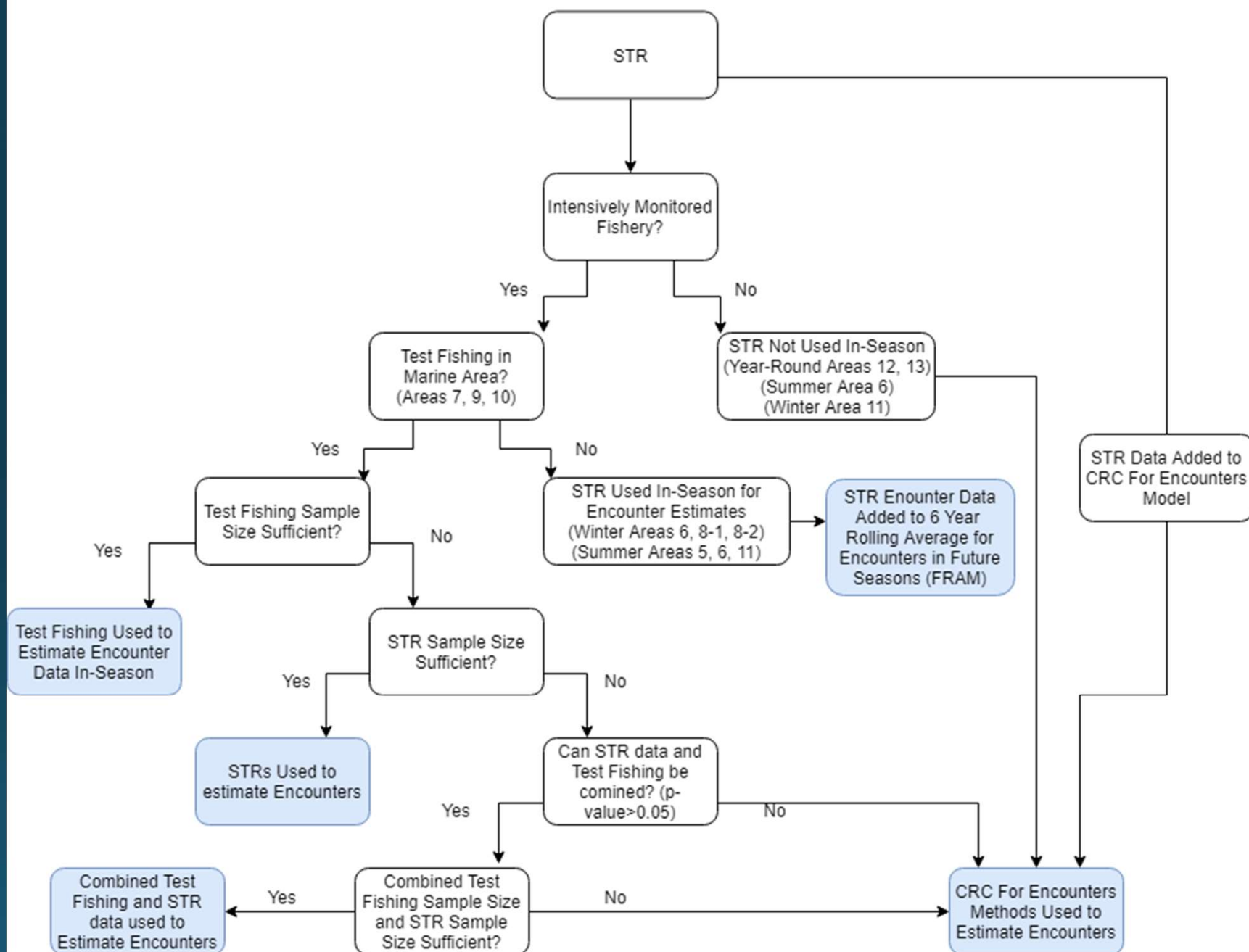
April 3 – North of Falcon #2, Lynnwood Embassy Suites, 9:30 am

April 11-15 – PFMC #2, Rohnert Park, CA

WDFW Puget Sound Sampling Unit



Volunteer Salmon Trip Report





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OREGON 97232-1274

March 5, 2019

Mr. Phil Anderson, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

Dear Chair Anderson:

The Pacific Coast Salmon Fishery Management Plan (FMP) requires that the Pacific Fishery Management Council (Council) develop management recommendations for fisheries under the FMP consistent with consultation standards analyzed and/or described in biological opinions on the fishery developed by the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) to protect species listed as threatened or endangered under the Endangered Species Act (ESA). This letter summarizes the consultation standards for salmon and steelhead and provides NMFS' preliminary guidance regarding their implementation for the 2019 ocean salmon fishing season, as in previous years. We will provide guidance for the 2019 season and work related to effects of Council fisheries on endangered Southern Resident killer whales separately in a supplemental guidance letter.

We also use this opportunity to comment on other subjects of general interest and provide additional recommendations for non-ESA-listed salmon stocks of particular relevance to Council fisheries. For the 2019 fishing season, these other subjects include: recommendations for fisheries affecting Sacramento River fall-run Chinook salmon and Klamath River fall-run Chinook salmon, including a proposal for genetic sampling in closed areas; implementing provisions of the new *United States (U.S.) v. Oregon* Management Agreement; and relevant coho provisions for the new Pacific Salmon Treaty (PST) Agreement, as applied January 1, 2019. In this letter, we first address the topics of general interest and non-ESA salmon stocks, followed by guidance related to consultation standards on ESA-listed salmon species.

Guidance related to non-ESA related topics

Coho Provisions under the PST

Background: A new harvest sharing agreement under the PST has been reached between the United States and Canada (provisionally applied January 1, 2019). The coho chapter of the new Agreement contains refinements to the recent management approach and applies to coho stocks in British Columbia, Washington, and Oregon. Retained in the new Agreement is the ability to request increases in any management unit's (MU) annual exploitation rate (ER) cap specified within the chapter, but new, per Section 8(g), is a commitment by both the United States and Canada to "not change the status or associated ER caps for an MU after March 31" in any given year. Therefore, any requests for modifying ER caps necessary to complete a Party's domestic process will need to be exchanged prior to March 31st.



The 2019 preseason planning manager-to-manager meeting between the U.S. and Canada will occur on March 18, 2019. The Parties will exchange preseason expectations of stock status and anticipated fishery structure that can be readily incorporated into model inputs. Canada's Thompson River coho stock remains in critical status under the PST Agreement. Conservation concerns regarding this stock will shape the 2019 Canadian fisheries.

Guidance: U.S. representatives that attend the meeting between the United States and Canada will share information on Canadian fishing levels and structure in 2019 with the Council's Salmon Technical Team (STT) for incorporation into planning U.S. domestic fisheries. Council fisheries, together with other southern United States fisheries, must be managed to stay within the ER caps. In 2017 and 2018, the Council adopted fisheries that resulted in slightly greater impacts on coho stocks in U.S. fisheries than were agreed to under the PST – Queets coho in 2017 and Grays Harbor coho in 2018. Provisions of the coho chapter of the PST allow for exceedance under certain conditions if both countries agree. In 2017, Canada agreed to the exceedance. In 2018, Canada did not agree, but did not object. Canada is unlikely to accept a third consecutive year of exceeding the agreed upon impacts.

Genetic Stock Identification (GSI) Sampling

Background: The West Coast Salmon Genetic Stock Identification (WCGSI) collaboration is a partnership of west coast fishermen's organizations, universities, states, and NMFS that was formed in 2006 to explore potential uses of genetic stock identification (GSI) for west coast salmon fisheries management. Various levels of at-sea tissue sampling have occurred since the inception of the WCGSI, both in open fisheries and in times and areas closed to salmon fishing.

In 2019, WCGSI partners intend to conduct sampling of Chinook salmon off the coast of California to examine fine scale ocean distribution patterns of Klamath River Chinook salmon compared to other stocks of interest, including ESA-listed California Coastal Chinook salmon. A proposal for the 2019 sampling plan has been submitted to the Council for its consideration. The proposed sampling scheme incorporates GSI sampling of Chinook salmon caught in commercial fisheries and non-retention GSI sampling of Chinook salmon in times and areas closed to salmon fishing. Proposed areas for non-retention sampling include part of the Klamath Management Zone that has been closed to commercial salmon fishing for approximately the last 30 years to conserve coho and Chinook salmon stocks from the Klamath River and the northern California coast.

Guidance: We recommend the Council consider the relative merits of implementing the non-retention GSI sampling portion of the project in 2019 and evaluate the proposal through the Council's usual fishery planning process. Impacts associated with hook-and-release mortality in non-retention GSI sampling should be accounted for in the STT's analysis of fisheries impacts. We encourage communication between scientists, advisory committees, and the Council in considering the proposal and to help direct development of GSI technologies that can best serve salmon management over the long term.

If the 2019 proposal is recommended by the Council, the WCGSI partnership would have to submit an application to NMFS' West Coast Region for a scientific research permit authorizing non-retention sampling of Chinook salmon in times and areas closed to commercial harvest.

Sacramento River Fall-run Chinook (SRFC) Salmon

Background: SRFC have declined in recent years to the point that in 2018 the three-year geometric mean of hatchery and natural area adult spawners was lower than the minimum stock size threshold (MSST), thereby resulting in an overfished status determination for this stock. As required in the FMP, the STT and other contributors are working to develop a rebuilding plan for Council consideration in 2019. In the interim, the FMP requires that the Council “structure Council-area fisheries to reduce the likelihood of the stock remaining overfished and to mitigate the effects on stock status” (Section 3.1.1 of the FMP).

Recent information helps inform decisions related to management in 2019. Forecasts of the Sacramento Index and the number of SRFC spawners have been higher than the post-season estimates in each of the last four years, although the 2018 Sacramento Index was relatively close to the preseason forecast (Table 1). The projected exploitation rates have also been consistently lower than the post-season estimates, substantially in most years. Spawner abundance declined by an order of magnitude from 2013 to 2017 from a high of 406,200 in 2013 to just 44,574 in 2017. The escapement in 2017 was near a record low. The post-season escapement in 2018 was a significant improvement but, again, below preseason expectations and remained below the floor of 122,000 associated with the FMP objective. The three-year geometric mean of spawners is 73,994 (2016-2018) and must increase to at least 122,000 to achieve rebuilt status. An escapement of 402,040 would be required to meet the FMP’s criteria for rebuilt status in 2019. It is impractical to expect to achieve rebuilding so quickly, but progress can be made in 2019 toward that end.

Table 1. SRFC preseason abundance, escapement, and exploitation rate forecasts for 2015-2018, and comparison to post-season estimates.

Year	Sacramento Index Forecast	Preseason Forecasted Spawning escapement	Preseason Exploitation Rate	Sacramento Index Post Season	Post-Season Spawning escapement	Post-Season Exploitation Rate
2015	651,985	341,017	48%	254,240	112,947	56%
2016	299,609	151,128	50%	205,289	89,674	56%
2017	230,700	133,242	42%	135,500	44,574	68%
2018	229,432	151,000	34%	223,900	105,739	53%
2019	379,632	-	-	-	-	-

The harvest control rule in the FMP specifies an exploitation rate that produces an expected escapement of 122,000 adults, corresponding to maximum sustainable yield (S_{MSY}). The conservation objective for SRFC in the FMP specifies a range of 122,000 – 180,000 adult spawners.

Guidance: Although the 2019 forecast of SRFC abundance is higher than forecasts in the previous three years, we recommend caution given the tendency of the model to over-forecast. A risk-averse management approach is warranted, so the 2019 fisheries should be structured to target an escapement

around the upper end of the SRFC conservation objective range, with at least one of the options adopted for public review and comment at the March Council meeting including a target escapement of 180,000 adult spawners.

Klamath River Fall-run Chinook (KRFC) Salmon

Background: The status of KRFC has also declined to the point that it has been declared overfished. As with SRFC, the STT and other contributors are working to develop a KRFC rebuilding plan for Council consideration in 2019. In the interim, the FMP requires that the Council “structure Council-area fisheries to reduce the likelihood of the stock remaining overfished and to mitigate the effects on stock status” (Section 3.1.1 of the FMP).

Recent information can help inform decisions related to management in 2019. Performance has been mixed over the last four years (Table 2). The ocean abundance forecasts and projected number of spawners have been substantially higher than the post-season estimates in the first two years and substantially lower in the last two years of the data series. The post-season escapement in 2018 was the highest escapement since 2014. However, interim escapements have been much lower. The projected exploitation rate in 2016 was lower than the post-season estimate, but preseason forecasts of exploitation rates were close to or below preseason projections in three of the last four years. The number of natural-area adult spawners since 2014 has declined substantially from the levels of escapement observed during the previous five years, nearing a record low in 2016. The three-year geometric mean (2016-2018), 24,594 is sixty percent of the S_{MSY} escapement objective of 40,700. An escapement of 63,165 would be required to meet the FMP’s criteria for rebuilt status in 2019. Escapements of this magnitude have occurred in the past under ocean abundances greater than 400,000. It may be impractical to expect to achieve rebuilding so quickly given the forecast ocean abundance for 2019 but progress can be made in 2019 toward that end.

Table 2. KRFC preseason abundance, escapement, and exploitation rate forecasts for 2015-2018, and comparison to post-season estimates.

Year	Ocean Abundance Forecast	Resulting Forecasted Spawning escapement	Preseason Exploitation Rate	Post-Season Ocean Abundance	Post-Season Spawning escapement	Post-Season Exploitation Rate
2015	423,753	40,700	59%	171,600	28,112	59%
2016	142,169	30,909	25%	57,500	13,937	37%
2017	54, 246	11,379	8%	73,200	19,904	10%
2018	359, 231	40,700	32%	408,600	53,624	28%
2019	274, 200	-	-	-	-	-

The KRFC harvest control rule specifies maximum allowable exploitation rates that vary with abundance, but generally seeks to provide for an S_{MSY} escapement level of 40,700 *natural-area adults* (i.e., adult fish that spawn in natural areas). The 2019 forecast provides for an expected escapement of

87,893 natural-area adult spawners absent fishing and, under the control rule, would allow for an exploitation rate of 53.7 percent.

Guidance: Given the fact that KRFC have met the criteria for an overfished determination, the status of escapement relative to the FMP conservation objective and the FMP mandate to the Council, we believe that a cautious approach is warranted. We recommend the Council target a natural-area adult KRFC escapement greater than 40,700 for 2019 fisheries to further stabilize the population and promote rebuilding.

Upper Columbia River Summer-run Chinook Salmon ESU

Background: In 2018 the management entities within the Columbia River completed a new *U.S. v. Oregon* Management Agreement for 2018-2027. The new agreement includes provisions for escaping a minimum aggregate of 29,000 Upper Columbia River summer Chinook salmon adults to the mouth of the Columbia River. The agreement also includes provisions about how adult equivalent harvest of non-treaty fisheries in the Pacific Ocean south of the southwesterly projection of the U.S.-Canada boundary between British Columbia and Washington will be counted as part of the total run size for allocation purposes.

Guidance: The FMP recognizes the agreement's determination as the conservation objective and, therefore, in 2019 Council fisheries must be managed to ensure an aggregate escapement of 29,000 adult Upper Columbia River Summer Chinook Salmon to the mouth of the Columbia River.

ESA-listed Chinook Salmon Species

California Coastal (CC) Chinook Salmon Evolutionarily Significant Unit (ESU)

Background: The CC Chinook salmon ESU has been listed as threatened under the ESA since 1999. The current consultation standard for CC Chinook is described in the FMP and is based on a 2000 NMFS biological opinion and additional ESA consultation on the ESU completed in 2005, which specified actions necessary to implement the reasonable and prudent alternatives (RPAs) of the 2000 opinion.

Guidance: The Council fisheries should be designed consistent with the RPA of the 2000 opinion (i.e., limits on the forecast KRFC age-4 ocean harvest rates would serve as the consultation standard to ensure that CC Chinook are not subject to increasing harvest rates in the future) and the 2005 consultation (i.e., management measures shall result in a forecast KRFC age-4 ocean harvest rate of no greater than 16 percent).

Sacramento River Winter-run Chinook Salmon (SRWC) ESU

Background: The SRWC ESU was listed under the ESA as threatened in 1990 and relisted as endangered in 1994. SRWC is one of eight species identified in NMFS' "Species in the Spotlight"

initiative because it is at high risk of extinction. For more information about actions for its conservation and recovery, please refer to its Species in the Spotlight Priority Action Plan¹.

NMFS has completed several ESA consultations regarding the impacts of the ocean salmon fishery on SRWC. The most recent and currently applicable opinion was completed in March 2018. That opinion analyzed the Council’s proposed new abundance-based control rule, informed by extensive analysis by the Council’s Ad Hoc Sacramento River Winter-run Chinook Salmon Workgroup (Workgroup), in conjunction with size and season limits previously implemented.

The terms and conditions in the opinion require that the fishery management framework, including the harvest control rule, be reviewed periodically beginning after the fifth year of implementation of the framework, as detailed in the terms and conditions of the 2018 opinion. The purpose of the review would be to assess performance, assumptions, and expectations described in the Workgroup’s analysis².

The 2018 opinion concluded that fisheries managed under this new control rule, and maintaining the fishery season and size restrictions that were part of the previous RPA, are not likely to jeopardize SRWC. The harvest control rule uses a forecast of SRWC age-3 escapement in the absence of fisheries (E_3^0) to determine the allowable impact rate³. If E_3^0 is above 3,000, a maximum impact rate of 20 percent is allowed. If E_3^0 is between 3,000 and 500, then the impact rate ranges from 0.20 to 0.10. If E_3^0 is below 500, then the impact rate has a steeper decline from 10 percent until it reaches zero at an E_3^0 of zero (Figure 1).

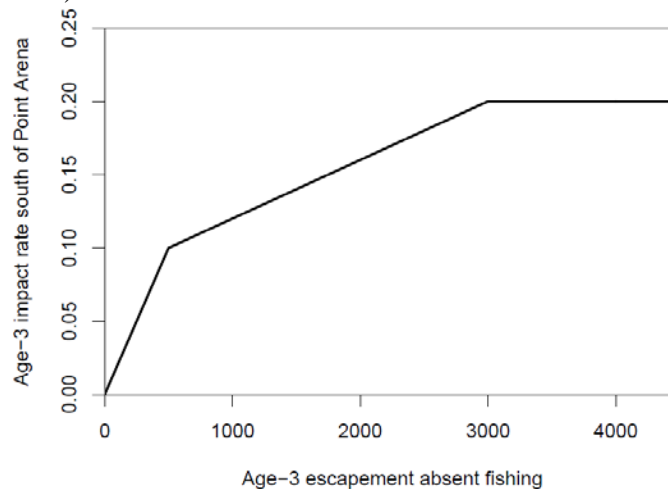


Figure 1. The adopted harvest control rule for management of ocean fisheries that affect Sacramento River winter-run Chinook salmon.

¹ Spotlight Priority Action Plan: <https://www.fisheries.noaa.gov/resource/document/species-spotlight-priority-actions-2016-2020-sacramento-river-winter-run>

² SRWC Workgroup. 2017a. Evaluation of Sacramento River winter Chinook salmon control rules: updated Management Strategy Evaluation analysis, dated August 14, 2017. Pacific Fishery Management Council Briefing Book for September 2017, 24 p. and SRWC Workgroup. 2017b. Further evaluation of Sacramento River winter Chinook control rules, dated October 18, 2017. Pacific Fishery Management Council Briefing Book for November 2017, 9 p.

³ O’Farrell, M., N. Hendrix, and M. Mohr. 2016. An evaluation of preseason abundance forecasts for Sacramento River winter Chinook salmon. Pacific Fishery Management Council Briefing Book for November 2016, 35 pages.

Guidance: The 2019 forecast of SRWC age-3 escapement in the absence of fisheries is 1,924. Applying this abundance forecast to the control rule results in a maximum allowable age-3 impact rate of 15.7 percent in 2019 fisheries south of Point Arena, California. Council fisheries in 2019 should be designed to not exceed 15.7 percent age-3 impact rate on SRWC.

Central Valley Spring-run Chinook Salmon ESU

Background: The Central Valley spring-run Chinook salmon ESU was first listed as threatened in 1999. Effects of the ocean salmon fishery on this ESU were most recently analyzed in NMFS' 2000 biological opinion. That opinion concluded that the fishery, as regulated under the FMP and NMFS' consultation standards for SRWC, is not likely to jeopardize the continued existence of Central Valley spring-run Chinook salmon.

The management framework for SRWC that includes the updated harvest control rule recommended by the Council in 2017 and size and season limits from the previous RPA for SRWC contains equivalent and/or additional restrictions on the fishery to previous management measures and is more responsive than prior management frameworks to information related to the status of Central Valley spring-run Chinook salmon by accounting for changes in freshwater conditions in the Central Valley for SRWC. As a result, NMFS concluded that the current management framework for SRWC, along with other regulatory measures in the FMP, limits impacts to Central Valley spring-run Chinook salmon for the 2019 fishing year in a manner that is more protective than anticipated in the 2000 opinion and, therefore, reinitiation of ESA consultation is not required at this time.

Guidance: Council fisheries in 2019 should be managed to meet the consultation standard for SRWC to be sufficiently protective of the Central Valley spring-run Chinook salmon ESU.

Lower Columbia River (LCR) Chinook Salmon ESU

Background: The LCR Chinook salmon ESU was listed as threatened under the ESA in 1999. In 2011, the Council recommended implementation of an abundance-based framework for limiting fishery impacts on this ESU. NMFS analyzed the effects of using this framework to manage ocean fisheries on LCR Chinook salmon in a 2012 biological opinion. The Council's abundance-based framework and the 2012 opinion provide the basis for our guidance in 2019.

LCR Chinook salmon includes a spring-run component, a "far-north" migrating bright component, and a component of north-migrating tules. The bright and tule components both have fall run timing. Of nine historical spring-run Chinook salmon populations, two are considered extinct, including the White Salmon and Hood River populations, which were both located in the Columbia River Gorge above Bonneville Dam. Four of the remaining seven populations are targeted to achieve high viability including the Upper Cowlitz, Cispus (a tributary of the Cowlitz), North Fork Lewis, and Sandy River populations. The historic spawning habitat for the Upper Cowlitz, Cispus, and Lewis River populations in Washington is now largely inaccessible to salmon due to impassable dams. These populations are therefore dependent, for the time being, on the associated hatchery programs.

a) Cowlitz and Lewis River Hatcheries populations – The Lower Columbia Salmon and Steelhead Recovery Plan⁴ specifies actions to be taken to facilitate recovery of LCR spring-run Chinook salmon populations in Washington State. The Cowlitz Salmon Hatchery and Lewis River Salmon Hatchery are being used, for example, for reintroduction of LCR spring-run Chinook salmon into the upper basins above the existing dams. The hatchery programs are critical to the overall recovery effort. Given the circumstances, maintaining the hatchery brood stocks for the Cowlitz and Lewis River Hatcheries is essential for implementation of specified recovery actions. The Cowlitz Salmon Hatchery has met its escapement objective in every year since 2002. Lewis River Salmon Hatchery escapements have routinely been above goal, but have been declining in recent years.

b) North Fork Lewis and Sandy River populations – There are two extant natural-origin bright populations in the LCR Chinook salmon ESU: the North Fork Lewis and Sandy River populations. Both populations are considered to be relatively healthy. The North Fork Lewis River population is used as a harvest indicator for ocean and in-river fisheries. The escapement goal used for management purposes for the North Fork Lewis population is 5,700, based on estimates of maximum sustainable yield derived from spawner-recruit analysis. Escapements averaged 10,400 since 2006 and, with few exceptions, have met or exceeded the goal since at least 1980. The Sandy River population is considered to be viable under current harvest conditions in the Lower Columbia River Salmon and Steelhead Recovery Plan (NMFS 2013). Given the long history of healthy returns and management constraints that will be in place this year for other stocks (e.g., tules and upriver brights), NMFS does not anticipate the need to take specific management actions in the ocean to protect the bright component of the LCR Chinook salmon ESU in 2019. NMFS does expect that the states of Washington and Oregon will continue to monitor the status of the LCR Chinook salmon bright populations, and take the specific actions necessary through their usual authorities to deliver spawning escapement through the in-river fisheries they manage sufficient to maintain the health of these populations.

c) LCR tule Chinook salmon – There are twenty-one separate populations within the tule component of the LCR Chinook salmon ESU. Unlike the spring-run or bright populations of the ESU, LCR tule Chinook salmon populations are caught in large numbers in Council fisheries, as well as fisheries to the north and in the Columbia River. NMFS' 2012 biological opinion on the abundance-based management (ABM) framework concluded that fisheries managed under this framework are not likely to jeopardize LCR Chinook salmon. The ABM framework sets the annual exploitation rate limit depending on the abundance of Lower River Hatchery (LRH) tule Chinook salmon (Table 3).

Since implementation of the framework, the preseason forecasts for LCR tule Chinook salmon have been high due in large part to favorable ocean survival conditions allowing for an exploitation rate of 0.41. In 2018, the framework allowed for an exploitation rate of 0.38. The terms and conditions of the 2012 opinion require that a postseason summary of the previous year's Council fisheries shall be provided annually by February 28; however, the estimated post season exploitation rate for LCR tule Chinok salmon in 2018 is not available at this time.

⁴http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/lower_columbia_river/lower_columbia_river_salmon_recovery_sub_domain.html

The 2012 opinion called for a review of the harvest framework every three years which is complimentary to an ongoing review of the recovery strategy. NMFS is finalizing its recommended harvest framework review in March 2019, a draft of which was provided to the Council in November 2018 inviting their review and comment. The harvest framework review concluded that the LRH abundance criteria currently used in the matrix has not been affected by recent changes in hatchery production.

Table 3. Variable exploitation rate limits based on the preseason forecast of LRH Chinook salmon.

Lower River Hatchery Abundance	Total Exploitation Rate Limit
0-30,000	0.30
30,000-40,000	0.35
40,000-85,000	0.38
> 85,000	0.41

Guidance: a) Cowlitz and Lewis River Hatcheries populations – The 2019 forecast for Cowlitz Salmon Hatchery escapement is 1,300 adults which will not meet the minimum hatchery escapement of 1,550 adults. The 2019 forecast for Lewis River Salmon Hatchery fish is 1,600 adults compared to an escapement goal of 1,380. We understand that the States of Washington and Oregon will manage the mainstem Columbia River spring season fisheries to ensure the escapement goal for the Lewis River Hatchery is met and the escapement to the Cowlitz Salmon Hatchery is maximized to the extent the forecast allows. Although additional progress is required to meet the high viability objective for the Sandy River, harvest objectives specified for the population through recovery planning are being met. We expect that the management agencies will continue to manage in-river fisheries, coordinating between mainstem and terminal tributary fisheries management, to meet hatchery escapement goals.

b) North Fork Lewis and Sandy River populations – Given the long history of healthy returns and management constraints that will be in place this year for other stocks (e.g., tules and upriver brights), we do not anticipate the need to take specific management actions in the ocean to protect the bright component of the LCR Chinook salmon ESU in 2019. We expect that the states of Washington and Oregon will continue to monitor the status of the LCR Chinook salmon bright populations, and take the specific actions necessary through their usual authorities to deliver spawning escapement through the in-river fisheries they manage sufficient to maintain the health of these populations.

c) LRH tule Chinook salmon – The preseason forecast for LRH tule Chinook salmon in 2019 is 54,500; therefore, Council fisheries in 2019 should be managed such that the total exploitation rate on LCR tule Chinook salmon in all ocean fisheries and all mainstem Columbia River fisheries below Bonneville Dam combined does not exceed 38 percent.

NMFS will continue to focus on implementing the comprehensive transitional strategy described in the recovery plan that links harvest actions to progress on the suite of actions necessary to achieve long-term recovery. In that regard, it is crucial for fishery managers to continue focusing on all aspects of the overall recovery strategy. Monitoring will be critical to verify that the actions specified in the plan are being taken and that populations are responding as expected. Success on both fronts will be necessary to avoid further constraints on harvest in the future.

Upper Columbia River Spring-run Chinook Salmon, Upper Willamette River Chinook Salmon, Snake River Spring/Summer-run Chinook Salmon ESUs

Background: NMFS has considered the effects of Council fisheries on spring-run Chinook salmon stocks from the Upper Columbia River and Upper Willamette River Basins and spring/summer-run Chinook salmon stocks from the Snake River in several biological opinions. In these opinions we concluded that the expected take in Council salmon fisheries of salmon originating from any one of these ESUs is at most an occasional event; therefore, the fisheries were not likely to jeopardize any of these ESUs.

Guidance: Consistent with the findings of the opinions, management actions designed to limit catch from these ESUs beyond what will be provided by harvest constraints for other stocks in 2019 are not necessary.

Snake River Fall-run Chinook Salmon ESU

Background: NMFS completed a biological opinion on the impacts of Council salmon fisheries on Snake River fall-run Chinook salmon in 1996. In that opinion, NMFS concluded that a 30.0 percent reduction in the age-3 and age-4 adult equivalent total exploitation rate in ocean salmon fisheries relative to the 1988-1993 base period standard provided a necessary and appropriate level of protection for Snake River fall-run Chinook salmon. Since this ESU has shown continued progress towards recovery with the 1996 opinion's standard in place, that standard still applies.

Guidance: 2019 Council salmon fisheries must be managed to ensure that the 30.0 percent base period reduction criterion for the aggregate of all ocean fisheries, including Southeast Alaska, Canada, and Council fisheries, is achieved.

Puget Sound Chinook Salmon ESU

Background: The following summarizes guidance for the Puget Sound Chinook salmon ESU. While NMFS is providing guidance for the 2019 Council salmon fisheries, we acknowledge the importance of, and continue to strongly support, the integrated management structure between the Council and North of Falcon planning processes. The FMP describes conservation objectives for each Puget Sound Chinook salmon stock, although these have evolved over time. The consultation standards for Puget Sound Chinook salmon stocks that NMFS includes in this letter are described in terms of total or southern U.S. fisheries (SUS) impacts rather than Council fisheries specific impacts. Under the current management structure, Council fisheries are included as part of the suite of fisheries that comprise the fishing regime negotiated each year by the co-managers under *U.S. v. Washington* to meet management objectives for Puget Sound and Washington Coastal salmon stocks.

Although Council and Puget Sound fisheries are intertwined, it is worth noting that impacts on Puget Sound Chinook salmon stocks in Council fisheries are generally quite low. In 2004, NMFS issued a biological opinion on the anticipated effects of Council fisheries on the listed Puget Sound Chinook

ESU for 2004 and future fishing years (NMFS 2004). The 2004 opinion found that exploitation rates in Council area fisheries within the range observed for brood years 1991-1998 would not jeopardize the continued existence of the species. Exploitation rates on Puget Sound spring- and fall-run Chinook stock aggregates in Council fisheries have been less than two percent and five percent on average, respectively, in recent years.

NMFS has consulted on a series of proposed harvest plans for the Puget Sound Chinook Salmon ESU since the ESU was listed in 1999. NMFS is currently reviewing a new comprehensive, multi-year joint Resource Management Plan (RMP) developed by the Washington Department of Fish and Wildlife and the Puget Sound Treaty Tribes (collectively the Puget Sound co-managers) submitted for consideration in December 2017 for the 2018-2028 fishing years. However, discussions between NMFS and the Puget Sound co-managers regarding the provisions of the RMP are on-going and review of that RMP will not be complete in time for the 2019 fishing season. Therefore, NMFS expects to consult on a Bureau of Indian Affairs proposed action encompassing the 2019 fishing season. We expect to issue the biological opinion for the Puget Sound fisheries by early May 2019. The following guidance reflects NMFS' discussions with the Puget Sound co-managers to date and our best preliminary assessment of appropriate conservation objectives for 2019.

The status of populations in the Puget Sound Chinook salmon ESU varies. However, there is no question that the status of the ESU as a whole has declined over the past 10 years. NMFS' most recent (2016) five-year status review of West Coast ESA-listed salmonids reported negative trends from 1999 to 2014 in natural-origin spawners for 17 of the 22 Puget Sound Chinook salmon populations. The proportion of natural-origin fish on the spawning grounds has decreased steadily over time. Natural-origin escapement of 7 of the 22 populations in the ESU are below their critical thresholds which, for all but one of the populations, means less than 200 natural-origin spawners. Six of those populations are essential to recovery of the ESU. The recent decline in the status of the ESU in general is primarily due to factors other than harvest, but with consideration of the status of the ESU as-a-whole and the critical populations, in particular, our guidance reflects additional conservatism.

Guidance: For the Puget Sound Chinook salmon ESU, consistent with the 2004 opinion, the 2019 Council fisheries should be managed such that exploitation rates on Puget Sound spring- and fall-run Chinook salmon populations do not exceed 3 and 6 percent, respectively. Also, in adopting its 2019 salmon fisheries recommendations, the Council should determine that its fisheries, when combined with the suite of other fisheries impacting the Puget Sound Chinook salmon ESU, meet the management targets set for populations within this ESU. For that reason, we provide detailed guidance below for Council fisheries and describe our expectation for the full suite of SUS fisheries that will affect Puget Sound Chinook salmon stocks in 2019.

Our 2019 guidance for conservation objectives for all Puget Sound Chinook salmon populations is summarized in Table 4. The guidance is a mixture of total and southern U.S. exploitation rates, escapement goals, or noted expectations in place of specific objectives. Primary factors considered in developing the guidance were: the status and trends of the individual populations and their various roles

in recovery of the ESU, NMFS' updated Fishery Regulation and Assessment Model (FRAM) equivalent Rebuilding Exploitation Rates (RERs), the forecast abundance of the population in 2019, and provisions in the proposed RMP.

We understand that the Puget Sound co-managers may provide management objectives to the Council for the 2019 season that are derived from various sources including the proposed 2018-2028 RMP, or that are specific to the circumstances in 2019, but that may differ from some of the guidance presented here. Where the conservation objectives differ, NMFS and the co-managers will continue working together to reconcile some or all of the differences. We may provide additional guidance to the Council in April pending further discussions with the Puget Sound co-managers and based on information developed through the North of Falcon process. This guidance is specific to the 2019 season and is not intended to limit the on-going discussions between NMFS and the co-managers with regard to the longer-term RMP.

Considerations for several Puget Sound Chinook populations, specific to circumstances in 2019, where we expect based on these considerations that the final objective that is produced during the preseason planning process will meet the conservation needs for the populations:

1. Puget Sound preseason run size information for 2019 indicates that the North and South Fork Nooksack early-run, Mid-Hood Canal, and the Stillaguamish populations will be at very low abundance in 2019. One or more of these stocks will likely have a limiting impact on some Puget Sound pre-terminal fisheries, such that full attainment of the exploitation rate ceilings as proposed by the co-managers, may not occur for several Puget Sound populations.
2. For the Skagit summer/fall run, the co-managers proposed exploitation rate ceiling of 48 percent (%) for the summer/fall aggregate population is higher than the NMFS' updated RERs for two of the three component populations—Upper Skagit (45%) and Lower Skagit (36%)—but lower than the 49% RER for the Lower Sauk population. Given the following conditions, we expect that the final objective that is produced during the preseason planning process will meet conservation needs for the population:
 - a. the likely constraints on 2019 SUS pre-terminal harvest due to the low abundance status of several Puget Sound stocks (as described above);
 - b. the recent status and trends of the natural-origin components of these Skagit populations—5 and 10-year natural-origin escapement average shows all three populations well above critical abundance levels and two of three above rebuilding abundance levels, with the third very near rebuilding levels;
 - c. recent 5-year average total exploitation rate below 40%; and
 - d. the 2019 natural-origin forecast is near the recent 5-year average.
3. Similarly, for the Skagit River spring run, the co-managers proposed exploitation rate ceiling (37.5%), on the aggregate spring run, is higher than NMFS' updated RERs of 24%, 32%, and 36%, respectively, for the Upper Sauk, Suiattle, and Cascade populations. Given the following

conditions we expect that the final objective that is produced during the preseason planning process will meet conservation needs for the population:

- a. the likely constraints on pre-terminal harvest due to the low abundance status of several Puget Sound stocks (as described above);
 - b. the recent status and trends of the natural-origin components of these populations—5 and 10-year natural-origin escapement average shows all three populations above rebuilding abundance levels;
 - c. recent 5-year average total exploitation rate below 20%; and
 - d. the 2019 natural-origin forecast above the recent 5-year average.
4. For the Stillaguamish River, the co-manager's proposed exploitation total rate ceiling (24%), on the summer/fall run, is higher than NMFS' updated RER of 22%. As mentioned in the text above, the Stillaguamish run is forecast to be at very low abundance this year and has been proposed to be managed for a SUS exploitation rate of no greater than 8%. This 8% SUS limit could be further reduced if northern exploitation rates in 2019 exceed 16% (the total rate cannot exceed 24% under the RMP). The recent 5-year average total exploitation rate for the Stillaguamish population has been 23%, with 9.2% of this occurring in the SUS and 13.8% in northern fisheries. The co-manager's proposed SUS critical exploitation rate (maximum 8%) combined with the recent years' northern exploitation rates as a reasonable assumption for this year's fishery would result in an exploitation rate at or below the NMFS RER. We expect that the final objective that is produced during the preseason planning process will meet conservation needs for the population.
5. For the Snohomish River, the co-manager's proposed exploitation ceiling (21%), on the summer/fall run aggregate, is higher than NMFS' updated RERs of 19% and 20%, respectively, for the summer and fall components. Given the following conditions we expect that the final objective that is produced during the preseason planning process will meet conservation needs for the population:
- a. the likely constraints on pre-terminal harvest due to the low abundance status of several Puget Sound stocks (as described above);
 - b. the recent status and trends of the natural-origin components of these populations—5 and 10-year natural-origin escapement average shows both populations above rebuilding abundance levels; and
 - c. recent 5-year average total exploitation rate below 20%.
6. For the Mid-Puget Sound fall Chinook populations—Green River, Puyallup River and Lake Washington— based on discussions with the co-managers, we have developed interim conservation objectives for the 2019 fishing season. These objectives represent recent-year average natural-origin spawner escapement, in the Green and Puyallup Rivers, and a natural-origin spawner escapement goal in the Cedar River (Lake WA) which looks to maximize spawner productivity. These interim objectives conserve recent gains in natural-origin escapement, consistent with these populations' role in recovery of the ESU. In all three of these

systems, hatchery broodstock collection goals are additional, important objectives that can limit the overall attainable harvest rates. Additionally, in the Green and Puyallup River systems, natural-origin adults can be captured at the hatchery facilities. These natural-origin fish are utilized in the hatchery program broodstock but adults that are in excess of that need can be transported to spawning reaches in the rivers to contribute to the natural-origin spawning objective. We expect that the co-manager's fishery management actions, in the case of Lake Washington, and fishery management actions and hatchery broodstock actions in the Green and Puyallup Rivers, for 2019 will result in spawning ground escapements that meet the objectives outlined in Table 4. We anticipate that these objectives will meet conservation needs for the populations.

If, during the North of Falcon process, circumstances are inconsistent with our expectations, we will work with the co-managers to develop appropriate measures.

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Table 4. NMFS' guidance for Puget Sound Chinook salmon conservation objectives for the 2019 fishing year.

Management Unit/Population	NMFS' Exploitation Rate Ceilings or Escapement objectives (Grayed/Bolded cells are agreed-to by NMFS and the Puget Sound Co-managers)		Puget Sound Co-manager's Proposed Exploitation Rate Ceilings	
	Total	Southern U.S. (SUS)	Total	Southern U.S. (SUS)
Nooksack spring NF Nooksack SF Nooksack	-	10.5%	-	10.5%
Skagit Summer/Fall Upper Skagit Lower Skagit Lower Sauk	See Bullet 2 above	-	48%	-
Skagit Spring Suiattle Upper Sauk Cascade	See Bullet 3 above	-	37.5%	-
Stillaguamish^a NF Stillaguamish SF Stillaguamish	See Bullet 4 above	-	24%	8%
Snohomish Skykomish Snoqualmie	See Bullet 5 above	-	21%	
Lake Washington Cedar River	500 NOR spawners in the Cedar River (bullet 6 above)	-	500 Escapement (13% PT SUS)	
Green	A combination of fishery and NOR broodstocking actions taken to achieve a minimum of 1,200 NOR spawners (bullet 6 above).	-	2,003 Escapement (13% PT SUS)	
White River		22% ^b	22%	
Puyallup	A combination of fishery and NOR broodstocking actions taken to achieve a minimum of 750 NOR spawners (bullet 6 above).	-	1,170 Escapement (13% PT SUS)	
Nisqually^c	49% (47% base +2% for experimental selective fishery)	-	49% Total (47% + no more than 900 fish experimental selective fishery)	
Skokomish^d	50%	-	50%	
Mid-Hood Canal	-	12.0% PT SUS	-	12% PT SUS
Dungeness	-	10.0%	-	10% SUS
Elwha	-	10.0%	-	10% SUS

^a Provisions of the 2018 RMP state that the total exploitation rate (including AK and Canadian salmon fisheries) cannot exceed 24%. If northern fisheries exceed 11%, Southern U.S. impacts will be lowered to maintain Natural Origin Recruit impacts to not exceed a 24% exploitation rate.

^b NMFS expects Canadian fisheries to remain constrained similar to the recent 5 years. Therefore, the total exploitation rate for White River Chinook salmon in 2019 is expected to be 28% or less.

^c Implementation of experimental selective fishery in 2019 is dependent on NMFS receipt of rationale for 2% increase to the 47% ceiling and detailed implementation plan for the experimental fishery prior to completion of the biological opinion.

^d Skokomish LAT is escapement of 800 natural spawners and 500 escapement to the hatchery. Anticipated hatchery or natural escapements below these spawner abundances trigger specific additional management actions. Contingent on continued implementation of the provisions of the Addendum to 2014 Plan for Management of Fall Chinook salmon in the Skokomish River (October 31, 2015).

In summary, while the primary purpose of this document is to provide guidance for the Council salmon fisheries in 2019, we acknowledge the importance of the integrated management structure between the Council and North of Falcon planning processes. Because impacts on Puget Sound Chinook salmon in Council fisheries are low, management actions taken to meet the above-described conservation objectives will occur primarily in Puget Sound fisheries. However, since impacts in both fisheries are considered in meeting the objectives, any delay in reaching the necessary agreements through the North of Falcon process by the end of the April 2019 Council meeting will complicate NMFS' ability to approve regulations for Council area fisheries and to complete the biological opinion for Puget Sound fisheries by May 2019. To avoid such complications, we strongly recommend that the Council provide assurance that the final option adopted at its April 2019 Council meeting, when combined with Puget Sound fisheries negotiated during the North of Falcon process, results in harvest impacts that are consistent with the conservation objectives for each Puget Sound Chinook management unit included in Table 4 based on the anticipated 2019 abundances.

ESA-listed Coho Salmon Species

Oregon Coast (OC) Coho Salmon ESU

Background: The ESA listing status of the OC coho ESU has changed over the years. Since February 2008, the OC coho ESU has been ESA-listed as threatened. Regardless of its listing status, the Council has managed OC coho consistent with the terms of Amendment 13 of the FMP as modified by the Council's 2000 ad-hoc OC Natural Coho Workgroup. NMFS concluded in its 1999 ESA section 7 consultation on Amendment 13 to the FMP that management of fisheries consistent with the Amendment was not likely to jeopardize this ESU. The 2000 modifications to the framework in Amendment 13 added management tiers to address lower marine survival and parent brood conditions. With these modifications, the framework has provided equivalent and/or additional restrictions on the ocean salmon fishery for OC coho salmon when compared to the provisions of the 1999 opinion. Therefore, reinitiation of consultation was not required.

Prior to FMP Amendment 13 (January 1999), coho originating in coastal Oregon streams from the Necanicum River in the north to the Winchuck River in the south were managed as one aggregate stock, Oregon Coast Natural (OCN) coho. Amendment 13 disaggregated OCN coho management into four sub-aggregates: northern (Necanicum River to Neskowin River), north central (Salmon River to Siuslaw River), south central (Siltcoos River to Sixes River), and southern (Elk River to

Winchuck River). Three of these (northern, north central, and south central) comprise the OC coho ESU. The southern sub-aggregate is within the Southern Oregon/Northern California Coastal coho ESU (SONCC coho), discussed below. Additionally, under Amendment 13, allowable fishery impact rates for OC coho are set based on measures of parental escapement and marine survival. Impact rates are set for each of the three OC coho sub-aggregates, with the ocean impacts rate being limited by the lowest of the three.

Guidance: For the 2019 season, the spawner status for the northern sub-aggregate is high, the north-central sub-aggregate is low, and the south-central sub-aggregate is medium. The marine survival index is in the low category. Under these circumstances, the 2000 Workgroup report⁵ requires that the total exploitation rate in 2019 marine and freshwater fisheries be limited to no more than 15 percent for all three of the OC coho sub-aggregates. Although the south sub-aggregate is included in the harvest matrix described in Amendment 13 as modified by the 2000 Workgroup, as described above the south sub-aggregate is part of the Southern Oregon/Northern California Coastal coho ESU and is managed subject to provisions that are described below for that ESU consistent with the 1999 opinion referenced above.

For 2019, fishery managers should continue to coordinate ocean fishery impacts with desired terminal fishery opportunities for wild coho salmon to ensure that the impacts for each of the sub-aggregates remain within the overall limits specified for the sport fishery consistent with the Fishery Management and Evaluation Plans for the rivers and lakes of the OC coho ESU⁶. For 2019, the ocean fisheries plus the specific river sport fisheries are subject to a limit of 15 percent in each sub-aggregate.

Lower Columbia River (LCR coho) Coho Salmon ESU

Background: The LCR coho ESU was listed as threatened under the ESA in 2005. In 2014, the Council recommended a harvest management matrix for managing impacts to LCR coho. NMFS completed a biological opinion concluding that Council fisheries managed using this matrix are not likely to jeopardize LCR coho. The matrix and the 2015 opinion provides the basis for our guidance in 2019.

The total exploitation rate limit for LCR coho is set each year based on measures of parental escapement and marine survival (Table 5). The total exploitation rate on LCR coho salmon in all marine area fisheries and fisheries in the mainstem Columbia River below Bonneville Dam must not exceed the year-specific exploitation rate limit.

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⁵ OCN Work Group Report, dated October 12, 2000: https://www.pcouncil.org/bb/2000/1100/B3b_OCN_WGR_Nov00BB.pdf

⁶ NMFS. 2009. Letter from Barry Thom, NMFS, to Ed Bowles, ODFW, dated September 1, 2009, concurring with ODFW's "Oregon Coastal Coho, Coastal Rivers Coho Sports Fishery" Fisheries Management and Evaluation Plan under limit 4 of the 4(d) rule.

Table 5. Harvest management matrix for LCR coho showing allowable fishery exploitation rates based on parental escapement and marine survival index.

Parental Escapement (rate of full seeding)		Marine Survival Index (based on return of jacks per hatchery smolt)					Allowable exploitation rate
		Very Low (≤ 0.06%)	Low (≤ 0.08%)	Medium (≤ 0.17%)	High (≤ 0.40%)	Very High (> 0.40%)	
Normal	≥ 0.30	10%	15%	18%	23%	30%	
Very Low	< 0.30	≤ 10%	≤ 15%	≤ 18%	≤ 23%	≤ 30%	

The 2015 opinion called for a review of the abundance-based management framework every three years or as needed to consider new information. NMFS is finalizing its recommended harvest framework review in March 2019, a draft of which was provided to the Council in November 2018 inviting their review and comment. The harvest framework review included information about, forecast methods, natural-origin spawner escapement, proportion of hatchery-origin spawners, marine survival, and other information used in the Beamesderfer et al. (2014) risk analysis⁷. Results of the harvest framework review did not suggest changes to the approach at this time. However, a longer time series of data is needed to allow for a more comprehensive review that would include comparisons of the estimates of exploitation rates from FRAM to independent exploitation rate estimates derived from coded-wire tag groups.

Guidance: For the 2019 season, parent escapement is in the normal category. The marine survival index is in the high category. Therefore, Council fisheries in 2019 should be managed such that the total exploitation rate in all fisheries on LCR coho below Bonneville Dam does not exceed 23 percent.

Southern Oregon/Northern California Coastal (SONCC) Coho Salmon ESU

Background: The SONCC coho ESU has been listed as threatened under the ESA since 1997. The current consultation standard for SONCC coho, described in the FMP, is from a 1999 NMFS biological opinion. The Rogue/Klamath coho hatchery stock is used as an indicator of fishery impacts on SONCC coho.

Guidance: 2019 fisheries should be consistent with the consultation standard, which requires that management measures developed under the FMP achieve an ocean exploitation rate on Rogue/Klamath coho hatchery stocks of no more than 0.13.

⁷ Beamesderfer, R., S. Ellis, J. Jording, C. Kern, C. LeFleur, D. Milward, E. Patiño, A. Rankis, and J. Whisler. 2014. Allowable Fishery Impacts To Lower Columbia River Natural Coho. A Review of the 2006 Harvest Control Rule for Possible Policy Reconsideration. Pages 53 p in PFMC, editor. Lower Columbia River Natural Coho Workgroup.

Central California Coastal (CCC) Coho Salmon ESU

Background: The CCC coho ESU was listed as threatened under the ESA in 1996 and relisted as endangered in 2005. The current consultation standard for CCC coho is from a 1999 NMFS biological opinion. Information on past harvest or non-retention mortality rates is lacking for CCC coho. In the absence of more specific information, the consultation standard requires that directed fishing for coho and retention of coho in Chinook salmon-directed fisheries be prohibited off California.

CCC coho are one of eight species identified in NMFS' "Species in the Spotlight" initiative because it is at high risk of extinction. For more information about actions for its conservation and recovery, please refer to its Species in the Spotlight Priority Action Plan.⁸

Guidance: 2019 fisheries should be consistent with the consultation standard to prohibit directed fishing for coho and retention of coho in Chinook salmon-directed fisheries off California.

ESA-listed Chum Salmon Species

Hood Canal Summer-run Chum Salmon ESU

Background: Chum salmon are not targeted and are rarely caught in Council salmon fisheries. However, the FMP requires fisheries to be managed consistent with NMFS' ESA standards for listed species, which includes the Hood Canal summer-run chum salmon ESU. The Summer Chum Salmon Conservation Initiative⁹, approved by NMFS under Limit 6 of the ESA 4(d) Rule describes the harvest actions that must be taken to protect listed Hood Canal summer-run chum salmon both in Washington fisheries managed under the jurisdiction of the Council and Puget Sound fisheries managed by the state and tribal fishery managers.

Under the terms of the Conservation Initiative, chum salmon must be released in non-treaty sport and troll fisheries in Washington catch Area 4 from August 1 through September 30. The Conservation Initiative does not require release of chum salmon in tribal fisheries in catch Area 4 during the same period, but does recommend that release provisions be implemented. As in previous years, tribal managers will discuss implementation of these provisions during the North of Falcon planning process.

Guidance: 2019 Council fisheries should be managed consistent with the terms of the Chum Salmon Conservation Initiative.

⁸ <https://www.fisheries.noaa.gov/species/coho-salmon-protected/spotlight>

⁹ Washington Department of Fish and Wildlife and Point No Point Treaty Tribes. 2000. Summer Chum Salmon Conservation Initiative: An Implementation Plan to Recover Summer Chum in the Hood Canal and Strait of Juan de Fuca Region. Dated April 2000. 797 p.

ESA-listed Sockeye Salmon Species

Snake River Sockeye Salmon and Ozette Lake Sockeye Salmon ESUs

Background: Sockeye salmon are rarely caught in Council salmon fisheries. In previous biological opinions, NMFS determined that Council fisheries were not likely to adversely affect Snake River or Ozette Lake sockeye salmon.

Guidance: Management constraints in the 2019 ocean fisheries for the protection of listed sockeye salmon are not considered necessary.


ESA-listed Steelhead Species

Background: One Distinct Population Segment (DPS) of steelhead is currently listed as endangered, and ten DPSs are listed as threatened in Washington, Oregon, Idaho, and California. All eleven ESA-listed DPSs have been considered in NMFS' biological opinions on the effects of Council fisheries. Steelhead are rarely caught in ocean fisheries and retention of steelhead in non-treaty commercial ocean fisheries is currently prohibited.

Guidance: Based on currently available information, we conclude that no additional measures are required at this time to avoid effects not already considered in prior opinions. The Council and states should continue to prohibit the retention of steelhead with intact adipose fins in ocean recreational fisheries and we encourage the same in treaty tribal fisheries to minimize the effect of whatever catch may occur.

The NMFS West Coast Region looks forward to working with the Council to develop 2019 ocean salmon fisheries consistent with the conservation and management objectives of the FMP, the Magnuson-Stevens Fishery Management and Conservation Act, and the ESA. We are committed to working with the Council to address the issues outlined in this letter. If you have questions, please contact Ryan Wulff, Assistant Regional Administrator for Sustainable Fisheries at 916-930-3733 or Ryan.Wulff@noaa.gov.

Sincerely,



Barry A. Thom
Regional Administrator

cc: Chuck Tracy, Executive Director, Pacific Fishery Management Council
Ryan Wulff, Assistant Regional Administrator for Sustainable Fisheries, NMFS WCR



March 6, 2019

Mr. Phil Anderson, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, Oregon 97220-1384

Dear Chair Anderson:

This letter supplements our annual guidance letter, dated March 5, 2019, on developing the Pacific Fishery Management Council's (Council) recommendations for the 2019 ocean salmon fisheries. This letter specifically addresses NOAA's National Marine Fisheries Service (NMFS) guidance related to effects of these fisheries on endangered Southern Resident killer whales (SRKW).

Background

SRKW are listed as endangered under the ESA. Over the last decade, the population has declined from 87 whales down to an historical low of 74 whales, and future projections under status quo conditions suggest a continued decline over the next 50 years (NMFS 2016). SRKW are one of eight species identified in NMFS' "Species in the Spotlight" initiative because it is at high risk of extinction. We are taking many actions to conserve and recover SRKW¹ and particularly to address the three main threats to the whales: prey limitation, vessel traffic and noise, and chemical contaminants.

Chinook salmon, the whales' primary prey, are important to SRKW survival and recovery. Any activities that affect the abundance of Chinook salmon available to SRKW have the potential to impact the survival and population growth of the whales. Fisheries can reduce the prey available to the whales and in some cases can interfere directly with their feeding. Insufficient prey can impact their energetics (causing them to search more for fewer prey), health (decreasing their body condition), and reproduction (reducing fecundity and calf survival).

NMFS consulted on the effects of Council fisheries under the ESA in 2009 and concluded that Council fisheries did not jeopardize the survival and recovery of SRKW. Since the 2009 consultation was completed, a substantial amount of new information is available on SRKW and their prey. Therefore, NMFS will re-initiate ESA consultation on the Council fisheries in 2019. NMFS would like to work with the Council to reassess the effects of Council fisheries on SRKW in light of this new information and as needed to develop a long-term approach that ensures these fisheries appropriately limit any adverse effects on SRKW. We anticipate that developing such a long-term approach will take some time, thus we do not anticipate that it will be available for 2019 fisheries. However, we are interested in establishing firm plans for this work as soon as possible, as discussed in more detail below.

¹ More information about conservation and recovery actions can be found in our SRKW Species in the Spotlight Priority Action Plan (<https://www.fisheries.noaa.gov/species/killer-whale#spotlight>) and in our ESA recovery plan for SRKW (https://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/index.html)



Ongoing research and analysis

SRKW consume Chinook salmon from a variety of runs throughout the year. In 2018, NMFS worked with the Washington Department of Fish and Wildlife (WDFW) and other partners to develop a framework to identify Chinook salmon stocks that are important to SRKW to assist in prioritizing actions to increase critical prey for the whales². The framework gives extra weight to salmon runs that have high overlap spatially and temporally with SRKW, and have been documented as part of their diet, especially during winter when the whales may have a harder time finding sufficient food. Several of the high priority Chinook salmon stocks currently identified in the framework contribute substantially to Council fisheries, including **lower Columbia River, Sacramento River, and Klamath River fall-run Chinook salmon stocks**. Identifying high priority Chinook salmon stocks for SRKW is an important step to assess impacts and prioritize management and recovery actions that will benefit the whales. As we continue to gather additional information to refine and update this framework, we welcome Council input.

Additionally, NMFS is working on a risk assessment that comprehensively analyzes the effects of salmon fisheries on the availability of SRKW prey throughout their geographic range and identifies conditions that may pose a risk to recovery of the whales. This comprehensive risk assessment describes the spatial and temporal overlap of each fishery with the whales, uses a retrospective analysis to assess the impacts of salmon fisheries on the total prey available in the past (including the last decade of decline for the whales), and assesses potential impacts to future prey availability for a variety of fisheries management regimes on the West Coast. In conjunction with the risk assessment, NMFS is developing an adaptive management framework that could help inform fisheries management regarding conditions that pose a risk to the recovery of the whales. If adjustments are needed, this framework could guide fisheries actions to limit impacts to prey availability in specific areas and times that are believed to create the greatest benefit to the whales. We believe adaptive frameworks like this, or other equally protective tools, provide confidence that fisheries can respond to the highest risk conditions and help improve conditions for SRKW in the future. We are very interested in sharing and discussing these ideas with the Council.

NMFS continues to focus on understanding the whales' migration patterns, feeding habits, health conditions, and preference for Chinook salmon as prey so that we can develop and prioritize strategies to increase abundance and availability of Chinook salmon to support SRKW recovery.

In addition to considering impacts to SRKW from fishing, we are also working closely with partners to reduce vessel disturbance and interference with foraging, so that the Chinook salmon are more accessible to the whales. Working with a variety of partners, we are implementing actions identified in our review of our existing vessel regulations³ to improve compliance with these regulations, improve habitat conditions for the whales, and implement actions recommended through the Governor of Washington's Task Force process. For more information about SRKW conservation and recovery actions underway, please refer to NMFS' West Coast Region website.¹

² https://www.westcoast.fisheries.noaa.gov/stories/2018/18_07182018_prioritized_salmon_stocks_for_srkw_recovery.html

³ Ferrara, G.A., T.M. Mongillo, L.M. Barre. 2017. Reducing disturbance from vessels to Southern Resident killer whales: Assessing the effectiveness of the 2011 federal regulations in advancing recovery goals. NOAA Tech. Memo. NMFS-OPR-58, 76 p. https://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/killer_whales/noaa_techmemo_nmfsopr-58_dec2017.pdf

2019 Pre-Season Ocean Salmon Fisheries Management Process

NMFS is currently evaluating recently available information about 2019 Chinook salmon abundance projections for the ocean and Puget Sound. We are looking at this information in conjunction with the best available information on which salmon stocks contribute most to the SRKW diet (see 2018 framework referenced above). As noted, there are at least three stocks included in the priority prey stock framework that are caught in substantial numbers in Council area fisheries: **Lower Columbia River, Sacramento River, and Klamath River fall-run Chinook salmon**. We would like the Council's participation between now and the April meeting to help us understand the potential impact of proposed Council fisheries on the draft priority SRKW prey stocks.

Work towards long-term approach and biological opinion

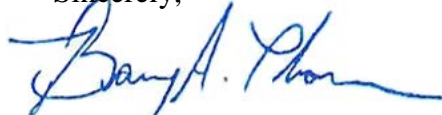
We would like to work collaboratively with the Council and its advisory bodies to reassess the effects of the Council-area fisheries on SRKW and to develop a long-term approach to address any identified effects as soon as practicable. We expect this collaborative process will include consideration of management tools, e.g. possibly an adaptive framework similar to that described previously, that under high risk conditions would trigger action that could reduce impacts on prey in a meaningful way. The goal is to help ensure that Council's harvest management is responsive to the status of SRKW and supports recovery to the extent necessary.

We also recommend that the Council consider scheduling a discussion about developing this collaborative process under its Future Agenda Planning agenda item at the March meeting, with time for discussion during the April meeting. We believe an ad hoc workgroup similar to those formed to assess effects and develop approaches for managing impacts to ESA-listed salmon stocks would be beneficial. NMFS would provide experts on SRKW and salmon fisheries to be part of the effort. We also suggest involving interested fishery participants and non-governmental organizations. A small technical workgroup at the direction of NMFS and the Council would be responsible for conducting the work and reporting back to the Council on progress and to receive additional guidance. We recommend beginning scoping the process, participants, and schedule at the April Council meeting.

The NMFS West Coast Region looks forward to working with the Council to develop 2019 ocean salmon fisheries consistent with the conservation and management objectives of the Pacific Coast Salmon Fishery Management Plan, the Magnuson-Stevens Fishery Management and Conservation Act, and the ESA. We are committed to working with the Council to address the issues outlined in this letter.

If you have questions, please contact Ryan Wulff, Assistant Regional Administrator for Sustainable Fisheries, at 916-930-3733 or Ryan.Wulff@noaa.gov.

Sincerely,



Barry A. Thom
Regional Administrator

cc: Chuck Tracy, Executive Director, Pacific Fishery Management Council
Ryan Wulff, Assistant Regional Administrator for Sustainable Fisheries, NMFS WCR

2019 Puget Sound Summer/Fall Chinook Preseason Forecasts (excludes age 2 fish)

Region	Watershed	Notes	Forecast Type	Hatchery	Supplmt	Wild	Total	Comp Chinook Management Criteria	
								RER ¹	Low Abundance Thresholds ^{2,3}
Strait	Hoko		Escape w/o fishing	896		1,734	2,630	Management Objectives TBD	
	Dungeness		Terminal	657		282	939		
	Elwha		Terminal	7,066		333	7,399		
	Morse Creek		0	0		0	0		
	Region total			8,619		2,349	10,968		
North Sound	Glenwood Springs		Terminal	321			321		
	Nooksack/Samish		Terminal	21,300			21,300		
	Skagit		Terminal	309		13,825	14,134		
	Stillaguamish		Terminal run w/ fishing	566		378	944		
	Snohomish		Escapement w/o fishing	7,225		3,696	10,921		
	Tulalip		Escapement w/o fishing	12,745			12,745		
	Region total			42,466	0	17,899	60,365		
Upper South Sound	Lake Washington								
	Issaquah		Terminal	4,266			4,266		
	Cedar		Terminal			955	955		
	Sammamish		Terminal			108	108		
	Subregion total			4,266		1,063	5,329		
	Green River								
	Soos Creek Hatchery		Terminal	20,423			20,423		
	Icy Creek		Terminal	537			537		
	Mainstem/Newaukum		Terminal			4,833	4,833		
	Subregion total			20,961		4,833	25,794		
Grovers		Terminal	2,880			2,880			
East Kitsap (Gorst, Dogfish)		Terminal	7,705			7,705			
Subregion total			10,585			10,585			
Puyallup River		Terminal	13,007		1,724	14,731			
Upper South Sound Total			48,819		7,620	56,439			

2019 Puget Sound Summer/Fall Chinook Preseason Forecasts (continued)

							Comp Chinook Management Criteria	
Region	Watershed	Notes	Hatchery	Supplmt	Wild	Total	RER ¹	Low Abundance Thresholds ³
Lower South Sound	Carr Inlet	Terminal	13,693			13,693	Management Objectives TBD	
	Deschutes	Terminal	16,730			16,730		
	Nisqually	Terminal	20,223		824	21,047		
	Chambers	Terminal	421			421		
	Lower South Sound Total			51,067		824		
South Sound Total			99,886	0	8,444	108,330		
Hood Canal	Skokomish w/George Adams	Terminal	37,160		520	37,680		
	12B Naturals	Terminal			285	285		
	12C/12H/12D	Terminal	28,911		298	29,209		
	Hood Canal Total			66,071	0	1,103		
Puget Sound Total			217,042	0	29,796	246,837		
Footnotes	1. RER = Recovery Exploitation Rate (interim management ceiling during recovery phase). 2. Level of spawning abundance that triggers additional management action. 3. Threshold expressed as natural origin spawners							

Puget Sound Spring Chinook 2019 Preseason Forecasts

Notes	Forecast					RER	Low Abundance Thresholds
	Type	Hatchery	Supplmt	Wild	Total		
Nooksack River							Management Objectives TBD
North Fork	Terminal	2,674	1,260	171	4,105		
South Fork	Terminal	3,134		77	3,211		
Skagit River	Terminal	4,113		2,003	6,116		
White River							
Minter Creek	Terminal	1,469			1,469		
White River Hatchery	Terminal	154			154		
Buckley Trap	Terminal		1,553	573	2,126		
<i>Total White River Springs</i>					3,749		
Total		11,544	2,813	2,824	17,181		

Washington Coast 2019 Chinook Preseason Forecasts

	Forecast Type	Hatchery	Wild	Total	Natural Escapement Goal
North Coast					
Quillayute River					
Spring	Terminal	2,091		2,091	200
Summer	Terminal		1,301	1,301	1,200
Fall	Terminal		6,645	6,645	> of 3,000 or 60% of run
Hoh					
Spring/Summer	Terminal		1,023	1,023	>of 900 or 69% of RS
Fall	Terminal		2,536	2,536	>of 1,200 or 60% of RS
Queets					
Spring/Summer	Terminal	-	-		>of 700 or 70% of RS
Fall	Terminal	484	2,292	2,776	>of 2,500 or 60% of RS
Quinault					
Fall	Terminal	2,713	3,700	6,413	
North Coast totals Summer/Falls:		3,197	16,474	19,671	
Spring/Summers:		2,091	1,023	3,114	22,785
Grays Harbor					
Chehalis springs	Terminal		581	581	1,400
Chehalis falls	Terminal	2,390	17,781	20,171	9,753
Humtulpis falls	Terminal	2,467	6,207	8,674	3,573
Subregion Falls Total		4,857	23,988	28,845	
Willapa Bay - Fall Chinook	Terminal	23,806	4,309	28,115	
Coast total		33,951	46,375	80,326	

2018 and 2019 Washington Coho Forecast Summary¹

Last updated: 02/22/19

Production unit	2018 Hatchery	2019 Hatchery	2018 Wild	2019 Wild	2018 Total	2019 Total
Dungeness R	9,087	9,760	505	2,290	9,592	12,050
Elwha R	242	3,433	718	1,363	960	4,796
Eastern Strait (excl. Dung, Elwha)			800	2,301	800	2,301
Western Strait			6,368	6,499	6,368	6,499
West/East sub-total excl. Dung, Elwha			7,168	8,800	7,168	8,800
West/East Strait sub-total	9,329	13,193	8,391	12,453	17,720	25,646
Nooksack R	50,797	57,686	18,629	18,308	69,426	75,994
Lummi Ponds	10,459	2,104			10,459	2,104
7B net pens	0	0			0	0
Indian Slough Hatchery	0	0			0	0
Samish R			1,162	4,857	1,162	4,857
Misc 7&7A (incl. San Juans CoOps)			783	1,968	783	1,968
Nook/Samish R sub-total	61,256	59,790	20,574	25,133	81,830	84,923
Skagit R sub-total	13,101	9,917	59,196	57,933	72,297	67,850
Stillaguamish R sub-total	0	2,234	18,950	23,820	18,950	26,054
Snohomish R	7,092	7,709	65,925	62,600	73,017	70,309
Tulalip Bay	31,211	35,043			31,211	35,043
Area 8A Misc. Hatchery		899			0	899
Snohomish R sub-total	38,303	43,651	65,925	62,600	104,228	106,251
Lake Washington	12,984	10,790	2,018	2,770	15,002	13,560
Green River	48,032	68,680	3,320	3,001	51,352	71,681
Elliot Bay Net Pens		23,797			0	23,797
Misc. Area 10,11,10E		14,637	1,429	3,136	1,429	17,773
Puyallup R	17,985	32,220	4,964	9,349	22,949	41,569
Mid-Sound sub-total	79,001	150,124	11,731	18,256	90,732	168,380
Area 13A-K wild, exc. Deschutes			1,976	6,776	1,976	6,776
Area 13A Hatchery (Minter CR)	7,340	7,543			7,340	7,543
Nisqually R	952	10,298	1,268	4,816	2,220	15,114
Deschutes R			59	574	59	574
Area 13D net pens (Squaxin Island)	15,718	33,039			15,718	33,039
Deep South Sound sub-total	24,010	50,880	3,303	12,166	27,313	63,046
Mid+Deep South Sound sub-total	103,011	201,004	15,034	30,422	118,045	231,426
Area 9A (Port Gamble)	12,680	13,783	579	539	13,259	14,322
Area 12A - Quilcene R	49,605	52,237	995	800	50,600	53,037
Area 12A - Quilcene Net Pens		-		-	0	0
Area 12/12B		-	27,693	13,860	27,693	13,860
Area 12C/12D (exc. Skokomish R)		-	30,503	15,265	30,503	15,265
Skokomish R	20,690	20,510	1,334	11,015	22,024	31,525
Area 12/12B-12D/Skok. R sub-total	20,690	27,347	59,530	40,140	80,220	67,487
Hood Canal sub-total	82,975	86,530	61,104	41,479	144,079	128,009
Puget Sound Total	307,975	416,319	249,174	253,840	557,149	670,159
Willapa Bay	44,542	94,019	20,645	63,448	65,187	157,467
Grays Harbor	51,414	64,345	42,379	71,527	93,793	135,872
Quinalt R	29,622	26,904	25,442	13,888	55,064	40,792
Queets R	10,814	13,175	6,964	11,100	17,778	24,275
North Coast Indept. Tribes					0	0
Hoh R			5,816	6,963	5,816	6,963
Quillayute R summer	3,313	3,428	2,743	1,181	6,056	4,609
Quillayute R fall	16,505	16,953	10,557	14,607	27,062	31,560
Coast total	156,210	218,824	114,546	182,714	270,756	401,538

Production unit	2018 Hatchery	2019 Hatchery	2018 Wild	2019 Wild	2018 Total	2019 Total
Columbia Hatch/WA Wild Early ²	152,523	527,976	4,519	9,846	157,042	537,822
Columbia Hatch/WA Wild Late ²	111,774	340,897	8,393	18,286	120,167	359,183
Columbia Oregon Wild ³	-	-	8,990	8,814	8,990	8,814
Columbia total	264,297	868,873	21,902	36,946	286,199	905,819
Grand Total	728,482	1,504,016	385,622	473,500	1,114,104	1,977,516

Notes:

1) Ocean Age 3 (OA3) abundance

2) Columbia Early and Late Production Unit hatchery forecast categories include hatchery production from all states, Columbia Early and Late Wild Production Unit forecasts contain Washington-origin stocks only.

3) Oregon Wild Production Unit category is summarized separately from Columbia Early and Late categories because it is considered by ODFW to account for entire fall coho return on Oregon side of river.

**CHUM, PINK, AND SOCKEYE SALMON
CO-MANAGER RUNSIZE FORECASTS FOR THE 2019 RETURN YEAR**

CHUM - SUMMER

	HATCHERY	WILD	TOTAL	FORECAST METHOD
Puget Sound				
Central Sound		1,381	1,381	R/S
South Sound		27,039	27,039	R/S
Hood Canal*		10,315	10,315	Ocean indicator regression
Strait of Juan de Fuca		1,684	1,684	Ocean indicator regression
Puget Sound Total		40,419	40,419	

* Wild forecast includes supplementation returns.

CHUM - FALL

	HATCHERY	WILD	TOTAL	FORECAST METHOD
Puget Sound				
Nooksack/Samish	21,840	74,896	96,736	R/S
Skagit	282	11,454	11,736	Fry based
Stillaguamish	435	4,758	5,193	Fry based
Snohomish	7,487	4,583	12,070	Fry based
Central Sound	51,504	75,933	127,437	R/S
South Sound	30,217	232,954	263,171	R/S
Hood Canal	349,412	169,233	518,645	R/S
Strait of Juan de Fuca	481	366	847	PDO regression
Puget Sound Total	461,658	574,177	1,035,835	

CHUM - WINTER

	HATCHERY	WILD	TOTAL	FORECAST METHOD
Puget Sound				
South Sound	10,199	25,653	35,852	R/S Runsize>40K
Puget Sound Total	10,199	25,653	35,852	

CHUM - FALL

	HATCHERY	WILD	TOTAL	FORECAST METHOD
Coastal				
Grays Harbor		66,816	66,816	PDO model harvest adjustment
Willapa	822	51,383	52,205	R/S and PDO adjustment
Coastal Total	822	118,199	119,021	

PINK

	HATCHERY	WILD	TOTAL	FORECAST METHOD
Puget Sound				
Nooksack		24,476	24,476	Fry based
Skagit		114,769	114,769	Fry based
Stillaguamish		47,919	47,919	Fry based
Snohomish		128,362	128,362	Fry based
Green		141,130	141,130	Fry based
Puyallup		47,905	47,905	Fry based
Nisqually		25,380	25,380	Fry based
South Sound Misc.		143	143	R/S
Hood Canal	4,200	66,475	70,675	Fry and R/S Avg
Strait of Juan de Fuca	42	7,587	7,629	Ocean indicator regression
Puget Sound Total	4,242	604,146	608,388	

SOCKEYE

	HATCHERY	WILD	TOTAL	FORECAST METHOD
Puget Sound				
Baker River*		33,737	33,737	NPGO and sibling relationship
Lake Washington	9,340	5,813	15,153	Sibling relationships
Puget Sound Total			48,890	

* Forecast contains hatchery and wild production

SOCKEYE

	HATCHERY	WILD	TOTAL	FORECAST METHOD
Columbia River				
Wenatchee River		18,300	18,300	Adult-cohort relationships
Okanogan River		74,500	74,500	Adult-cohort relationships
Columbia River Total		92,800	92,800	

Fraser River Forecasts (from Fisheries and Oceans Canada)

Sockeye Salmon	4,795,000	p50
Pink Salmon	5,018,600	Fry based and salinity

Chinook and coho harvest quotas for March PFMC 2019 proposed ocean salmon fishery management options.

Fishery or Quota Designation	Chinook TACs for Option			Coho TACs for Option		
	I - High	II - Mid	III - Low	I - High	II - Mid	III - Low
Model Run:	Chin1019	Chin1119	Chin1219	Coho1911-CR	Coho1912-CR	Coho1913-CR
TREATY INDIAN OCEAN TROLL	45,000	35,000	25,000	65,000	55,000	35,000
May-June quota:	22,500	17,500	12,500			
July-Sept quota:	22,500	17,500	12,500			
NON-INDIAN COMMERCIAL TROLL (coho MSF)	32,500	27,500	22,500	32,800	30,400	5,600
RECREATIONAL (coho MSF)	32,500	27,500	22,500	172,200	159,600	94,400
NON-INDIAN TOTAL	65,000	55,000	45,000	205,000	190,000	100,000
TOTAL NORTH OF CAPE FALCON	110,000	90,000	70,000	270,000	245,000	135,000

March PFMC 2019 ocean options and 2019 US abundances, with 2018 Puget Sound and WA coast terminal fisheries.

2019 Coho Potential 'Driver Stocks'	Coho Updated 12-Mar-19	Relevant Coho Modeling Outputs:						ER Cap or PFMC Escapement Floor
		Option I	(Ocean ER)	Option II	(Ocean ER)	Option III	(Ocean ER)	
Interior Fraser River (IFR), "Thompson"	US ER	11.0%	6.3%	10.1%	5.4%	7.7%	3.0%	10% US ER
Oregon Coastal Natural (OCN)	Total ER	14.6%	13.2%	13.0%	11.6%	10.4%	8.9%	15% Total ER
Lower Columbia River Natural (LCN)	Total ER	18.5%	15.3%	16.6%	13.4%	12.6%	9.3%	23% Total ER
Grays Harbor Natural	Ocean Escapement	65,271		66,075		68,053		35,400
Queets River Natural	Ocean Escapement	8,923		9,133		9,732		5,800
Hoh River Natural	Ocean Escapement	5,646		5,786		6,230		2,000
Quillayute River Fall Natural	Ocean Escapement	13,586		13,714		14,076		6,300
Strait of Juan De Fuca Natural	SUS ER	7.8%	5.0%	7.1%	4.3%	5.2%	2.4%	10% SUS ER
Hood Canal Natural	Total ER	48.8%	6.3%	48.2%	5.4%	46.8%	2.9%	45% Total ER
Skagit River Natural	Total ER	33.8%	5.7%	33.2%	4.9%	31.4%	2.7%	35% Total ER
Stillaguamish River Natural	Total ER	32.5%	4.1%	31.9%	3.4%	30.5%	1.9%	50% Total ER
Snohomish River Natural	Total ER	33.7%	4.1%	33.1%	3.4%	31.6%	1.9%	50,000

2019 Chinook PFMC DriverStocks	Chinook Updated 12-Mar-19	Relevant Chinook Modeling Outputs:			ER Cap
		Option I	Option II	Option III	
Lower Columbia River Natural Tules	Total ER	38.8%	36.7%	34.7%	38.0%
Puget Sound natural production stocks		See Puget Sound TAMM Table 2 handout			-

Table H. Hatchery escapement to Puget Sound broodstock collection facilities

		Option I-High	Option II-Mid	Option III-Low
		Coho1911-CR	Coho1912-CR	Coho1913-CR
	Escapement	FRAM	FRAM	FRAM
	Goal¹	Escapement²	Escapement²	Escapement²
Lummi Bay	3,500	871	884	931
Skookum Creek	3,500	12,507	12,710	13,462
Skagit/Marblemount	400	4,739	4,806	5,052
	5,750 goal			
Snoh/Wallace	w/2,400			
	priority	4,912	4,974	5,155
Issaquah/Lake WA	2,000	4,844	4,912	5,182
Green River (Soos+Keta)	8,000	19,765	20,073	21,299
Puyallup/Voights	1,800	14,562	14,787	15,638
Minter	2,410	5,912	5,999	6,345
Nisqually	1,280	5,737	5,816	6,130
George Adams	550	8,552	8,670	9,200
Quilcene NFH	1,500	16,994	17,260	18,536
Dungeness	500	3,300	3,343	3,491
Elwha	350	2,820	2,846	2,935

¹ Values updated for 2016 preseason planning process.

² Values from Time Step 5 (Oct-Dec), for Marked+Unmarked components.

A. SEASON ALTERNATIVE DESCRIPTIONS		
ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III
North of Cape Falcon	North of Cape Falcon	North of Cape Falcon
Supplemental Management Information	Supplemental Management Information	Supplemental Management Information
<p>Model #: Coho-1911, Chinook 1019</p> <ol style="list-style-type: none"> Overall non-Indian TAC: 65,000 Chinook and 205,000 coho marked with a healed adipose fin clip (marked). Non-Indian commercial troll TAC: 32,500 Chinook and 32,800 marked coho. Trade: May be considered at the April Council meeting. Overall Chinook and/or coho TACs may need to be reduced or fisheries adjusted to meet NMFS ESA guidance, FMP requirements, upon conclusion of negotiations in the North of Falcon forum, or upon receipt of preseason catch and abundance expectations for Canadian and Alaskan fisheries. 	<p>Model #: Coho-1912, Chinook 1119</p> <ol style="list-style-type: none"> Overall non-Indian TAC: 55,000 Chinook and 190,000 coho marked with a healed adipose fin clip (marked). Non-Indian commercial troll TAC: 27,500 Chinook and 30,400 marked coho. Trade: Same as Alternative 1 	<p>Model #: Coho-1913, Chinook 1219</p> <ol style="list-style-type: none"> Overall non-Indian TAC: 45,000 Chinook and 100,000 coho marked with a healed adipose fin clip (marked). Non-Indian commercial troll TAC: 22,500 Chinook and 5,600 coho. Trade: Same as Alternative 1
<p>U.S./Canada Border to Cape Falcon</p> <ul style="list-style-type: none"> May 1 through the earlier of June 30, or 21,700 Chinook. No more than 4,825 of which may be caught in the area between the U.S./Canada border and the Queets River, and no more than 3,780 of which may be caught in the area between Leadbetter Pt. and Cape Falcon (C.8). <p>Open seven days per week (C.1).</p> <p>In the area between the U.S./Canada border and the Queets River the landing and possession limit is 60 Chinook per vessel per landing week (Thurs.-Wed.) (C.1, C.6).</p> <p>In the area between the Leadbetter Pt. and Cape Falcon the landing and possession limit is 60 Chinook per vessel per landing week (Thurs.-Wed.) (C.1, C.6).</p> <p>All salmon, except coho (C.4, C.7). Chinook minimum size limit of 28 inches total length (B). See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3).</p> <p>When it is projected that approximately 75% of the overall Chinook guideline has been landed, approximately 75% of the Chinook subarea guideline has been landed in the area between the U.S./Canada border and the Queets River, or approximately 75% of the Chinook subarea guideline has been landed in the area between Leadbetter Pt. and Cape Falcon, inseason action will be considered to ensure the guideline is not exceeded.</p>	<p>U.S./Canada Border to Cape Falcon</p> <ul style="list-style-type: none"> May 1 through the earlier of June 28, or 16,500 Chinook. No more than 5,200 of which may be caught in the area between the U.S./Canada border and the Queets River, and no more than 4,400 of which may be caught in the area between Leadbetter Pt. and Cape Falcon (C.8). <p>Open seven days per week (C.1).</p> <p>In the area between the U.S./Canada border and the Queets River, the landing and possession limit is 50 Chinook per vessel per landing week (Thurs.-Wed.) (C.1, C.6).</p> <p>In the area between the Leadbetter Pt. and Cape Falcon landing and possession limit of 50 Chinook per vessel per landing week (Thurs.-Wed.) (C.1, C.6).</p> <p>Same as Alternative 1</p> <p>When it is projected that approximately 60% of the overall Chinook guideline has been landed, approximately 60% of the Chinook subarea guideline has been landed in the area between the U.S./Canada border and the Queets River, or approximately 60% of the Chinook subarea guideline has been landed in the area between Leadbetter Pt. and Cape Falcon, inseason action will be considered to ensure the guideline is not exceeded.</p>	<p>U.S./Canada Border to Cape Falcon</p> <ul style="list-style-type: none"> May 1 through the earlier of June 25, or 11,300 Chinook. No more than 3,550 of which may be caught in the area between the U.S./Canada border and the Queets River, and no more than 3,000 of which may be caught in the area between Leadbetter Pt. and Cape Falcon (C.8). <p>Open five days per week (Fri.-Tues.) (C.1).</p> <p>In the area between the U.S./Canada border and the Queets River, the landing and possession limit is 40 Chinook per vessel per open period (C.1, C.6).</p> <p>In the area between the Queets River and Leadbetter Pt. a landing and possession limit of 200 Chinook per vessel per open period (C.1, C.6).</p> <p>In the area between Leadbetter Pt. and Cape Falcon the landing and possession limit is 40 Chinook per vessel per open period (C.1, C.6).</p> <p>Same as Alternative 1</p> <p>When it is projected that approximately 60% of the overall Chinook guideline has been landed, approximately 60% of the Chinook subarea guideline has been landed in the area between the U.S./Canada border and the Queets River, or approximately 60% of the Chinook subarea guideline has been landed in the area between Leadbetter Pt. and Cape Falcon, inseason action will be considered to ensure the guideline is not exceeded.</p>

A. SEASON ALTERNATIVE DESCRIPTIONS		
ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III
<p>U.S./Canada Border to Cape Falcon</p> <ul style="list-style-type: none"> July 1 through the earlier of September 30, or 10,800 Chinook or 32,800 coho (C.8). <p>Open seven days per week. All salmon. Chinook minimum size limit of 28 inches total length. Coho minimum size limit of 16 inches total length (B, C.1). All coho must be marked with a healed adipose fin clip (C.8.d). No chum retention north of Cape Alava, Washington in August and September (C.4, C.7). See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3).</p> <p>In the area between the U.S./Canada border and the Queets River, a landing and possession limit of 60 Chinook per vessel per landing week (Thurs.-Wed.) will be in place (C.1, C.6).</p> <p>In the area between Leadbetter Pt. to Cape Falcon landing and possession limit of 60 Chinook per vessel per landing week (Thurs.-Wed.) (C.1, C.6).</p> <p>Landing and possession limit of 150 marked coho per vessel per landing week (Thurs.-Wed.) (C.1).</p>	<p>U.S./Canada Border to Cape Falcon</p> <ul style="list-style-type: none"> July 1 through the earlier of September 24, or 11,000 Chinook or 30,400 coho; no more than 5,200 Chinook may be caught in the area between the U.S./Canada border and the Queets River (C.8). <p>Same as Alternative 1</p> <p>In the area between the U.S./Canada border and the Queets River, a landing and possession limit of 50 Chinook per vessel per landing week (Thurs.-Wed.) will be in place (C.1, C.6).</p> <p>In the area between Leadbetter Pt. to Cape Falcon landing and possession limit of 50 Chinook per vessel per landing week (Thurs.-Wed.) (C.1, C.6).</p> <p>Landing and possession limit of 100 marked coho per vessel per landing week (Thurs.-Wed.) (C.1).</p>	<p>U.S./Canada Border to Cape Falcon</p> <ul style="list-style-type: none"> July 1 through the earlier of September 24, or 11,200 Chinook or 5,600 coho; no more than 5,300 Chinook may be caught in the area between the U.S./Canada border and the Queets River, and no more than 1,325 Chinook may be caught in the area between Leadbetter Point and Cape Falcon (C.8). Open July 1-2 then; July 5-September 24; open five days per week (Fri. - Tues.) (C.1). <p>All salmon. Chinook minimum size limit of 28 inches total length. Coho minimum size limit of 16 inches total length (B, C.1). All coho must be marked with a healed adipose fin clip (C.8.d). No chum retention north of Cape Alava, Washington in August and September (C.4, C.7). See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3).</p> <p>In the area between the U.S./Canada border and the Queets River, a landing and possession limit of 40 Chinook per vessel per open period (C.1, C.6).</p> <p>In the area between the Queets River and Leadbetter Pt. a landing and possession limit of 100 Chinook per vessel per open period (C.1, C.6).</p> <p>In the area between Leadbetter Pt. to Cape Falcon a landing and possession limit of 40 Chinook per vessel per open period (C.1, C.6).</p> <p>Landing and possession limit of 10 marked coho per vessel per open period (C.1).</p>
<p>For all commercial troll fisheries north of Cape Falcon: Vessels fishing, or in possession of salmon while fishing, north of Leadbetter Point must land and deliver all species of fish in a Washington port and must possess a Washington troll license. For delivery to Washington ports south of Leadbetter Point, vessels must notify the Washington Department of Fish and Wildlife at 360-249-1215 prior to crossing the Leadbetter Point line with area fished, total Chinook, coho and halibut catch aboard, and destination with approximate time of delivery. During any single trip, only one side of the Leadbetter line may be fished (C.11).</p>	<p>For all commercial troll fisheries north of Cape Falcon: Vessels fishing, or in possession of salmon while fishing, north of Leadbetter Point must land and deliver all species of fish within the area and north of Leadbetter Point (C.11).</p>	<p>For all commercial troll fisheries north of Cape Falcon: Vessels fishing, or in possession of salmon while fishing, north of Leadbetter Point must land and deliver all species of fish within the area and north of Leadbetter Point (C.11).</p>
<p>For all commercial troll fisheries north of Cape Falcon: Mandatory closed areas include: Salmon troll Yelloweye Rockfish Conservation Area, Cape Flattery and Columbia Control Zones, and beginning August 12, Grays Harbor Control Zone (C.5). Vessels must land and deliver their salmon within 24 hours of any closure of this fishery. Vessels fishing or in possession of salmon while fishing south of Leadbetter Point must land and deliver all species of fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land all species of fish in Garibaldi, Oregon. Under state law, vessels must report their catch on a state fish receiving ticket. Oregon State regulations require all fishers landing salmon into Oregon from any fishery between Leadbetter Point, Washington and Cape Falcon, Oregon to notify ODFW within one hour of delivery or prior to transport away from the port of landing by either calling 541-867-0300 ext. 271 or sending notification via e-mail to nfalcon.trollreport@state.or.us. Notification shall include vessel name and number, number of salmon by species, port of landing and location of delivery, and estimated time of delivery. Inseason actions may modify harvest guidelines in later fisheries to achieve or prevent exceeding the overall allowable troll harvest impacts (C.8). Vessels in possession of salmon north of the Queets River may not cross the Queets River line without first notifying WDFW at 360-249-1215 with area fished, total Chinook, coho and halibut catch aboard, and destination. Vessels in possession of salmon south of the Queets River may not cross the Queets River line without first notifying WDFW at 360-249-1215 with area fished, total Chinook, coho and halibut catch aboard, and destination. (C.11).</p>		

A. SEASON ALTERNATIVE DESCRIPTIONS		
ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III
North of Cape Falcon	North of Cape Falcon	North of Cape Falcon
Supplemental Management Information	Supplemental Management Information	Supplemental Management Information
<p>1. Overall non-Indian TAC: 65,000 Chinook and 205,000 coho marked with a healed adipose fin clip (marked).</p> <p>2. Recreational TAC: 32,500 Chinook and 172,200 marked coho; all retained coho must be marked.</p> <p>3. A trade with commercial troll may be considered in April.</p> <p>4. No Area 4B add-on fishery.</p> <p>5. Buoy 10 fishery opens August 1 with an expected landed catch of 40,000 marked coho in August and September.</p> <p>6. Overall Chinook and/or coho TACs may need to be reduced or fisheries adjusted to meet NMFS ESA guidance, FMP requirements, upon conclusion of negotiations in the North of Falcon forum, or upon receipt of preseason catch and abundance expectations for Canadian and Alaskan fisheries.</p>	<p>1. Overall non-Indian TAC: 55,000 Chinook and 190,000 coho marked with a healed adipose fin clip (marked).</p> <p>2. Recreational TAC: 27,500 Chinook and 159,600 marked coho; all retained coho must be marked.</p> <p>3. Trade:</p> <p>4. No Area 4B add-on fishery.</p> <p>5. Buoy 10 fishery opens August 1 with an expected landed catch of 45,000 marked coho in August and September.</p> <p>6. Same as Alternative I</p>	<p>Overall non-Indian TAC: 45,000 Chinook and 100,000 coho marked with a healed adipose fin clip (marked).</p> <p>2. Recreational TAC: 22,500 Chinook and 94,400 marked coho; all retained coho must be marked.</p> <p>3. Trade:</p> <p>4. No Area 4B add-on fishery.</p> <p>5. Buoy 10 fishery opens August 1 with an expected landed catch of 50,000 marked coho in August and September.</p> <p>6. Same as Alternative I</p>
<p>U.S./Canada Border to Cape Alava (Neah Bay)</p> <ul style="list-style-type: none"> June 15 through earlier of September 30, or 17,910 marked coho subarea quota, with a subarea guideline of 6,500 Chinook (C.5). <p>Open seven days per week. All salmon, except no chum beginning August 1; two salmon per day. All coho must be marked with a healed adipose fin clip (C.1).</p> <p>Beginning August 1, Chinook non-retention east of the Bonilla-Tatoosh line (C.4.a) during Council managed ocean fishery. See gear restrictions and definitions (C.2, C.3). Inseason management may be used to sustain season length and keep harvest within the overall Chinook and coho recreational TACs for north of Cape Falcon (C.5).</p>	<p>U.S./Canada Border to Cape Alava (Neah Bay)</p> <ul style="list-style-type: none"> June 22 through earlier of September 30, or 16,600 marked coho subarea quota, with a subarea guideline of 5,500 Chinook (C.5). <p>Open seven days per week. All salmon, except no chum beginning August 1; two salmon per day, no more than one of which may be a Chinook. All coho must be marked with a healed adipose fin clip (C.1).</p> <p>Same as Alternative 1</p>	<p>U.S./Canada Border to Cape Alava (Neah Bay)</p> <ul style="list-style-type: none"> June 29 through earlier of September 15, or 4,370 marked coho subarea quota, with a subarea guideline of 4,400 Chinook (C.5). <p>Open seven days per week. All salmon, except no chum beginning August 1; two salmon per day, no more than one of which may be a Chinook. All coho must be marked with a healed adipose fin clip (C.1).</p> <p>Same as Alternative 1</p>

A. SEASON ALTERNATIVE DESCRIPTIONS		
ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III
<p>Cape Alava to Queets River (La Push Subarea)</p> <ul style="list-style-type: none"> June 15 through earlier of September 22, or 4,380 marked coho subarea quota, with a subarea guideline of 1,400 Chinook (C.5) September 28 through earlier of October 13, or 100 marked coho quota, or 100 Chinook quota (C.5) in the area north of 47°50'00" N. lat. and south of 48°00'00" N. lat. <p>Open seven days per week. All salmon, two salmon per day. All coho must be marked with a healed adipose fin clip (C.1). See gear restrictions and definitions (C.2, C.3).</p> <p>Inseason management may be used to sustain season length and keep harvest within the overall Chinook and coho recreational TACs for north of Cape Falcon (C.5).</p>	<p>Cape Alava to Queets River (La Push Subarea)</p> <ul style="list-style-type: none"> June 22 through earlier of September 30, or 4,150 marked coho subarea quota, with a subarea guideline of 1,300 Chinook (C.5). <p>Same as Alternative 1</p> <p>Same as Alternative 1</p>	<p>Cape Alava to Queets River (La Push Subarea)</p> <ul style="list-style-type: none"> June 29 through earlier of September 15, or 1,090 marked coho subarea quota, with a subarea guideline of 1,100 Chinook (C.5). <p>Open seven days per week. All salmon, two salmon per day, no more than one of which may be a Chinook. All coho must be marked with a healed adipose fin clip (see C.1). See gear restrictions and definitions (C.2, C.3).</p> <p>Same as Alternative 1</p>
<p>Queets River to Leadbetter Point (Westport Subarea)</p> <ul style="list-style-type: none"> June 22 through earlier of September 30, or 63,710 marked coho subarea quota, with a subarea guideline of 15,700 Chinook (C.5). <p>Open seven days per week. All salmon; two salmon per day, no more than one of which may be a Chinook. All coho must be marked with a healed adipose fin clip (C.1).</p> <p>See gear restrictions and definitions (C.2, C.3). Grays Harbor Control Zone closed beginning August 12 (C.4.b). Inseason management may be used to sustain season length and keep harvest within the overall Chinook and coho recreational TACs for north of Cape Falcon (C.5).</p>	<p>Queets River to Leadbetter Point (Westport Subarea)</p> <ul style="list-style-type: none"> June 29 through earlier of September 22, or 59,050 marked coho subarea quota, with a subarea guideline of 13,300 Chinook (C.5) <p>Same as Alternative 1</p> <p>Same as Alternative 1</p>	<p>Queets River to Leadbetter Point (Westport Subarea)</p> <ul style="list-style-type: none"> June 16 through earlier of September 15, or 15,540 marked coho subarea quota, with a subarea guideline of 10,900 Chinook (C.5). <p>Open five days per week (Sunday through Thursday). All salmon; two salmon per day no more than one of which may be a Chinook. All coho must be marked with a healed adipose fin clip (C.1).</p> <p>Same as Alternative 1</p>
<p>Leadbetter Point to Cape Falcon (Columbia River Subarea)</p> <ul style="list-style-type: none"> June 22 through earlier of September 30, or 86,100 marked coho subarea quota, with a subarea guideline of 8,800 Chinook (C.5). <p>Open seven days per week. All salmon; two salmon per day, no more than one of which may be a Chinook. All coho must be marked with a healed adipose fin clip (C.1). See gear restrictions and definitions (C.2, C.3). Columbia Control Zone closed (C.4.c). Inseason management may be used to sustain season length and keep harvest within the overall Chinook and coho recreational TACs for north of Cape Falcon (C.5).</p>	<p>Leadbetter Point to Cape Falcon (Columbia River Subarea)</p> <ul style="list-style-type: none"> June 22 through earlier of September 30, or 79,800 marked coho subarea quota, with a subarea guideline of 7,400 Chinook (C.5). <p>Same as Alternative 1</p>	<p>Leadbetter Point to Cape Falcon (Columbia River Subarea)</p> <ul style="list-style-type: none"> June 29 through earlier of September 30, or 73,400 marked coho subarea quota, with a subarea guideline of 6,100 Chinook (C.5). <p>Same as Alternative 1</p>

Table 5. Projected key stock escapements (thousands of fish) or management criteria for 2019 ocean fishery Alternatives_STT analyzed.^{a/} (Page 1 of 2)

Key Stock/Criteria	PROJECTED			2019
	Alt I	Alt II	Alt III	Criteria
CHINOOK		CHINOOK		CHINOOK
Columbia Upriver Brights	160.7	163.4	165.1	74.0 Minimum ocean escapement to attain 40.0 adults over McNary Dam, with normal distribution and no mainstem harvest. The management goal has been increased to 60.0 by Columbia River managers.
Mid-Columbia Brights	65.6	66.7	67.4	14.9 Minimum ocean escapement to attain 7.9 for Little White Salmon egg-take, assuming average conversion and no mainstem harvest.
Columbia Lower River Hatchery Tules	53.9	55.2	56.2	25.0 Minimum ocean escapement to attain 14.8 adults for hatchery egg-take, with average conversion and no lower river mainstem or tributary harvest.
Columbia Lower River Natural Tules ^{c/} (threatened)	39.2%	36.7%	34.8%	≤ 38.0% Total adult equivalent fishery exploitation rate (2019 NMFS ESA guidance).
Columbia Lower River Wild ^{d/} (threatened)	14.0	14.2	14.4	6.9 Minimum ocean escapement to attain MSY spawner goal of 5.7 for N. Lewis River fall Chinook (NMFS ESA consultation standard).
Spring Creek Hatchery Tules	46.0	48.1	49.5	8.2 Minimum ocean escapement to attain 6.0 adults for Spring Creek Hatchery egg-take, assuming average conversion and no mainstem harvest.
Upper Columbia River Summer	35.1	36.0	36.7	29.0 Aggregate escapement to mouth of Columbia River (2019 NMFS guidance).
Snake River Fall (threatened) SRFI	67.1%	59.7%	53.7%	≤ 70.0% Of 1988-1993 base period exploitation rate for all ocean fisheries (NMFS ESA consultation standard).
Klamath River Fall	46.4	46.1	46.4	≥ 40.7 2019 minimum natural area adult escapement (FMP control rule).
Federally recognized tribal harvest	50.0%	50.0%	50.0%	50.0% Equals 28.8, 29.0, and 29.1 (thousand) adult fish for Yurok and Hoopa Valley tribal fisheries.
Exploitation (spawner reduction) rate	47.3%	47.6%	47.3%	≤ 53.7% FMP control rule.
Adult river mouth return	98.2	98.1	98.5	NA Total adults in thousands.
Age-4 ocean harvest rate	15.9%	16.0%	15.3%	≤ 16.0% NMFS ESA consultation standard for threatened California Coastal Chinook.
KMZ sport fishery share	6.9%	6.9%	7.0%	NA Includes 0.0 (thousand) adult fish impacted in the KMZ sport fishery during fall (Sept.-Dec.) 2018.
River recreational fishery share	15.0%	15.0%	15.0%	NA Equals 4.3, 4.4, and 4.4 (thousand) adult fish for recreational inriver fisheries.
Sacramento River Winter (endangered)	15.7%	15.6%	13.5%	≤ 15.7% Age-3 ocean impact rate in fisheries south of Pt. Arena. In addition, the following season restrictions apply: <u>Recreational</u> - Pt. Arena to Pigeon Pt. between the first Saturday in April and the second Sunday in November; Pigeon Pt. to the U.S./Mexico border between the first Saturday in April and the first Sunday in October. Minimum size limit ≥ 20 inches total length. <u>Commercial</u> - Pt. Arena to the U.S./Mexico border between May 1 and September 30, except Pt. Reyes to Pt. San Pedro between October 1 and 15 (Monday-Friday). Minimum size limit ≥ 26 inches total length (NMFS 2019 ESA Guidance).
Sacramento River Fall	152.3	163.9	--	≥ 151.0 Alternatives I & II: 2019 minimum hatchery and natural area adult escapement (Council guidance).
	--	--	180.1	≥ 180.0 Alternative III: 2019 minimum hatchery and natural area adult escapement (Council guidance).
Sacramento Index Exploitation Rate	59.9%	56.8%	52.6%	≤ 67.9% FMP control rule.
Ocean commercial impacts	149.6	136.1	121.0	Includes fall (Sept-Dec) 2018 impacts (6.2 thousand SRFC).
Ocean recreational impacts	50.9	50.7	46.8	Includes fall 2018 impacts (7.7 thousand SRFC).
River recreational impacts	26.9	28.9	31.8	NA Equals 11.8%, 13.4%, and 15.9% of the total allowable harvest.

Table 5. Projected key stock escapements (thousands of fish) or management criteria for 2019 ocean fishery Alternatives_STT analyzed.^{a/} (Page 2 of 2)

Key Stock/Criteria	PROJECTED			2019	
	Alt I	Alt II	Alt III	Criteria	Spaw ner Objective or Other Comparative Standard as Noted ^{b/}
COHO	COHO			COHO	
Interior Fraser (Thompson River)	11.0%(6.3%)	10.1%(5.4%)	7.7%(3.0%)	≤ 10.0%	2019 Southern U.S. exploitation rate ceiling; PSC coho agreement.
Skagit	33.8%(5.7%)	33.2%(4.9%)	31.4%(2.7%)	≤ 35.0%	2019 total exploitation rate ceiling; FMP matrix ^{d/}
Stillaguamish	32.5%(4.1%)	31.9%(3.4%)	30.5%(1.9%)	≤ 50.0%	2019 total exploitation rate ceiling; FMP matrix ^{d/}
Snohomish	33.7%(4.1%)	33.1%(3.4%)	31.6%(1.9%)	≤ 40.0%	2019 total exploitation rate ceiling; FMP matrix ^{d/}
Hood Canal	48.8%(6.3%)	48.2%(5.4%)	46.8%(2.9%)	≤ 45.0%	2019 total exploitation rate ceiling; FMP matrix ^{d/}
Strait of Juan de Fuca	9.6%(5.0%)	8.9%(4.3%)	7.0%(2.4%)	≤ 20.0%	2019 total exploitation rate ceiling; FMP matrix ^{d/}
Quillayute Fall	13.6	13.7	14.1	6.3	FMP MSY adult spaw ner estimate. Value depicted is ocean escapement.
Hoh	5.6	5.8	6.2	2.0	FMP MSY adult spaw ner estimate. Value depicted is ocean escapement.
Queets Wild	8.9	9.1	9.7	5.8	FMP MSY adult spaw ner estimate. Value depicted is ocean escapement.
Grays Harbor	65.3	66.1	68.1	24.4	FMP MSY adult spaw ner estimate. Value depicted is ocean escapement.
Willapa Bay Natural	55.5	56.3	58.5	17.2	FMP MSY adult spaw ner estimate. Value depicted is ocean escapement.
Low er Columbia River Natural (threatened)	15.3%	13.4%	9.3%	≤ 23.0%	Total marine and mainstem Columbia R. fishery exploitation rate (2018 NMFS ESA guidance). Value depicted is marine ER before Buoy 10.
Upper Columbia ^{e/}	≥ 50%	≥ 50%	≥ 50%	≥ 50%	Minimum percentage of the run to Bonneville Dam.
Columbia River Hatchery Early	337.2	351.0	372.0	77.2	Minimum ocean escapement to attain hatchery egg-take goal of 21.7 early adult coho, with average conversion and no mainstem or tributary fisheries.
Columbia River Hatchery Late	204.9	217.4	250.6	9.7	Minimum ocean escapement to attain hatchery egg-take goal of 6.4 late adult coho, with average conversion and no mainstem or tributary fisheries.
Oregon Coastal Natural	14.6%	13.0%	10.4%	≤ 15.0%	Marine and freshw ater fishery exploitation rate (NMFS ESA consultation standard).
Southern Oregon/Northern California Coast (threatened)	5.8%	5.8%	6.2%	≤ 13.0%	Marine fishery exploitation rate for R/K hatchery coho (NMFS ESA consultation standard).

a/ Projections in the table assume 2018 post season fishing effort scalars for coho in Canadian fisheries. Model results for Chinook in this table used 2018 preseason catches and fishing effort scalars, and are updated with 2018 post season data if available. Assumptions for these fisheries will be changed prior to the April meeting as new information becomes available.

b/ Ocean escapement is the number of salmon escaping ocean fisheries and entering freshw ater with the following clarifications. Ocean escapement for Puget Sound stocks is the estimated number of salmon entering Area 4B that are available to U.S. net fisheries in Puget Sound and spaw ner escapement after impacts from the Canadian, U.S. ocean, and Puget Sound troll and recreational fisheries have been deducted. Numbers in parentheses represent Council area exploitation rates for Puget sound coho stocks. For Columbia River early and late coho stocks, ocean escapement represents the number of coho after the Buoy 10 fishery. Exploitation rates for LCN coho include marine impacts only. Exploitation rates for OCN coho represent marine and freshw ater impacts. Values reported for Klamath River fall Chinook are natural area adult spaw ners. Values reported for Sacramento River fall Chinook are hatchery and natural area adult spaw ners.

c/ Includes projected impacts of inriver fisheries that have not yet been shaped.

d/ Annual management objectives may be different than FMP goals, and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders. It is anticipated that fishery management will be adjusted by state and tribal comanagers during the preseason planning process to comply with stock management objectives.

e/ Includes minor contributions from East Fork Lewis River and Sandy River.

3/18/2019

Chin1019 (High)
65k NT, 45k TRChin1119 (Mid)
55k NT, 35k TRChin1219 (Low)
45k NT, 25k TR

Stock	ER Ceiling	ER Type	Total ER	SUS ER	PT-SUS ER	Total ER	SUS ER	PT-SUS ER	Total ER	SUS ER	PT-SUS ER
Spring/Early:											
Nooksack - Total	10.5%	SUS	37.0%	11.8%	8.1%	36.4%	11.1%	7.4%	35.7%	10.3%	6.6%
North/Middle Fork											
South Fork											
Skagit - Total	37.5%	Total	32.2%	20.8%	6.4%	31.9%	20.6%	6.1%	31.7%	20.3%	5.8%
Upper Sauk											
Upper Cascade											
Suitttle											
White	22.0%	SUS	25.8%	18.6%	7.2%	25.5%	18.2%	6.8%	25.1%	17.8%	6.3%
Dungeness	10.0%	SUS	6.3%	1.8%	1.7%	6.3%	1.7%	1.6%	6.2%	1.7%	1.6%
Summer/Fall:											
Skagit - Total	48.0%	Total	39.1%	18.1%	5.7%	39.0%	17.9%	5.5%	38.7%	17.6%	5.2%
Upper Skagit											
Sauk											
Lower Skagit											
Stillaguamish - Total	24.0%	Total									
Unmarked ER	8.0%	UM SUS	28.6%	18.4%	8.5%	28.5%	18.2%	8.3%	28.3%	18.0%	8.1%
Marked ER	12.0%	M SUS	31.1%	21.4%	11.9%	30.9%	21.2%	11.7%	30.7%	21.0%	11.4%
Snohomish - Total	21.0%	Total	17.7%	7.7%	6.4%	17.4%	7.5%	6.2%	17.0%	7.0%	5.7%
Skykomish	15.0%	SUS									
Snoqualmie											
Lake WA (Cedar R.)	13.0%	PT-SUS	36.9%	25.2%	16.4%	35.8%	24.0%	15.1%	34.6%	22.7%	13.8%
Green	13.0%	PT-SUS	51.8%	40.1%	16.4%	50.8%	39.0%	15.1%	49.7%	37.8%	13.8%
Puyallup	13.0%	PT-SUS	52.1%	40.4%	16.4%	51.3%	39.5%	15.1%	50.5%	38.5%	13.8%
Nisqually	49%	Total	51.8%	44.8%	18.9%	51.0%	43.9%	17.5%	49.9%	42.8%	15.9%
Western Strait-Hoko	10%	SUS	20.7%	2.4%	2.4%	20.4%	2.2%	2.2%	20.0%	1.8%	1.8%
Elwha	10%	SUS	6.9%	2.2%	2.1%	6.8%	2.1%	2.0%	6.7%	2.0%	2.0%
Mid-Hood Canal	12%	PT-SUS	25.5%	15.4%	15.1%	24.2%	14.1%	13.8%	22.7%	12.5%	12.2%
Skokomish	50%	Total	49.8%	39.8%	15.5%	49.0%	38.9%	14.2%	48.0%	37.8%	12.6%

LCN

38% Total

39.2%

36.7%

34.8%

Fish Name	Stillaguamish		Mid HC		LK WA		Nooksack Sp	
	Jul-Sep	Oct-Apr	Jul-Sep	Oct-Apr	Jul-Sep	Oct-Apr	Jul-Sep	Oct-Apr
Ar 7 Sport	29.5%	9.3%	11.4%	4.6%	5.9%	3.5%	9.6%	25.5%
Ar 5 Sport	6.6%	4.7%	8.1%	1.7%	15.7%	0.9%	9.7%	12.6%
Ar 8-1 Spt	1.4%	5.6%	0.5%	2.1%	0.5%	2.6%	1.0%	2.8%
Ar 9 Sport	6.1%	8.2%	9.2%	4.8%	9.2%	6.3%	2.0%	12.6%
Ar 6 Sport	1.9%	7.7%	15.5%	4.5%	6.9%	2.6%	1.6%	20.6%
A 10 Sport	4.3%	1.0%	6.6%	5.1%	32.1%	4.0%	0.0%	0.0%
A 11 Sport	3.9%	3.2%	17.9%	0.9%	5.9%	1.7%	2.1%	0.0%
A 10A Sprt	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
A 10E Sprt	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%
A 12 Sport	0.0%	0.2%	1.9%	2.2%	0.1%	0.2%	0.0%	0.0%
A 13 Sport	0.0%	0.0%	2.2%	0.8%	0.7%	0.3%	0.0%	0.0%
FW Sport	6.5%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%

* From Chin1119

*2018 Puget Sound fisheries with 2019 abundances/2019 ocean fisheries

Puget Sound Chinook Mark-Selective Fishery Sampling Methods

Overview

The Puget Sound Sampling Unit uses three different sampling designs to intensively monitor mark-selective Chinook fisheries (MSFs) in Puget Sound marine areas. These include the *Full Murthy Design*, *Reduced Murthy Design* and the *Aerial Access Design* (Figure 1). The sampling design used depends on area and season considerations as well as State-Tribal agreements made pre-season (Table 1).

The *Full Murthy Design* is the most intensive sampling design and is used to monitor the Areas 9 and 10 summer MSFs. Here, sampling occurs on 2 days during the Monday-Thursday time period and every Friday, Saturday and Sunday. The 2 days of sampling from the Monday-Thursday period are averaged and multiplied by 4 to create an estimate of catch for all four days. Then this estimate is added to the Friday, Saturday and Sunday estimates to provide a total estimate for the week.

The basic idea for the daily catch estimate is that we select and sample 2 ramps or exit locations on every sample day, count all the Chinook that are caught on a given day for those ramps, and expand those counts for the areas we do not sample. We conduct on-the-water interviews approximately weekly to determine where anglers will be leaving the fishery and determine how many people will exit the fishery at our sampled locations. This tells us how many Chinook came through the locations we sampled and what percentage of the anglers exited the fishery at the sampled locations. Although the mathematical formula that we use is a bit more complex, an approximation of the catch can be simplified as the number of Chinook observed at the sampled locations divided by the percentage of anglers leaving the fishery through the sampled locations.

We estimate total Chinook encounters (landed and released fish) based on the assumption that all legal-marked fish that are encountered are kept. This is done by dividing the estimate of total landed Chinook by the proportion of legal-marked fish encountered in the test fishery or reported in voluntary trip reports (VTRs).

However, this estimate is incorrect because anglers do not keep every legal-marked fish that is encountered. To correct for bias in this estimate due to intentional and unintentional releases of legal-marked fish (approximately 13% based on past studies¹), the initial estimate of total encounters is divided by 0.87.

Finally, the estimate of fishery total Chinook encounters can be apportioned into the four size/mark-status groups (legal-marked, legal-unmarked, sublegal-marked, sublegal-unmarked) by multiplying the total encounters estimate by the proportion in which each group is found in the fish population, which is estimated using information from the test fishing or VTR reports.

¹ See Conrad & McHugh (2008) for further information (<http://wdfw.wa.gov/publications/00492/>)

Sampling Activities

For all three sampling designs there are three main components required to estimate total encounters (number of fish retained and released) for a given fishery:

1) *Effort Surveys:*

- a. On-the-water Interviews (Boat Surveys) are conducted during most fisheries. During these surveys, samplers attempt to intercept all anglers on the water in a given fishery and determine where they intend to tie up or exit the fishery upon completing their trip. This provides us with a list of sites (ramps/launches) used to access the fishery as well as information on the relative amount of use (# of anglers) each site receives. Based on this information we designate a “sample-frame” of 5-6 of the highest use access sites for each fishery, from which we select sample sites for dockside creel sampling. Information from the boat surveys also allows us to estimate the total effort that originates from non-sampled sites and include it in our estimates.
- b. Aerial effort surveys are conducted in fisheries where Boat Surveys are infeasible due to large survey areas and unsafe boating conditions. During these surveys flights are conducted to count the total number of boats on the water in a fishery. The sample-frame (sites where we station samplers) consists of the four access sites expected to be of highest use in the fishery. Paired with interviews conducted at these sites, the aerial surveys provide information on the proportion of total fishery effort that originates from non-sampled sites, enabling expansion of observed dockside counts to fishery-wide totals.

2) *Dockside Creel Sampling* occurs 3 or 5 days per week, depending on the sampling design used. This provides information on effort (# of anglers), retained and released Chinook (# of marked and unmarked) and other fish species retained and released for the site on the day sampled. Selected sites are sampled from approximately dawn until dark. Empty trailers are noted as missed boats upon the sampler’s departure and get incorporated into estimates. Since effort differs on weekdays and weekends, each week is separated into weekday (Mon-Thurs) and weekend (Fri-Sun) time periods. In non-aerial survey designs, two sites from the sample-frame are selected on each sampling day. On sampling days in aerial survey areas, all four sites within the sample-frame are sampled.

3) *Test fishery or Voluntary Trip Report (VTR)* data are used to provide information on the composition of the four size and mark-status groups (Legal-Marked, Legal-Unmarked, Sublegal-Marked, Sublegal-Unmarked) present in the population of fish being encountered. This information is used independently of dockside sampling data and ***does not*** result in double-counted fish.

Estimation Example

To demonstrate how all of these pieces of information come together, below we provide a simplified example demonstrating the estimation of effort (# anglers), Chinook catch and total Chinook encounters for a Monday-Thursday period during which one site is sampled on two randomly selected days. ***Please note that this is a simplified example for informational purposes only.*** In actuality, at least two sites are sampled on every sample day (e.g., 1 northern site and 1 southern site in Area 9 summer fisheries), resulting in more complex estimation equations. For full details on sampling procedures and estimation methods see please reference WDFW’s Methods Report for Monitoring Mark-Selective Recreational Chinook Fisheries in the Marine Catch Areas of Puget Sound (<http://wdfw.wa.gov/publications/01357/>).

Dockside Creel Sampling Data:

Monday - Port Townsend		Wednesday - Everett Ramp	
Anglers	30	Anglers	40
Landed Chinook	20	Landed Chinook	20

Test Fishery Data

	# Fish	Proportion
Legal-AD	50	0.50
Legal-UM	20	0.20
Sublegal-AD	20	0.20
Sublegal-UM	10	0.10
Total	100	

Boat Survey Data:

Site	Anglers	Site-Weight	
Fort Casey/Keystone	20	20 / 100 = 0.20	
Mukilteo	10	10 / 100 = 0.10	
Everett	40	40 / 100 = 0.40	
Port Townsend	25	25 / 100 = 0.25	
Kingston	5	5 / 100 = 0.05	In-Sample Proportion
Total In-Frame (Sampled sites)	100		100/150 = 0.67
Total Out-of-Frame (Non-sampled sites)	50		
Total Anglers	150		

Daily Estimates: To estimate the number of anglers on Monday we take the number of anglers sampled on Monday at Port Townsend (30) and divide by the proportion of “in-sample” (within sample-frame) effort from Port Townsend (0.25). This gives us an estimate of 120 anglers that fished out of the 5 sample-frame sites. To estimate total anglers on Monday for the whole fishery, including non-sampled sites, we divide the 120 in-sample anglers by the proportion of total effort that originated from the 5 sample-frame sites (0.67) generating an estimate of 180 anglers.

By the same methods we estimate:

$$\text{Total Landed Chinook on Monday} = (20 / 0.25) / 0.67 = 120$$

$$\text{Total Anglers on Wednesday (sampling from Everett Ramp)} = (40 / 0.40) / 0.67 = 150$$

$$\text{Total Landed Chinook on Wednesday (sampling from Everett Ramp)} = (20 / 0.40) / 0.67 = 75$$

Weekday Estimates: To estimate effort and catch across the whole time period (Mon-Thurs) we combine the daily estimates from the two days sampled and multiply by the ratio of (N/n) where “N” is the total number of days in the time period (4) and “n” is the number of days sampled (2):

$$\text{Total Anglers} = (180 + 150) \times (4 / 2) = 660; \text{Total Landed Chinook} = (120 + 75) \times (4 / 2) = 390$$

Total Encounters: Initially, we calculate an estimate of total Chinook encounters based on the assumption that all legal-marked fish that are encountered are kept. This is done by dividing the estimate of total landed Chinook (390) by the proportion of legal-marked fish encountered in the test fishery or reported in VTRs (0.50), as follows:

$$\text{Total Encounters} = 390 / 0.50 = 780 \text{ (uncorrected estimate)}$$

However, this estimate is incorrect because anglers do not keep every legal-marked fish that is encountered. To correct for bias in this estimate due to intentional and unintentional releases of legal-marked fish (approximately 13% based on past studies), the initial estimate of total encounters is divided by 0.87.

$$\text{Bias-corrected Total Encounters} = 780 / 0.87 = 897 \text{ total Chinook encounters.}$$

Encounters by size/mark group: The estimate of total Chinook encounters can be apportioned into the four size and mark-status groups by multiplying it by the proportions of the four groups from the test fishing/VTR data.

$$\text{Legal-AD} = 897 \times 0.50 = 449$$

$$\text{Legal-UM} = 897 \times 0.20 = 179$$

$$\text{Sublegal-AD} = 897 \times 0.20 = 179$$

$$\text{Sublegal-UM} = 897 \times 0.10 = 90$$

Full Murthy Sampling Design

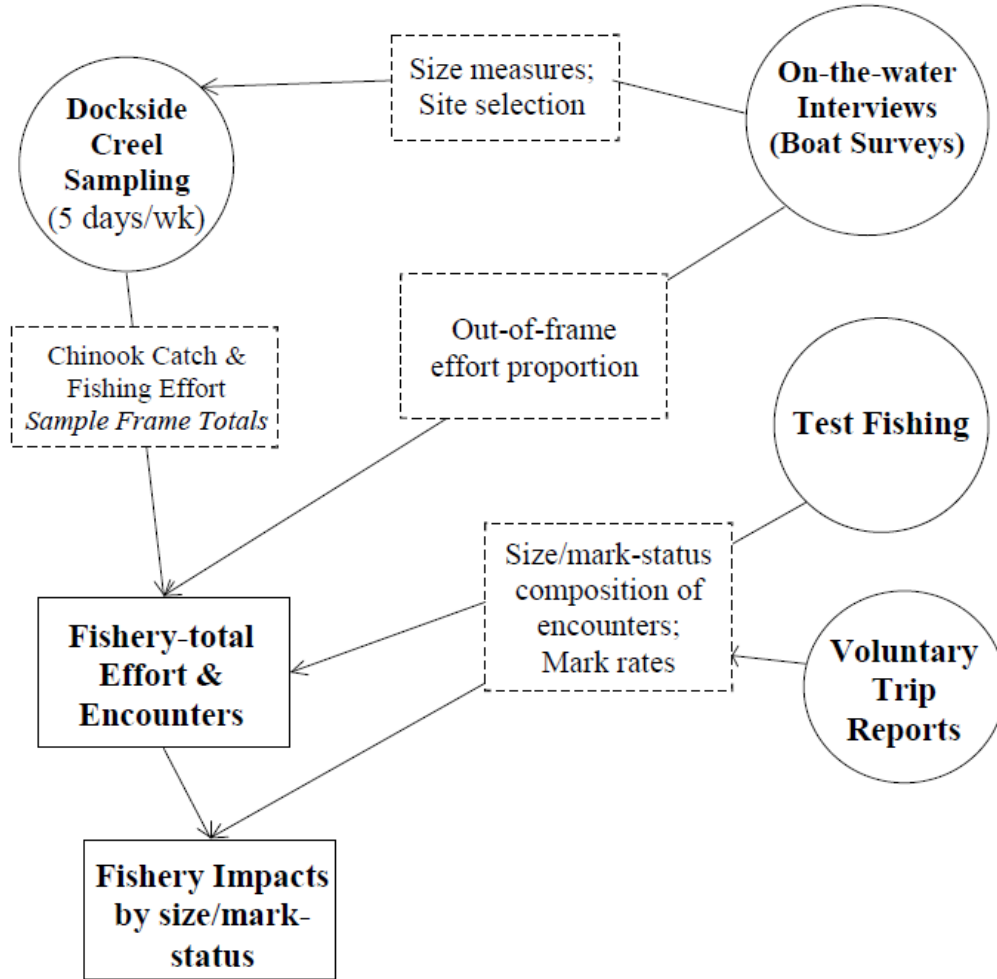


Figure 1. Conceptual diagram of the *Full Murthy Sampling Design*. Circles represent discrete sampling activities, dashed boxes represent parameters that are estimated using data from a given activity, and solid boxes depict key quantities estimated from the comprehensive plan. The *Reduced Murthy Sampling Design* is identical to the *Full Murthy*, except only three days per week are sampled instead of five and test fishing may or may not occur. The *Aerial Access Design* is identical to the *Reduced Murthy*, except boat surveys are replaced by aerial effort surveys.

Table 1. List of the sampling design used to monitor each of the Chinook MSFs in Puget Sound

Sampling Design	Fishery
Full Murthy Design	Summer Fisheries in Areas 9 & 10
Reduced Murthy Design	Summer Fisheries in Areas 5 & 11; Winter Fisheries in Areas 8-1, 8-2, 10 & 11
Aerial Access Design	Winter Fisheries in Areas 6, 7 and 9
Baseline Sampling only	Summer Fisheries in Areas 6, 12 and 13; Winter Fisheries in Area 12

STR FLOW CHART

