Agenda Item D.2.a
Supplemental STT Report 1
March 2022

SALMON TECHNICAL TEAM REPORT 1

Excerpts from the Review of 2021 Ocean Salmon Fisheries and 2022 Preseason 1 Report

PFMC
03/08/2022

2021 Review: TABLE II-6. Chinook stock status relative to overfished and overfishing criteria. A stock is overfished if the 3-year geometric mean spawning escapement is less than the minimum stock size threshold (MSST); a stock experiences overfishing if the total annual exploitation rate exceeds the maximum fishing mortality threshold (MFMT).

	Spawning Escapement									Exploitation Rate						
Chinook Stock	2016	2017	2018	2019	2020	2021	3-yr Geo Mean	MSST	S_{MSY}	2016	2017	2018	2019	2020	2021	MFMT
Sacramento Fall	89,699	44,329	105,466	163,767	138,091	104,483	133,192	91,500	122,000	0.56	0.68	0.52	0.68	0.61	NA	0.78
Klamath River Fall	13,937	19,904	52,352	20,022	26,185	29,942	**25,039**	30,525	40,700	0.37	0.10	0.32	0.43	0.30	NA	0.71
Southern Oregon	27,278	91,977	39,497	19,426	30,497	48,870	30,706	20,500	34,992	NA	NA	NA	NA	NA	NA	0.78
Central and Northern OR[a/]	118	114	92	65	137	85	91	30 fish/mile	150k-200k	0.47	0.45	0.66	0.50	NA	NA	0.78
Upper River Bright - Fall[a/]	151,373	96,096	58,540	77,880	98,401	102,616	92,303	19,182	39,625	0.53	0.49	0.34	0.37	NA	NA	0.86
Upper River - Summer[a/]	79,253	56,265	38,816	41,090	70,654	52,076	53,273	6,072	12,143	0.55	0.46	0.54	0.26	NA	NA	0.75
Willapa Bay - Fall[b/]	1,888	3,147	2,847	2,894	3,585	NA	3,091	1,696	3,393	0.72	0.51	0.61	0.73	NA	NA	0.78
Grays Harbor Fall[a/b/]	11,248	17,145	20,741	14,880	20,879	NA	18,609	5,694	13,326	0.64	0.48	0.63	0.72	NA	NA	0.78
Grays Harbor Spring	926	1,384	493	983	2,828	2,573	1,927	546	1,400	NA	NA	NA	NA	NA	NA	0.78
Queets - Fall[a/]	3,035	2,822	2,207	2,663	3,459	NA	2,729	1,250	2,500	0.62	0.55	0.66	0.64	NA	NA	0.87
Queets - Sp/Su	704	825	484	322	342	NA	376	350	700	NA	NA	NA	NA	NA	NA	0.78
Hoh - Fall[a/b/]	2,831	1,808	2,478	1,552	2,273	NA	2,060	600	1,200	0.54	0.51	0.56	0.79	NA	NA	0.90
Hoh Sp/Su	1,144	1,364	793	766	1,248	NA	912	450	900	NA	NA	NA	NA	NA	NA	0.78
Quillayute - Fall[a/b/]	3,654	3,604	3,937	7,765	8,672	3,873	6,389	1,500	3,000	0.64	0.69	0.72	0.73	NA	NA	0.87
Quillayute - Sp/Su	871	1,097	990	1,442	935	748	1,003	600	1,200	NA	NA	NA	NA	NA	NA	0.78
Hoko -Su/Fa[a/]	1,324	1,188	2,179	1,815	2,122	NA	2,032	425	850	0.28	0.26	0.54	0.77	NA	NA	0.78

a/ Preliminary CWT based exploitation rates from PSC-CTC 2021 Exploitation Rate Analysis.

b/ Queets River fall Chinook coded-wire-tag (CWT) exploitation rates used as a proxy. Adjustments made to terminal fishery impacts to account for differential harvest rates.

2021 Review: TABLE III-7. Coho stock status relative to overfished and overfishing criteria. A stock is overfished if the 3-year geometric mean spawning escapement is less than the minimum stock size threshold (MSST); a stock experiences overfishing if the total annual exploitation rate exceeds the maximum fishing mortality threshold (MFMT).

	Spawning Escapement									Exploitation Rate						
Coho Stock	2016	2017	2018	2019	2020	2021	3-yr Geo Mean	MSST	S_{MSY}	2016	2017	2018	2019	2020	2021	MFMT
Willapa Bay	30,667	11,379	17,228	15,115	16,476	NA	16,249	8,600	17,200	0.38	0.34	0.35	0.39	NA	NA	0.74
Grays Harbor	38,595	26,907	49,622	30,468	23,814	NA	33,020	18,320	24,426	0.11	0.32	0.22	0.40	NA	NA	0.65
Queets[a/]	5,156	5,232	2,631	1,700	4,181	NA	**2,654**	4,350	5,800	0.15	0.23	0.23	0.57	NA	NA	0.65
Hoh	5,009	4,478	2,463	2,445	2,840	NA	2,576	1,890	2,520	0.08	0.43	0.34	0.57	NA	NA	0.65
Quillayute Fall	9,630	7,474	6,091	6,852	7,695	8,321	7,599	4,725	6,300	0.18	0.42	0.30	0.37	NA	NA	0.59
Juan de Fuca[a/]	8,435	5,530	5,470	4,625	8,548	NA	**6,002**	7,000	11,000	0.03	0.05	0.08	0.12	NA	NA	0.60
Hood Canal	24,313	23,871	7,512	7,884	16,832	NA	**9,990**	10,750	14,350	0.40	0.35	0.57	0.46	NA	NA	0.65
Skagit	35,822	20,184	19,047	14,246	23,808	NA	18,624	14,875	25,000	0.20	0.09	0.49	0.48	NA	NA	0.60
Stillaguamish	13,048	6,099	23,937	12,887	21,555	NA	18,804	6,100	10,000	0.16	0.12	0.22	0.20	NA	NA	0.50
Snohomish[b/]	44,141	18,195	58,135	40,314	42,675	NA	46,418	31,000	50,000	0.18	0.21	0.25	0.17	NA	NA	0.60

a/ Categorized as overfished in 2018. Rebuilding plan in place.

b/ Categorized as overfished in 2018, catagorized as 'not overfished-rebuilding in 2021. Rebuilding plan in place.

2022 Preseason I Report: TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 1 of 3)

Production Source and Stock or Stock Group	2017	2018	2019	2020	2021	2022	Methodology for 2022 Prediction and Source
Sacramento River							
Fall (Sacramento Index)	230.7	229.4	379.6	473.2	271.0	396.5	Log-log regression of the Sacramento Index on jack escapement from the previous year, accounting for lag-1 autocorrelated errors. STT.
Winter (age-3 absent fishing)	--	1.6	1.9	3.1	9.1	6.0	Stochastic life cycle model applied to natural- and hatchery-origin production. STT.
Klamath River (Ocean Abundance)							
Fall	54.2	359.2	274.2	186.6	181.5	200.1	Linear regression analysis of age-specific ocean abundance estimates on river runs of same cohort. STT.
Oregon Coast							
North and South/Local Migrating	--	--	--	--	--	--	None.
Columbia River (Ocean Escapement)							
Cowlitz Spring	17.1	5.2	1.3	1.4	1.8	4.1	Age-specific linear regressions of cohort returns in previous run years. WDFW.
Kalama Spring	3.1	1.5	1.4	1.0	2.2	2.0	Age-specific linear regressions of cohort returns in previous run years. WDFW.
Lewis Spring	0.7	3.7	1.5	1.4	2.4	2.4	Age-specific linear regressions of cohort returns in previous run years. WDFW.
Willamette Spring	38.1	53.8	40.2	40.8	50.1	51.2	Age-specific linear regressions of cohort returns in previous run years. ODFW. Forecast includes adult fish only.
Sandy Spring	3.6	5.3	5.5	5.2	5.3	5.6	Recent 3-year average. ODFW.
Upriver Spring [a/]	160.4	166.7	99.3	81.7	75.2	122.9	Log-linear sibling regressions of cohort returns in previous run years.
Upriver Summer[b/]	63.1	67.3	35.9	38.3	77.6	57.5	Log-linear sibling regressions or average return (4-ocean fish). Columbia River TAC subgroup.
LRW Fall	12.5	7.6	13.7	19.7	20.0	10.8	Columbia River Fall Chinook: AIC-weighted average of age-specific cohort ratios and sibling regression models. Columbia River TAC subgroup and WDFW.
LRH Fall	92.4	62.4	54.5	51.0	73.1	73.0	
SCH Fall	158.4	50.1	46.0	46.2	46.8	91.2	
MCB Fall	45.6	36.4	56.7	71.8	77.4	70.2	
URB Fall	260.0	200.1	158.4	233.4	354.2	230.4	

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 2 of 3)

Production Source and Stock or Stock Group		2017	2018	2019	2020	2021	2022	Methodology for 2022 Prediction and Source
Washington Coast								
Willapa Bay Fall	Natural	4.2	3.8	4.3	2.9	3.9	3.1	Sibling and environmental relationships from recent year returns.
	Hatchery	34.3	40.3	23.6	28.3	30.5	30.1	Relationships between brood year survival and number of spawners.
Grays Harbor Fall	Natural	--	16.4	18.0	15.0	15.5	17.9	Combination of geometric mean of recent year returns and linear relationships of sibling recruits per spawner.
	Hatchery	--	4.8	7.7	6.9	7.6	8.6	Combination of recent year smolt return rates and log linear regressions of sibling returns per smolt.
Quinault Spring/Summer	Natural	NA	NA	NA	NA	NA	NA	
	Hatchery	--	4.8	NA	NA	NA	NA	
Quinault Fall	Natural	5.9	5.2	5.3	4.2	6.0	3.2	Regression of age-specific Quinault returns on age-specific Queets returns applied to age-specific Queets forecasts
	Hatchery	4.4	3.1	2.7	4.5	4.9	5.6	Estimated age-specifc Queets smolt return rates applied by brood and age class to Quinault smolt releases.
Queets Spring/Sum	Natural	0.5	0.5	0.6	0.6	0.6	0.6	Recent 5 year average terminal return.
Queets Fall	Natural	3.7	3.3	3.4	4.1	4.3	5.3	Natural: Log linear sibling regressions of returns per spawner.
	Hatchery	0.9	0.6	0.8	0.7	0.6	0.5	Hatchery: Estimates of smolt return rates applied to smolt releases.
Hoh Spring/Summer	Natural	1.0	1.1	1.0	0.8	1.0	0.7	Spring/Summer and Fall: Recent 3 year mean recruit per spawner
Hoh Fall	Natural	2.7	2.6	2.5	2.6	2.6	3.4	adjusted by previous performance.
Quillayute Spring	Hatchery	2.2	2.1	2.1	2.4	2.6	3.0	Spring: Recent 5 year mean for all ages.
Quillayute Sum/Fall	Natural	7.6	8.0	7.9	9.8	9.6	8.8	Summer: Recent 5 year mean for all ages. Fall: Recent 5 year average of adjusted and unadjusted mean for all ages.
Hoko[c/]	Natural	1.5	1.5	2.8	2.6	1.3	0.9	Naïve forecast - recent 5-yr average.
North Coast Totals								
Spring/Summer	*Natural*	*1.5*	*1.6*	*1.7*	*1.4*	*1.5*	*1.3*	
Fall	*Natural*	*19.9*	*19.1*	*19.2*	*20.6*	*22.5*	*20.7*	
Spring/Summer	*Hatchery*	*2.2*	*2.1*	*2.1*	*2.4*	*2.6*	*3.0*	
Fall	*Hatchery*	*5.3*	*3.7*	*3.5*	*5.2*	*5.5*	*6.1*	

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 3 of 3)

Production Source and Stock or Stock Group		2017	2018	2019	2020	2021	2022	Methodology for 2022 Prediction and Source
Puget Sound summer/fall[d/]								
Nooksack/Samish	Hatchery	21.2	24.6	21.3	18.2	18.9	28.1	Three year average return rate.
East Sound Bay	Hatchery	0.8	0.7	0.3	0.3	0.6	0.4	Three year average return rate.
Skagit	Natural	15.8	13.3	13.6	12.9	10.5	12.5	Natural: Hierarchical Bayesian model to estimate the spawner-recruit dynamics. Hatchery: One year ahead forecasts generated using Chinook run sizes and GAM and ARIMA models.
	Hatchery	0.4	0.3	0.3	0.5	0.5	0.5	
Stillaguamish[e/]	Natural	1.5	1.6	0.9	0.9	0.9	0.9	Natural plus hatchery. Multiple regression environmental model (Environmental Model to Predict Adult Returns, EMPAR).
Snohomish[e/]	Natural	3.4	3.5	3.2	3.0	2.9	2.4	Natural fingerling: Multiple regression environmental model (EMPAR). Natural yearling: Naïve models using the ForecastR tool (Vélez-Espino et al. 2018; https://solv-code.shinyapps.io/forecastr/).
	Hatchery	4.8	6.5	7.0	6.8	6.1	6.0	Hatchery: Recent 3-year geomean of total return broken out into returns from fingerling and yearling releases and age at return.
Tulalip[e/]	Hatchery	5.3	7.5	12.5	6.0	5.8	7.7	Multiple regression environmental model (EMPAR).
South Puget Sound	Natural	4.7	4.8	8.4	5.8	7.0	6.9	Natural: Lake Washington; 4-yr avg recruit per spawner for age 3, 4-yr avg sibling ratios for ages 4 & 5. Green; 2 year average return rates. Puyallup; climate relationship for age 3, 5 year average return per spawner for ages 4-5. Nisqually; average smolt to adult return rates (2-yr avg for ages 3 &4, 5-yr avg for age 5) Hatchery: Variety of recent year average return rates or sibling relationships.
	Hatchery	80.4	123.6	99.9	100.7	78.8	90.3	
Hood Canal	Natural	2.5	3.9	1.2	4.6	5.7	5.4	Includes hatchery strays to spawning grounds in Skokomish River. Proportioned using Hood Canal terminal run reconstruction-based relative contribution of the individual management units for 2017-2021 return years. Area 12B returns derived by applying an average proportion of natural origin recruits returning to area 12B for 2017-2020.
	Hatchery	48.3	57.6	66.0	67.6	64.1	51.9	Brood 2017 fingerling lbs released from WDFW facilities in 2018, multiplied by the average of post-season estimated terminal area return rates for the last 5 years (2017-2021).
Strait of Juan de Fuca Including Dungeness spring run	Natural	3.1	6.0	8.3	5.0	5.5	5.0	Natural and hatchery. Dungeness and Elwha hatchery estimated by mean return rates times average releases. Dungeness wild estimated by smolts times mean return rate. Elwha wild estimated using 12 year hatchery/wild breakouts from otolith and CWT.

a/ Since 2005, the upriver spring Chinook run includes Snake River summer Chinook.
b/ Since 2005, the upriver summer Chinook run includes only upper Columbia summer Chinook, and not Snake River summer Chinook.
c/ Expected spawning escapement without fishing.
d/ Unless otherwise noted, Puget Sounds forecasts are in units of terminal run size.
e/ Includes a mixture of runsize types including escapement without fishing and terminal run. 2022 values are terminal runsize.

2022 Preseason I Report: TABLE I-2. Preseason adult coho salmon stock forecasts in thousands of fish. (Page 1 of 2)

Production Source and Stock or Stock Group		2017	2018	2019	2020	2021	2022	Methodology for 2022 Prediction and Source
OPI Area Total Abundance (California, Oregon Coasts, and Columbia River)		496.2	349.0	1,009.6	268.7	1,732.9	1,225.9	Abundance of all OPI components based on cohort reconstruction including all fishery impacts using Mixed Stock Model (MSM); prior to 2008 only fishery impacts south of Leadbetter Point were used (traditional OPI accounting). OPITT, see Chapter III for details.
OPI Public	Hatchery	394.3	294.1	933.5	185.7	1607.9	1003.5	OPIH: Columbia River jacks adjusted for delayed smolt releases and total OPI jacks regressed on 1970-2021 adults. Columbia/Coastal proportions based on jacks; Columbia early/late proportions based on jacks; Coastal N/S proportions based on smolts.
Columbia River Early		231.7	164.7	545.0	130.7	1014.0	592.5	
Columbia River Late		154.6	121.5	360.6	50.3	576.0	404.7	
Coastal N. of Cape Blanco		3.5	3.3	12.0	2.4	6.4	1.9	
Coastal S. of Cape Blanco		4.5	4.6	15.9	2.3	11.5	4.4	
Lower Columbia River	Natural	30.1	21.9	36.9	24.8	39.2	65.7	Oregon: recent two year average return; Washingtion: natural smolt production multiplied by 2019 brood marine survival rate. Abundance is subset of early/late hatchery abundance above.
Oregon Coast (OCN)	Natural	101.9	54.9	76.1	83.0	125.0	222.4	Rivers: Generalized additive model (GAM) relating ocean recruits to parental spawners and marine environmental variables. See text in Chapter III for details. Lakes: recent three year average abundance.
Washington Coast								
Willapa	Natural	36.7	20.6	63.4	17.9	19.0	35.8	Washington Coast stocks: A variety of methods were used for 2022, primarily based on smolt production and survival. See text in Chapter III for details.
	Hatchery	55.0	44.5	94.0	51.8	61.6	74.7	
Grays Harbor	Natural	50.0	42.4	71.5	50.0	44.8	120.4	
	Hatchery	36.4	51.4	64.3	42.3	31.7	78.3	
Quinault	Natural	26.3	25.4	13.9	17.5	15.0	19.4	
	Hatchery	29.4	29.6	26.9	27.0	24.6	42.7	
Queets	Natural	6.5	7.0	11.1	7.8	3.9	18.2	
	Hatchery	13.7	10.8	13.2	10.9	11.8	22.2	
Hoh	Natural	6.2	5.8	7.0	4.2	3.0	4.7	

TABLE I-2. Preseason adult coho salmon stock forecasts in thousands of fish. (Page 2 of 2)

Production Source and Stock or Stock Group		2017	2018	2019	2020	2021	2022	Methodology for 2022 Prediction and Source
Quillayute Fall	Natural	15.8	10.6	14.7	9.2	7.5	12.5	For all Washington Coast stocks: A variety of methods were used for 2022, primarily based on smolt production and survival. See text in Chapter III for details.
	Hatchery	17.6	16.5	17.0	13.0	15.1	20.3	
Quillayute Summer	Natural	1.5	2.7	1.2	0.8	0.3	0.9	
	Hatchery	3.4	3.3	3.4	3.4	3.4	4.6	
North Coast Independent Tributaries	Natural	6.5	4.1	8.1	5.1	4.7	18.0	
	Hatchery	0.2	7.9	12.5	1.3	0.1	0.1	
WA Coast Total	*Natural*	*149.5*	*118.7*	*191.0*	*112.4*	*98.4*	*229.8*	
	Hatchery	*155.6*	*164.1*	*231.3*	*149.6*	*148.2*	*243.0*	
Puget Sound								
Strait of Juan de Fuca	Natural	13.1	7.2	8.8	7.5	6.7	7.3	For all Puget Sound stocks: A variety of methods were used for 2022, primarily based on smolt production and survival. See text in Chapter III and Joint WDFW and tribal annual reports on Puget Sound Coho Salmon Forecast Methodology for details.
	Hatchery	15.4	10.6	16.8	20.6	12.5	12.7	
Nooksack-Samish	Natural	13.2	20.6	25.1	15.4	35.3	36.0	
	Hatchery	45.6	61.3	59.8	42.5	54.6	73.8	
Skagit	Natural	11.2	59.2	57.9	31.0	58.4	80.4	
	Hatchery	7.6	13.1	9.9	18.2	22.0	21.3	
Stillaguamish	Natural	7.6	19.0	23.8	19.5	26.8	24.9	
	Hatchery	1.5	0.0	2.2	2.3	4.0	1.9	
Snohomish	Natural	107.3	65.9	62.6	39.0	60.0	64.2	
	Hatchery	62.0	38.3	43.7	26.6	29.9	22.6	
South Sound	Natural	20.2	15.0	30.4	7.3	27.5	31.0	
	Hatchery	102.4	103.0	180.4	164.0	192.7	208.5	
Hood Canal	Natural	115.6	59.5	40.1	35.0	28.8	20.2	
	Hatchery	74.9	84.5	87.9	72.2	55.7	61.4	
Puget Sound Total	*Natural*	*288.3*	*246.4*	*248.8*	*154.6*	*243.5*	*264.0*	
	Hatchery	*309.3*	*310.8*	*400.7*	*346.3*	*371.4*	*402.3*	

2022 Preseason I Report: TABLE V-4. Stock status relative to overfished and overfishing criteria. A stock is approaching an overfished condition if the 3-year geometric mean of the most recent two years and the forecast spawning escapement is less than the minimum stock size threshold (MSST); a stock would experience overfishing if the total annual exploitation rate exceeds the maximum fishing mortality threshold (MFMT). Occurrences of stocks *at risk of* approaching an overfished condition or experiencing overfishing are indicated in **bold**. 2022 spawning escapement and exploitation rate estimates are based on preliminary 2022 preseason abundance forecasts and 2021 Council regulations.

	Estimated Adult Spawning Escapement									Total Exploitation Rate						
	2017	2018	2019	2020	2021[a/]	Forecast 2022[b/]	3-yr Geo Mean	MSST	S_{MSY}	2017	2018	2019	2020	2021[a/]	2022[b/]	MFMT
Chinook																
Sacramento Fall	44,329	105,466	163,767	138,091	104,483	189,235	139,767	91,500	122,000	0.68	0.52	0.68	0.61	0.68	0.52	0.78
Klamath River Fall	19,904	52,352	20,022	26,190	30,196	33,829	**29,908**	30,525	40,700	0.10	0.32	0.43	0.30	0.38	0.34	0.71
Southern Oregon[c/]	91,977	39,507	20,076	30,497	48,870	NA	31,045	20,500	34,992	NA	NA	NA	NA	NA	NA	0.54
Central and Northern OR[d/]	114	92	65	137	85	NA	91	30 fish/mi	60 fish/mi	0.45	0.66	0.50	NA	NA	NA	0.78
Upper River Bright - Fall[d/]	96,096	58,540	77,880	98,401	86,644	73,749	85,671	19,182	39,625	0.49	0.34	0.37	NA	NA	NA	0.86
Upper River - Summer[d/]	56,265	38,816	41,090	70,654	52,076	51,006	57,253	6,072	12,143	0.46	0.54	0.26	NA	NA	NA	0.75
Willapa Bay - Fall[e/]	3,147	2,847	2,894	3,585	NA	NA	3,091	1,696	3,393	0.51	0.61	0.73	NA	NA	NA	0.78
Grays Harbor Fall[d/e/]	17,145	20,741	14,880	20,879	NA	NA	18,609	5,694	13,326	0.48	0.63	0.72	NA	NA	NA	0.78
Grays Harbor Spring	1,384	493	983	2,828	2,573	NA	1,927	700	1,400	NA	NA	NA	NA	NA	NA	0.78
Queets - Fall[d/]	2,822	2,207	2,663	3,459	NA	NA	2,729	1,250	2,500	0.55	0.66	0.64	NA	NA	NA	0.87
Queets - Sp/Su	825	484	322	342	NA	NA	376	350	700	NA	NA	NA	NA	NA	NA	0.78
Hoh - Fall[d/e/]	1,808	2,478	1,552	2,273	NA	NA	2,060	600	1,200	0.51	0.56	0.79	NA	NA	NA	0.90
Hoh Sp/Su	1,364	793	766	1,248	NA	NA	912	450	900	NA	NA	NA	NA	NA	NA	0.78
Quillayute - Fall[d/e/]	3,604	3,937	7,765	8,672	3,873	NA	6,389	1,500	3,000	0.69	0.72	0.73	NA	NA	NA	0.87
Quillayute - Sp/Su	1,097	990	1,442	935	748	NA	1,003	600	1,200	NA	NA	NA	NA	NA	NA	0.78
Hoko -Su/Fa[d/]	1,188	2,179	1,815	2,122	NA	NA	2,032	425	850	0.26	0.54	0.77	NA	NA	NA	0.78
Coho																
Willapa Bay[f/]	11,379	17,228	15,115	16,476	NA	32,947	20,169	8,600	17,200	0.34	0.35	0.39	0.33	NA	0.37	0.74
Grays Harbor[f/]	26,907	49,622	30,468	23,814	NA	95,898	41,130	18,320	24,426	0.32	0.22	0.39	0.29	NA	0.26	0.65
Queets	5,232	2,631	1,700	4,181	NA	14,464	4,685	4,350	5,800	0.23	0.23	0.57	0.22	NA	0.21	0.65
Hoh	4,478	2,463	2,445	2,840	NA	3,414	2,873	1,890	2,520	0.43	0.34	0.57	0.49	NA	0.27	0.65
Quillayute Fall	7,474	6,091	6,852	7,695	8,321	10,740	8,827	4,725	6,300	0.42	0.30	0.37	0.16	NA	0.14	0.59
Juan de Fuca	5,530	5,470	4,625	8,548	NA	6,649	**6,406**	7,000	11,000	0.05	0.08	0.12	0.07	NA	0.09	0.60
Hood Canal	23,871	7,512	7,884	16,832	NA	11,234	11,424	10,750	14,350	0.35	0.57	0.46	0.29	NA	0.45	0.65
Skagit	20,184	19,047	14,246	23,808	NA	53,939	26,350	14,875	25,000	0.09	0.49	0.48	0.43	NA	0.33	0.60
Stillaguamish	6,099	23,937	12,887	21,555	NA	16,768	16,700	6,100	10,000	0.12	0.22	0.20	0.13	NA	0.33	0.50
Snohomish	18,195	58,135	40,314	42,675	NA	43,222	42,051	31,000	50,000	0.21	0.25	0.17	0.11	NA	0.33	0.60

a/ Preliminary.

b/ Preliminary approximations based on preseason forecasts and the previous year fishing regulations.

c/ MSST 18,440 (20,500 as measured at Huntley Park).

d/ Preliminary CWT based exploitation rates from PSC-CTC 2021 Exploitation Rate Analysis.

e/ Queets River fall Chinook coded-wire-tag (CWT) exploitation rates used as a proxy. Adjustments made to terminal fishery impacts to account for differential harvest rates.

f/ Willapa Bay and Grays Harbor coho escapement and exploitation rate estimates based on natural area adult spawners.

2022 Preseason I Report: TABLE V-5. Postseason S_{ACL}, S_{OFL}, and spawner escapement estimates for Sacramento River fall Chinook (SRFC) and Klamath River fall Chinook (KRFC). For the current year, S_{ACL}, S_{OFL}, and spawner escapements are preseason values based on current abundance forecasts and the previous year fishing regulations.

	SRFC			KRFC			Willapa Bay Coho		
Year	S_{ACL}[a/]	S_{OFL}	Escapement[b/]	S_{ACL}[a/]	S_{OFL}	Escapement[c/]	S_{ACL}[a/]	S_{OFL}	Escapement[c/]
2012	188,378	138,144	285,429	70,922	64,273	121,543	--	--	--
2013	260,798	191,251	406,846	52,032	47,154	59,156	--	--	--
2014	165,355	121,260	212,476	47,674	43,205	95,104	--	--	--
2015	76,485	56,089	113,468	22,202	20,120	28,112	9,440	8,181	17,086
2016	61,595	45,170	89,699	7,056	6,394	13,937	14,839	12,860	30,667
2017	41,119	30,154	44,329	7,113	6,446	19,904	5,180	4,489	11,379
2018	66,110	48,481	105,466	24,468	22,174	52,352	7,903	6,849	17,228
2019	152,116	111,551	163,767	11,312	10,251	20,022	7,458	6,464	15,115
2020	105,723	77,530	138,091	12,018	10,891	26,190	7,399	6,413	16,476
2021	96,641	70,870	104,483	15,466	14,016	30,196	NA	NA	NA
2022	118,937	87,221	189,235	16,290	14,763	33,829	15,439	13,381	32,947

a/ $S_{ACL} = S_{ABC.}$

b/ Hatchery and natural area adult spawners.

c/ Natural area adult spawners.

2022 Preseason I Report: TABLE V-6. Comparison of projected ocean escapements and exploitation rates for critical natural and Columbia River hatchery coho stocks (thousands of fish) resulting from application of 2021 Council-adopted regulations to 2021 and 2022 ocean abundance forecasts.[a/]

	Ocean Escapement and ER Estimates Under 2021 Regulations[b/]				
	2021 Abundance Forecasts		2022 Abundance Forecasts		
Stock	Ocean Escapement	Exploitation Rate	Ocean Escapement	Exploitation Rate	2022 FMP Conservation Objective[c/]
Natural Coho Stocks					
Skagit	54.4	34.9%	74.7	33.3%	Exploitation Rate ≤60.0%[d/]
Stillaguamish	59.0	28.6%	63.3	32.9%	Exploitation Rate ≤50.0%[d/]
Snohomish	57.3	28.5%	61.3	33.0%	Exploitation Rate ≤40.0%[d/]
Hood Canal	26.6	43.1%	18.6	44.6%	Exploitation Rate ≤45.0%[d/]
Strait of Juan de Fuca	6.3	9.2%	6.9	9.1%	Exploitation Rate ≤20.0%[d/]
Quillayute Fall	7.3	13.8%	12.0	14.1%	6.3 - 15.8 Spawners
Hoh	2.6	26.9%	4.0	27.5%	2.0 - 5.0 Spawners
Queets	3.4	20.0%	15.7	21.0%	5.8 - 14.5 Spawners
Grays Harbor[f/]	46.8	25.8%	122.5	26.2%	35.4 Spawners
LCN	35.7	10.1%	57.6	13.5%	Exploitation Rate ≤23.0[e/]
OCN	109.4	12.8%	192.4	13.9%	Exploitation Rate ≤15.0%[e/]
R/K	9.4	2.7%	3.5	3.3%	Exploitation Rate ≤13.0%[e/]
Hatchery Coho Stocks					
Columbia Early	797.4	29.8%	394.1	41.7%	6.2 Hatchery Escapement
Columbia Late	452.0	28.3%	289.3	34.5%	14.2 Hatchery Escapement

a/ Quota levels include harvest and hooking mortality estimates used in planning the Council's 2021 ocean fisheries and a coho catch for the Canadian troll fishery off the West Coast of Vancouver Island (WCVI).

b/ 2021 preseason regulations with the following coho quotas: U.S. Canada Border to Cape Falcon: Treaty Indian troll-26,500; non-Indian troll-5,000 selective; recreational-70,000 selective; Cape Falcon to OR/CA border: recreational-120,000 selective and 14,000 non-selective; troll-10,000 selective. Ocean escapement is generally the estimated number of coho escaping ocean fisheries and entering freshwater. For Puget Sound stocks, ocean escapement is the total abundance minus ocean fisheries (ie outside Puget Sound). For the OCN coho stock, this value represents the estimated spawner escapement in SRS accounting. For Columbia R. hatchery and LCN stocks, ocean escapement represents the number of coho after the Buoy 10 fishery; the LCN exploitation rates shown are total marine and mainstem Columbia R. fishery ERs.

c/ Goals represent FMP conservation objectives, ESA consultation standards, or hatchery escapement needs. Spawning escapement goals are not directly comparable to ocean escapement because the latter occur before inside fisheries.

d/ Assumed exploitation rate based on preliminary abundance forecasts.

e/ Pending confirmation of 2022 ESA consultation standard.

f/ Grays Harbor escapements and exploitation rate estimates based on natural area adult spawners.

TABLE V-7.Comparison of Lower Columbia natural (LCN), Oregon coastal natural (OCN), and Rogue/Klamath (RK) coho projected harvest mortality and exploitation rates by fishery under Council-adopted 2015 management measures and preliminary 2016 preseason abundance estimates.

	Projected Harvest Mortality and Exploitation Rate					
	LCN		OCN		RK[a/]	
Fishery	Number	Percent	Number	Percent	Number	Percent
SOUTHEAST ALASKA	0	0.0%	0	0.0%	0	0.0%
BRITISH COLUMBIA	246	0.4%	2,135	1.0%	22	0.6%
PUGET SOUND/STRAITS	74	0.1%	60	0.0%	0	0.0%
NORTH OF CAPE FALCON						
Recreational	1,370	2.1%	834	0.4%	0	0.0%
Treaty Indian Troll	673	1.0%	493	0.2%	0	0.0%
Non-Indian Troll	247	0.4%	185	0.1%	0	0.0%
SOUTH OF CAPE FALCON						
Recreational:						
Cape Falcon to Humbug Mt.	2,683	4.1%	17,936	8.0%	20	0.6%
Humbug Mt. to Horse Mt. (KMZ)	47	0.1%	876	0.4%	36	1.0%
Fort Bragg	3	0.0%	180	0.1%	20	0.6%
South of Pt. Arena	3	0.0%	171	0.1%	7	0.2%
Troll:						
Cape Falcon to Humbug Mt.	474	0.7%	1,926	0.9%	5	0.1%
Humbug Mt. to Horse Mt. (KMZ)	4	0.0%	46	0.0%	2	0.1%
Fort Bragg	0	0.0%	60	0.0%	2	0.1%
South of Pt. Arena	16	0.0%	406	0.2%	4	0.1%
BUOY 10	1,787	2.7%	386	0.2%	0	0.0%
ESTUARY/FRESHWATER	1,167	1.8%	5,405	2.4%	NA	NA
TOTAL	8,794	13.5%	31,099	13.9%	118	3.3%

a/ Unmarked hatchery production used as a surrogate for Rogue/Klamath natural stock coho.