

SALMON TECHNICAL TEAM REPORT 1

Excerpts from the Review of 2020 Ocean Salmon Fisheries and
2021 Preseason Report I

2020 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)

Chinook Stock	Spawning Escapement						3-yr Geo		S _{MSY}	Exploitation Rate						
	2015	2016	2017	2018	2019	2020	Mean	MSST		2015	2016	2017	2018	2019	2020	MFMT
Sacramento Fall	113,468	89,699	44,329	105,466	163,767	137,907	133,549	91,500	122,000	0.55	0.56	0.68	0.52	0.68	NA	0.78
Klamath River Fall	28,112	13,937	19,904	52,352	20,022	26,190	30,167	30,525	40,700	0.59	0.37	0.10	0.32	0.42	NA	0.71
Southern Oregon	30,462	27,278	91,977	39,497	19,426	30,497	28,602	20,500	34,992	NA	NA	NA	NA	NA	NA	0.78
Central and Northern OR ^{a/}	247	118	114	92	65	135	93	30 fish/mile	150k-200k	0.45	0.47	0.44	0.65	NA	NA	0.78
Upper River Bright - Fall ^{a/}	323,276	151,373	96,096	58,540	77,880	NA	75,950	19,182	39,625	0.37	0.47	0.42	0.33	NA	NA	0.86
Upper River - Summer ^{a/}	88,691	79,253	56,265	38,816	41,090	70,654	48,302	6,072	12,143	0.53	0.55	0.44	0.52	NA	NA	0.75
Willapa Bay - Fall ^{b/}	2,824	1,888	3,078	2,853	2,894	NA	2,940	1,696	3,393	0.49	0.62	0.55	0.65	NA	NA	0.78
Grays Harbor Fall ^{b/}	17,305	11,248	17,145	20,741	14,880	NA	17,426	5,694	13,326	0.49	0.62	0.55	0.65	NA	NA	0.78
Grays Harbor Spring	1,841	926	1,384	493	983	2,828	1,111	546	1,400	NA	NA	NA	NA	NA	NA	0.78
Queets - Fall ^{a/}	5,483	3,035	2,822	2,207	2,663	NA	2,550	1,250	2,500	0.49	0.62	0.55	0.65	NA	NA	0.87
Queets - Sp/Su	532	704	825	484	322	NA	505	350	700	NA	NA	NA	NA	NA	NA	0.78
Hoh - Fall ^{b/}	1,795	2,831	1,808	2,478	1,552	NA	1,909	600	1,200	0.49	0.62	0.55	0.65	NA	NA	0.90
Hoh Sp/Su	1,070	1,144	1,364	793	766	NA	939	450	900	NA	NA	NA	NA	NA	NA	0.78
Quillayute - Fall ^{b/}	3,440	3,654	3,604	3,937	7,765	8,202	6,306	1,500	3,000	0.49	0.62	0.55	0.65	NA	NA	0.87
Quillayute - Sp/Su	783	871	1,097	990	1,442	635	968	600	1,200	NA	NA	NA	NA	NA	NA	0.78
Hoko -Su/Fa ^{a/}	2,877	1,324	1,188	2,179	1,815	1,298	1,725	425	850	0.29	0.28	0.26	0.53	NA	NA	0.78

a/ CWT based exploitation rates from PSC-CTC 2020 Exploitation Rate Analysis and Model Calibration.

b/ Queets River fall Chinook coded-wire-tag (CWT) exploitation rates used as a proxy. Exploitation rates in the terminal fisheries will differ from those calculated for Queets fall CWTs.

2020 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).

Coho Stock	Escapement									Exploitation Rate						
	2015	2016	2017	2018	2019	2020	3-yr Geo Mean	MSST	S _{MSY}	2015	2016	2017	2018	2019	2020	MFMT
Willapa Bay	17,086	30,667	11,379	17,228	15,115	NA	14,363	8,600	17,200	0.46	0.38	0.34	0.35	NA	NA	0.74
Grays Harbor	21,278	38,595	26,907	49,622	30,468	NA	34,392	18,320	24,426	0.49	0.11	0.32	0.22	NA	NA	0.65
Queets	2,028	5,156	5,232	2,631	1,700	NA	2,860	4,350	5,800	0.26	0.15	0.23	0.23	NA	NA	0.65
Hoh	1,794	5,009	4,478	2,463	2,445	NA	2,999	1,890	2,520	0.39	0.08	0.43	0.34	NA	NA	0.65
Quillayute Fall	2,571	9,630	7,474	6,091	6,852	7,096	6,666	4,725	6,300	0.48	0.18	0.42	0.30	NA	NA	0.59
Juan de Fuca	3,859	8,435	5,530	5,470	4,625	NA	5,191	7,000	11,000	0.18	0.03	0.05	0.08	NA	NA	0.60
Hood Canal	26,926	24,313	23,871	7,512	NA	NA	16,336	10,750	14,350	0.59	0.40	0.35	0.57	NA	NA	0.65
Skagit	5,794	35,822	20,184	19,047	14,246	NA	17,627	14,875	25,000	0.63	0.20	0.09	0.49	NA	NA	0.60
Stillaguamish	2,914	13,048	6,099	23,937	12,887	NA	12,345	6,100	10,000	0.47	0.16	0.12	0.22	NA	NA	0.50
Snohomish	12,804	44,141	18,195	58,135	40,314	NA	34,937	31,000	50,000	0.54	0.18	0.21	0.25	NA	NA	0.60

2021 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	2016	2017	2018	2019	2020	2021	Methodology for 2021 Prediction and Source
Sacramento River							
Fall (Sacramento Index)	299.6	230.7	229.4	379.6	473.2	271.0	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	Stochastic life cycle model applied to natural- and hatchery-origin production. STT.
Klamath River (Ocean Abundance)							
Fall	142.2	54.2	359.2	274.2	186.6	181.5	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	25.1	17.1	5.2	1.3	1.4	1.8	Age-specific linear regressions of cohort returns in previous run years. WDFW.
Kalama Spring	4.9	3.1	1.5	1.4	1.0	2.2	Age-specific linear regressions of cohort returns in previous run years. WDFW.
Lewis Spring	1.0	0.7	3.7	1.5	1.4	2.4	Age-specific linear regressions of cohort returns in previous run years. WDFW.
Willamette Spring	68.7	38.1	53.8	40.2	40.8	50.1	Age-specific linear regressions of cohort returns in previous run years. ODFW. Forecast includes adult fish only.
Sandy Spring	NA	3.6	5.3	5.5	5.2	5.3	Recent 3-year average. ODFW.
Upriver Spring ^{a/}	188.8	160.4	166.7	99.3	81.7	75.2	Log-linear sibling regressions of cohort returns in previous run years.
Upriver Summer ^{b/}	93.3	63.1	67.3	35.9	38.3	77.6	Log-linear sibling regressions or average return (4-ocean fish). Columbia River TAC subgroup.
LRW Fall	22.2	12.5	7.6	13.7	19.7	20.0	Columbia River Fall Chinook: Age-specific average cohort ratios or sibling regressions. Columbia River TAC subgroup and WDFW.
LRH Fall	133.7	92.4	62.4	54.5	51.0	73.1	
SCH Fall	89.6	158.4	50.1	46.0	46.2	46.8	
MCB Fall	101.0	45.6	36.4	56.7	71.8	77.4	
URB Fall	589.0	260.0	200.1	158.4	233.4	354.2	

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

Production Source and Stock or Stock Group		2016	2017	2018	2019	2020	2021	Methodology for 2021 Prediction and Source
Washington Coast								
Willapa Bay Fall	Natural	3.3	4.2	3.8	4.3	2.9	3.9	Sibling relationships from recent year returns.
	Hatchery	36.2	34.3	40.3	23.6	28.3	30.5	Relationships between brood year survival and number of spawners.
Grays Harbor Fall	Natural	--	--	16.4	18.0	15.0	15.5	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	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	
Quinault Fall	Natural	5.5	5.9	5.2	5.3	4.2	6.0	Combination of geometric mean returns-per-spawner and geometric mean of sibling return-per-spawner ratios applied to spawners.
	Hatchery	5.3	4.4	3.1	2.7	4.5	4.9	Combination of geometric mean returns-per-smolt and geometric mean of sibling return-per-smolt ratios applied to smolt releases.
Queets Spring/Sum	Natural	0.5	0.5	0.5	0.6	0.6	0.6	Recent 5 year average terminal return.
Queets Fall	Natural	4.9	3.7	3.3	3.4	4.1	4.3	Natural: Combination of geometric mean of recent year returns and log
	Hatchery	1.7	0.9	0.6	0.8	0.7	0.6	linear sibling regressions of returns per spawner. Hatchery: Recent year smolt return rates applied to smolt releases.
Hoh Spring/Summer	Natural	0.9	1.0	1.1	1.0	0.8	1.0	Recent 3 year mean adjusted by previous performance.
Hoh Fall	Natural	1.8	2.7	2.6	2.5	2.6	2.6	Recent 3 year average recruit per spawner.
Quillayute Spring	Hatchery	1.8	2.2	2.1	2.1	2.4	2.6	Spring: Recent 5 year mean for all ages.
Quillayute Sum/Fall	Natural	7.5	7.6	8.0	7.9	9.8	9.6	Summer: Recent 5 year mean for all ages. Fall: Recent 5 year average of adjusted and unadjusted mean for all ages.
Hoko ^{cf}	Natural	2.9	1.5	1.5	2.8	2.6	1.3	Escapement without fishing, includes supplemental. Sibling regressions using data from return years 1989-2019.
North Coast Totals								
Spring/Summer	Natural	1.4	1.5	1.6	1.7	1.4	1.5	
Fall	Natural	19.7	19.9	19.1	19.2	20.6	22.5	
Spring/Summer	Hatchery	1.8	2.2	2.1	2.1	2.4	2.6	
Fall	Hatchery	7.0	5.3	3.7	3.5	5.2	5.5	

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

Production Source and Stock or Stock Group		2016	2017	2018	2019	2020	2021	Methodology for 2021 Prediction and Source
Puget Sound summer/fall^{d/}								
Nooksack/Samish	Hatchery	27.9	21.2	24.6	21.3	18.2	18.9	Three year average return rate.
East Sound Bay	Hatchery	0.7	0.8	0.7	0.3	0.3	0.6	Three year average return rate.
Skagit	Natural	15.1	15.8	13.3	13.6	12.9	10.5	Natural: Hierarchical Bayesian model to estimate the spaw ner-recruit dynamics. Hatchery: Recent 2-year average terminal smolt to adult return rate to estimate ages 2 -5.
	Hatchery	0.4	0.4	0.3	0.3	0.5	0.5	
Stillaguamish ^{e/}	Natural	0.5	1.5	1.6	0.9	0.9	0.9	Natural plus hatchery terminal run. Multiple regression environmental model (EMPAR).
Snohomish ^{e/}	Natural	3.3	3.4	3.5	3.2	3.0	2.9	Natural fingerling: Multiple regression environmental model (EMPAR). Natural yearling: Combination of naïve models and sibling regressions.
	Hatchery	5.0	4.8	6.5	7.0	6.8	6.1	Hatchery: Recent 3-year geomean of total return broken out into returns from fingerling and yearling releases and age at return.
Tulalip ^{e/}	Hatchery	1.4	5.3	7.5	12.5	6.0	5.8	Multiple regression environmental model (EMPAR).
South Puget Sound	Natural	4.5	4.7	4.8	8.4	5.8	7.0	Natural: Lake Washington, 3 year median recruits per spaw ner. Green, 3 year geometric mean return rates. Puyallup, climate relationship for age 3, 5 year average return per spaw ner for ages 4-5. Nisqually, average smolt to adult return for ages 3 and 5, sibling relationship for age 4. Hatchery: Variety of recent year average return rates.
	Hatchery	43.1	80.4	123.6	99.9	100.7	78.8	
Hood Canal	Natural	2.3	2.5	3.9	1.2	4.6	5.7	Includes hatchery strays to spaw ning grounds in Skokomish River. Proportioned using Hood Canal terminal run reconstruction-based relative contribution of the individual management units for 2016-2020 return years. Area 12B returns derived by applying an average proportion of natural origin recruits returning to area 12B for 2017-2020.
	Hatchery	42.7	48.3	57.6	66.0	67.6	64.1	
Strait of Juan de Fuca Including Dungeness spring run	Natural	3.7	3.1	6.0	8.3	5.0	5.5	Natural and hatchery. Dungeness and Elw ha hatchery estimated by mean return rates times average releases. Dungeness wild estimated by smolts times mean return rate. Elw ha wild estimated using 11 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 spaw ning escapement w ithout fishing.

d/ Unless other wise noted, Puget Sounds forecasts are in units of terminal run size.

e/ Includes a mixture of runsize types including escapement w ithout fishing and terminal run. 2021 values are terminal runsize.

2021 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		2016	2017	2018	2019	2020	2021	Methodology for 2021 Prediction and Source
OPI Area Total Abundance (California, Oregon Coasts, and Columbia River)		549.2	496.2	349.0	1,009.6	268.7	1,732.9	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	396.5	394.3	294.1	933.5	185.7	1607.9	OPIH: Columbia River jacks adjusted for delayed smolt releases and total OPI jacks regressed on 1970-2020 adults. Columbia/Coastal proportions based on jacks; Columbia early/late proportions based on jacks; Coastal N/S proportions based on smolts.
Columbia River Early		153.7	231.7	164.7	545.0	130.7	1014.0	
Columbia River Late		226.9	154.6	121.5	360.6	50.3	576.0	
Coastal N. of Cape Blanco		5.5	3.5	3.3	12.0	2.4	6.4	
Coastal S. of Cape Blanco		10.4	4.5	4.6	15.9	2.3	11.5	
Lower Columbia River	Natural	40.0	30.1	21.9	36.9	24.8	39.2	Oregon: recent two year average return; Washington: natural smolt production multiplied by 2018 brood marine survival rate. Abundance is subset of early/late hatchery abundance above.
Oregon Coast (OCN)	Natural	152.7	101.9	54.9	76.1	83.0	125.0	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	39.5	36.7	20.6	63.4	17.9	19.0	Washington Coast stocks: A variety of methods were used for 2021, primarily based on smolt production and survival. See text in Chapter III for details.
	Hatchery	28.1	55.0	44.5	94.0	51.8	61.6	
Grays Harbor	Natural	35.7	50.0	42.4	71.5	50.0	44.8	
	Hatchery	22.9	36.4	51.4	64.3	42.3	31.7	
Quinault	Natural	17.1	26.3	25.4	13.9	17.5	15.0	
	Hatchery	19.8	29.4	29.6	26.9	27.0	24.6	
Queets	Natural	3.5	6.5	7.0	11.1	7.8	3.9	
	Hatchery	4.5	13.7	10.8	13.2	10.9	11.8	
Hoh	Natural	2.1	6.2	5.8	7.0	4.2	3.0	

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

Production Source and Stock or Stock Group		2016	2017	2018	2019	2020	2021	Methodology for 2021 Prediction and Source	
Quillayute Fall	Natural	4.5	15.8	10.6	14.7	9.2	7.5	For all Washington Coast stocks: A variety of methods were used for 2021, primarily based on smolt production and survival. See text in Chapter III for details.	
	Hatchery	6.4	17.6	16.5	17.0	13.0	15.1		
Quillayute Summer	Natural	0.3	1.5	2.7	1.2	0.8	0.3		
	Hatchery	1.4	3.4	3.3	3.4	3.4	3.4		
North Coast Independent Tributaries	Natural	1.9	6.5	4.1	8.1	5.1	4.7		
	Hatchery	2.5	0.2	7.9	12.5	1.3	0.1		
<i>WA Coast Total</i>	<i>Natural</i>	<i>104.6</i>	<i>149.5</i>	<i>118.7</i>	<i>191.0</i>	<i>112.4</i>	<i>98.4</i>		
	<i>Hatchery</i>	<i>85.6</i>	<i>155.6</i>	<i>164.1</i>	<i>231.3</i>	<i>149.6</i>	<i>148.2</i>		
Puget Sound									For all Puget Sound stocks: A variety of methods were used for 2021, 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.
Strait of Juan de Fuca	Natural	4.4	13.1	7.2	8.8	7.5	6.7		
	Hatchery	3.9	15.4	10.6	16.8	20.6	12.5		
Nooksack-Samish	Natural	9.0	13.2	20.6	25.1	15.4	35.3		
	Hatchery	28.8	45.6	61.3	59.8	42.5	54.6		
Skagit	Natural	8.9	11.2	59.2	57.9	31.0	58.4		
	Hatchery	4.9	7.6	13.1	9.9	18.2	22.0		
Stillaguamish	Natural	2.8	7.6	19.0	23.8	19.5	26.8		
	Hatchery	0.0	1.5	0.0	2.2	2.3	4.0		
Snohomish	Natural	20.6	107.3	65.9	62.6	39.0	60.0		
	Hatchery	16.7	62.0	38.3	43.7	26.6	29.9		
South Sound	Natural	9.9	20.2	15.0	30.4	7.3	27.5		
	Hatchery	27.1	102.4	103.0	180.4	164.0	192.7		
Hood Canal	Natural	35.3	115.6	59.5	40.1	35.0	28.8		
	Hatchery	83.5	74.9	84.5	87.9	72.2	55.7		
<i>Puget Sound Total</i>	<i>Natural</i>	<i>91.0</i>	<i>288.3</i>	<i>246.4</i>	<i>248.8</i>	<i>154.6</i>	<i>243.5</i>		
	<i>Hatchery</i>	<i>165.0</i>	<i>309.3</i>	<i>310.8</i>	<i>400.7</i>	<i>346.3</i>	<i>371.4</i>		

2021 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**. 2021 spawning escapement and exploitation rate estimates are based on preliminary 2021 preseason abundance forecasts and 2020 Council regulations.

	Estimated Adult Spawning Escapement										Total Exploitation Rate						
	2016	2017	2018	2019	2020 ^{a/}	Forecast 2021 ^{b/}	3-yr Geo Mean	MSST	S _{MSY}		2016	2017	2018	2019	2020 ^{a/}	2021 ^{b/}	MFMT
Chinook																	
Sacramento Fall	89,699	44,329	105,466	163,767	137,907	123,126	140,622	91,500	122,000		0.56	0.68	0.52	0.68	0.61	0.55	0.78
Klamath River Fall	13,937	19,904	52,352	20,022	26,190	30,388	25,164	30,525	40,700		0.37	0.10	0.32	0.43	0.30	0.28	0.71
Southern Oregon ^{c/}	27,278	91,977	39,507	20,076	30,497	NA	28,920	20,500	34,992		NA	NA	NA	NA	NA	NA	0.54
Central and Northern OR ^{d/}	118	114	92	65	135	NA	93	30 fish/mi	60 fish/mi		0.47	0.44	0.65	NA	NA	NA	0.78
Upper River Bright - Fall ^{d/}	151,373	96,096	58,540	77,880	98,401	104,487	92,860	19,182	39,625		0.47	0.42	0.33	NA	NA	NA	0.86
Upper River - Summer ^{d/}	79,253	56,265	38,816	41,090	70,654	56,175	54,635	6,072	12,143		0.55	0.44	0.52	NA	NA	NA	0.75
Willapa Bay - Fall ^{e/}	1,888	3,078	2,853	2,894	NA	NA	2,940	1,696	3,393		0.62	0.55	0.65	NA	NA	NA	0.78
Grays Harbor Fall ^{e/}	11,248	17,145	20,741	14,880	NA	NA	17,426	5,694	13,326		0.62	0.55	0.65	NA	NA	NA	0.78
Grays Harbor Spring	926	1,384	493	983	2,828	NA	1,111	700	1,400		NA	NA	NA	NA	NA	NA	0.78
Queets - Fall ^{d/}	3,035	2,822	2,207	2,663	NA	NA	2,550	1,250	2,500		0.62	0.55	0.65	NA	NA	NA	0.87
Queets - Sp/Su	704	825	484	322	NA	NA	505	350	700		NA	NA	NA	NA	NA	NA	0.78
Hoh - Fall ^{e/}	2,831	1,808	2,478	1,552	NA	NA	1,909	600	1,200		0.62	0.55	0.65	NA	NA	NA	0.90
Hoh Sp/Su	1,144	1,364	793	766	NA	NA	939	450	900		NA	NA	NA	NA	NA	NA	0.78
Quillayute - Fall ^{e/}	3,654	3,604	3,937	7,765	8,202	NA	6,306	1,500	3,000		0.62	0.55	0.65	NA	NA	NA	0.87
Quillayute - Sp/Su	871	1,097	990	1,442	635	NA	968	600	1,200		NA	NA	NA	NA	NA	NA	0.78
Hoko - Su/Fa ^{d/}	1,324	1,188	2,179	1,815	1,298	NA	1,725	425	850		0.28	0.26	0.53	NA	NA	NA	0.78
Coho																	
Willapa Bay ^{f/}	30,667	11,379	17,228	15,115	NA	26,175	18,960	8,600	17,200		0.38	0.34	0.35	0.39	NA	0.29	0.74
Grays Harbor	38,595	26,907	49,622	30,468	NA	31,391	36,206	18,320	24,426		0.11	0.32	0.22	0.40	NA	0.30	0.65
Queets	5,156	5,232	2,631	1,700	NA	3,070	2,395	4,350	5,800		0.15	0.23	0.23	0.57	NA	0.22	0.65
Hoh	5,009	4,478	2,463	2,445	NA	1,650	2,150	1,890	2,520		0.08	0.43	0.34	0.57	NA	0.45	0.65
Quillayute Fall	9,630	7,474	6,091	6,852	7,096	6,048	6,650	4,725	6,300		0.18	0.42	0.30	0.37	NA	0.20	0.59
Juan de Fuca	8,435	5,530	5,470	4,625	NA	6,193	5,391	7,000	11,000		0.03	0.05	0.08	0.12	NA	0.07	0.60
Hood Canal	24,313	23,871	7,512	7,884	NA	17,346	10,090	10,750	14,350		0.40	0.35	0.57	0.46	NA	0.40	0.65
Skagit	35,822	20,184	19,047	14,246	NA	41,954	22,496	14,875	25,000		0.20	0.09	0.49	0.48	NA	0.29	0.60
Stillaguamish	13,048	6,099	23,937	12,887	NA	20,226	18,410	6,100	10,000		0.16	0.12	0.22	0.20	NA	0.25	0.50
Snohomish	44,141	18,195	58,135	40,314	NA	48,331	48,385	31,000	50,000		0.18	0.21	0.25	0.17	NA	0.20	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/ CWT based exploitation rates from PSC-CTC 2020 Exploitation Rate Analysis and Model Calibration.

e/ Queets River fall Chinook CWT exploitation rates used as a proxy. Exploitation rates in the terminal fisheries will differ from those calculated for Queets fall CWTs.

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

2021 Preseason I Report: TABLE V-5. Postseason S_{ACL} , S_{OFL} , and spawner escapement estimates for Sacramento River fall Chinook (SRFC), Klamath River fall Chinook (KRFC) and Willapa Bay coho. For the current year, S_{ACL} and S_{OFL} are preseason values. Current year spawner escapements are preseason values based on current abundance forecasts and the previous year fishing regulations.

Year	SRFC			KRFC			Willapa Bay Coho		
	$S_{ACL}^{a/}$	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	24,472	22,178	52,352	7,903	6,849	17,228
2019	152,147	111,574	163,767	11,309	10,249	20,022	7,458	6,464	15,115
2020	105,578	77,423	137,907	11,909	10,792	26,190	NA	NA	NA
2021	81,287	59,611	123,126	13,471	12,208	30,388	11,072	9,596	26,175

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

b/ Hatchery and natural area adult spaw ners.

c/ Natural area adult spaw ners.

2021 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 2020 Council-adopted regulations to 2020 and 2021 ocean abundance forecasts.^{a/}

Stock	Ocean Escapement and ER Estimates Under 2020 Regulations ^{b/}				
	2020 Abundance Forecasts		2021 Abundance Forecasts		2021 FMP Conservation Objective ^{c/}
	Ocean Escapement	Exploitation Rate	Ocean Escapement	Exploitation Rate	
Natural Coho Stocks					
Skagit	29.0	31.1%	55.7	28.5%	Exploitation Rate $\leq 35.0\%$ ^{d/}
Stillaguamish	18.6	17.8%	26.0	24.8%	Exploitation Rate $\leq 50.0\%$ ^{d/}
Snohomish	37.3	12.6%	58.1	19.6%	Exploitation Rate $\leq 40.0\%$ ^{d/}
Hood Canal	32.6	42.2%	27.4	40.0%	Exploitation Rate $\leq 45.0\%$ ^{d/}
Strait of Juan de Fuca	7.1	9.0%	6.4	7.5%	Exploitation Rate $\leq 20.0\%$ ^{d/}
Quillayute Fall	8.7	21.8%	7.3	20.0%	6.3 - 15.8 Spaw ners
Hoh	3.6	48.4%	2.8	45.4%	2.0 - 5.0 Spaw ners
Queets	6.7	26.6%	3.6	22.0%	5.8 - 14.5 Spaw ners
Grays Harbor	47.1	32.1%	43.4	30.1%	35.4 Spaw ners
LCN	21.4	16.9%	37.8	6.3%	Exploitation Rate $\leq 30.0\%$ ^{e/}
OCN	73.7	11.6%	119.9	4.2%	Exploitation Rate $\leq 15.0\%$ ^{e/}
R/K	1.9	3.1%	9.5	1.2%	Exploitation Rate $\leq 13.0\%$ ^{e/}
Hatchery Coho Stocks					
Columbia Early	86.7	45.5%	959.0	19.2%	6.2 Hatchery Escapement
Columbia Late	35.4	42.4%	533.8	30.5%	14.2 Hatchery Escapement

a/ Quota levels include harvest and hooking mortality estimates used in planning the Council's 2020 ocean fisheries and a coho

b/ 2020 preseason regulations with the following coho quotas: U.S. Canada Border to Cape Falcon: Treaty Indian troll-16,500; non-Indian troll-2,000 selective; recreational-26,500 selective; Cape Falcon to OR/CA border: recreational-22,000 selective and 3,000 non-selective; troll-none. 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 spaw ner 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. Spaw ning 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 2021 ESA consultation standard.

Excerpt from the 2020 Review (pages 4-5)

COASTWIDE OCEAN FISHING SUMMARY

Aspects of ocean salmon fisheries, and the monitoring of these fisheries, were affected by the COVID-19 pandemic. An overview of these effects, by state, are summarized below.

In Washington, due to concerns over the spread of COVID-19 the Makah and Quileute Indian reservations, which include the Washington ocean access ports of Neah Bay and La Push, were closed to public access for the entirety of the 2020 ocean salmon fisheries. Limited local commercial troll landings continued in the port of La Push, but no commercial landings were allowed into the port of Neah Bay, and no recreational fishing occurred from either port. The central and southern Washington coast ports of Westport and Ilwaco remained open to public access throughout the salmon fisheries. To provide landing access to the commercial fleet on the northern Washington coast, early in-season action opened the area between the Sekiu River and Port Angeles to troll landing and delivery; this area includes the ports of Sekiu and Port Angeles. Recreational access to ocean areas on the northern Washington coast mainly originated from the port of Sekiu. The COVID-19 pandemic had little overall impact on fishery sampling. Safety protocols such as mandatory masks, hand and equipment sanitizing, and physical distancing were implemented to protect field staff and the public. Sampling commercial and recreational fisheries for effort and catch data and coded wire tags proceeded as usual in all major Washington ports open to landings with only a slight reduction in sampling rates compared with 2019. Onboard observation trips (used to supplement on-water voluntary trip reports and dockside release reports in calculating total encounters in mark-selective fisheries) were halted in 2020. Biological data collection such as Chinook scales and lengths was reduced, and collection of DNA samples was halted. In-season catch estimates and fishery management were unaffected, as was post-season data expansion.

In addition, the COVID-19 pandemic delayed some tribal fishery openings and resulted in reduced tribal troll harvest. Specifically, the Makah Tribe opened their treaty troll fishery on July 24, instead of May 1. There was also no effort on the spring Chinook-directed fishery and minimal effort on the summer fishery—overall only 13% of the Chinook treaty quota was harvested.

For Oregon, the COVID-19 pandemic did not result in any significant limitations on the ability to effectively sample and manage salmon fisheries. However, there were some reductions in the collection of biological data such as length and weight.

The COVID-19 pandemic presented some challenges for fishery monitoring in California, as ocean salmon fisheries commenced before personal protective equipment was acquired and COVID-19-related field sampling protocols were developed and authorized by the California Department of Fish and Wildlife (CDFW). This resulted in a lapse for some data collection during the early part of the 2020 season, compared to data that would be collected following standard protocols. The extent to which field sampling activities did not occur in 2020 varied by fishery and month, as described below.

The commercial fishery was not sampled during May when the San Francisco and Monterey management areas were periodically open. Although field sampling did not occur, harvest data

for May are available via fish tickets which are mandatory for all commercial landings. Sampling commenced in June and continued through the end of the season.

Charter boats were not sampled during May, however very few charter boats were allowed to operate during that month due to local COVID-19 regulations, and consequently, relatively few trips occurred. Harvest and effort data for the limited trips that did occur can be obtained from logbooks. Beginning in June, salmon charters were sampled for the remainder of the season.

Private skiffs were not sampled during May or June, and no proxy exists for estimating catch and effort during those months. Thus, recreational fishery estimates for California during May and June are not included in this report (with the exception of charter boat estimates in Tables IV-10 and IV-11). Modified skiff sampling activities commenced in July and continued through the end of the season. Since field staff were not able to safely handle angler catch and maintain social distancing in the course of performing their duties, salmon head collection protocols were modified such that heads were only recovered from anglers who voluntarily provided them to CDFW staff. Angler cooperation varied by area, resulting in low sample rates for coded-wire tags in some ports.

The COVID-19 pandemic also affected angler participation in California's recreational ocean salmon fishery. To protect public safety, many launch ramps were closed and most charter boats were not allowed to offer trips when the fishery opened south of Horse Mountain on May 1. All launch ramps were open by the end of May, but most charter boats could not begin taking passengers until sometime in June. Additionally, many local jurisdictions required charter boats to reduce their passenger capacity for the entirety of the season.

Excerpts from the 2021 Preseason I Report (page 3):

STT RECOMMENDATIONS

In the 2020 Preseason Report I document (PFMC 2020a), the STT included a concern regarding the potential over-representation of the Columbia River summer Chinook stock within the Chinook Fishery Regulation Assessment Model (FRAM), as had been identified during the 2019 salmon Methodology Review process. In the absence of a formal resolution to this issue in the form of an updated Chinook FRAM base period calibration, an interim resolution was implemented during the 2020 preseason planning process. As of the writing of this report, it is still unclear whether a new Chinook FRAM base period calibration that addresses this issue will be implemented. If the 2021 preseason planning process proceeds without the use of this new base period calibration, the STT recommends using the same interim resolution in 2021 that was implemented during the 2020 planning process.

TECHNICAL CHALLENGES ARISING FROM THE COVID-19 PANDEMIC

As described in the *Review of 2020 Ocean Salmon Fisheries* (PFMC, 2021), the COVID-19 pandemic presented some challenges for fishery monitoring in California, as ocean salmon fisheries commenced before personal protective equipment was acquired and COVID-19-related field sampling protocols were developed and authorized by the California Department of Fish and Wildlife (CDFW). This resulted in a lapse for some data collection during the early part of the 2020 season, compared to data that would be collected following standard protocols. While most of the season was sampled adequately, estimates of recreational catch and effort during May and June utilizing standard methodology are currently unavailable. However, it was necessary to develop alternative harvest estimates for these strata that are lacking empirical data in order to

update cohort reconstructions, develop postseason estimates of abundance and harvest, and determine if overfishing occurred. To accomplish this, recreational harvest during May was estimated using the preseason model-predicted harvest, scaled by the postseason/preseason ratio of harvest during the first month for which complete sampling occurred (i.e., July). Recreational harvest during June was estimated in a different manner given that the fishery was partially sampled in this month; charter boats were sampled, but private skiffs were not. The ratio of total recreational harvest to charter boat harvest during June was estimated for each management area using data from the ten prior seasons and then applied to the June 2020 estimate of charter boat harvest to estimate total recreational harvest for this month.

Coded-wire tags (CWTs), which inform harvest stock composition estimates, were not collected during May from both the recreational and commercial fisheries and during June in the Fort Bragg and California Klamath Management Zone (KMZ) recreational fisheries. To estimate the hatchery contribution and stock composition of the harvest during strata lacking CWT recovery data, recoveries and the associated catch/sample data from June (or July for Fort Bragg and KMZ recreational fisheries) were used to impute CWT recoveries during May and, if necessary, June. In other words, the CWT composition of catch from the sampled, surrogate period was applied to catch from the unsampled period to generate expected recoveries, with minor modifications made to account for the presence of stocks and ages in mid-season surrogate samples that would not typically be observed in May.