

SALMON TECHNICAL TEAM REPORT 1

*Excerpts from Review of 2018 Ocean Salmon Fisheries and
2019 Preseason Report I*

March 8, 2019

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 experienced overfishing if the total annual exploitation rate exceeds the maximum fishing mortality threshold (MFMT).

Chinook Stock	Spawning Escapement									Exploitation rates						
	2013	2014	2015	2016	2017	2018	3-yr Geo		S _{MSY}	2013	2014	2015	2016	2017	2018	MFMT
							Mean	MSST								
Sacramento Fall	406,846	212,468	114,085	89,699	42,714	105,739	73,994	91,500	122,000	0.53	0.61	0.56	0.56	0.68	NA	0.78
Klamath River Fall	59,156	95,104	28,112	13,937	19,904	53,624	24,594	30,525	40,700	0.64	0.36	0.59	0.37	0.09	NA	0.71
Southern Oregon	81,655	53,546	30,462	27,278	91,977	39,497	46,276	20,500	34,992	NA	NA	NA	NA	NA	NA	0.78
Central and Northern OR ^{a/}	189	157	247	118	114	92	107	30 fish/mile	150k-200k	0.46	0.43	0.42	0.47	NA	NA	0.78
Upper River Bright - Fall ^{a/}	305,445	233,934	323,276	151,373	97,789	30,105	76,383	19,182	39,625	0.52	0.53	0.40	0.51	NA	NA	0.86
Upper River - Summer ^{a/}	68,380	77,982	88,691	79,253	56,265	38,816	55,730	6,072	12,143	0.59	0.69	0.67	0.63	NA	NA	0.75
Willapa Bay - Fall ^{b/}	1,904	2,075	2,824	1,887	3,078	NA	2,541	1,696	3,393	0.71	0.57	0.47	0.59	NA	NA	0.78
Grays Harbor Fall ^{b/}	12,503	11,893	17,305	11,248	17,145	NA	13,887	5,694	13,326	0.71	0.57	0.47	0.59	NA	NA	0.78
Grays Harbor Spring	2,459	1,583	1,841	926	1,384	493	858	546	1,400	NA	NA	NA	NA	NA	NA	0.78
Queets - Fall ^{a/}	2,582	3,820	5,313	2,915	2,702	NA	3,472	1,250	2,500	0.71	0.57	0.47	0.59	NA	NA	0.87
Queets - Sp/Su	520	377	532	704	NA	NA	521	350	700	NA	NA	NA	NA	NA	NA	0.78
Hoh - Fall ^{b/}	1,269	1,933	1,795	2,831	1,808	NA	2,094	600	1,200	0.71	0.57	0.47	0.59	NA	NA	0.90
Hoh Sp/Su	750	744	1,070	1,144	1,364	NA	1,186	450	900	NA	NA	NA	NA	NA	NA	0.78
Quillayute - Fall ^{b/}	3,901	2,782	3,440	3,654	3,604	4,031	3,758	1,500	3,000	0.71	0.57	0.47	0.59	NA	NA	0.87
Quillayute - Sp/Su	957	608	794	900	1,097	1,232	1,067	600	1,200	NA	NA	NA	NA	NA	NA	0.78
Hoko -Su/Fa ^{a/}	1,406	1,760	2,877	1,324	1,188	2,179	1,508	425	850	0.23	0.42	0.30	0.30	NA	NA	0.78

a/ CWT based exploitation rates from PSC-CTC 2018 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.

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	Spawning Escapement									Exploitation Rate						
	2013	2014	2015	2016	2017	2018	3-yr Geo		S _{MSY}	2013	2014	2015	2016	2017	2018	MFMT
	Mean	MSST	2013	2014	2015	2016	2017	2018								
Willapa Bay	22,834	47,154	10,790	25,290	9,091	NA	13,537	8,600	17,200	0.39	0.51	0.44	0.38	NA	NA	0.74
Grays Harbor	56,785	105,039	21,278	38,595	26,907	NA	28,061	18,320	24,426	0.45	0.45	0.49	0.11	NA	NA	0.65
Queets	5,684	7,558	2,028	5,156	5,232	NA	3,796	4,350	5,800	0.43	0.41	0.26	0.15	NA	NA	0.65
Hoh	2,899	4,565	1,794	5,009	4,478	NA	3,427	1,890	2,520	0.70	0.52	0.39	0.07	NA	NA	0.65
Quillayute Fall	7,072	7,425	2,571	9,630	7,474	5,157	7,187	4,725	6,300	0.56	0.58	0.48	0.18	NA	NA	0.59
Juan de Fuca	8,458	11,488	3,859	8,435	5,530	NA	5,646	7,000	11,000	0.14	0.17	0.18	0.03	NA	NA	0.60
Hood Canal	16,064	26,787	26,926	24,313	22,519	NA	24,520	10,750	14,350	0.58	0.68	0.59	0.40	NA	NA	0.65
Skagit	85,751	24,820	5,794	35,822	20,184	NA	16,121	14,875	25,000	0.43	0.52	0.63	0.20	NA	NA	0.60
Stillaguamish	60,387	35,829	2,914	13,048	6,099	NA	6,144	6,100	10,000	0.23	0.27	0.48	0.16	NA	NA	0.50
Snohomish	125,870	46,244	12,804	44,141	18,195	NA	21,746	31,000	50,000	0.28	0.31	0.55	0.18	NA	NA	0.60

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

Production Source and Stock or Stock Group	Preseason Abundance Forecasts						Methodology for 2019 Prediction and Source
	2014	2015	2016	2017	2018	2019	
Sacramento River							
Fall (Sacramento Index)	634.7	652.0	299.6	230.7	229.4	379.6	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	Stochastic life cycle model applied to natural- and hatchery-origin production. STT.
Klamath River (Ocean Abundance)							
Fall	299.3	423.8	142.2	54.2	359.2	274.2	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)							
Upriver Spring ^{a/}	227.0	232.5	188.8	160.4	166.7	99.3	Log-linear sibling regressions of cohort returns in previous run years. Columbia River TAC.
Willamette Spring	58.7	55.4	68.7	38.1	53.8	40.2	Age-specific linear regressions of cohort returns in previous run years. ODFW. Forecast includes adult fish only.
Sandy Spring	5.5	5.5	NA	3.6	5.3	5.5	Recent 3-year average. ODFW.
Cowlitz Spring	7.8	11.2	25.1	17.1	5.2	1.3	Age-specific linear regressions of cohort returns in previous run years. WDFW.
Kalama Spring	0.5	1.9	4.9	3.1	1.5	1.4	Age-specific linear regressions of cohort returns in previous run years. WDFW.
Lewis Spring	1.1	1.1	1.0	0.7	3.7	1.5	Age-specific linear regressions of cohort returns in previous run years. WDFW.
Upriver Summer ^{b/}	67.5	73.0	93.3	63.1	67.3	35.9	Log-linear sibling regressions or average return (4-ocean fish). Columbia River TAC subgroup.
URB Fall	973.3	500.3	589.0	260.0	200.1	158.4	Columbia River Fall Chinook: Age-specific average cohort ratios or sibling regressions. Columbia River TAC subgroup and WDFW.
SCH Fall	115.1	160.5	89.6	158.4	50.1	46.0	
LRW Fall	34.2	18.9	22.2	12.5	7.6	13.7	
LRH Fall	110.0	94.9	133.7	92.4	62.4	54.5	
MCB Fall	360.1	113.3	101.0	45.6	36.4	56.7	

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

Production Source and Stock or Stock Group		Preseason Abundance Forecasts						Methodology for 2019 Prediction and Source
		2014	2015	2016	2017	2018	2019	
Washington Coast								
Willapa Bay Fall	Natural	2.9	3.8	3.3	4.2	3.8	4.3	Return per spaw ners applied to 3-6 year olds (brood years 2013-16) adjusted by brood year performance.
	Hatchery	29.5	31.0	36.2	34.3	40.3	23.8	
Grays Harbor Fall	Natural	--	--	--	--	16.4	NA	Past year based on a 4-year average recruits for age-3, and recruits per spaw ner adjusted by brood performance for age-4, 5, 6.
	Hatchery	--	--	--	--	4.8	NA	Past year based on a 10-year average recruits per spaw n for age 3 and log linear regressions for age-4 on Age-2 and 3; age-5 on age-2, 3, and 4 for all stocks; and age- 6 on age-5.
Quinault Spring/Summer	Natural	NA	NA	NA	NA	NA	NA	Hatchery: Past year based on ten-year average recruits per spaw ner for age-3; log linear regressions for age-4 on age-2 and 3; age-5 on age-2, 3, 4 for all stocks; and age-6 on age-5.
	Hatchery	--	--	--	--	4.8	NA	
Quinault Fall	Natural	6.0	8.1	5.5	5.9	5.2	NA	
	Hatchery	10.3	4.0	5.3	4.4	3.1	NA	
Queets Spring/Sum	Natural	0.5	0.4	0.5	0.5	0.5	0.6	Based on recent 5 year average.
Queets Fall	Natural	3.6	4.3	4.9	3.7	3.3	NA	Past year based on recent year mean and cohort relationship.
	Hatchery	0.9	1.5	1.7	0.9	0.6	NA	Past year based on returns per smolt release.
Hoh Spring/Summer	Natural	0.9	0.8	0.9	1.0	1.1	1.0	Recent 3 year mean adjusted by previous performance.
Hoh Fall	Natural	2.5	2.6	1.8	2.7	2.6	2.5	Recent 5 year mean adjusted by previous performance, age 3 & 4 adjusted by regressions.
Quillayute Spring	Hatchery	2.0	1.7	1.8	2.2	2.1	2.1	Spring: Recent 5 year mean adjusted by previous performance.
Quillayute Sum/Fall	Natural	7.6	8.5	7.5	7.6	8.0	7.9	Summer: Recent 3 year mean for all ages. Fall: Recent 5 year means; adjusted for previous 5 year forecast performance.
Hoko ^{cl}	Natural	2.7	3.3	2.9	1.5	1.5	2.8	Includes supplemental. 2018 recruits for age-3 is recent 5-year average return, age 4-6 is sibling regression.
North Coast Totals								
Spring/Summer	Natural	1.4	1.2	1.4	1.5	1.6	1.7	
Fall	Natural	19.7	23.5	19.7	19.9	19.1	NA	
Spring/Summer	Hatchery	2.0	1.7	1.8	2.2	2.1	2.1	
Fall	Hatchery	11.2	5.5	7.0	5.3	3.7	NA	

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

Production Source and Stock or Stock Group		Preseason Abundance Forecasts						Methodology for 2019 Prediction and Source
		2014	2015	2016	2017	2018	2019	
Puget Sound summer/fall^{d/}								
Nooksack/Samish	Hatchery	43.9	38.6	27.9	21.2	24.6	21.3	Three year average return rate.
East Sound Bay	Hatchery	1.2	1.2	0.7	0.8	0.7	0.3	Three year average return rate.
Skagit ^{e/}	Natural	18.0	11.8	15.1	15.8	13.3	13.6	<u>Natural</u> : Hierarchical Bayesian model to estimate the spaw ner-recruit dynamics. <u>Hatchery</u> : Recent 4-year average terminal smolt to adult return rate to estimate ages 2 -5.
	Hatchery	0.3	0.6	0.4	0.4	0.3	0.3	
Stillaguamish ^{f/}	Natural	1.6	0.5	0.5	1.5	1.6	0.9	Natural plus Hatchery. Multiple regression environmental model (EMPAR).
Snohomish ^{f/}	Natural	5.3	4.2	3.3	3.4	3.5	3.7	Escapement w ithout fishing. Multiple regression environmental model (EMPAR).
	Hatchery	5.4	3.3	5.0	4.8	6.5	7.2	Terminal Run (to 8-2), w ith ocean fishing, Recent 4-year geomean age at return rates applied to releases.
Tulalip ^{f/}	Hatchery	4.7	1.3	1.4	5.3	7.5	12.7	Three year geomean escapement w ithout fishing.
South Puget Sound	Natural	4.8	3.8	4.5	4.7	4.8	8.4	<u>Natural</u> : Puyallup R. average return per spaw ner applied to brood years contributing ages 3-5. For Nisqually, 5 year average age specific return/spaw ner. For Green, 3-year geometric return rates. <u>Hatchery</u> : Variety of recent year average return rates and sibling relationships.
	Hatchery	96.7	62.4	43.1	80.4	123.6	99.9	
Hood Canal ^{e/}	Natural	3.5	3.1	2.3	2.5	3.9	1.2	Natural fish based on the Hood Canal terminal run reconstruction-based relative contribution of the individual Hood Canal management units in the 2014-2018 return years.
	Hatchery	80.6	59	42.7	48.3	57.6	66.0	Brood 2015 fingerling lbs released from WDFW facilities in 2016, multiplied by the average of post-season estimated terminal area return rates for the last 5 years (2014-2018).
Strait of Juan de Fuca Including Dungeness spring run ^{e/}	Natural	3.8	4.9	3.7	3.1	6.0	8.3	Natural and hatchery. Dungeness and Elw ha hatchery estimated by recent return rates times average releases. Dungeness w ild estimated by smolts times average hatchery return rate. Elw ha w ild estimated using 9 year hatchery/w ild 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 otherw ise noted, forecasts are for Puget Sound run size (4B) available to U.S. net fisheries. Does not include fish caught in troll and recreational fisheries.

e/ Terminal run forecast.

f/ Includes a mixture of runsize types including escapement w ithout fishing and terminal run. 2019 values are escapement w /out fishing for Tulalip and Snohomish natural, and terminal runsize for Stillaguamish and Snohomish hatchery.

TABLE I-2. Preseason ocean abundance adult coho salmon stock forecasts in thousands of fish. (Page 1 of 2)

Production Source and Stock or Stock Group		Preseason Ocean Abundance Forecasts						Methodology for 2019 Prediction and Source
		2014	2015	2016	2017	2018	2019	
OPI Area Total Abundance (California, Oregon Coasts, and Columbia River)		1,213.7	1,015.0	549.2	496.2	349.0	1,009.6	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	983.1	808.4	396.5	394.3	294.1	933.5	OPIH: Columbia River jacks adjusted for delayed smolt releases and total OPI jacks regressed on 1970-2018 adults. Columbia/Coastal proportions based on jacks; Columbia early/late proportions based on jacks; Coastal N/S proportions based on smolts.
Columbia River Early		526.6	515.2	153.7	231.7	164.7	545.0	
Columbia River Late		437.5	261.8	226.9	154.6	121.5	360.6	
Coastal N. of Cape Blanco		4.8	6.9	5.5	3.5	3.3	12.0	
Coastal S. of Cape Blanco		14.2	24.4	10.4	4.5	4.6	15.9	
Low er Columbia River	Natural	33.4	35.9	40.0	30.1	21.9	36.9	Oregon: recent two year average return; Washington: natural smolt production multiplied by 2016 brood marine survival rate. Abundance is subset of early/late hatchery abundance above.
Oregon Coast (OCN)	Natural	230.6	206.6	152.7	101.9	54.9	76.1	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	58.9	42.9	39.5	36.7	20.6	63.4	Washington Coast stocks: A variety of methods were used for 2019, primarily based on smolt production and survival. See text in Chapter III for details.
	Hatchery	41.0	57.7	28.1	55.0	44.5	94.0	
Grays Harbor	Natural	108.8	142.6	35.7	50.0	42.4	71.5	
	Hatchery	65.4	46.6	22.9	36.4	51.4	64.3	
Quinault	Natural	25.0	44.2	17.1	26.3	25.4	13.9	
	Hatchery	24.7	24.9	19.8	29.4	29.6	26.9	
Queets	Natural	10.3	7.5	3.5	6.5	7.0	11.1	
	Hatchery	15.7	11.3	4.5	13.7	10.8	13.2	
Hoh	Natural	8.9	5.1	2.1	6.2	5.8	7.0	

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

Production Source and Stock or Stock Group		Preseason Ocean Abundance Forecasts						Methodology for 2019 Prediction and Source	
		2014	2015	2016	2017	2018	2019		
Quillayute Fall	Natural	18.4	10.5	4.5	15.8	10.6	14.7	For all Washington Coast stocks: A variety of methods were used for 2019, primarily based on smolt production and survival. See text in Chapter III for details.	
	Hatchery	12.6	8.0	6.4	17.6	16.5	17.0		
Quillayute Summer	Natural	2.0	1.2	0.3	1.5	2.7	1.2		
	Hatchery	3.2	2.2	1.4	3.4	3.3	3.4		
North Coast Independent Tributaries	Natural	15.2	11.7	1.9	6.5	4.1	8.1		
	Hatchery	11.6	11.9	2.5	0.2	7.9	12.5		
<i>WA Coast Total</i>	<i>Natural</i>	<i>247.5</i>	<i>265.6</i>	<i>104.6</i>	<i>149.5</i>	<i>118.7</i>	<i>191.0</i>		
	<i>Hatchery</i>	<i>174.2</i>	<i>162.6</i>	<i>85.6</i>	<i>155.6</i>	<i>164.1</i>	<i>231.3</i>		
Puget Sound									
Strait of Juan de Fuca	Natural	12.5	11.1	4.4	13.1	7.2	8.8		For all Puget Sound stocks: A variety of methods were used for 2019, 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	17.3	11.1	3.9	15.4	10.6	16.8		
Nooksack-Samish	Natural	20.8	28.1	9.0	13.2	20.6	25.1		
	Hatchery	61.7	50.8	28.8	45.6	61.3	59.8		
Skagit	Natural	112.4	121.4	8.9	11.2	59.2	57.9		
	Hatchery	15.8	19.5	4.9	7.6	13.1	9.9		
Stillaguamish	Natural	32.5	31.3	2.8	7.6	19.0	23.8		
	Hatchery	6.0	0.0	0.0	1.5	0.0	2.2		
Snohomish	Natural	150.0	151.5	20.6	107.3	65.9	62.6		
	Hatchery	78.2	53.9	16.7	62.0	38.3	43.7		
South Sound	Natural	62.8	63.0	9.9	20.2	15.0	30.4		
	Hatchery	150.7	180.2	27.1	102.4	103.0	180.4		
Hood Canal	Natural	82.8	61.5	35.3	115.6	59.5	40.1		
	Hatchery	47.6	108.4	83.5	74.9	84.5	87.9		
<i>Puget Sound Total</i>	<i>Natural</i>	<i>473.8</i>	<i>467.9</i>	<i>91.0</i>	<i>288.3</i>	<i>246.4</i>	<i>248.8</i>		
	<i>Hatchery</i>	<i>377.3</i>	<i>423.9</i>	<i>165.0</i>	<i>309.3</i>	<i>310.8</i>	<i>400.7</i>		

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**. 2019 spawning escapement and exploitation rate estimates are based on preliminary 2019 preseason abundance forecasts and 2018 Council regulations.

	Estimated Adult Spawning Escapement									Total Exploitation Rate						
	2014	2015	2016	2017	2018 ^{a/}	Forecast 2019 ^{b/}	3-yr Geo Mean	MSST	S _{MSY}	2014	2015	2016	2017	2018 ^{a/}	2019 ^{b/}	MFMT
Chinook																
Sacramento Fall	212,468	114,085	89,699	42,714	105,739	230,486	101,348	91,500	122,000	0.61	0.55	0.56	0.68	0.53	0.39	0.78
Klamath River Fall	95,104	28,112	13,937	19,904	53,624	58,729	39,724	30,525	40,700	0.36	0.59	0.37	0.10	0.28	0.33	0.71
Southern Oregon ^{c/}	53,546	30,462	27,278	91,977	39,497	NA	46,276	20,500	34,992	NA	NA	NA	NA	NA	NA	0.54
Central and Northern OR	157	247	118	114	92	NA	107	30 fish/mi	60 fish/mi	0.43	0.42	0.47	NA	NA	NA	0.78
Upper River Bright - Fall ^{d/}	233,934	323,276	151,373	97,789	58,540	62,215	70,884	19,182	39,625	0.53	0.40	0.51	NA	NA	NA	0.86
Upper River - Summer ^{d/}	77,982	88,691	79,253	56,265	38,816	33,084	41,651	6,072	12,143	0.69	0.67	0.63	NA	NA	NA	0.75
Willapa Bay - Fall ^{e/}	2,075	2,824	1,887	3,078	NA	NA	2,541	1,696	3,393	0.57	0.47	0.59	NA	NA	NA	0.78
Grays Harbor Fall ^{e/}	11,893	17,305	11,248	17,145	NA	NA	14,944	5,694	13,326	0.57	0.47	0.59	NA	NA	NA	0.78
Grays Harbor Spring	1,583	1,841	926	1,384	493	NA	858	700	1,400	NA	NA	NA	NA	NA	NA	0.78
Queets - Fall ^{d/}	3,820	5,313	2,915	2,702	NA	NA	3,472	1,250	2,500	0.57	0.47	0.59	NA	NA	NA	0.87
Queets - Sp/Su	377	532	704	NA	NA	NA	521	350	700	NA	NA	NA	NA	NA	NA	0.78
Hoh - Fall ^{e/}	1,933	1,795	2,831	1,808	NA	NA	2,094	600	1,200	0.57	0.47	0.59	NA	NA	NA	0.90
Hoh Sp/Su	744	1,070	1,144	1,364	NA	NA	1,186	450	900	NA	NA	NA	NA	NA	NA	0.78
Quillayute - Fall ^{e/}	2,782	3,440	3,654	3,604	4,031	NA	3,758	1,500	3,000	0.57	0.47	0.59	NA	NA	NA	0.87
Quillayute - Sp/Su	608	794	900	1,097	1,232	NA	1,067	600	1,200	NA	NA	NA	NA	NA	NA	0.78
Hoko -Su/Fa ^{d/}	1,760	2,877	1,324	1,188	2,179	NA	1,508	425	850	0.42	0.30	0.30	NA	NA	NA	0.78
Coho																
Willapa Bay	47,154	10,790	25,290	9,091	NA	50,124	22,587	8,600	17,200	0.51	0.44	0.38	0.33	NA	0.25	0.74
Grays Harbor	105,039	21,278	38,595	26,907	NA	57,788	39,151	18,320	24,426	0.45	0.49	0.12	0.32	NA	0.19	0.65
Queets	7,558	2,028	5,156	5,232	NA	9,331	6,314	4,350	5,800	0.41	0.26	0.15	0.23	NA	0.17	0.65
Hoh	4,565	1,794	5,009	4,478	NA	3,632	4,335	1,890	2,520	0.52	0.39	0.08	0.43	NA	0.48	0.65
Quillayute Fall	7,425	2,571	9,630	7,474	5,157	11,439	7,611	4,725	6,300	0.57	0.47	0.18	0.42	NA	0.22	0.59
Juan de Fuca	11,488	3,859	8,435	5,530	NA	8,314	7,292	7,000	11,000	0.17	0.18	0.03	0.06	NA	0.04	0.60
Hood Canal	26,787	26,926	24,313	22,519	NA	21,828	22,863	10,750	14,350	0.68	0.59	0.40	0.35	NA	0.46	0.65
Skagit	24,820	5,794	35,822	20,184	NA	40,551	30,836	14,875	25,000	0.52	0.63	0.20	0.09	NA	0.30	0.60
Stillaguamish	35,829	2,914	13,048	6,099	NA	16,420	10,933	6,100	10,000	0.27	0.48	0.16	0.12	NA	0.31	0.50
Snohomish	46,244	12,804	44,141	18,195	NA	42,477	32,433	31,000	50,000	0.31	0.55	0.18	0.21	NA	0.32	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 annual catch and escapement distribution from PSC-CTC 2013 Exploitation Rate Analysis.

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.

Table V-5. Postseason S_{ACL} , S_{OFL} , and spawner escapement estimates for Sacramento River fall Chinook (SRFC) and 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	188,405	138,164	285,429	70,946	64,295	121,543	--	--	--
2013	260,867	191,302	406,846	52,021	47,144	59,156	--	--	--
2014	165,358	121,262	212,468	47,673	43,204	95,104	--	--	--
2015	76,670	56,225	114,085	22,209	20,127	28,112	9,183	7,958	17,086
2016	61,595	45,170	89,699	7,066	6,403	13,937	14,780	12,810	30,667
2017	40,636	29,800	42,714	7,111	6,444	19,904	9,183	7,958	10,878
2018	67,156	49,248	105,739	23,794	21,563	53,624	NA	NA	NA
2019	113,890	83,519	230,486	28,126	25,489	58,729	27,553	23,879	71,734

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

b/ Hatchery and natural area adult spawners.

c/ Natural area adult spawners.

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 2018 Council-adopted Regulations to 2018 and 2019 abundance forecasts.^{a/}

Stock	Ocean Escapement and ER Estimates Under 2018 Regulations ^{b/}				
	2018 Abundance Forecasts		2019 Abundance Forecasts		2019 FMP Conservation Objective ^{c/}
	Ocean Escapement	Exploitation Rate	Ocean Escapement	Exploitation Rate	
Natural Coho Stocks					
Skagit	57.0	31.3%	56.2	30.3%	Exploitation Rate $\leq 35.0\%$ ^{d/}
Stillaguamish	18.5	34.5%	23.4	31.2%	Exploitation Rate $\leq 50.0\%$ ^{d/}
Snohomish	64.3	33.5%	61.5	32.3%	Exploitation Rate $\leq 40.0\%$ ^{d/}
Hood Canal	57.0	42.5%	38.8	45.7%	Exploitation Rate $\leq 45.0\%$ ^{d/}
Strait of Juan de Fuca	6.9	6.7%	8.6	5.7%	Exploitation Rate $\leq 20.0\%$ ^{d/}
Quillayute Fall	10.1	23.5%	14.3	22.4%	6.3 - 15.8 Spawners
Hoh	5.2	49.7%	6.5	48.0%	2.0 - 5.0 Spawners
Queets	6.1	19.6%	10.1	16.5%	5.8 - 14.5 Spawners
Grays Harbor	40.5	20.7%	69.4	19.4%	35.4 Spawners
LCN	19.1	16.2%	35.3	8.6%	Exploitation Rate $\leq 23.0\%$ ^{e/}
OCN	48.1	12.9%	71.6	6.1%	Exploitation Rate $\leq 15.0\%$ ^{e/}
R/K	2.5	5.5%	12.9	2.4%	Exploitation Rate $\leq 13.0\%$ ^{e/}
Hatchery Coho Stocks					
Columbia Early	105.1	59.9%	472.7	42.2%	6.2 Hatchery Escapement
Columbia Late	81.0	43.6%	311.2	26.4%	14.2 Hatchery Escapement

a/ Quota levels include harvest and hooking mortality estimates used in planning the Council's 2018 ocean fisheries and a coho catch for the Canadian troll fishery off the West Coast of Vancouver Island (WCVI).

b/ 2018 preseason regulations with the following coho quotas: U.S. Canada Border to Cape Falcon: Treaty Indian troll-12,500; non-Indian troll-5,600 selective; recreational-42,000 selective; Cape Falcon to OR/CA border: recreational-35,000 selective and 3,500 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 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. The 2019 marine fisheries exploitation rates are forecast at 4.0% compared to 9.9% in 2018; the total 2018 ESA limit was 18.0% including mainstem Columbia R. fisheries.

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 2019 ESA consultation standard.