Attachment 4

Coastal Multi-Species Conservation and Management Plan

Wild Fish Monitoring Summaries

2014-2020

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Table of Contents

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Section I. Coastal Chinook Salmon

Abundance

The Oregon Department of Fish and Wildlife (ODFW) used time series of Chinook salmon spawner abundances from a base period of 1986 through 2011 to develop the Coastal Multi-Species Conservation and Management Plan's (CMP) thresholds for Desired Abundance and Critical Abundance (CMP Table AIII:2; ODFW 2014). The methods used to derive the abundance time series differed among populations. After adoption of the CMP, ODFW's Oregon Coastal Chinook Technical Team (OCCTT) completed a methodological standardization that resulted in revised time series of historical spawner abundances of coastal fall Chinook populations (1986-2018).

Revised population abundance time series are currently available for the Nehalem, Tillamook, Nestucca, Salmon River, Siletz, Yaquina, Alsea, Siuslaw, Umpqua (derived from South Umpqua), Coos, Coquille, Floras, Sixes, and Elk River populations. Counts of Chinook salmon on groupings of select index reaches have been calibrated to mark-recapture abundance estimates[1] for 10 populations or subpopulations. A variety of methods have been used to estimate abundances in the Tillamook, Yaquina, Alsea, and Floras populations, where there have not been mark-recapture investigations. Estimates in these populations are therefore subject to greater uncertainty. Abundance time series are not available for the Necanicum and Yachats Aggregate populations.

Critical and Desired Abundance. ODFW used the new Chinook population abundance time series to generate critical thresholds for the sliding scale for harvest (discussed further in Population Summaries below) (ODFW 2020a). These criteria replace the CMP's original Critical Abundance thresholds. Likewise, ODFW recalculated the Desired Abundance thresholds for Coastal Chinook populations to align the thresholds with the new abundance time series. Revision of the Critical and Desired Abundance thresholds ensures that abundance criteria:

- are benchmarked to the best available time series of Coastal Chinook population abundances;
- apply a consistent statistical basis for assessing contemporary annual abundance estimates; and
- align with critical thresholds for sliding scale harvest management.

Further details regarding the revision of Critical and Desired Abundance criteria for Coastal Chinook populations are provided below. Revised thresholds are the primary basis for assessment in the population summaries that follow, but in all cases the CMP's original thresholds are provided for comparison (See Tables I-1, I-3, and the Population monitoring summaries that follow).

The revised Critical Abundance thresholds differ from the CMP's original criteria for three reasons:

- *Revision of Abundance Time Series.* Revision of the abundance time series for Coastal Chinook populations means that the base datasets used to calculate the CMP's original thresholds are different than the current abundance datasets. Revising critical criteria based on the new time series ensures a consistent basis of comparison for Critical Abundance thresholds and ongoing annual abundance estimates.
- *Statistical Basis for Calculation.* The CMP's original Critical Abundance criteria were calculated as (Smsy+20%)*0.5, where Smsy is the spawner abundance at maximum sustainable yield from the stock-recruit (S/R) relationship for the population, the 20% increase in Smsy is a risk buffer for uncertainty in the estimation of Smsy and future threats to populations, and taking half of the resulting product is consistent with Critical Abundances identified in other plans and ocean harvest management forums.[2] Instead of retaining the basis in Smsy, revised critical criteria were

[1] Mark & recapture population estimates are derived from capturing, marking (e.g., tagging), and releasing a subset of individuals in the population and recapturing marked and unmarked individuals in a subsequent capture event or events.

[2] The CMP's original Critical Abundance thresholds for the four Chinook populations with divergent PVA results (Tillamook, Nestucca, Salmon, and Floras) were calculated as the 5th percentile of spawner abundance during the base period rather than (Smsy+20%)*0.5 given the conflicting model results (which are used to derive Smsy). In these cases, the statistical basis (5th

simply benchmarked to a 5th percentile[3] of the revised historical abundance time series because of uncertainty in the S/R relationships used to estimate Smsy. ODFW will revisit the statistical basis of Critical Abundance thresholds when meaningful spawner-recruit relationships are more fully developed.

- *Base Period for Data.* The base period for calculation of the CMP's original Critical Abundance thresholds was 1986 through 2011. ODFW used a longer base period (1986 through 2018) to calculate the revised thresholds.

Differences between the original and revised Critical Abundance thresholds (Table I-1) are driven primarily by the revision of the population abundance time series and, in some cases, changing the statistical basis of the calculation to the 5th percentile; the effects of extending the time series are comparatively small (Table I-2; but see the Coquille population for an exception).

Table I-1. Comparison of original and revised Critical Abundance Criteria for Coastal Chinook salmon populations. Revised thresholds were calculated as the 5th percentile of the lognormal distribution of the revised time series over a base period of 1986-2018. For comparison, the original thresholds are shown as percentiles of the original time series over the original base period, 1986-2011.

Chinook Population	Critical Abundance Threshold		
	Original Threshold	Revised Threshold	Percentile of Original Threshold *Original Time Series Original Base Period, 1986-2011*
Nehalem	3,800	5,369	1st
Tillamook	3,700	2,745	5th
Nestucca	1,600	2,066	5th
Salmon	400	363	5th
Siletz	2,300	3,471	3rd
Yaquina	2,200	1,564	5th
Alsea	2,900	3,846	<1st
Siuslaw	6,900	3,987	<1st
South Umpqua[1]	1,500	1,493	5th
Coos	1,800	2,531	5th
Coquille	3,500	2,833	<1st
Floras	100	100	5th
Sixes	1,200	712	11th
Elk	800	690	<1st

[1]The original CMP criteria are for the South Umpqua, with the remainder of the stratum 'To Be Determined'. The dataset for the sliding scale was for the Umpqua Stratum, based on the South Umpqua Abundance/0.467. The sliding scale is based on the Umpqua stratum number, but here it is converted to just the South Umpqua for comparison to the CMP abundance thresholds.

Whether the revised Critical Abundance criteria are more conservative or less conservative than the CMP's original criteria cannot be determined by a simple comparison of the original and revised threshold values shown in Table I-1. This is because the base data underlying the two thresholds are different; each population's original and revised time series have different statistical distributions. However, comparisons can be drawn by considering the original and revised criteria as percentiles of their respective base datasets. The original critical criteria for the Tillamook, Nestucca, Salmon River and Floras populations were calculated as the 5th percentile (rounded to 100s) of the original abundance time

percentile) for calculating the revised Critical Abundance Thresholds is the same as that used to calculate the CMP's original Critical Abundance thresholds.

[3] A percentile of a dataset is a statistical measure that indicates the value below which a specified percentage of the data falls. For example, a 5th percentile of an abundance dataset indicates a value below which 5% of the abundance estimates fall. The percentiles discussed in this section are calculated as percentiles of the lognormal distribution of abundance time series.

series for the period of 1986-2011. The revised critical criteria are also calculated as a 5th percentile but using the revised abundance time series. From this standpoint neither criterion is more conservative or less conservative than the other relative to the respective base data; both reflect the value below which we would expect the lower 5% of the abundance distribution to fall.

The original Critical Abundance thresholds for the remaining populations were calculated as a function of Smsy (previously discussed). Except for the Sixes population, this approach resulted in critical thresholds set approximately equal to or lower than the 5th percentiles of the original abundance time series (Table I-1). In these populations, the new thresholds could be considered more conservative (they are set to a higher percentile of the revised abundance time series) in the Nehalem, Alsea, Siuslaw, Coquille, and Elk River populations. This can be counterintuitive when the numbers are compared directly. For example, in the Siuslaw, Coquille, and Elk River populations, the revised Critical Abundance values are lower than the originals, but the original values were equivalent to a lower percentile of the datasets used to compute them (i.e., <1st percentile vs. 5th percentile) (Table I-1). As a percentile of the respective base datasets, the revised critical criterion is less conservative than the original only in the Sixes population (Table I-1).

Table I-2. Comparison of the 5th percentile of the Chinook population abundance estimates calculated using the revised abundance datasets over the original base period (1986-2011) and the longer base period (1986-2018) used to calculate the revised Critical Abundance criteria. The effect of lengthening the base period was relatively small except for the larger difference in the Coquille population.

Chinook Population	5th Percentile *New Time Series* *Original Base Period, 1986-2011*	5th Percentile *New Time Series* *New Base Period, 1986-2018*
Nehalem	5,218	5,369
Tillamook	2,771	2,745
Nestucca	1,951	2,066
Salmon	413	363
Siletz	3,049	3,471
Yaquina	1,370	1,564
Alsea	3,852	3,846
Siuslaw	4,006	3,987
South Umpqua[1]	1,333	1,493
Coos	2,612	2,531
Coquille	4,411	2,833
Floras	103	100
Sixes	656	712
Elk	637	690

Revised Desired Abundance targets use the same benchmark to historical abundance time series as the original criteria (75th percentile) and differ from the originals only due to revisions to the base abundance estimates and the duration of the base period (extending it to 2018). The exception is the Elk River population, where the CMP used the median abundance over the base period plus 20%. This calculation was used for the original Desired Abundance threshold because of the Elk River population's non-viable status (i.e., this calculation resulted in a higher or more conservative value than the 75th percentile of the original dataset). However, the revised critical criterion for the Elk River population is based on the 75th percentile because, when calculated using the revised dataset over the longer base period, the CMP calculation method results in a lower or less conservative value than the 75th percentile. Where populations were determined to be viable, the CMP set Desired Abundance targets to 75th percentiles, as opposed to a value based on the stock-recruit relationship or PVA results, because improvements were desired despite the populations' viable status. The desire is to have a population's abundance be greater or equal to the goal half the time (i.e., moving median abundance toward the base period 75th percentile).

Revised Desired Abundance criteria are not inherently more or less conservative than the originals when the criteria are considered relative to their respective base datasets. This is because the statistical basis (75th percentile) for calculating the original and revised targets has not changed. Comparison of the 75th percentiles of the new abundance datasets over the original base period (1986-2011) and the new base period (1986-2018) indicate that differences between the original and revised Desired Abundance targets is largely the result of revisions of the underlying abundance time series rather than extension of the base period through 2018 (Table I-3).

Table I-3. Comparison of the CMP's original Desired Abundance targets and those recalculated using revised time series of population abundance estimates over a longer base period (1986-2018). The 75th percentiles of lognormal distribution of the revised time series over the original base period (1986-2011) are provided to show the influence of the extended base period (comparison of right two columns).

Chinook Population	Desired Abundance Target		
	Original Target *75th Percentile[1] Original Time Series Original Base Period, 1986-2011*	Revised Target *75th Percentile Revised Time Series Revised Base Period, 1986-2018*	75th Percentile *Revised Time Series Original Base Period, 1986-2011*
Nehalem	12,100	13,302	12,816
Tillamook	10,500	11,910	12,365
Nestucca	11,900	16,227	18,422
Salmon	1,800	1,933	1,707
Siletz	8,100	17,469	17,875
Yaquina	9,600	9,849	9,702
Alsea	9,300	9,599	9,314
Siuslaw	26,200	16,274	16,402
South Umpqua[2]	6,500	8,284	7,516
Coos	6,300	9,711	9,507
Coquille	14,300	13,782	13,313
Floras	700	600	613
Sixes	4,400	4,124	3,736
Elk	2,000(3)	2,243	2,257

[1] Original Desired Abundance targets were based on the 75th percentile of the lognormal distribution of abundance time series, but the values used as targets were rounded to 100s.
[2]The original CMP criteria are for the South Umpqua, with the remainder of the stratum To Be Determined. The dataset for the sliding scale was for the Umpqua Stratum, based on the South Umpqua Abundance/0.467. Data here are converted back to South Umpqua for comparison to the CMP target.
[3]The original Desired Abundance target for the Elk River population was calculated as the median abundance plus 20%.

Practical Implications of Revised Abundance Criteria. Annual abundance estimates for Coastal Chinook populations should be compared to revised abundance criteria because the current annual abundance estimates, and revised criteria share the same basis for derivation. Comparing contemporary annual abundance estimates against the CMP's original criteria would effectively set critical abundances to values ranging from less than the 1st percentile to greater than the 23rd percentile of the revised abundance distributions (Table I-4). Likewise, the original Desired Abundance thresholds reflect percentiles ranging from as low as the 30th percentile to greater than the 90th percentile of the revised abundance distributions (Table I-4). For critical criteria, the results since 2014 would be the misclassification of two below-critical years in the Siletz population and one below-critical year in the Coos Population (Table I-5). For Desired Abundance, the misapplication of the original criteria to the new abundance estimates would have resulted in the assignment of more years as above Desired Abundance in some populations (most notably in the Siletz and Coos populations) and fewer years above Desired Abundance in the Siuslaw population (Table I-5). Figure I-1 shows the results of assessment of post-CMP population abundance estimates

(2014-2020) against the revised Desired and Critical Abundance criteria, and Figure I-2 provides a roll-up of population abundance thresholds and abundance estimates to the Species Management Unit (SMU) scale. Additional information is provided in Population summaries that follow.

Table I-4. The CMP's original Desired and Critical Abundance thresholds expressed as percentiles of revised abundance time series over a base period of 1986-2018. For comparison, revised Desired and Critical Abundance thresholds have been set to the 75th and 5th percentiles, respectively.

Chinook Population	Desired Abundance *Percentile of Original Threshold in New Abundance Time Series*	Critical Abundance *Percentile of Original Threshold in New Abundance Time Series*
Nehalem	67	<1
Tillamook	68	12
Nestucca	63	3
Salmon	73	10
Siletz	33	1
Yaquina	74	11
Alsea	72	<1
Siuslaw	93	23
South Umpqua	64	5
Coos	47	4
Coquille	77	9
Floras	81	5
Sixes	78	17
Elk	67	9

Table I-5. Comparison of the number of years after CMP adoption (2014-2019) in which abundance estimates either were (1) below the original or revised Critical Abundance threshold or (2) above the original or revised Desired Abundance targets. Specific years are shown in parentheses.

Chinook Population	Number of Years below Critical Threshold, 2014-2019		Number of Years Above the Desired Abundance Target, 2014-2019	
	Original	Revised	Original	Revised
Nehalem	0	0	3 *(2014, 15,16)*	2 *(2014, 2015)*
Tillamook	2 *(2018, 2019)*	2 *(2018, 2019)*	2 *(2014, 2015)*	2 *(2014, 2015)*
Nestucca	0	0	0	0
Salmon	1 *(2018)*	1 *(2018)*	5 *(2014, 2015, 2016, 2017, 2019)*	4 *(2014, 2015, 2016, 2017)*
Siletz	0	1 *(2019)*	4 *(2014, 2015, 2016, 2017)*	0
Yaquina	0	0	2 *(2014, 2015)*	2 *(2014, 2015)*
Alsea	0	2 *(2018, 2019)*	2 *(2014, 2015)*	2 *(2014, 2015)*
Siuslaw	2 *(2018, 2019)*	2 *(2018, 2019)*	0	2 *(2014, 2015)*
South Umpqua	1 *(2019)*	1 *(2019)*	2 *(2014, 2015)*	2 *(2014, 2015)*
Coos	0	1 *(2017)*	3 *(2014, 2015, 2019)*	1 *(2015)*
Coquille	2 *(2018, 2019)*	2 *(2018, 2019)*	1 *(2015)*	1 *(2015)*
Floras	0	0	1 *(2016)*	1 *(2016)*
Sixes	0	0	1 *(2015)*	1 *(2015)*
Elk	0	0	2 *(2015, 2016)*	1 *(2015)*

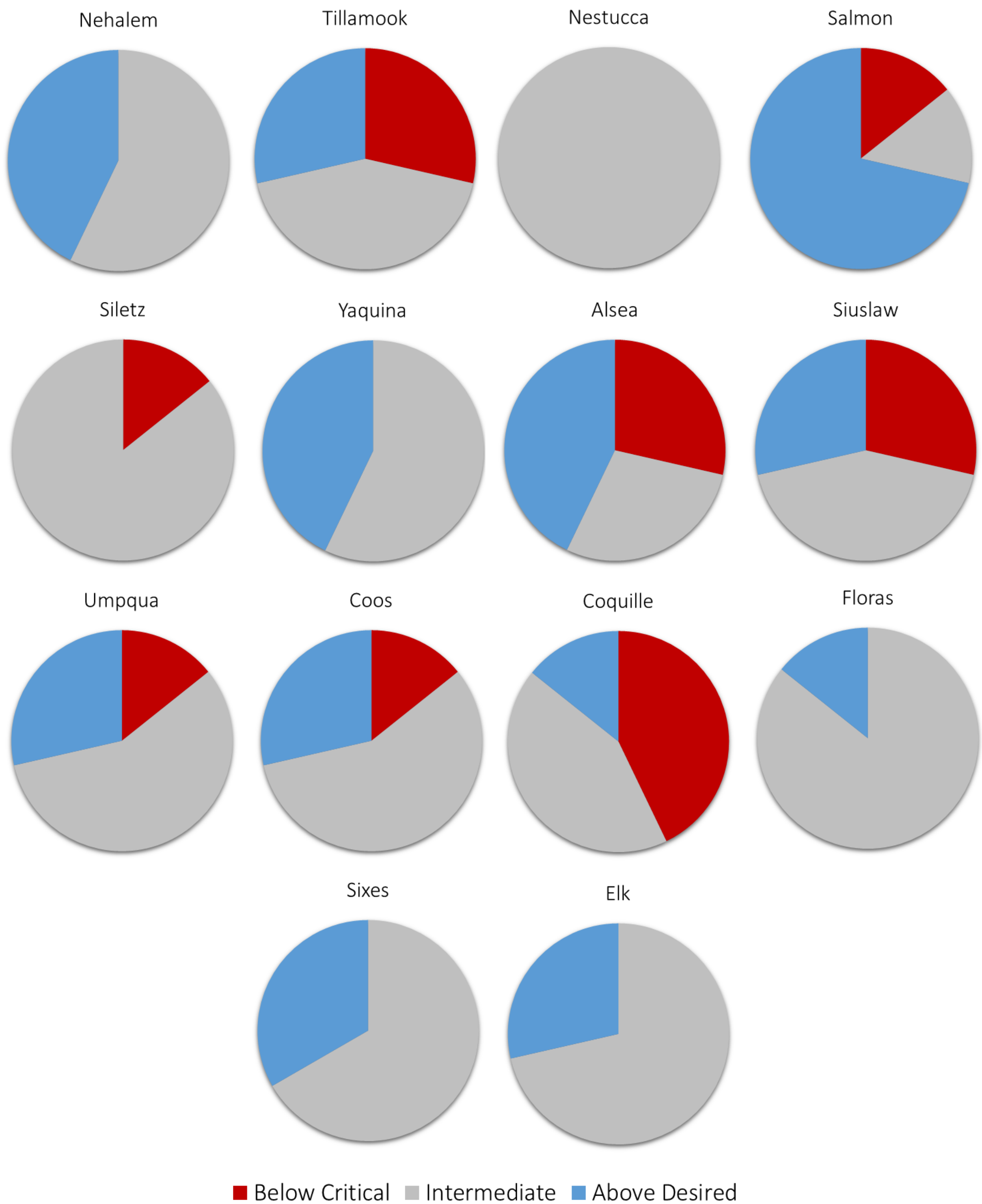

Figure I-1. Coastal Chinook Populations. Percent of years from 2014 to 2020 with abundance estimates in the following categories: Below Critical Abundance (Red), Above Desired Abundance (Blue), or Intermediate between Critical Abundance and Desired Abundance (Gray).

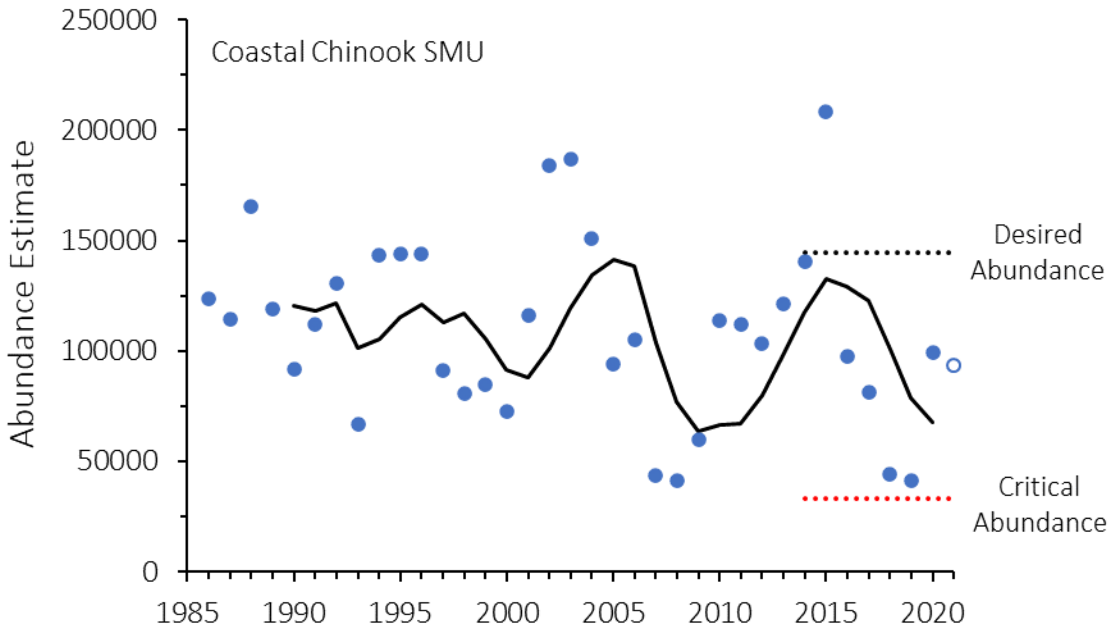

Figure I-2. Natural origin spawner abundance estimates for the Coastal Chinook Salmon SMU, 1986-2020 (•; the open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired Abundance (147,192) and Critical Abundance (33,888) thresholds, respectively. Abundance thresholds, Abundance Estimates, and the Forecast Abundance are the sum across all populations with available data. Abundance estimates do not include the Elk and Salmon River populations prior to 1998 and 1988, respectively; there are no abundance estimates for the Necanicum and Yachats aggregate, and abundance criteria for these populations are not included in the abundance summations.

Harvest and Hatcheries

Harvest and hatchery influence are addressed separately in the population monitoring summaries below. Note that estimates of the proportion of hatchery fish on the spawning grounds (pHOS) presented below are preliminary estimates that may include the immediate area around acclimation and hatchery release sites and are thus subject to refinement and revision.

Productivity

ODFW will evaluate intrinsic productivity of coastal Chinook populations at the next assessment period called for in the CMP.

Spatial Structure

ODFW will evaluate spatial structure for each population at the next assessment called for in the CMP.

Diversity

To account for inter-annual variability in environmental conditions, ODFW will evaluate diversity measures at the next assessment period called for in the CMP. Evaluation may include spawning timing, spawner age composition, and adult size composition.

Early-Run Chinook Salmon

Chinook populations in this SMU include early returning (returning in the spring or summer) and late returning (returning in the fall) adult components. In this report where they exist, early returning components of Chinook populations are referred to as early-run Chinook to distinguish them from the more abundant later returning components of the populations. The two independent populations of spring returning Chinook comprising the Coastal Spring Chinook SMU (North Umpqua and South Umpqua) are referred to as Spring Chinook as opposed to early-run Chinook. The CMP indicates that early-run

Chinook are present in the Nehalem, Tillamook, Nestucca, Siletz, Alsea, and Coquille Chinook populations (CMP Table 2).

The Chinook spawner abundances reported here generally exclude early-run life history variants, where present, due to the lack of forecasting methods for these early components of the runs, the lack of population-level expansions from different sampling methods, an inability to adequately account for them in the PVA models, and harvest limits and closures intended to add extra measures of protection to these runs. However, spawning surveys begin early (September) in the Nehalem where there is a substantial early component to the run, and monitoring in some populations provides information on early-run Chinook that is independent of monitoring for the later component of the run (i.e., Tillamook - Trask and Wilson sub-basins; Nestucca; Siletz; Alsea).

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: North Coast

Population: Nehalem

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Nehalem Chinook salmon (Table I-6; Figure I-3). Critical Abundance Thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's original critical thresholds in Table I-6 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-6). The Nehalem population includes a substantial early-run component that spawns primarily in Rock Creek and the upper Nehalem River above Humbug Creek. Relative to other basins, spawning ground surveys for Nehalem Chinook begin in early (September) to better account for these early-returning fish.

Table I-6. Natural Origin Spawner Abundance estimates for the Nehalem Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Nehalem Population	13,302 (12,100)	5,369 (3,800)	2014	14,147
			2015	15,605
			2016	12,956
			2017	8,762
			2018	5,949
			2019	8,574
			2020	16,919

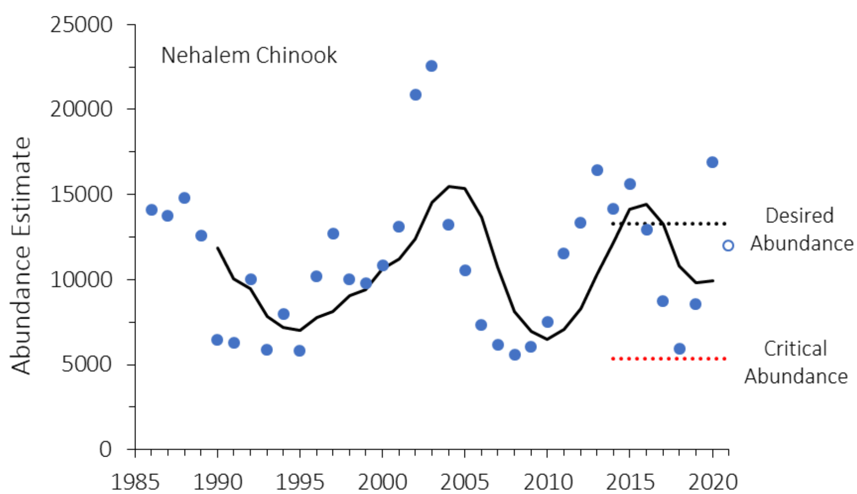

Figure I-3. Natural origin spawner abundance estimates for Nehalem Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of wild fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Nehalem is *greater* than the Critical Abundance (Table I-7).

Table I-7. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Nehalem Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Nehalem Population	16,919	11,968	14,444	5,369

Hatchery Influence

Hatchery Chinook are not currently released into the Nehalem population area. Monitoring for Nehalem Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW has evaluated the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS (Table I-8). Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes in some years. Targets for pHOS are evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-8. Percent hatchery origin spawners (pHOS) for the Nehalem Population of Chinook salmon (adults, excluding jacks. pHOS targets are from CMP Table AIII:4.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	Observed	
			pHOS	9-year Average
Nehalem Population	<10%	2014	2%	<1%
		2015	<1%	<1%
		2016	<1%	<1%
		2017	<1%	<1%
		2018	<1%	<1%
		2019	5%	1%
		2020	<1%	1%

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: North Coast

Population: Tillamook

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Tillamook Chinook salmon (Table I-9; Figure I-4). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-9 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-9). Spawner abundances exclude early-run life history variants, but additional information on Tillamook early-run Chinook is provided below (See Tables I-12 & I-13; Figures I-5 & I-6).

Table I-9. Natural Origin Spawner Abundance estimates for the Tillamook Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Tillamook Population	11,910 (10,500)	2,745 (3,700)	2014	12,408
			2015	14,442
			2016	5,089
			2017	5,024
			2018	2,403
			2019	2,571
			2020	5,319

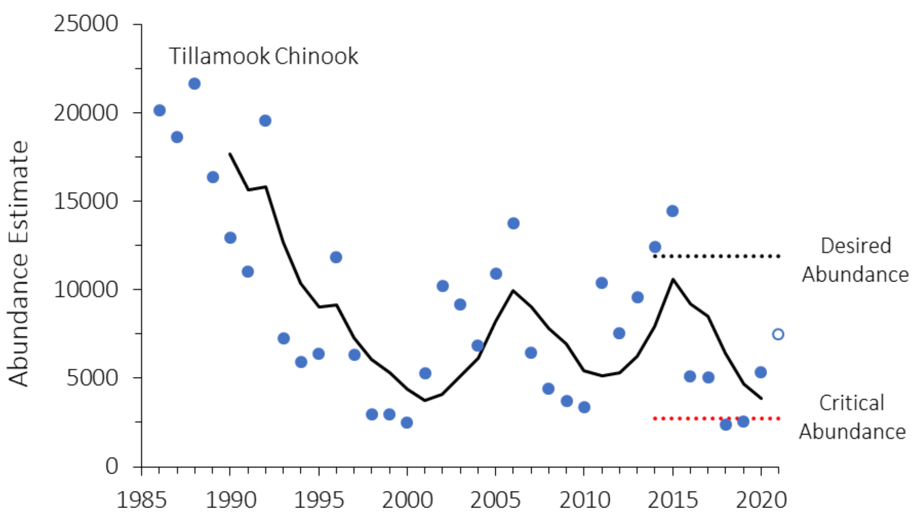

Figure I-4. Natural origin spawner abundance estimates for Tillamook Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Tillamook is *greater* than the Critical Abundance (Table I-10).

Table I-10. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Tillamook Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Tillamook Population	5,319	7,479	6,399	2,745

Hatchery Influence

The CMP allows for the release of 150,000 hatchery fall Chinook in the Trask River within the Tillamook population area. Monitoring for Tillamook Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW has evaluated the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS (Table I-11). Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes in some years Targets for pHOS are evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-11. Percent hatchery origin spawners (pHOS) for the Tillamook Population of Chinook salmon (adults, excluding jacks). pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (2-mile radius) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat. **pHOS estimates below are preliminary and may include the immediate area around acclimation and hatchery release sites.**

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target (%)	Year	Observed	
			pHOS	9-year Average
Tillamook Population	≤10 (<30/<60)	2014	2%	1%
		2015	7%	2%
		2016	<1%	2%
		2017	<1%	2%
		2018	3%	2%
		2019	3%	2%
		2020	<1%	2%

Early-Run Chinook

The abundance of early-run Chinook in the Tillamook Population has been indexed through resting hole counts since 1965. Surveys consist of one to four divers (depending on the size of the hole) snorkeling through and counting the number of adult and jack Chinook present. The same holes or reaches within each river system are snorkeled each year in mid- to late-August. Hatchery and wild fish are not differentiated in these surveys (Table I-12; Figures I-5 & I-6).

Table I-12. Adult, Jack, and Total (Adults + Jacks) densities (number/resting hole) of early-run Chinook salmon observed during resting hole snorkel and dive counts in the Wilson River and Trask River Management Areas (Tillamook Population). The CMP does not include specific targets for this abundance index of early-run Chinook salmon. 5-year averages for the period prior to adoption of the CMP (2009-2013) are provided for context.

ABUNDANCE INDEX – RESTING HOLE DENSITY				
Spatial Extent	Year	Adult Density (Adults/Resting Hole)	Jack Density (Jacks/Resting Hole)	Total Density (Adults+Jacks/Resting Hole)
Wilson River Management Area (Tillamook Population)	2014	0.7	0.0	0.7
	2015	0.3	0.0	0.3
	2016	3.3	0.0	3.3
	2017	2.8	0.0	2.8
	2018	0.1	0.0	0.1
	2019	0.0	0.1	0.1
	2020	0.0	0.0	0.0
	5-yr Average (2009-2013)	*1.2*	*0.0*	*1.2*
Trask River Management Area (Tillamook Population)	2014	9.5	0.2	9.7
	2015	8.3	0.0	8.3
	2016	13.1	0.0	13.1
	2017	3.4	0.0	3.4
	2018	0.8	0.0	0.8
	2019	0.5	0.1	0.6
	2020	2.5	0.0	2.5
	5-yr Average (2009-2013)	*9.4*	*0.3*	*9.7*

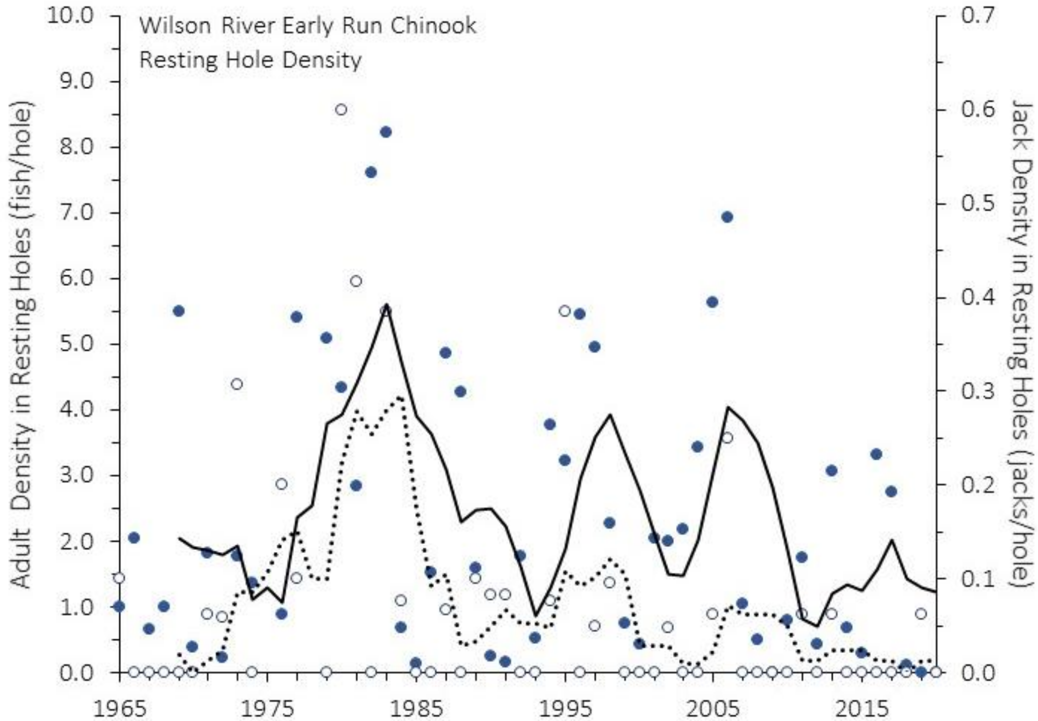

Figure I-5. Densities of adult (•) and jack (○) early-run Chinook in resting holes (fish/resting hole) in the Wilson River sub-basin, 1965-2020. Solid and dashed lines are running 5-year averages of adults and jacks, respectively.

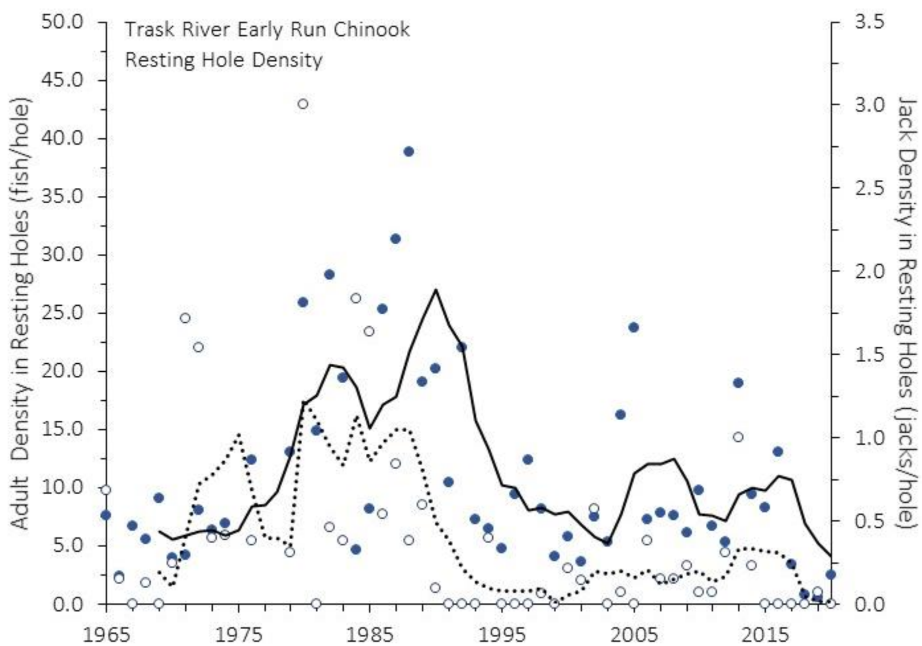

Figure I-6. Densities of adult (•) and jack (○) early-run Chinook in resting holes (fish/resting hole) in the Trask River sub-basin, 1965-2020. Solid and dashed lines are 5-year averages of adults and jacks, respectively.

In addition to resting hole counts, ODFW conducted spawning surveys targeting early-run Chinook in the Wilson and Trask rivers (Tillamook) in 2005-2008 (ODFW 2008; 2013a) and in the Wilson River in 2017-2019. Surveys in 2017-2019 were not resourced with new funding; surveys were conducted with existing Fish Research and District resources and were therefore not at the same scale and effort as those conducted in 2005-2008. These surveys provide an index of abundance (peak adult density), distribution (occupancy), and hatchery influence (pHOS) (Table I-13). Due to further budget and personnel limitations, these metrics cannot be estimated for 2020.

The CMP allows for the release of hatchery Spring Chinook in the Trask River, while discontinuing releases in the Wilson River. To-date, there are insufficient data and spatial coverage (survey funding was eliminated after CMP adoption) to calculate a 9-year running average of pHOS for comparison with the population target specified in the CMP (≤10 (<30%/<60%), but annual estimates have been above the target (CMP Table AIII:4). However, hatchery returns to the Wilson may still include year classes from pre-CMP hatchery releases; a clearer signal of post-CMP hatchery programs would require additional monitoring.

Table I-13. Peak adult density, occupancy, and pHOS for early-run Chinook during early-season (Sept – Oct) spawning ground surveys in the Tillamook Population). The CMP does not include specific abundance and occupancy targets for early-run Chinook. Averages from the last survey period prior to the CMP (2005-2008) provide context to post-CMP surveys. There are insufficient data to calculate a 9-year average pHOS.

ABUNDANCE INDEX – EARLY-RUN SPAWNING GROUND SURVEYS				
Spatial Extent	Year	Peak Adult Density (Adults/mi)	Occupancy (%)	pHOS (%)
Wilson River Management Area (Tillamook Population)	2017	4.6	100	46
	2018	0.9	83	69
	2019	0.4	33	69
	2020	n/a	n/a	n/a
	Average (2005-2008)	3.3	69[1]	68

[1]Pre-CMP Occupancy Average is based on 2007 and 2008.

The prevalence of hatchery fish in the Wilson River generally has been highest in lower portions of the basin, nearer to hatchery release locations (e.g., ODFW 2013a). The amount of disturbance (e.g., recreational use, swimming) is particularly high in the upper Wilson River. This may negatively affect areas in which a higher percentage of wild fish is expected to be holding and may disproportionately affect their over-summer survival.

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: North Coast

Population: Nestucca

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Nestucca Chinook salmon (Table I-14; Figure I-7). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-14 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-14). Spawner abundances exclude early-run life history variants, but additional information on Nestucca early-run Chinook is provided below (See Tables I-17 & I-18; Figure I-8).

Table I-14. Natural Origin Spawner Abundance estimates for the Nestucca Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Nestucca Population	16,227 (11,900)	2,066 (1,600)	2014	10,053
			2015	7,397
			2016	6,488
			2017	6,426
			2018	3,060
			2019	3,335
			2020	4,708

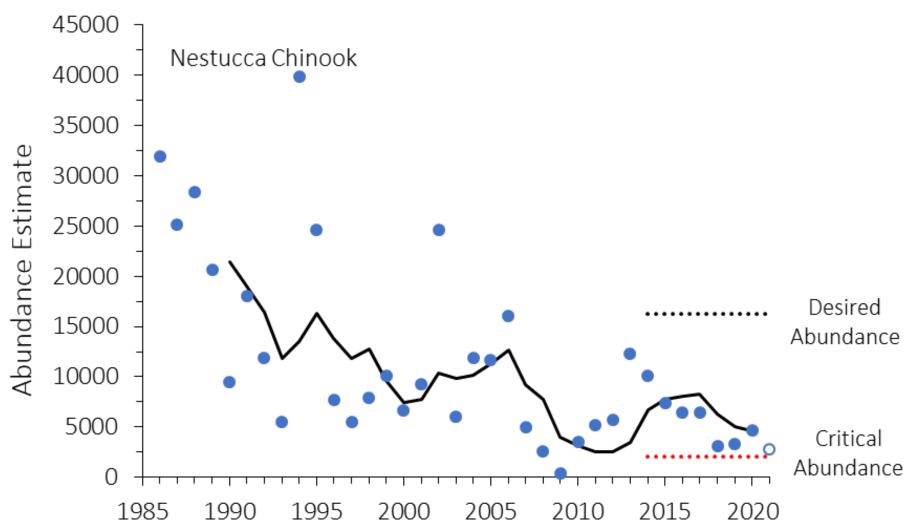

Figure I-7. Natural origin spawner abundance estimates for Nestucca Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Nestucca is *greater* than the Critical Abundance (Table I-15).

Table I-15. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Nestucca Population of Chinook salmon.

Spatial Extent	2019 Abundance Estimate	2020 Forecast Abundance	Closure Metric	Critical Abundance
Nestucca Population	4,708	2,761	3,735	2,066

Hatchery Influence

The CMP allows for the release of 100,000 fall Chinook into the Nestucca population area. Monitoring for Nestucca Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW has evaluated the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS (Table I-16). Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes in some years. Targets for pHOS are evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-16. Percent hatchery origin spawners (pHOS) for the Nestucca Population of Chinook salmon (adults, excluding jacks). pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (2-mile radius) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat. **pHOS estimates below are preliminary and may include the immediate area around acclimation and hatchery release sites.**

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target (%)	Year	Observed	
			pHOS	9-year Average
Nestucca Population	≤10 (<30/<60)	2014	8%	8%
		2015	24%	10%
		2016	<1%	10%
		2017	33%	13%
		2018	7%	13%
		2019	2%	12%
		2020	2%	11%

Early-Run Chinook

The abundance of early-run Chinook in the Nestucca Population has been indexed through resting hole counts since 1965. Surveys consist of one to four divers (depending on the size of the hole) snorkeling through and enumerating the number of adult and jack Chinook salmon present. The same holes or reaches within each river system are snorkeled each year in mid- to late-August. Hatchery and wild fish are not differentiated in these surveys (Table I-17; Fig. I-8).

Table I-17. Adult, Jack, and Total (Adults + Jacks) densities (number/resting hole) of early-run Chinook salmon observed during resting hole snorkel and dive counts in the Nestucca Population. The CMP does not include specific targets for this abundance index of early-run Chinook salmon. 5-year averages for the period prior to adoption of the CMP (2009-2013) are provided for context.

ABUNDANCE INDEX – RESTING HOLE DENSITY				
Spatial Extent	Year	Adult Density (Adults/Resting Hole)	Jack Density (Jacks/Resting Hole)	Total Density (Adults+Jacks/Resting Hole)
Nestucca Population	2014	5.6	0.3	5.9
	2015	1.6	0.0	1.6
	2016	2.2	0.0	2.2
	2017	3.5	0.0	3.5
	2018	0.2	0.0	0.2
	2019	0.2	0.0	0.2
	2020	1.3	0.2	1.5
	5-yr Average (2009-2013)	*3.2*	*0.1*	*3.3*

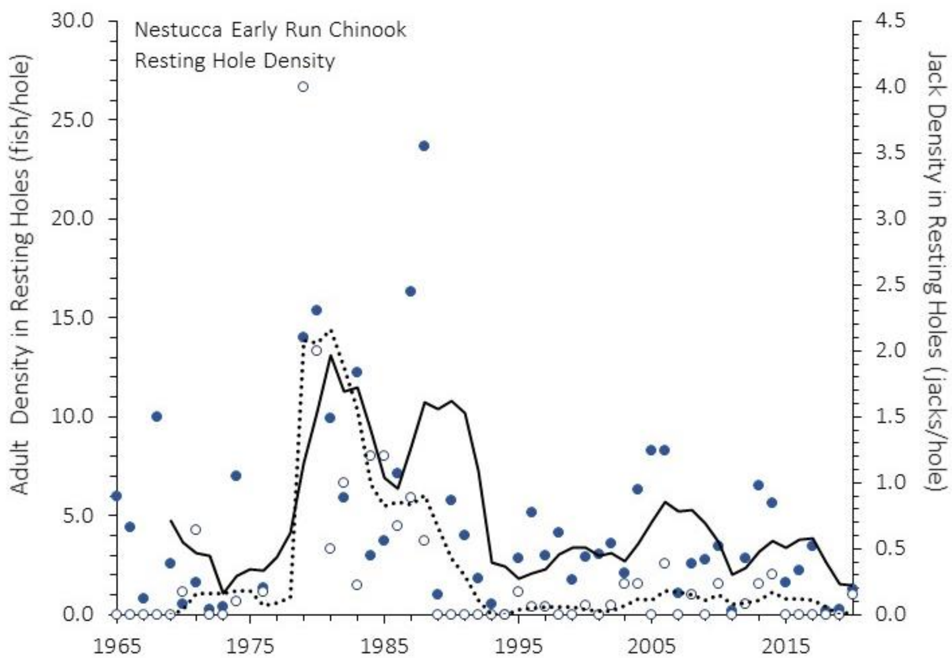

Figure I-8. Densities of adult (•) and jack (o) early-run Chinook in resting holes (fish/resting hole) in the Nestucca basin, 1965-2020. Solid and dashed lines are 5-year averages of adults and jacks, respectively.

In addition to resting hole counts, ODFW conducted spawning ground surveys targeting early-run Nestucca Chinook in 2005-2008 (ODFW 2008; 2013a) and 2017-2019. Surveys in 2017-2019 were not resourced with new funding; surveys were conducted with existing Fish Research and District resources and were therefore not at the same scale and effort as those conducted in 2005-2008. These surveys provide estimates of an abundance index (peak adult density), distribution (occupancy), and hatchery influence (pHOS) (Table I-13). Due to further budget and personnel limitations, these metrics cannot be estimated for 2020.

The CMP allowed for increased releases of hatchery Spring Chinook in the Nestucca (100,000 to 200,000) and new releases into the Little Nestucca (0 to 30,000). To-date, there are insufficient data and spatial coverage to calculate a 9-year running average of pHOS for the early-run component for comparison with the population target specified in the CMP (≤10 (<30%/<60%), but annual estimates have been above the target (CMP Table AIII:4). However, hatchery returns to the Nestucca may still include year classes from pre-CMP hatchery releases; a clearer signal of post-CMP hatchery programs would require additional monitoring. As in the Wilson River (Tillamook Population), the prevalence of hatchery fish in the Nestucca basin tends to be highest lower in the watershed, and pHOS has been higher, as anticipated, near new hatchery release locations (see Table I-18).

Table I-18. Peak adult density, occupancy, and pHOS for early-run Chinook during early-season (Sept – Oct) spawning ground surveys in the Tillamook Population). The CMP does not include specific abundance and occupancy targets for early-run Chinook. pHOS values represent observation on mainstem surveys; values in parentheses represent surveys in the Little Nestucca and Beaver Creek, which include new hatchery release locations. Averages from the last survey period prior to the CMP (2005-2008) provide context to post-CMP surveys. There are insufficient data to calculate a 9-year average pHOS.

ABUNDANCE INDEX, OCCUPANCY, pHOS EARLY-RUN SPAWNING GROUND SURVEYS				
Spatial Extent	Year	Peak Adult Density (Adults/mi)	Occupancy (%)	pHOS (%)
Nestucca Population (Mainstem)	2017	4.1	65	49 (58)
	2018	2.8	86	72 (96)
	2019	2.2	63	88 (100)
	2020	n/a	n/a	n/a
	Average (2005-2008)	*7.0*[(1)]	*93*[(2)]	*72*

[1]Surveys in 2017 through 2019 include the addition of the Little Nestucca and Beaver Creek to monitor new hatchery release locations. These locations were not included in surveys during 2005-2008.
[2]Pre-CMP Occupancy Average is based on 2007 and 2008.

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: Mid Coast

Population: Salmon River

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Salmon River Chinook salmon (Table I-19; Figure I-9). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1988 through 2018. These thresholds replace the CMP's critical thresholds in Table I-19 below. After 2019, the dataset for the Salmon River was revised to address inconsistencies in reporting of hatchery and wild fish. Thresholds below were calculated based on the revised estimates of wild abundance. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-19).

Table I-19. Natural Origin Spawner Abundance estimates for the Salmon River Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1998 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Salmon River Population	1,933 (1,800)	363 (400)	2014	3,318
			2015	2,413
			2016	2,820
			2017	2,843
			2018	354
			2019	1,420
			2020	3,741

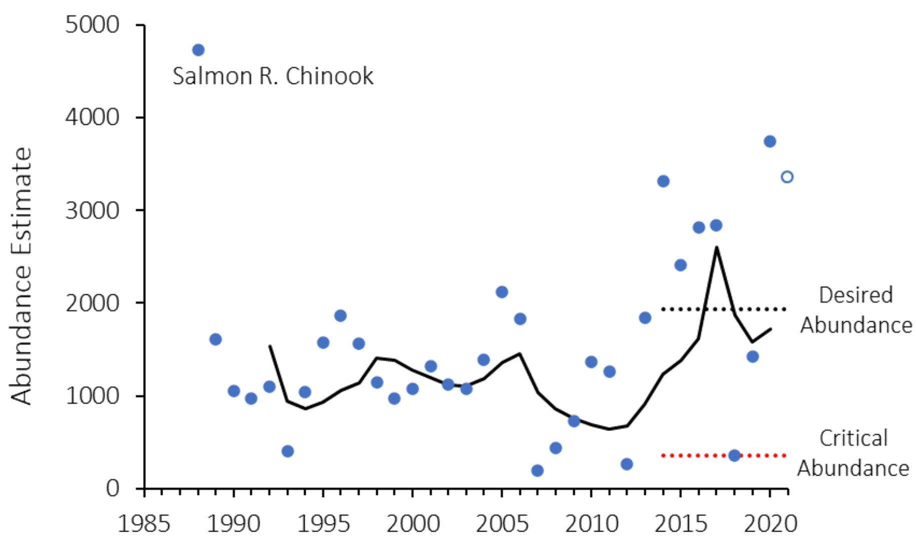

Figure I-9. Natural origin spawner abundance estimates for Salmon River Chinook salmon, 1988-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Salmon River is *greater* than the Critical Abundance (Table I-20).

Table I-20. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Salmon River Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Salmon R. Population	3,741	3,355	3,548	317

Hatchery Influence

The CMP allows for the release of 200,000 fall Chinook into the Salmon River population area. The hatchery population from the Salmon River is monitored as a Pacific Salmon Treaty (PST) Exploitation Rate Indicator Stock. This monitoring provides for an estimate of pHOS. Targets for pHOS are evaluated as a running nine-year average to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets (Table I-21).

Table I-21. Percent hatchery origin spawners (pHOS) for the Salmon River Population of Chinook salmon. pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (2-mile radius) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target (%)	Year	Observed	
			pHOS (%)	9-year Average (%)
Salmon River Population	≤30 (<60/<90)	2014	56	57
		2015	58	61
		2016	56	62
		2017	28	58
		2018	6	53
		2019	49	52
		2020	34	48

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: Mid Coast

Population: Siletz

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Siletz Chinook salmon (Table I-22; Figure I-10). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-22 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-22). Spawner abundances exclude early-run life history variants, but additional information on Siletz early-run Chinook is provided below (See Tables I-25, I-26 & I-27; Figures I-10 & I-11).

Table I-22. Natural Origin Spawner Abundance estimates for the Siletz Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Siletz Population	17,469 (8,100)	3,471 (2,300)	2014	16,895
			2015	11,232
			2016	17,327
			2017	14,063
			2018	5,757
			2019	3,263
			2020	13,530

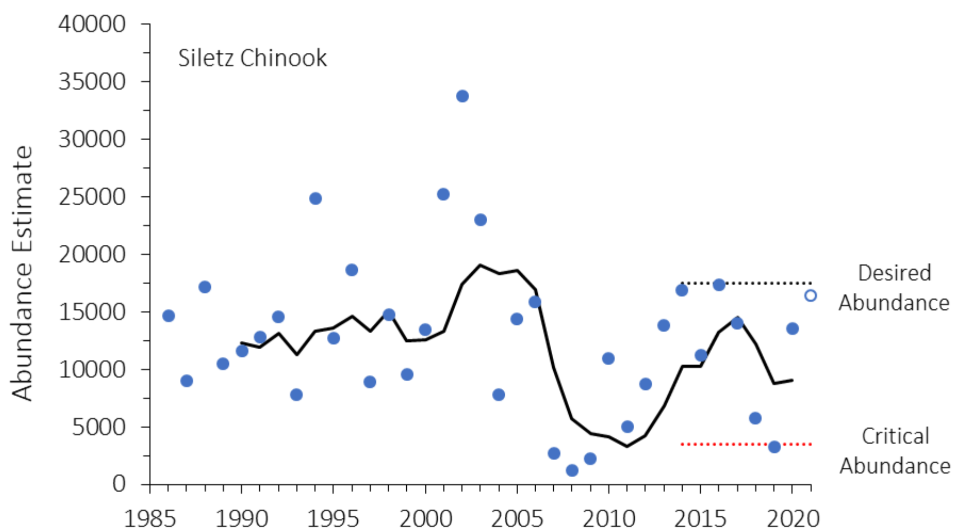

Figure I-10. Natural origin spawner abundance estimates for Siletz Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Siletz is *greater* than the Critical Abundance (Table I-23).

Table I-23. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Siletz Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Siletz Population	13,530	16,350	14,940	3,471

Hatchery Influence

Hatchery Chinook salmon are not currently released into the Siletz population area. Monitoring for Siletz Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW has evaluated the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS (Table I-24). Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes in some years. Targets for pHOS are evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-24. Percent hatchery origin spawners (pHOS) for the Siletz Population of Chinook salmon (adults, excluding jacks). pHOS targets are from CMP Table AIII:4.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	Observed	
			pHOS	9-year Average
Siletz Population	<10%	2014	<1%	1%
		2015	<1%	<1%
		2016	<1%	<1%
		2017	2%	<1%
		2018	1%	<1%
		2019	2%	1%
		2020	<1%	<1%

Early-Run Chinook

Counts of early-run Chinook at the Siletz Falls fish trap (River Mile 64.5) provide an index of abundance for early-run Chinook in the Siletz population (Table I-25; Figure I-11). Currently, wild early-run Chinook and wild summer steelhead are the only anadromous fish passed above the falls; resident trout and sea-run coastal cutthroat can volitionally pass the trap. The trap has been operated year-round since 1994. During 1996 and 1997, the trap was run intermittently; data are extrapolated in those years to account for gaps.

Table I-25. Counts of wild early-run Chinook at Siletz Falls. The CMP does not include abundance targets for Siletz Early-Run Chinook. The five-year geometric mean for the period preceding the CMP (2009-2013) is provided for context.

Spatial Extent	Counts at Siletz Falls Trap	
	Year	Wild Adults
Siletz Early-Run Chinook (above Siletz Falls)	2014	826
	2015	706
	2016	538
	2017	302
	2018	320
	2019	264
	2020	445
	5-yr Geomean (2009-2013)	*343*

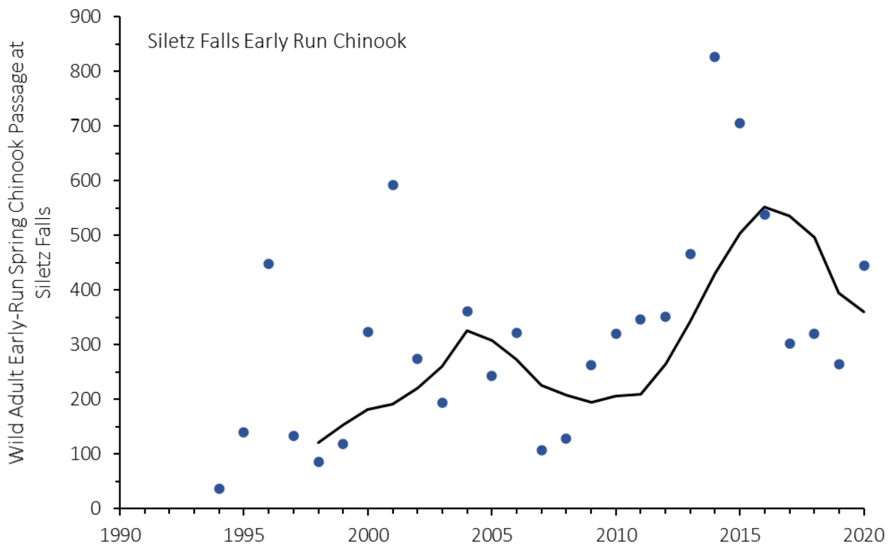

Figure I-11. Counts of wild adult early-run Chinook salmon (•) trapped and passed above Siletz Falls, 1994-2020. Solid line is the running 5-year geometric mean of adult counts.

In addition to counts at Siletz Falls, spawning surveys at three mainstem standard index sites have been conducted since 1995 (Ojalla Bridge to Morgan Park, Twin Bridges to Illahee Park; Logsden to Twin Bridges). Surveys are intended to target the early portion of the run (mid to late August - October), but fish from the predominant fall portion of the run are present, particularly in October. To account for intermingling of early and late run fish, the Peak Density Summary (Table I-26) identifies peak counts of the early-run component based on (1) comment fields from surveyors that distinguish early and late run fish based on appearance and (2) defining a peak prior to the significant arrival of late-run fish (generally in October). Peak counts include both hatchery and wild fish (See Table I-27 for pHOS). Funding for surveys was discontinued after 2019. Surveys have continued at a reduced level of effort, and results will be reported, as feasible, in future annual reports.

Table I-26. Average Peak Density (Live + Dead Fish/mile) on spawning ground surveys for early-run Chinook in the Siletz population. The CMP does not include abundance targets for Siletz early-run Chinook. The five-year geometric mean for the period preceding the CMP is provided for context.

Spatial Extent	Return Year	Peak Adult Density (Live + Dead)/mile
Siletz Early-Run Chinook	2014	17.6
	2015	16.1
	2016	8.7
	2017	4.3
	2018	4.6
	2019	3.2
	2020	TBD
	5-yr Geomean (2009-2013)	*6.5*

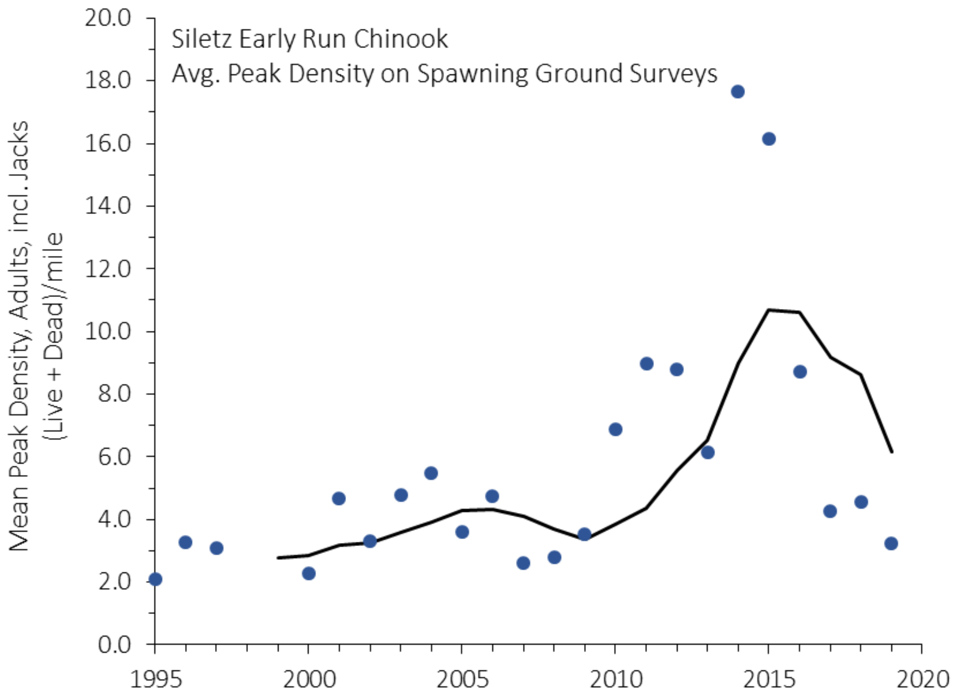

Figure I-12. Average peak density of early-run Chinook salmon (adults, incl. jacks; live + dead per mile) on spawning ground surveys (•). Peak density estimate includes hatchery and wild fish. Trend line is a running 5-year geometric mean.

Peak densities of early-run Chinook on spawning ground surveys include both hatchery and wild origin fish (Table I-26; Figure I-12). However, hatchery Chinook are not currently released into Siletz basin. In recent years where spawning ground surveys included information on origin of live fish and carcasses, pHOS in the early portion of the run (September) has been below the CMP target (Table I-27).

Table I-27. September pHOS on early-run standard spawning surveys in the mainstem Siletz River. pHOS is calculated in September to target early-run fish prior to return of the dominant fall-run portion of the population. No marked carcasses were reported in 2015. This is likely a data omission rather than an indication of 0%, so pHOS is not reported for 2015.

PERCENT HATCHERY ORIGIN SPAWNERS – Early-Run			
Spatial Extent	pHOS Target (%)	Year	Observed pHOS (%)
Siletz Population (Early-Run)	<10	2016	0[1]
		2017	1
		2018	3
		2019	6
		2020	TBD

[1]Estimate based on fewer than 10 observations of known-status live fish or carcasses (n = 2 in 2016)

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: Mid Coast

Population: Yaquina

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Yaquina Chinook salmon (Table I-28; Figure I-13). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-28 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-28).

Table I-28. Natural Origin Spawner Abundance estimates for the Yaquina Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Yaquina Population	9,849 (9,600)	1,564 (2,200)	2014	11,625
			2015	17,745
			2016	6,342
			2017	5,435
			2018	2,917
			2019	3,585
			2020	14,904

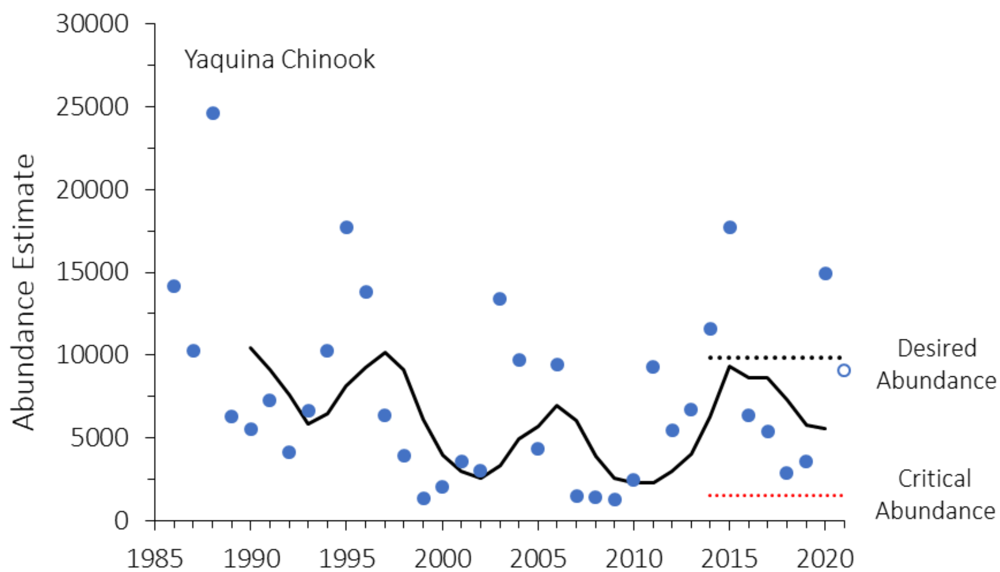

Figure I-13. Natural origin spawner abundance estimates for Yaquina Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Yaquina is *greater* than the Critical Abundance (Table I-29).

Table I-29. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Yaquina Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Yaquina Population	14,904	9,059	11,982	1,564

Hatchery Influence

Hatchery Chinook salmon are not currently released into the Yaquina population area. Monitoring for Yaquina Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW has evaluated the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS (Table I-30). Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes in some years. Targets for pHOS are evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-30. Percent hatchery origin spawners (pHOS) for the Yaquina Population of Chinook salmon (adults, excluding jacks). pHOS targets are from CMP Table AIII:4.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	Observed	
			pHOS	9-year Average
Yaquina Population	<10%	2014	<1%	9%
		2015	4%	2%
		2016	1%	2%
		2017	1%	2%
		2018	2%	2%
		2019	2%	2%
		2020	3%	2%

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: Mid Coast

Population: Alsea

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Alsea Chinook salmon (Table I-31; Figure I-14). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-31 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-31). Spawner abundances exclude early-run life history variants, but additional information on Alsea early-run Chinook is provided below (See Tables I-34 & I-35; Figure I-15).

Table I-31. Natural Origin Spawner Abundance estimates for the Alsea Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Alsea Population	9,599 (9,300)	3,846 (2,900)	2014	9,782
			2015	14,609
			2016	6,979
			2017	5,517
			2018	3,724
			2019	3,540
			2020	11,458

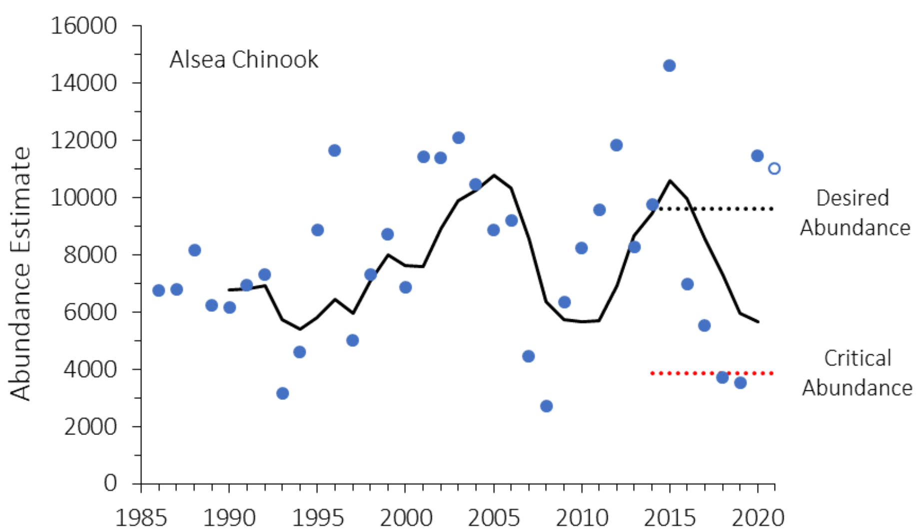

Figure I-14. Natural origin spawner abundance estimates for Alsea Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Alsea is *greater* than the Critical Abundance (Table I-32).

Table I-32. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Alsea Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Alsea Population	11,458	10,993	11,226	3,846

Hatchery Influence

Hatchery Chinook salmon are not currently released into the Alsea population area. Monitoring for Alsea Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW has evaluated the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS (Table I-33). Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes and few observations of hatchery origin spawners. Targets for pHOS are evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-33. Percent hatchery origin spawners (pHOS) for the Alsea Population of Chinook salmon (adults, excluding jacks). pHOS targets are from CMP Table AIII:4. Estimate for the Alsea Population includes fish in Beaver Creek and Yachats Aggregate.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	Observed	
			pHOS	9-year Average
Alsea Population	<10%	2014	<1%	4%
		2015	<1%	3%
		2016	3%	2%
		2017	3%	1%
		2018	<1%	1%
		2019	<1%	1%
		2020	<1%	1%

Early-Run Chinook

Early-run Chinook salmon in the Alsea basin have been monitored by the Lincoln Soil and Water Conservation District and the ODFW Mid Coast Fish District at 4 mainstem standard index surveys: Honeygrove Bridge to Schoolhouse Creek; Schoolhouse Creek to Salmonberry Park; Salmonberry Park to Digger Creek; Digger Creek to Big Riffle Ranch Road). Surveys are intended to target the early portion of the run (mid to late August - October), but fish from the predominant fall portion of the run are present, particularly in October. To account for intermingling of early and late run fish, the Peak Count Summary (Table I-34) identifies peak counts of the early-run component based on (1) comment fields from surveyors that distinguish early and late run fish based on appearance and (2) defining a peak prior to the significant arrival of late-run fish (generally in October) (Table I-34: I-35; Figure I-15). Funding for surveys was discontinued after 2019. Surveys have continued at a reduced level of effort, and results will be reported, as feasible, in future annual reports.

Table I-34. Average Peak Density (Live + Dead Fish/mile) on spawning ground surveys for early-run Chinook in the Alsea population. The CMP does not include abundance targets for Alsea early-run Chinook. The five-year geometric mean for the period preceding the CMP is provided for context.

Spatial Extent	Return Year	Peak Adult Density (Live + Dead)/mile
Alsea Early-Run Chinook	2014	12.4
	2015	10.6
	2016	6.7
	2017	10.0
	2018	1.7
	2019	1.3
	2020	TBD
	5-yr Geomean (2009-2013)	*10.3*

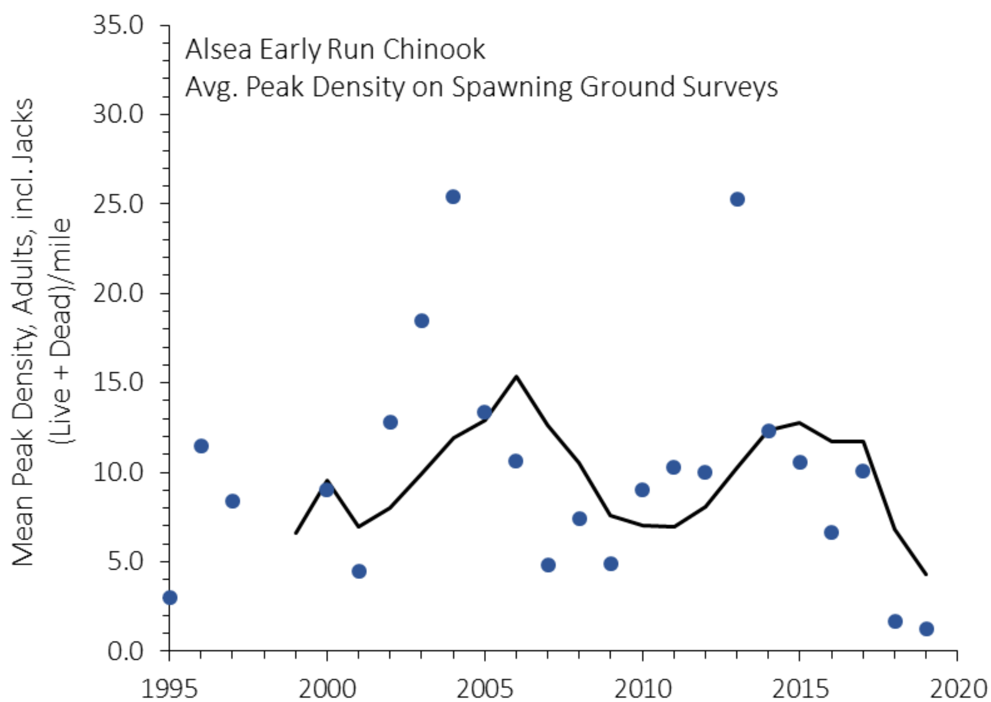

Figure I-15. Average peak density of early-run Chinook salmon (adults, incl. jacks; live + dead per mile) on spawning ground surveys. Trend line is a running 5-year geometric mean.

Peak densities of early-run Chinook on spawning ground surveys include both hatchery and wild origin fish (Table I-34; Figure I-14). However, hatchery Chinook are not currently released into the in the Alsea population. In recent years where spawning ground surveys included information on origin of live fish and carcasses, pHOS in the early portion of the run has below the CMP target (Table I-35). A higher value in 2016 (20%) was based on few observations (n = 5).

Table I-35. September pHOS on standard early-run spawning ground surveys in the mainstem Alsea River. pHOS is calculated in September to target early-run fish prior to return of the dominant fall-run portion of the population. No marked carcasses or live fish were reported in 2015. This is likely a data omission rather than an indication of 0%, so pHOS is not reported for 2015.

PERCENT HATCHERY ORIGIN SPAWNERS – Early-Run			
Spatial Extent	pHOS Target (%)	Year	Observed pHOS (%)
Alsea Chinook (Early-Run)	<10	2016	20[1]
		2017	>1
		2018	3
		2019	0
		2020	TBD

[1]Data based on fewer than 10 observations of known-status live fish or carcasses (n = 5 in 2016)

.

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: Mid Coast

Population: Siuslaw

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Siuslaw Chinook salmon (Table I-36; Figure I-16). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-36 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-36).

Table I-36. Natural Origin Spawner Abundance estimates for the Siuslaw Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Targets		Year	Abundance Estimate
	Desired	Critical		
Siuslaw Population	16,274 (26,200)	3,987 (6,900)	2014	16,395
			2015	18,061
			2016	8,606
			2017	7,371
			2018	3,047
			2019	1,691
			2020	4,430

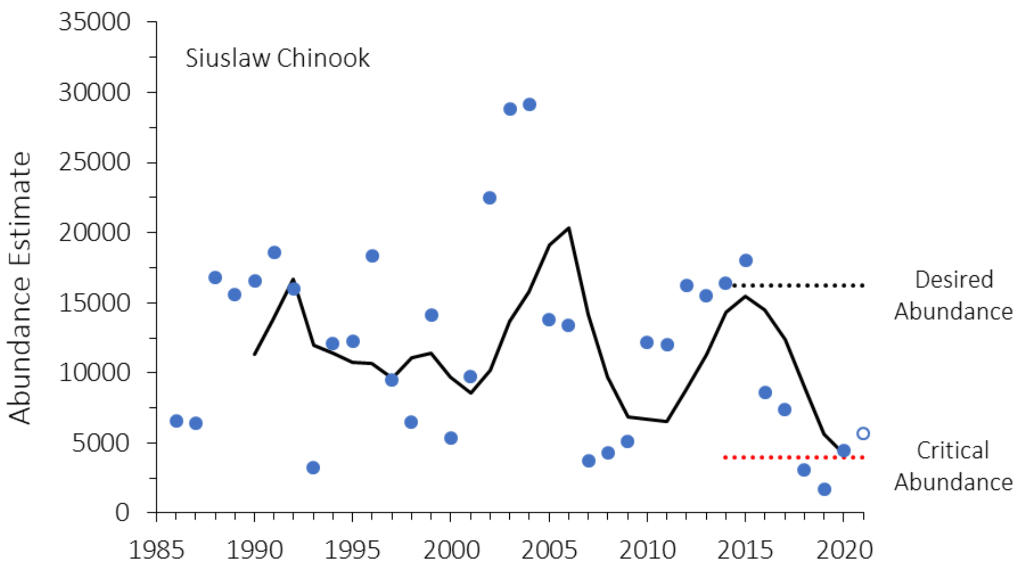

Figure I-16. Natural origin spawner abundance estimates for Siuslaw Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Siuslaw is *greater* than the Critical Abundance (Table I-37).

Table I-37. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Siuslaw Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Siuslaw Population	4,430	5,629	5,029	3,987

Hatchery Influence

Hatchery Chinook salmon are not currently released into the Siuslaw population area. Monitoring for Siuslaw Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW has evaluated the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS (Table I-38). Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes in some years. Targets for pHOS are evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-38. Percent hatchery origin spawners (pHOS) for the Siuslaw Population of Chinook salmon (adults, excluding jacks). pHOS targets are from CMP Table AIII:4.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	Observed	
			pHOS	9-year Average
Siuslaw Population	<10%	2014	<1%	2%
		2015	<1%	2%
		2016	<1%	<1%
		2017	<1%	<1%
		2018	<1%	<1%
		2019	<1%	<1%
		2020	2%	<1%

WILD FISH MONITORING SUMMARY
SMU: Coastal Chinook Salmon
Stratum: Umpqua
Population: Lower, Middle, South and North Umpqua Populations

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Umpqua Chinook salmon (Table I-39; Figure I-17). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-39 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-39). For sliding scale harvest management, the abundance estimate for the Umpqua basin was calculated as the South Umpqua abundance estimate divided by 0.467, an apportionment based on three years of radio telemetry data from fish tagged in the lower mainstem Umpqua River.

Table I-39. Natural Origin Spawner Abundance estimates for Umpqua Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Umpqua Population Aggregate	17,740 (TBD[1])	3,197 (TBD[1])	2014	17,889
			2015	52,853
			2016	10,698
			2017	11,804
			2018	7,903
			2019	2,861
			2020	6,741
South Umpqua Population	8,284 (6,500)	1,493 (1,500)	2014	8,354
			2015	24,682[(2)]
			2016	4,996
			2017	5,512
			2018	3,691
			2019	1,336
			2020	3,148

[1]The CMP (Table A-III) included desired and critical abundance targets only for the South Umpqua population. Targets for the Lower Umpqua and Middle Umpqua were considered "To Be Determined" (TBD). The Sliding Scale for harvest is implemented at the stratum-scale for the Umpqua; targets for the South Umpqua are shown for comparison to CMP abundance thresholds.

[2]2015 was the first year in a change in methodology to a basis in the sum of carcasses.

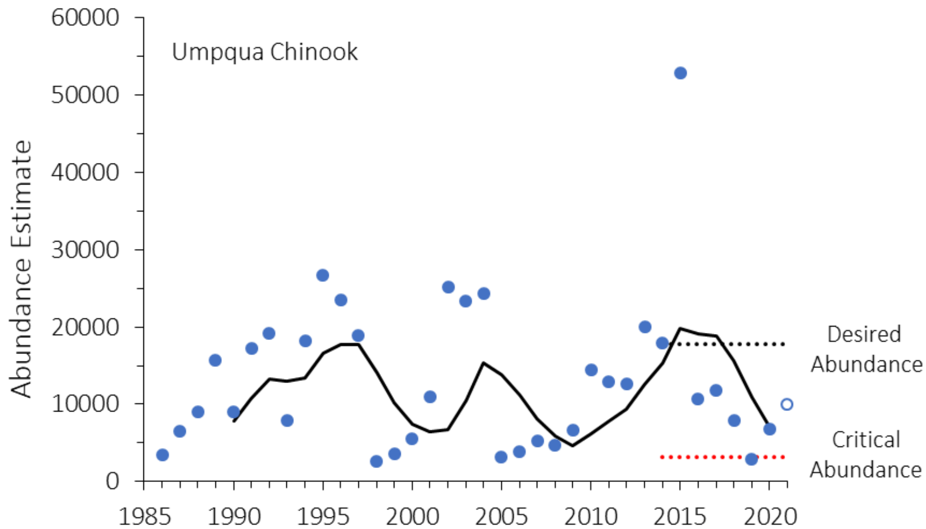

Figure I-17. Natural origin spawner abundance estimates for Umpqua Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance, thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for Umpqua Chinook is *greater* than the Critical Abundance (Table I-40).

Table I-40. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Umpqua Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Umpqua	6,741	9,997	8,369	3,197

Hatchery Influence

The CMP allows for the release of Fall Chinook in the lower and middle Umpqua and Spring Chinook in the North Umpqua. Monitoring for Coastal Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW has evaluated the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS (Table I-41). Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes in some years. Targets for pHOS are evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-41. Percent hatchery origin spawners (pHOS) for Umpqua Chinook salmon. pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (2-mile radius) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat. **pHOS estimates below are preliminary and may include the immediate area around acclimation and hatchery release sites.**

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target (%)	Year	Observed	
			pHOS (%)	9-year Average (%)
Umpqua Population Aggregate	Lower Umpqua ≤10 (<30/<60) Middle Umpqua ≤10 (<30/<60) South Umpqua <10	2014	<1%	2%
		2015	<1%	2%
		2016	<1%	2%
		2017	2%	2%
		2018	2%	2%
		2019	1%	2%
		2020	<1%	2%

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: Mid-South Coast

Population: Coos

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for the Coos Population of Chinook salmon (Table I-42; Figure I-18). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-42 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-42).

Table I-42. Natural Origin Spawner Abundance estimates for the Coos Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Coos Population	9,711 (6,300)	2,531 (1,800)	2014	9,709
			2015	18,484
			2016	4,404
			2017	2,066
			2018	4,800
			2019	6,883
			2020	9,888

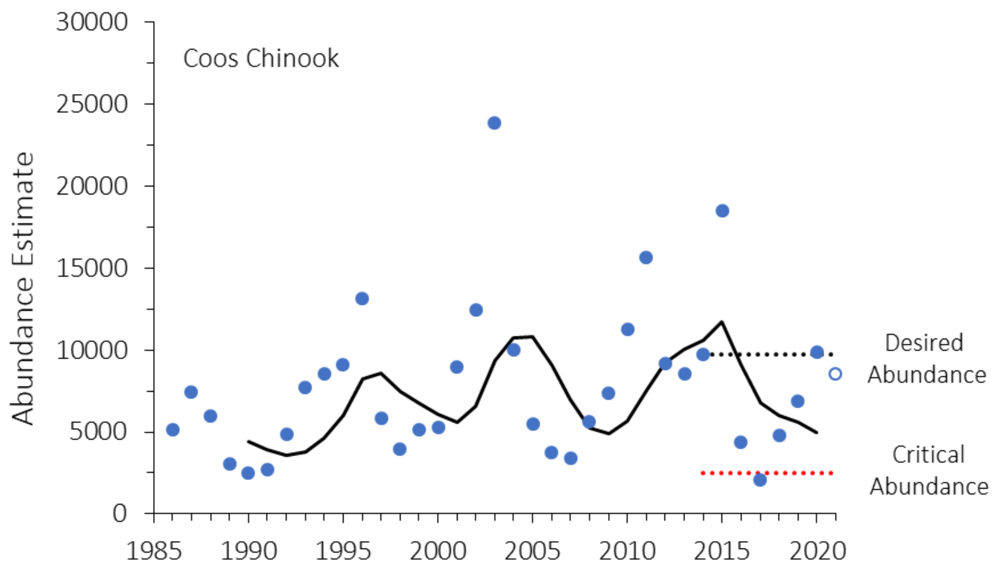

Figure I-18. Natural origin abundance estimates for Coos Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance). For 2021, the closure metric for the Coos is *greater* than the Critical Abundance (Table I-43).

Table I-43. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Coos Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Coos Population	9,888	8,525	9,206	2,531

Hatchery Influence

The CMP allows for the release of approximately 2 million fall Chinook into the Coos Bay Frontal management area. Monitoring for Coos Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW has evaluated the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS (Table I-44). Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes in some years. Targets for pHOS are evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-44. Percent hatchery origin spawners (pHOS) for Coos Chinook salmon (adults, excluding jacks). pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (2-mile radius) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat. **pHOS estimates below are preliminary and may include the immediate area around acclimation and hatchery release sites.**

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target (%)	Year	Observed	
			pHOS	9-year Average
Coos Population	≤10 (<30/<60)	2014	24%	18%
		2015	20%	11%
		2016	12%	11%
		2017	20%	12%
		2018	41%	16%
		2019	38%	19%
		2020	8%	19%

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: Mid-South Coast

Population: Coquille

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Coquille Chinook salmon (Table I-45; Figure I-19). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-45 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-45). Spawner abundances exclude early-run life history variants. There are no independent indices of abundance currently available for early-run Chinook in the Coquille population; there have been no observations of early-run Chinook on limited surveys and spot checks since plan adoption.

Table I-45. Natural Origin Spawner Abundance estimates for the Coquille Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Coquille Population	13,782 (14,300)	2,833 (3,500)	2014	12,586
			2015	14,669
			2016	9,720
			2017	6,470
			2018	498
			2019	275
			2020	879

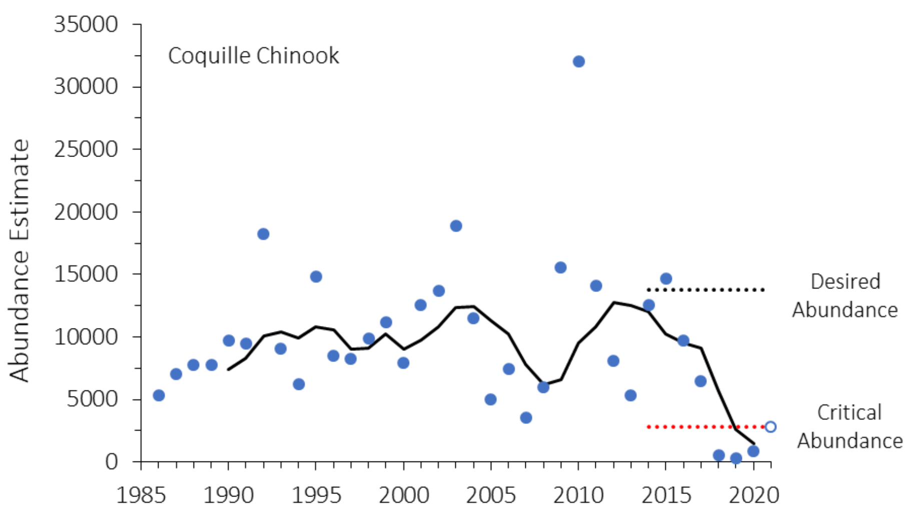

Figure I-19. Natural origin spawner abundance estimates for Coquille Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Coquille is *less* than the Critical Abundance (Table I-46).

Table I-46. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Coquille Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Coquille Population	879	2,785	1,832	2,833

Hatchery Influence

The CMP allows for the release of 175,000 hatchery Fall Chinook into the lower Coquille River (Coquille Bay). Monitoring for Coquille Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW has evaluated the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS (Table I-47). Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes in some years. Targets for pHOS are evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-47. Percent hatchery origin spawners (pHOS) for the Coquille Population of Chinook salmon (adults, excluding jacks). pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (2-mile radius) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat. **pHOS estimates below are preliminary and may include the immediate area around acclimation and hatchery release sites.**

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	Observed	
			pHOS	9-year Average
Coquille Population	≤10 (<30/<60)	2014	1%	2%
		2015	1%	2%
		2016	5%	2%
		2017	1%	2%
		2018	1%	2%
		2019	1%	2%
		2020	1%	2%

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: Mid-South Coast

Population: Floras

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Floras Chinook salmon (Table I-48; Figure I-20). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-48 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-48).

Table I-48. Natural Origin Spawner Abundance estimates for the Floras Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Floras Population	600 (700)	100 (100)	2014	199
			2015	593
			2016	732
			2017	588
			2018	249
			2019	159
			2020	266

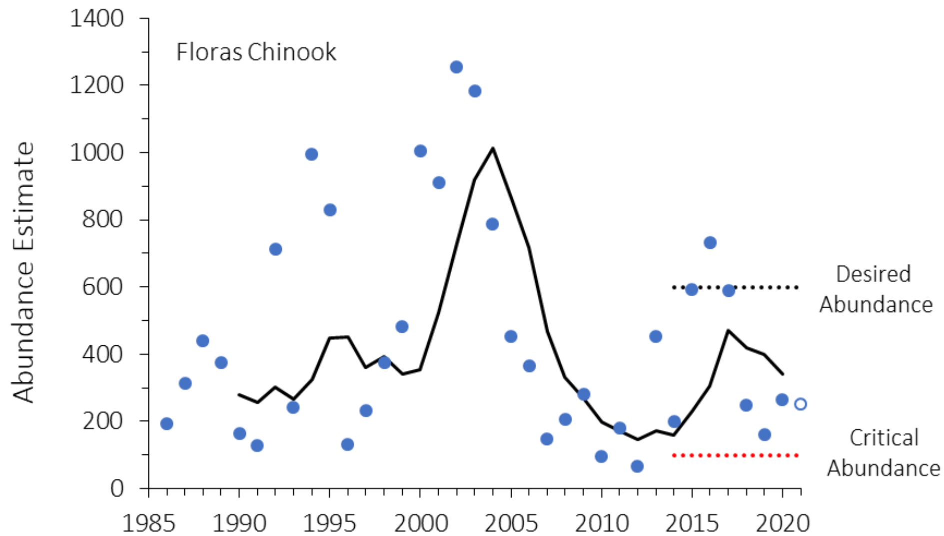

Figure I-20. Natural origin spawner abundance estimates for the Floras population of Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Floras is *greater* than the Critical Abundance (Table I-49).

Table I-49. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Floras Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Floras Population	266	251	259	100

Hatchery Influence

Hatchery Chinook salmon are not currently released into the Floras population area. Monitoring for Floras Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW is evaluating the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS for the Floras Population. These estimates will be included below when they become available (Table I-50). Targets for pHOS will be evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-50. Percent hatchery origin spawners (pHOS) for the Floras Population of Chinook salmon. pHOS targets are from CMP Table AIII:4.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target (%)	Year	Observed	
			pHOS (%)	9-year Average (%)
Floras Population	<10	2014	TBD	TBD
		2015	TBD	TBD
		2016	TBD	TBD
		2017	TBD	TBD
		2018	TBD	TBD
		2019	TBD	TBD
		2020	TBD	TBD

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: Mid-South Coast

Population: Sixes

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Sixes River Chinook salmon (Table I-51; Figure I-21). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1986 through 2018. These thresholds replace the CMP's critical thresholds in Table I-51 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-51).

Table I-51. Natural Origin Spawner Abundance estimates for the Sixes Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Sixes Population	4,124 (4,400)	712 (1,200)	2014	3,829
			2015	16,883
			2016	3,002
			2017	3,268
			2018	2,224
			2019	1,491
			2020	4,686

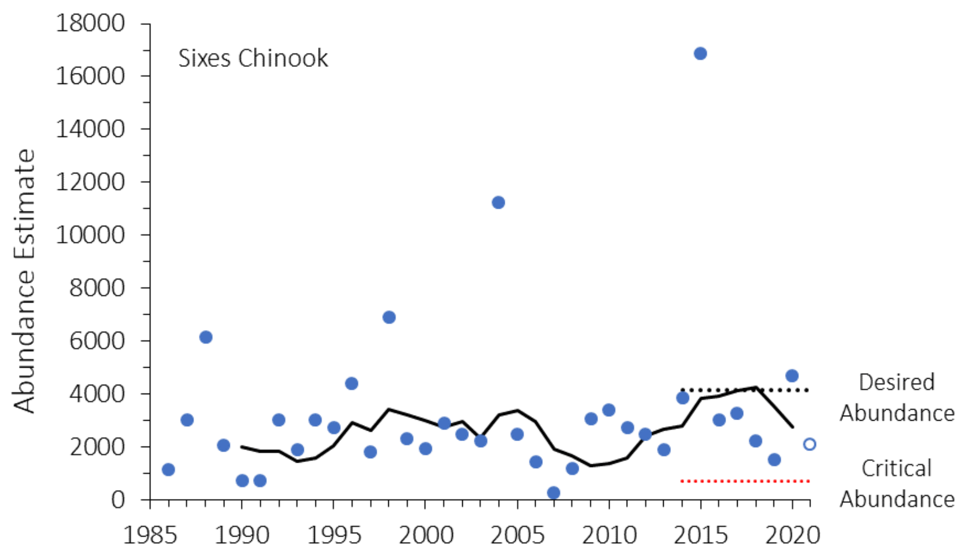

Figure I-21. Natural origin spawner abundance estimates for Sixes River Chinook salmon, 1986-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Sixes is *greater* than the Critical Abundance (Table I-52).

Table I-52. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Sixes Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Sixes Population	4,686	2,054	3,370	712

Hatchery Influence

Hatchery Chinook salmon are not currently released into the Sixes population area. Monitoring for Sixes Chinook salmon was not specifically designed to estimate pHOS at the population scale, but ODFW is evaluating the existing data (e.g., carcass observations on spawning surveys) to provide the best possible estimates of pHOS for the Sixes Population. These estimates will be included below when they become available (Table I-53). Targets for pHOS will be evaluated using the running nine-year average rather than annual point estimates to account for error in estimates and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table I-53. Percent hatchery origin spawners (pHOS) for the Sixes Population of Chinook salmon. pHOS targets are from CMP Table AIII:4.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	Observed	
			pHOS	9-year Average
Sixes Population	<10%	2014	TBD	TBD
		2015	TBD	TBD
		2016	TBD	TBD
		2017	TBD	TBD
		2018	TBD	TBD
		2019	TBD	TBD
		2020	TBD	TBD

WILD FISH MONITORING SUMMARY

SMU: Coastal Chinook Salmon

Stratum: Mid-South Coast

Population: Elk River

Abundance

A time series of spawner abundance estimates is used to evaluate the CMP's Desired and Critical Abundance criteria for Elk River Chinook salmon (Table I-54; Figure I-22). Critical Abundance thresholds are based on the 5th percentile of the lognormal distribution of spawner abundance estimates for the period of 1998 through 2018. These thresholds replace the CMP's critical thresholds in Table I-54 below. Likewise, Desired Abundance targets were recalculated as the 75th percentile of the lognormal distribution of abundance estimates over the same period (Table I-54). In the CMP, ODFW classified the Elk River Chinook population as non-viable. Given this non-viable status, ODFW will continue to evaluate the adequacy of these abundance thresholds for Elk River Chinook.

Table I-54. Natural Origin Spawner Abundance estimates for the Elk River Population of Chinook salmon. Desired and Critical Abundance thresholds are calculated as the 75th and 5th percentile, respectively, of the lognormal distribution of abundance estimates from 1986 through 2018. For comparison, the CMP's original desired and critical thresholds (CMP Table AIII:2) are provided in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Elk River Population	2,243 (2,000)	690 (800)	2014	1,628
			2015	3,472
			2016	2,151
			2017	1,880
			2018	1,260
			2019	1,566
			2020	1,719

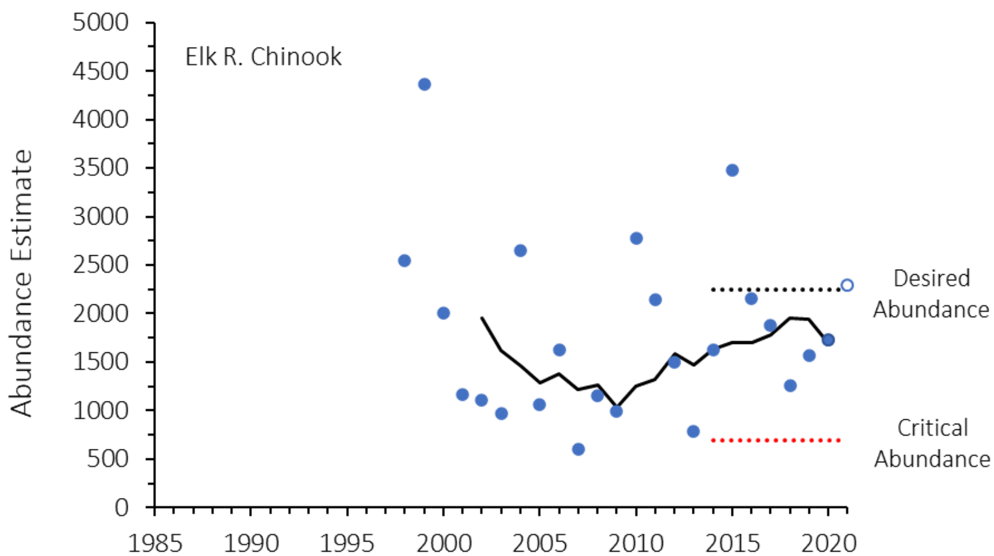

Figure I-22. Natural origin spawner abundance estimates for Elk River Chinook salmon, 1998-2020 (•; open circle is the 2021 abundance forecast). The solid black line is the running 5-year geometric mean of abundance estimates; the black and red dashed lines are the revised Desired and Critical Abundance thresholds, respectively.

Harvest - Sliding Scale

The CMP called for a "sliding scale" of harvest as a function of abundances at the stratum level. The sliding scale is intended to help determine the allowable bag limits for fisheries on wild coastal fall Chinook salmon. Daily and seasonal bag limits of natural origin fall Chinook generally are the same for all populations within a stratum unless there is a conservation closure.

Conservation closures of fisheries for Chinook salmon may be triggered when the population's Closure Metric (the average of the spawner abundance estimate and the upcoming year's forecast abundance) is *less* than the Critical Abundance. For 2021, the closure metric for the Elk River is *greater* than the Critical Abundance (Table I-55).

Table I-55. 2020 abundance estimate, 2021 forecast abundance, 2021 Closure Metric, and Critical Abundance for the Elk River Population of Chinook salmon.

Spatial Extent	2020 Abundance Estimate	2021 Forecast Abundance	Closure Metric	Critical Abundance
Elk River Population	1,719	2,288	2,004	690

Hatchery Influence

The CMP allows for the release of 275,000 Fall Chinook salmon into the Elk River population area. The hatchery population from the Elk River is monitored as a Pacific Salmon Treaty (PST) Exploitation Rate Indicator Stock. This monitoring provides for an estimate of pHOS. Targets for pHOS are evaluated as a running nine-year average to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets (Table I-56). Nine-year averages of pHOS were higher than the CMP target immediately after plan adoption but have since declined to near target levels; this reflects annual estimates near or below the CMP target in all years since plan adoption.

Table I-56. Percent hatchery origin spawners (pHOS) for the Elk River Population of Chinook salmon. pHOS targets are from CMP Table AIII:4.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target (%)	Year	Observed	
			pHOS (%)	9-year Average (%)
Elk River Population	≤30	2014	28	52
		2015	20	50
		2016	31	48
		2017	25	43
		2018	6	36
		2019	27	31
		2020	24	28

Section II. Coastal Spring Chinook Salmon

Abundance

Abundances of Spring Chinook salmon in the North and South Umpqua populations are estimated based on Winchester Dam counts and surveys of adult Spring Chinook holding in resting holes, respectively. Abundance estimates are compared against the Critical and Desired Abundance targets identified in the CMP (Figures II-1 and II-2). The CMP does not include a Critical Abundance threshold for South Umpqua Spring Chinook because harvest of Chinook salmon is prohibited in the South Umpqua Basin. For comparative purposes pending development of a low abundance threshold, abundances in Figure II-1 are compared to the population's quasi-extinction threshold[4] identified in the CMP. A Critical Abundance threshold for South Umpqua Spring Chinook will be considered during development of a sliding scale for harvest in the Umpqua basin. Additional information is provided in population summaries below.

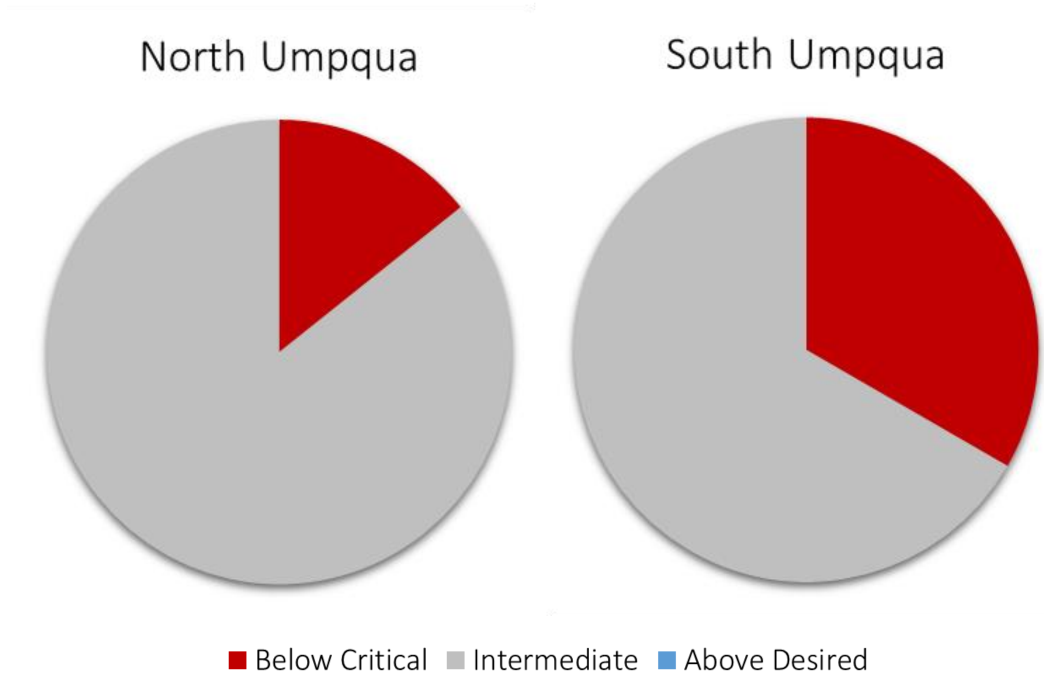

Figure II-1. Coastal Spring Chinook salmon. Percent of years from 2014 to 2020 in the South Umpqua (excluding 2015 – unsurveyed) and 2014 to 2020 in the North Umpqua with abundance estimates in the following categories: Below Critical Abundance (Red), Above Desired Abundance (Blue), or Intermediate between Critical Abundance and Desired Abundance (Gray). The CMP does not include a Critical Abundance threshold for South Umpqua Spring Chinook where harvest of Chinook salmon is prohibited; here, abundances are compared to the CMP's quasi-extinction threshold for comparative purposes pending development of a critical abundance threshold.

[4]A quasi-extinction threshold (QET) represents a threshold of abundance below which the population is considered functionally extinct after multiple consecutive years (the CMP used 3 consecutive years in population viability analyses). The QET is greater than zero to account for genetic and demographic impacts associated with persistent low abundance. For the South Umpqua Spring Chinook population, the QET (n = 50) is approximately equal to the 5th percentile of the lognormal distribution for the CMP's base period for South Umpqua Spring Chinook (1972 to 2010). QET values for small, medium, and large populations are from the CMP, page 148. The South Umpqua Spring Chinook Population was classified as a Small Population in CMP Table A-II: 11. Population size classification is for historical levels. Classification was initially determined based on the SMU-specific number of stream kilometers for a population, but it was modified on a case-by-case basis to account for likely historical differences in productivity and habitat between basins for each population in comparison to others across the entire SMU.

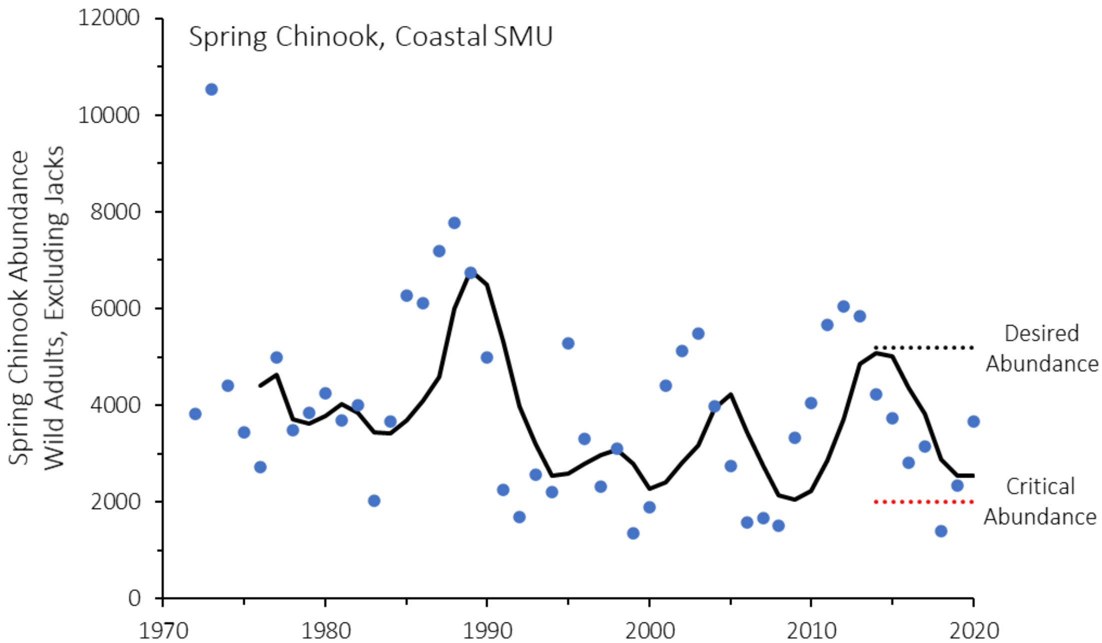

Figure II-2. Abundance of Coastal Spring Chinook Salmon (Adults, excluding Jacks), 1972-2020 (•). 1972 is the start of the base period for the CMP assessment. The abundance estimate for 2020 (open circle) is provisional pending availability of harvest data to complete the abundance estimate for the North Umpqua population. The solid black line is the running 5-year geometric mean of abundance estimates; dashed black and red lines are the CMP Desired and Critical Abundance thresholds, respectively, calculated as the sum of abundance thresholds for the SMU's constituent populations, the North and South Umpqua. Note that the Critical Abundance threshold is based solely on that of the North Umpqua population, pending development of a Critical Abundance threshold for the South Umpqua population.

Hatcheries and Harvest

Harvest and hatchery influence are addressed separately in the population summaries below.

Productivity

ODFW will use size composition to assess productivity measures. Although a lack of age composition, marine harvest impacts or current smolt abundance estimates precludes estimation of Adult-to-Adult Survival, Smolt-to-Adult Survival or Adult-to-Outmigrant Survival estimation at this time, there is some ability to collect age information during existing and planned sampling.

Spatial Structure

Spatial structure is not directly assessed for South Umpqua or North Umpqua Spring Chinook because sampling is not conducted throughout the range of spawning or rearing habitat for these populations.

Diversity

Measurement of phenotypic diversity for Coastal Spring Chinook is limited to estimates of run timing of the North Umpqua population at Winchester Dam. To account for influences of inter-annual differences in environmental conditions, ODFW will evaluate run timing at the next assessment period called for in the CMP.

WILD FISH MONITORING SUMMARY

SMU: Coastal Spring Chinook Salmon

Stratum: Umpqua

Population: South Umpqua

Abundance

The abundance of South Umpqua Spring Chinook is indexed through snorkel and dive counts in resting holes in the upper portion of the South Umpqua River (Table II-1; Figure II-3). These counts consist of underwater observations of summer-holding adults in select index pools. The counts have been conducted annually for over 40 years and provide a long-term index of trend for this population. The base period for the CMP assessment began in 1972 because exploitation rates prior to this time are unknown. Recent resting hole counts are assumed to equal 95% of the census population and are expanded accordingly. The CMP did not include a Critical Abundance threshold for the South Umpqua Population of Spring Chinook; a Critical Abundance threshold will be developed with the Umpqua Spring Chinook sliding scale for harvest.

Table II-1. Resting-hole abundance estimates for wild Spring Chinook in the South Umpqua Population. Desired Abundance Targets are from CMP Table A-III:2. Estimates are adults, excluding jacks. The CMP does not include a Critical Abundance threshold for South Umpqua Spring Chinook salmon.

NATURAL ORIGIN ABUNDANCE – Resting Hole Counts				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
South Umpqua Population	600(1)	*n/a*[2]	2014	245
			2015	*Not Surveyed*[3]
			2016	247
			2017	216
			2018	24
			2019	43
			2020	102

[1]Desired Abundance for South Umpqua Spring Chinook is calculated as the Minimum Equilibrium Threshold (n = 500) + 20%

[2]South Umpqua Spring Chinook do not have a critical abundance threshold because there is no harvest on this population within the South Umpqua basin.

[3]Resting hole surveys were not conducted in 2015 to avoid additional stress to fish given low flow conditions and high water temperatures.

Harvest

The South Umpqua River is closed to harvest of Chinook salmon year-round. A sliding scale will be developed for wild Spring Chinook on the mainstem Umpqua.

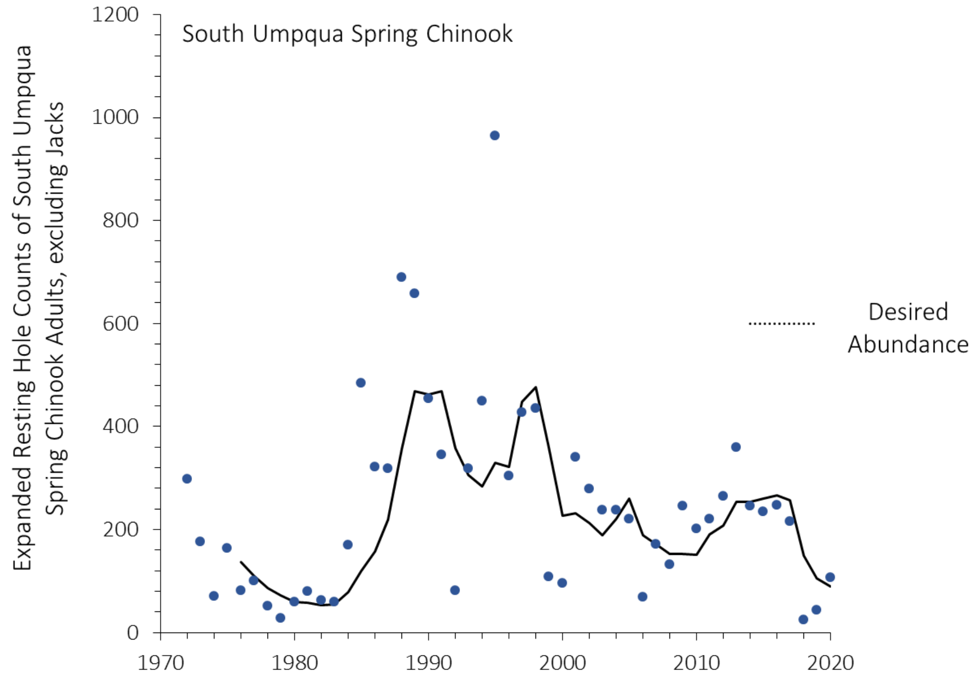

Figure II-3. Resting hole counts of wild South Umpqua Spring Chinook (Adults, excluding jacks) expanded by proportion of population represented in index pool counts), 1972-2020 (•). The solid black line is the running 5-year geometric mean of abundance estimates, and the black dashed line is CMP Desired Abundance. The CMP did not define a Critical Abundance threshold for South Umpqua Spring Chinook.

Hatchery Influence

Hatchery Spring Chinook salmon are not currently released into the South Umpqua River. Annual estimates of pHOS for the South Umpqua population of Spring Chinook salmon are based on observations of fin-clipped fish during resting hole surveys (Table II-2). All unmarked fish are assumed to be wild. pHOS targets are evaluated as a running nine-year average to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets.

Table II-2. Percent hatchery origin spawners (pHOS) for the South Umpqua Population of Spring Chinook salmon. pHOS targets are from CMP Table AIII:4.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target[1]	Year	Observed	
			pHOS (%)	9-year Average (%)
South Umpqua Population	< 10%	2014	1	1
		2015	*Not Surveyed[1]*	1
		2016	0	1
		2017	0	1
		2018	0	1
		2019	3	1
		2020	0	1

[1]*Resting hole surveys were not conducted in 2015 to avoid stress to fish due to low water and high water temperatures.*

WILD FISH MONITORING SUMMARY

SMU: Coastal Spring Chinook Salmon

Stratum: Umpqua

Population: North Umpqua

Abundance

ODFW estimates the abundance of North Umpqua Spring Chinook through video counts at Winchester Dam (Table II-3; Figure II-4). Wild fish are distinguished from hatchery fish by the presence of intact adipose fins. Estimates of naturally produced spawners are adjusted to account for jacks by origin (hatchery or wild), a change in counting methods in 1992, wild fish retained at hatchery facilities (wild broodstock), and recreational harvest upstream of Winchester Dam. The CMP used a base period of 1972 – 2010 for calculation of Desired and Critical Abundance thresholds.

Table II-3. Natural Origin Spawner Abundance estimates for the North Umpqua Population of Spring Chinook salmon. Estimates are adults, excluding jacks, after accounting for a change in counting methods in 1992, wild fish retained at hatcheries, and recreational harvest upstream of Winchester Dam. Desired and Critical Abundance Targets are from CMP Table A-III:2.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
North Umpqua Population	4,600	2,000	2014	3,973
			2015	3,492
			2016	2,570
			2017	2,942
			2018	1,374
			2019	2,298
			2020	3,563

Harvest

A sliding scale will be developed for harvest of North Umpqua Spring Chinook on the mainstem Umpqua.

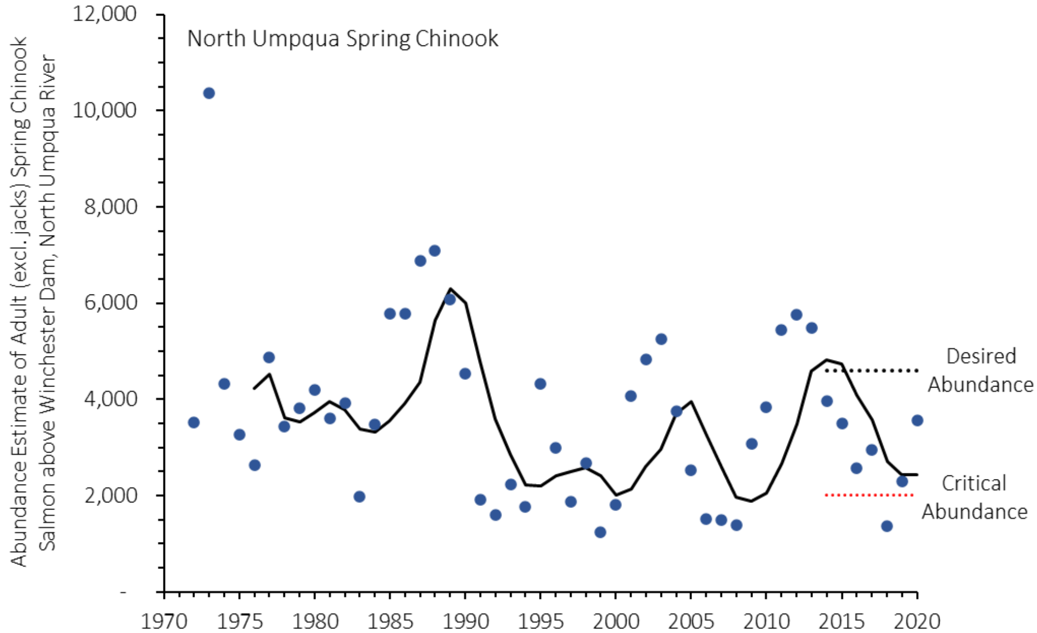

Figure II-4. Abundance estimates of wild adult Spring Chinook salmon (excluding jacks) above Winchester Dam on the North Umpqua River (•), 1972-2020. Estimates are based on counts of unmarked Spring Chinook salmon passing Winchester Dam counting facilities (Mar. 1 – Sept. 30) after adjusting for jacks by origin, fish retained at hatchery facilities, a change in counting methods in 1992, and recreational harvest above Winchester Dam. Desired and Critical Abundance thresholds from the CMP are shown as dashed black and red lines, respectively.

Hatchery Influence

The CMP allows for the release of 342,000 hatchery Spring Chinook into the North Umpqua River. Estimates of the abundance of naturally spawning hatchery fish are derived by subtracting returns to Rock Creek Hatchery and hatchery fish harvested in the North Umpqua upstream of Winchester Dam from video counts of fin-clipped fish at the dam. This estimate is used with the estimate of naturally produced spawners to provide an estimate of pHOS. Targets for pHOS are evaluated as a running nine-year average to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets (Table II-4).

Table II-4. Percent hatchery origin spawners (pHOS) for the North Umpqua population of Spring Chinook salmon. pHOS targets are from CMP Table AIII:4.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	Observed	
			pHOS (%)	9-year Average (%)
North Umpqua Population	≤10 (<30/<60)	2014	63	63
		2015	53	61
		2016	55	60
		2017	39	56
		2018	56	54
		2019	42	52
		2020	33	50

After accounting for harvest and retention at hatchery facilities, estimates of pHOS above Winchester Dam (River Mile 7) have been higher than the CMP pHOS target for the North Umpqua Population (Table II-4). However, the 9-year running average of pHOS estimates has been steadily declining since a peak in 2007, and the estimates in Table II-4 are calculated assuming complete spatial overlap of spawning by hatchery and wild fish. Several additional datasets (described below) indicate some degree of spatial segregation of hatchery and wild Spring Chinook in the North Umpqua Population.

Observations at Soda Springs Dam passage facilities (River Mile 70, ~34 river miles above Rock Creek) indicate that pHOS in the upper portions of the basin is much lower than reported in Table II-4 (Table II-5). Mark status (adipose fin clips) of carcasses observed during upper basin spawning surveys[5] also indicate that pHOS in the upper basin has been near or below the CMP target of ≤10% since plan adoption. Conversely, observations of mark status during snorkel surveys of holding pools in Rock Creek indicate higher pHOS, as expected given that Rock Creek is the location of the hatchery and releases of hatchery smolts (Table II-5). Less is currently known about pHOS in mainstem locations between Rock Creek and upper basin spawning survey locations. ODFW will continue to investigate options for more accurately assessing this metric and will implement additional actions to reduce pHOS, if needed.

Table II-5. Percent hatchery origin spawners (pHOS) of Spring Chinook Salmon in specific portions of North Umpqua population: Soda Springs passage facilities, carcass observations during upper basin spawning surveys, and Rock Creek snorkel surveys. Rock Creek pHOS is based on observations during snorkel surveys of holding pools upstream of the Rock Creek Diversion Dam; Data at Soda Springs are insufficient for calculating 9-year averages; 9-year averages are available for Rock Creek beginning in 2016. Note that pHOS at Soda Springs is based on passage counts, and the estimate does not account for exploration by adult fish that fall back to ultimately spawn downstream.

Year	Soda Springs	Upper Basin Spawning Surveys		Rock Creek Holding Pools	
	pHOS	pHOS	pHOS, 9-yr Average	pHOS	pHOS, 9-yr Average
2014	24%	10%	11%	94%	*n/a*
2015	17%	8 %	11%	97%	*n/a*
2016	15%	5%	10%	95%	96%
2017	11%	4%	9%	92%	96%
2018	16%	5%	9%	88%	95%
2019	17%	8%	9%	82%	93%

[5]Spring Chinook Salmon spawning ground surveys are conducted in the mainstem North Umpqua River above (Soda Springs Reservoir upstream to Slide Creek Dam approximately 3.6 miles) and below (Soda Springs Powerhouse downstream to Calf Creek approximately 7.4 miles) the dam and in North Umpqua River tributaries above (Fish Creek) and below (Copeland, Boulder, and Calf creeks) the dam. Surveys were not conducted above Soda Springs Dam until 2013, and 2017 counts are incomplete due to river access restrictions caused by forest fires.

Section III. Coastal Winter Steelhead

Abundance

Spawner abundance estimates of wild coastal winter steelhead are available for the four strata (North Coast, Mid Coast, Umpqua, and Mid-South Coast), the Salmonberry subpopulation of the Nehalem population, and the North Umpqua population. Abundance estimates are compared against the CMP's Critical and Desired Abundance targets (Figure II-1).

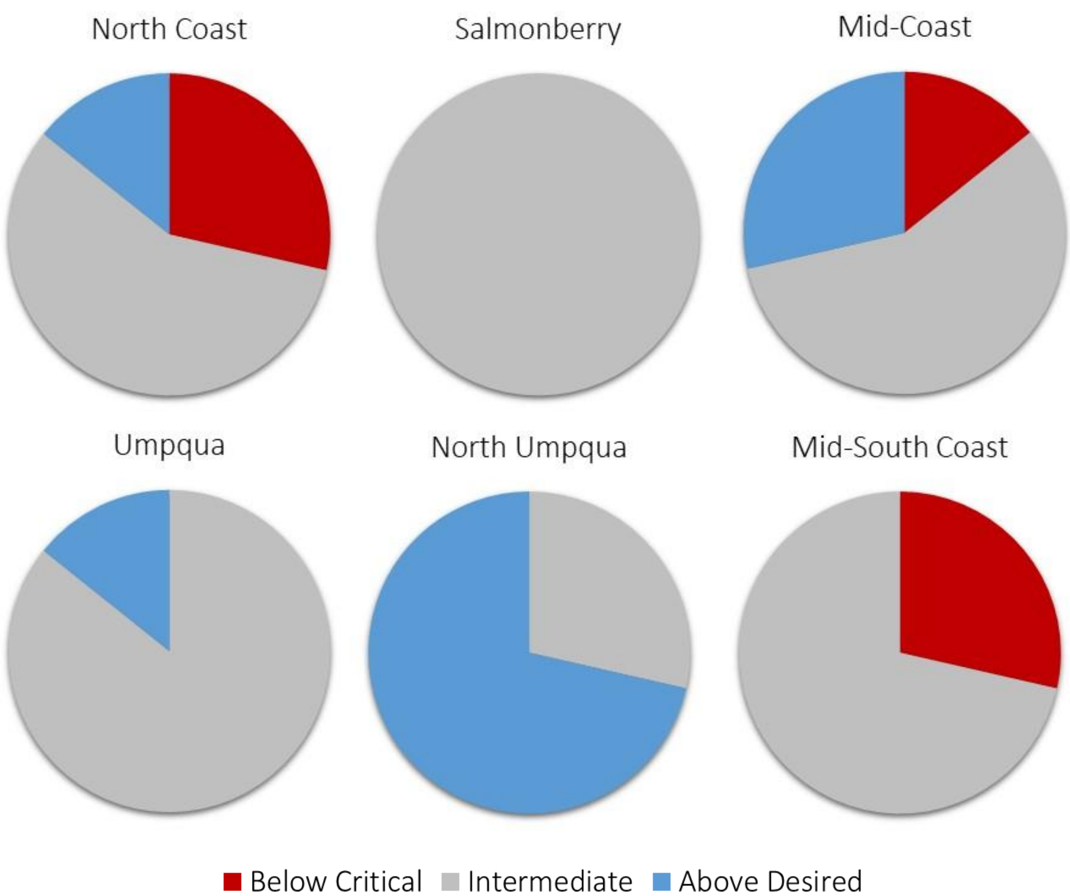

Figure III-1. Coastal Winter Steelhead. Percent of years from 2014 to 2020 with wild abundance estimates in the following categories: Below Critical Abundance (Red), Above Desired Abundance (Blue), or Intermediate between Critical Abundance and Desired Abundance (Gray). Abundance estimates for the North Coast, Mid Coast, Umpqua, and Mid-South Coast are stratum-scale abundances, while estimates for the North Umpqua and Salmonberry are for the population and subpopulation, respectively. The Salmonberry estimate is compared to the Nehalem Critical and Desired Abundance thresholds (the CMP does not include specific abundance targets for the Salmonberry subpopulation).

The CMP's stratum-level Desired and Critical Abundance thresholds were calculated as the 75th percentile and 0.5*median, respectively, of abundance estimates over a base period of 2003 through 2012. The stratum-level Critical Abundances were calculated as 0.5*median abundance because of the limited time period available to develop percentiles and because the base time period encompassed a recent period of relatively abundant years based on time series of abundances in the Salmonberry subpopulation and the North Umpqua population.

The CMP's stratum-level winter steelhead abundance time series were developed based on estimates of the abundance of steelhead redds expanded to adult fish abundance using the following redds-to-fish expansion: fish abundance = 1.04*redds + 42. The CMP recognized that this expansion was likely conservative, and following adoption of the CMP, ODFW began to apply a revised redds-to-fish expansion factor (fish abundance = 1.7*redds + 3.74) for annual fish abundance estimates. Revision of the expansion factor for coastal winter steelhead was based on a re-analysis of the relationship between the abundances of redds and fish at sites where independent estimates of fish abundance were available (e.g., dam counts or mark-recapture studies) (ODFW 2013b).

To align the CMP's coastal winter steelhead abundance thresholds with current fish abundance estimates, the CMP thresholds were recalculated using the current redds-to-fish conversion. It is important to recognize that, with one exception, adjusting the CMP thresholds by applying the current redds-to-fish expansion does not change assessment results because both the thresholds and annual estimates of redd abundance are adjusted using the same expansion equation. The exception is the North Umpqua population, where the Desired Abundance assessment would become more conservative (thresholds become higher relative to annual abundance estimates). For this reason, the Desired Abundance criterion for the North Umpqua population was set to the 75th percentile of the long-term record based on counts at Winchester Dam. This criterion is discussed further in the Umpqua Stratum summary. For transparency, all winter steelhead stratum summaries include thresholds and annual abundance estimates derived from both the original and the current redds-to-fish expansion equations. Figure III-2 provides a SMU-scale roll up of winter steelhead abundance criteria and abundance estimates.

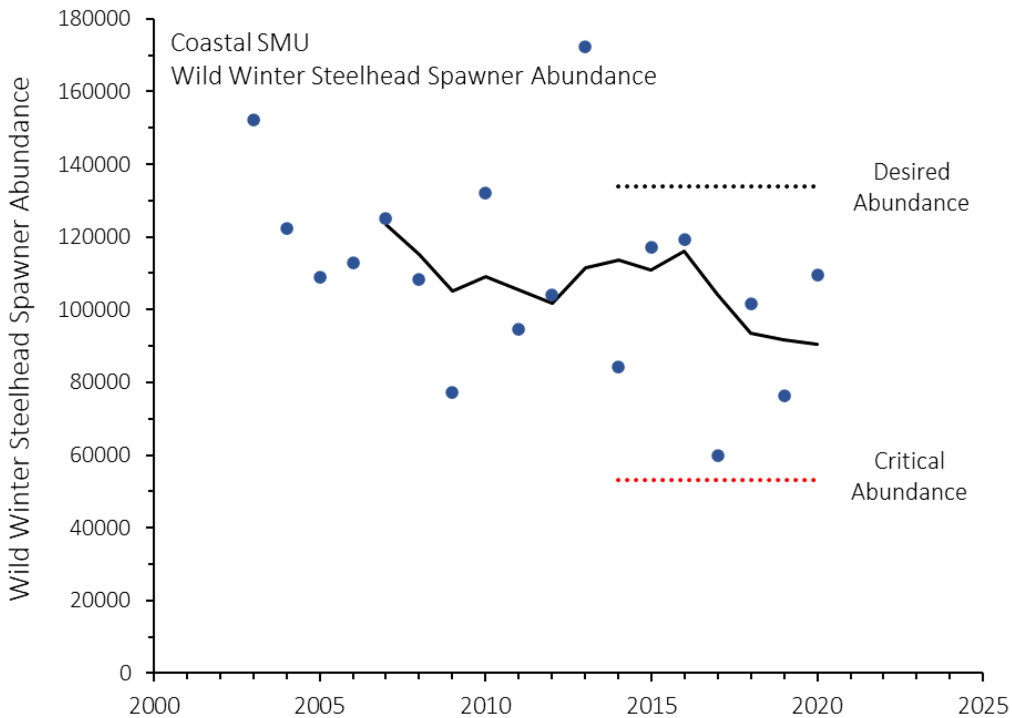

Figure III-2. Abundance estimates for the wild winter steelhead in the Coastal SMU (•), 2003-2020, derived from random redd surveys (expanded to fish abundance) and counts of wild winter steelhead at Winchester Dam (North Umpqua) after adjustment for harvest and retention at hatchery facilities. The solid black line is the running five-year geometric mean of abundance estimates. Revised Desired and Critical Abundance thresholds at the SMU-scale, calculated as the sum of revised stratum-scale abundance criteria, are shown as dashed black and red lines, respectively.

Harvest and Hatcheries

Harvest and hatchery influence are addressed separately in the population summaries below.

Productivity

At the next assessment called for in the CMP, ODFW will assess age composition where possible at life cycle monitoring sites. ODFW also conducts random juvenile surveys in wadeable streams to provide information on juvenile abundance, density, and distribution (Table III-1).

Table III-1. Abundance, density, and site occupancy of steelhead parr in the Coastal SMU. Data are from un-calibrated snorkel surveys in 1st – 3rd order streams. 95% Confidence Intervals are expressed as a percent of the estimate. The CMP does not include specific targets for juvenile abundance, density, or occupancy. The 5-year averages of the period prior to adoption of the CMP are provided for context.

JUVENILE ABUNDANCE, DENSITY & OCCUPANCY, STEELHEAD				
Spatial Extent	Year	Abundance ±95% CI	Average Density in Pools (parr/m^2 ±95% CI)	Occupancy (% ± 95% CI)
Coastal Winter Steelhead SMU	2014	274,672 ± 24%	0.029 ± 18%	88 ± 34%
	2015	136,759 ± 23%	0.015 ± 28%	65 ± 18%
	2016	247,939 ± 19%	0.020 ± 17%	73 ± 22%
	2017	313,308 ± 20%	0.021 ± 16%	84 ± 29%
	2018	166,980 ± 20%	0.018 ± 19%	71 ± 19%
	2019	185,529 ± 22%	0.014 ± 17%	72 ± 8%
	2020	349,654 ± 24%	0.030 ± 23%	82 ± 7%
	5-yr Average (2009-2013)	261,424[1]	0.039	79

[1]The 5-year average abundance for the period 2009 through 2013 is calculated as a geometric mean.

Spatial Structure

Spatial structure will be evaluated for each population at the next assessment called for in the CMP. Summaries of adult occupancy are provided in the population summaries below.

Diversity

To account for influence of inter-annual variability in environmental conditions, ODFW will evaluate metrics of phenotypic diversity at the next assessment period called for in the CMP. Metrics may include spawning timing, spawner age composition, adult size composition at life cycle monitoring sites, and migration timing at life cycle monitoring sites.

WILD FISH MONITORING SUMMARY

SMU: Coastal Winter Steelhead

Stratum: North Coast

Population: Multiple Population Aggregate, Salmonberry Management Area (Nehalem), Nestucca

Abundance

Spawner abundance of wild winter steelhead in the North Coast Stratum is evaluated based on redd surveys (redd abundance expanded to fish abundance) (Table III-2; Figure III-3). In the Salmonberry Management Area of the Nehalem Population, an annual abundance estimate is based on expansion of the peak count of redds in the long-term standard spawning survey on the Salmonberry River (i.e., the Enright Reach); the calculation assumes no hatchery fish given no substantial history of hatchery programs (Table III-2; Figure III-4). Beginning in 2017, ODFW increased the number of random redd surveys in the Nestucca Population to better assess pHOS targets. This densification of surveys allowed for a population-level abundance estimate for 2017-2020, but this work was discontinued after 2020 (Table III-2). As previously described, the CMP's stratum-level abundance thresholds for winter steelhead were recalculated using a revised redds-to-fish expansion equation. This does not change assessment results because both the thresholds and annual redd abundance estimates are adjusted using the same expansion equation. Regardless, Table III-2 provides thresholds and annual abundance estimates calculated using both expansions.

It should be noted that the Desired Abundance targets for winter steelhead at the population scale (e.g., Nestucca) are based on the expected apportionment of strata goals to the populations (See CMP Table A-III:2). These apportionments were based on a variety of information, including population-specific kilometers of distribution, and estimated population redd densities using data aggregated from 2003-2012, juvenile snorkel surveys, smolt trap data, historical harvest data, and professional judgment; population apportionments should be considered preliminary and may be adjusted as new data are available.

Since 1994, volunteers coordinated through ODFW's Salmon and Trout Enhancement Program (STEP) have surveyed winter steelhead redds in the Salmonberry subpopulation at eight standard survey sites in addition to the Enright standard survey reach. The CMP's thresholds and annual abundance assessments are based only on expansion of the Enright reach because of the longer time series available for that site (ca. 1973). However, redd density (redds/mile) across the full suite of standard sites provides another trend index for the Salmonberry subpopulation (Figure III-5).

Table III-2. Natural origin spawner abundance targets and estimates for North Coast winter steelhead. Desired and Critical Abundance Targets are from CMP Table A-III:2, with stratum-level estimates adjusted using a revised redds-to-fish expansion factor. For comparison, the original abundance thresholds and annual abundance estimates derived using the CMP's original expansion factor are shown in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Targets		Year	Abundance Estimate
	Desired	Critical		
North Coast Stratum	35,613 (21,800)	16,174 (9,900)	2014	24,118 (14,794)
			2015	41,893 (25,669)
			2016	26,338 (16,153)
			2017	18,228 (11,191)
			2018	15,481 (9,510)
			2019	13,410 (8,243)
			2020	33,611 (20,602)
Salmonberry Management Area, Nehalem[1]	*n/a*	*n/a*	2014	1,233
			2015	2,100
			2016	1,933
			2017	1,433
			2018	1,367
			2019	1,296
			2020	1,963
Nestucca Population	25% of Stratum Target 8,903 (5,450)	*TBD*	2017	1,753 (1,112)
			2018	2,991 (1,869)
			2019	2,489 (1,562)
			2020	5,352 (3,314)

[1]The CMP does not include Desired and Critical Abundance criteria for the Salmonberry subpopulation of the Nehalem population. The critical abundance threshold for the Nehalem population is 600.

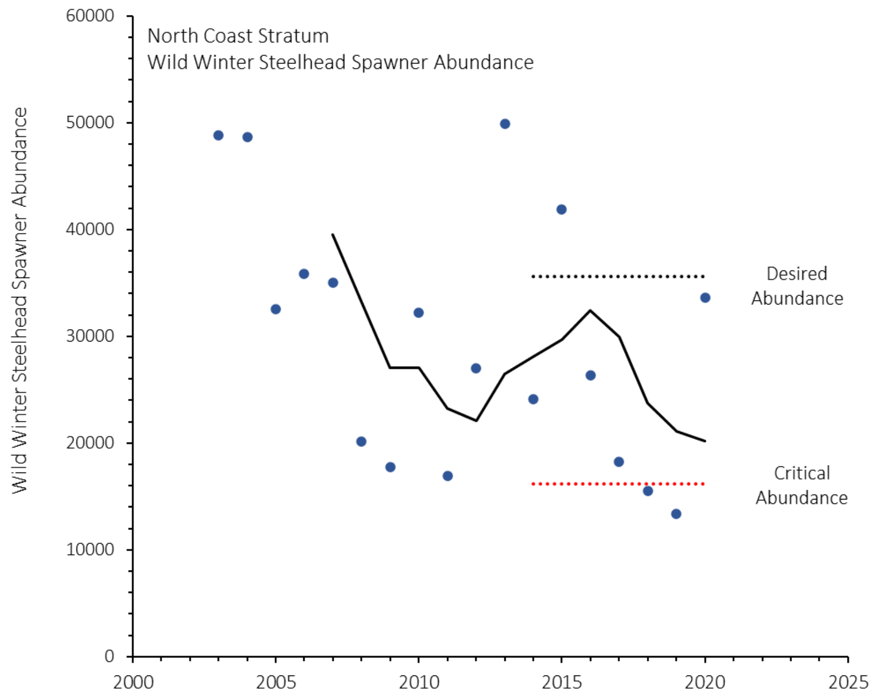

Figure III-3. Abundance estimates for the North Coast Stratum of wild winter steelhead (•) derived from random redd surveys (expanded to abundance), 2003-2020. Solid black line is the running five-year geometric mean of abundance estimates. Revised Desired and Critical Abundance thresholds are shown as dashed black and red lines, respectively.

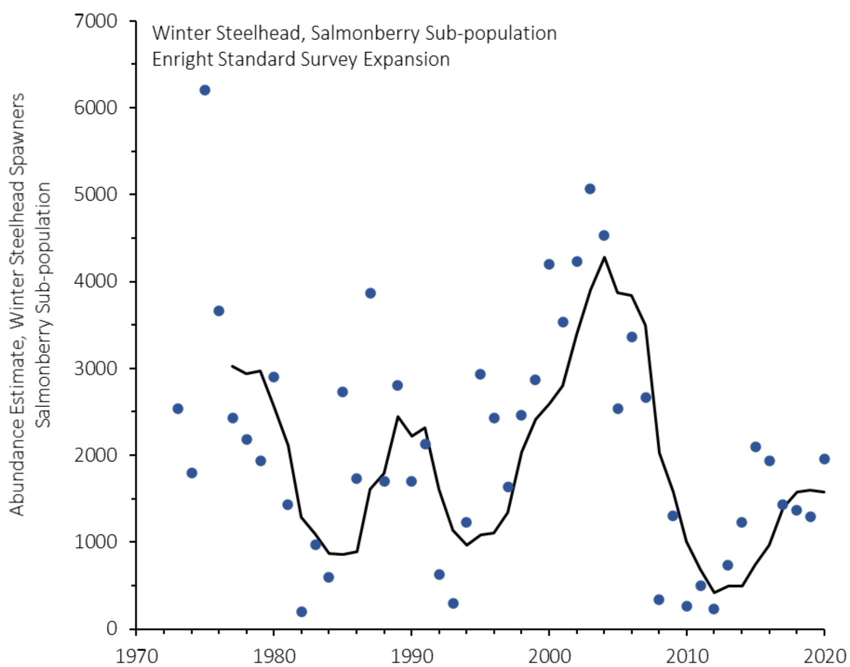

Figure III-4. Abundance estimates for winter steelhead (•) in the Salmonberry River subpopulation (Nehalem population), 1973-2020. Estimates are based on expansion of peak redd counts on a 3.0-mile standard survey that has been conducted since 1973. The solid black line is the running five-year geometric mean of abundance estimates. The CMP does not include Desired and Critical Abundance thresholds for the Salmonberry subpopulation of the Nehalem population.

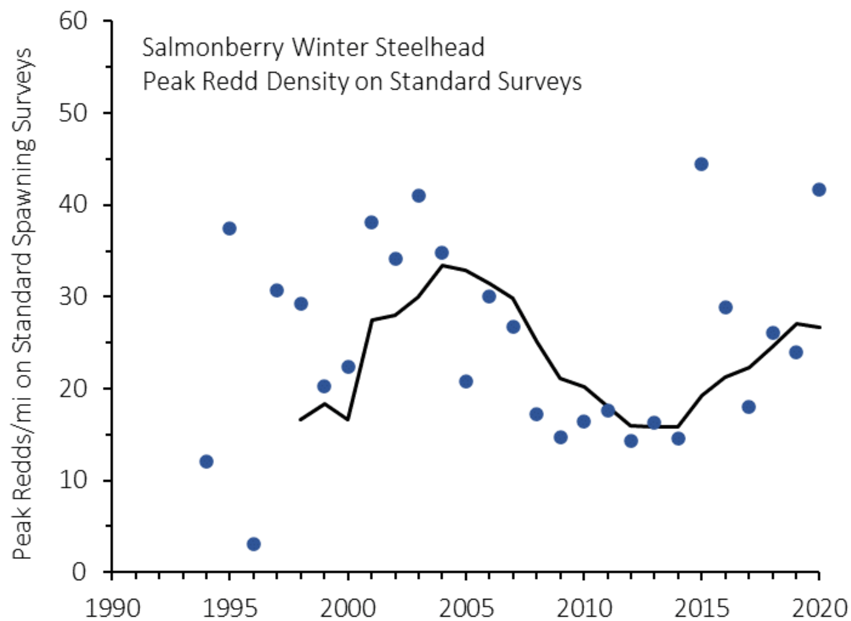

Figure III-5. Peak redd density (redds/mile) on nine standard survey sites for winter steelhead (•) in the Salmonberry River subpopulation (Nehalem Population), 1994-2020. Not all surveys were conducted in all years (n = 6 to 9 surveys; 6 to 12 miles). No attempt has been made to impute missing values. The black line is the running 5-year geometric mean.

Harvest

Retention of wild winter steelhead is prohibited in the North Coast Stratum.

Hatchery Influence

ODFW uses data collected during randomly selected spawning surveys to calculate annual estimates of pHOS within each stratum. Because recovery of steelhead carcasses is generally low, live spawners are inspected for the presence of intact adipose fins, and un-clipped fish are assumed to be wild. pHOS targets are evaluated as a running nine-year average to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets (Table III-3).

In the North Coast Stratum, pHOS cannot be assessed at the population-level except for the Nestucca population in 2017-2020, when there was expanded survey effort. However, pHOS estimates at the stratum level have been near or below targets set for North Coast populations. In the Nestucca population, single-year pHOS estimates have been above the basin-wide average in two of four monitoring years for both the basin-wide estimate and the estimate above Blaine (Table III-3). Estimates above Blaine in 2019 were based on relatively few observations of mark status (n = 8). Population-level monitoring of Nestucca winter steelhead was discontinued after 2020 due to budget constraints; the population will be monitored in aggregate with the other populations in the North Coast Stratum.

Table III-3. Percent hatchery origin spawners (pHOS) for North Coast Stratum Winter Steelhead. pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (within 4 stream miles) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	pHOS Estimate	
			pHOS (%)	9-year Average
North Coast Stratum	No Stratum-Level Target *Population Targets are:* *Necanicum ≤30* *Nehalem ≤10 (<30/<60)* *Tillamook ≤10 (<30/<60)* *Nestucca ≤30*	2014	4	11
		2015	4	11
		2016	11	9
		2017	13	7
		2018	30	8
		2019	9	9
		2020	6	9
Nestucca (Population)	Population-Wide ≤30%	2017	3	-
		2018	38	-
		2019	33[1]	-
		2020	20	-
	Above Blaine <10%	2017	4	-
		2018	26	-
		2019	25[1]	-
		2020	4	-

[1]pHOS estimates in the Nestucca were based on few observations of mark status in 2019.

The CMP allows for higher pHOS in areas within 4 stream miles of acclimated hatchery release sites in some populations (hotspots; see parenthetical values in Table III-3). Beginning in 2016, survey sites were stratified to aid in reducing bias associated with hotspots and to assess management goals for the strata and hotspots separately. To-date, sample size within hotspots has been insufficient to provide annual estimates of hotspot pHOS at the stratum scale; pHOS within hotspot areas was estimated at an SMU scale (50%, 17%, 93%, 0% and 9% in 2016, 2017, 2018, 2019, and 2020, respectively). Some of the volatility in these estimates may be attributable to relatively few surveys in hotspot areas (5 to 8 surveys SMU-wide).

Spatial Structure

Spatial structure will be evaluated for each population at the next assessment called for in the CMP. Occupancy in random spawning ground surveys is shown below (Table III-5). Survey sites are considered occupied based on the presence of at least one steelhead redd. At the next assessment, occupancy will be assessed with the goal being occupancy in all major tributaries over the assessment period.

Table III-5. Percent of randomly selected spawning survey sites occupied by adult winter steelhead in the North Coast Stratum. Survey sites were considered occupied based on the presence of at least one steelhead redd.

ADULT OCCUPANCY, STEELHEAD		
Spatial Extent	Year	Observed Occupancy (%)
North Coast Stratum	2014	57
	2015	61
	2016	73
	2017	60
	2018	77
	2019	65
	2020	79

WILD FISH MONITORING SUMMARY

SMU: Coastal Winter Steelhead
Stratum: Mid Coast
Population: Multiple Population Aggregate

Abundance

Spawner abundance of winter steelhead in the Mid Coast Stratum is evaluated based on redd surveys (redd abundance expanded to fish abundance) (Table III-6; Figure III-6). As previously described, the CMP's stratum-scale abundance thresholds for winter steelhead were recalculated using a revised redds-to-fish expansion factor. This does not change assessment results, however, because both the thresholds and redd abundance estimates are adjusted using the same expansion equation. Regardless, for transparency, Table III-6 provides thresholds and annual abundance estimates calculated using the current and original (values in parentheses) expansion equations.

Table III-6. Natural origin spawner abundance targets and estimates for Mid Coast winter steelhead. Desired and Critical Abundance Targets are from CMP Table A-III:2, with stratum-scale estimates adjusted using a revised redds-to-fish expansion factor. For comparison, the original abundance thresholds and annual abundance estimates derived using the CMP's original expansions are shown in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Mid Coast Stratum	30,162 (18,500)	11,706 (7,200)	2014	15,324 (9,414)
			2015	26,257 (16,103)
			2016	40,423 (24,769)
			2017	9,391 (5,785)
			2018	32,290 (19,794)
			2019	24,110 (14,789)
			2020	27,501 (16,175)

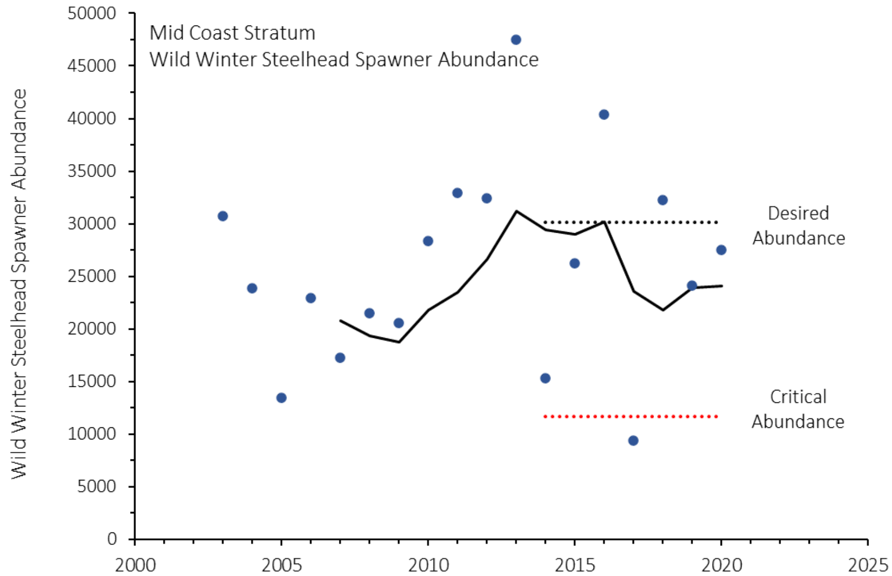

Figure III-6. Abundance estimates for the Mid Coast Stratum of wild winter steelhead (•) derived from random redd surveys (expanded to abundance), 2003-2020. Solid black line is the running five-year geometric mean of abundance estimates. Desired and Critical Abundance thresholds are shown as dashed black and red lines, respectively.

Harvest

Within the Mid Coast Stratum, harvest of wild winter steelhead is allowed only in the Salmon River population and the Big Elk Creek (Yaquina) Management Area. Harvest rates of wild winter steelhead in the Mid Coast Stratum have been assessed using two methods:

- Salmon River: creel and spawning ground surveys, 2017-2019 (ODFW 2018; 2019; 2020b). This project was shifted to the Sixes River in 2020.
- Both Areas: Stratum abundance estimates downscaled to the population or management area using estimates of historic abundance ratios (Kenaston 1980) and harvest card estimates of wild steelhead harvest.

Harvest rates have been low and within CMP thresholds regardless of assessment method (Table III-7).

Table III-7. Estimates of harvest rates for wild winter steelhead in the Salmon River Population and Big Elk Creek (Yaquina) Management Area. 2020 estimates are pending availability of harvest card data. Downscaled abundance estimates are stratum-scale estimates apportioned to the population or management area using historic abundance ratios (Kenaston 1980).

Spatial Extent	Target (%)	Year	Harvest Rate, Monitoring Approach	
			Spawning Surveys & Creel (%)[1]	Downscaled Abundance & Harvest Cards (%)
Salmon River (Population)	<10	2015	*n/a*	3
		2016	*n/a*	2
		2017	12[(2)]	2
		2018	2	4
		2019	2	3
		2020	*n/a*	2
Big Elk Creek (Yaquina)	<10	2015	*n/a*	<1
		2016	*n/a*	<1
		2017	*n/a*	3
		2018	*n/a*	<1
		2019	*n/a*	1
		2020	*n/a*	1

[1]Estimates based on spawning surveys and creel are available only for the Salmon River, 2017-2019.
[2]Estimate in 2014 is considered an overestimate because spawning ground surveys ended before the peak of the run (abundance of natural origin spawners was underestimated) (ODFW 2018).

Hatchery Influence

ODFW uses randomly selected spawning surveys to provide annual estimates of pHOS within each stratum. Because recovery of steelhead carcasses is generally low, live spawners are inspected for the presence of intact adipose fins, and un-clipped fish are assumed to be wild. Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes and few observations of hatchery origin spawners. For example, a pHOS estimate of zero may indicate that pHOS is low (e.g., see 2020 estimate, Table III-8), but an absence of hatchery fish in an entire stratum is unlikely. Targets for pHOS targets are evaluated as a running nine-year average to account for this error and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets (Table III-8). In the Mid Coast Stratum, pHOS cannot be assessed at the population level. However, the running 9-year average at the stratum level has been higher than the stratum's individual population targets. While the 9-year average pHOS at the stratum level has been greater than 10%, there has been a declining trend in the running 9-year average since plan adoption.

Table III-8. Percent hatchery origin spawners (pHOS) for Mid Coast Stratum winter steelhead. pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (within 4 stream miles) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	pHOS Estimate	
			pHOS (%)	9-year Average (%)
Mid Coast Stratum	No Stratum-Level Target *Population Targets are:* *Salmon <10* *Siletz ≤10 (<30/<60)* *Yaquina <10* *Alsea ≤10 (<30/<60)* *Yachats Aggregate <10* *Siuslaw ≤10 (<30/<60)*	2014	22	24
		2015	22	25
		2016	9	21
		2017	29	19
		2018	17	19
		2019	5	16
		2020	0	14

The CMP allows for higher pHOS in areas within 4 stream miles of acclimated hatchery release sites in some populations (hotspots; see parenthetical values in Table III-8). Beginning in 2016, survey sites were stratified to aid in reducing bias associated with hotspots and to assess management goals for the strata and hotspots separately. To-date, sample size within hotspots has been insufficient to provide annual estimates of hotspot pHOS at the stratum scale; pHOS within hotspot areas was estimated at a SMU scale (50%, 17%, 93%, 0% and 9% in 2016, 2017, 2018, 2019, and 2020, respectively). Some of the volatility in these estimates may be attributable to relatively few surveys in hotspot areas (5 to 8 surveys SMU-wide).

Spatial Structure

Spatial structure will be evaluated for each population at the next assessment called for in the CMP. Occupancy in random spawning ground surveys is shown below (Table III-9). Survey sites are considered occupied based on the presence of at least one steelhead redd. At the next assessment, occupancy will be assessed with the goal being occupancy in all major tributaries over the assessment period.

Table III-9. Percent of random spawning ground survey sites occupied by adult winter steelhead in the Mid Coast Stratum. Survey sites were considered occupied based on the presence of at least one steelhead redd.

ADULT OCCUPANCY, STEELHEAD		
Spatial Extent	Year	Observed Occupancy (%)
Mid Coast Stratum	2014	69
	2015	74
	2016	81
	2017	54
	2018	58
	2019	77
	2020	78

WILD FISH MONITORING SUMMARY

SMU: Coastal Winter Steelhead

Stratum: Umpqua

Population: Multiple Population Aggregate, North Umpqua Population

Abundance

Spawner abundance targets for Umpqua winter steelhead are evaluated using two monitoring programs. Redd surveys (redd abundance expanded to fish abundance) provide an estimate of wild spawner abundance at the stratum level, excluding unsurveyed areas above Winchester Dam on the North Umpqua River (Table III-10). The wild abundance estimate for the remaining portion of the stratum (the North Umpqua Population above Winchester Dam) is derived from video counts at the dam. The sum of estimates from both monitoring programs provides the stratum-level estimate of abundance (Table III-10; Figure III-7). Figure III-8 provides the long-term abundance time series for North Umpqua winter steelhead, based on counts of wild winter steelhead at Winchester Dam, adjusted to account for a change in enumeration methods in 1992, hatchery strays from the South Fork program beginning in 1971, hatchery summer steelhead counted during the winter period, and harvest (when allowable) above Winchester Dam.

As previously described, ODFW has revised the equation used to expand redd abundance to fish abundance, and this has required revision of the CMP's stratum-scale abundance thresholds so that the thresholds are aligned with current annual fish abundance estimates. For transparency, Table III-10 provides thresholds and annual abundance estimates calculated using the current and original (values in parentheses) expansion equations. Since the revised redds-to-fish expansion is applied to both the calculation of thresholds and to annual estimates of fish abundance (excluding areas above Winchester Dam, which are based on passage counts), there is no effect on the assessment of the stratum abundance estimates against the stratum abundance thresholds (See Table III-10).

Although revising the stratum abundance thresholds for Umpqua winter steelhead does not change the stratum-scale assessment results, there are implications for assessing the Desired Abundance for the North Umpqua Population. The stratum Desired Abundance target was calculated as the sum of two quantities: the 75th percentile of abundances estimated at the stratum scale via redd surveys (2003-2012; redd surveys, excluding areas above Winchester Dam on the North Umpqua) and the 75th percentile for the North Umpqua population (1946-2011, based on counts at Winchester Dam). Only the stratum level quantity is affected by the revision of the redds-to-fish expansion; North Umpqua population abundances are based on adjusted Winchester Dam counts, which are independent of redds-to-fish expansions. Since the CMP's preliminary Desired Abundance target for the North Umpqua was set to a percentage of the stratum target[6], the revision of the redds-to-fish expansion equation would result in an increase in the population Desired Abundance target with no concomitant upward adjustment of annual North Umpqua population abundance estimates.

To address this issue, the Desired Abundance target for the North Umpqua population was set to the 75th percentile of the long-term abundance time series (1946-2011). This is the same value used in the calculation of the stratum Desired Abundance target, and it uses the same basis for calculation applied to viable populations in other SMUs where there were abundance time series sufficient for calculating percentiles. As with other populations, the 75th percentile was used, as opposed to a value based on the

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[6] Population-level Desired Abundance targets for winter steelhead were based on an apportionment of strata goals to the populations (See CMP Table A-III:2). These apportionments were based on a variety of information, including population-specific kilometers of distribution, and estimated population redd densities using data aggregated from 2003-2012, juvenile snorkel surveys, smolt trap data, historical harvest data, and professional judgment; population apportionments were considered in the CMP to be preliminary and subject to adjustment.

stock-recruit relationship or PVA results, because PVA results indicated the population was already viable, but improvements were nevertheless desired.

Table III-10. Natural origin spawner abundance targets and estimates for Umpqua Stratum winter steelhead. Estimates for the North Umpqua Population are based on adjusted counts of wild winter steelhead at Winchester Dam; the stratum estimate is the North Umpqua abundance + the estimate based on expansion of randomly selected redd surveys in the remaining portions of the stratum. Desired and Critical Abundance Targets are from CMP Table A-III:2 with stratum-scale estimates adjusted using a revised redds-to-fish expansion factor. For comparison, the original CMP stratum thresholds and abundance estimates derived using the CMP's original expansion factor are shown in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Umpqua Stratum	34,540 (24,600)	12,121 (8,200)	2014	26,396 (19,972)
			2015	29,360 (22,155)
			2016	28,790 (22,809)
			2017	20,589 (16,679)
			2018	35,382 (24,887)
			2019	29,663 (21,424)
			2020	27,552 (20,805)
North Umpqua Population	8,795	2,200	2014	9,748
			2015	10,699
			2016	13,282
			2017	10,416
			2018	8,247
			2019	8,339
			2020	10,071

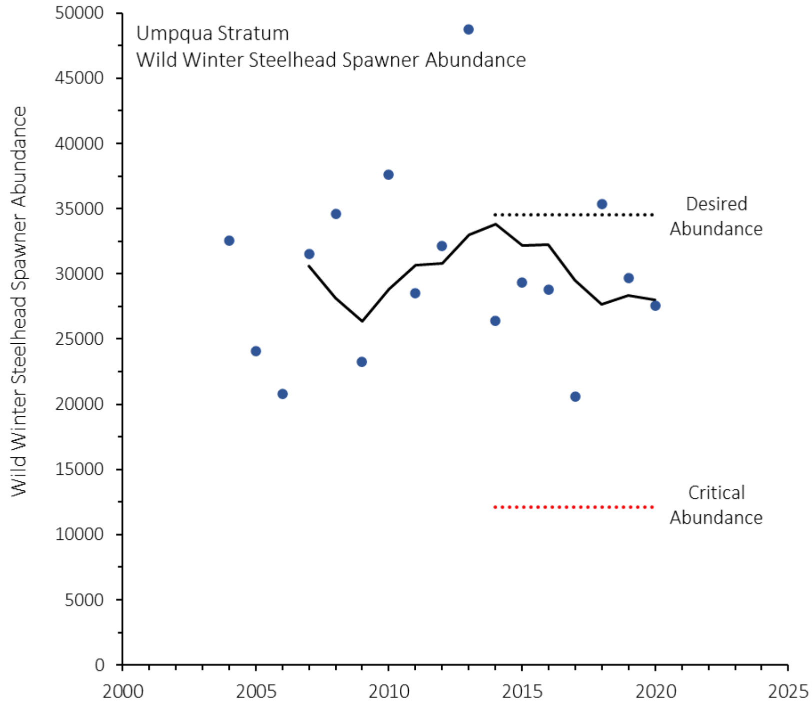

Figure III-7. Abundance estimates for wild winter steelhead in the Umpqua Stratum (•), 2003-2020. The solid black line is the running 5-year geometric mean. The estimates for the North Umpqua are based on adjusted counts of wild winter steelhead at Winchester Dam; the stratum estimate is the adjusted North Umpqua count + the estimate based on expansion of random redd surveys in the Umpqua basin, excluding the unsurveyed portion above Winchester Dam on the North Umpqua. Revised Desired and Critical Abundance thresholds are shown as dashed black and red lines, respectively.

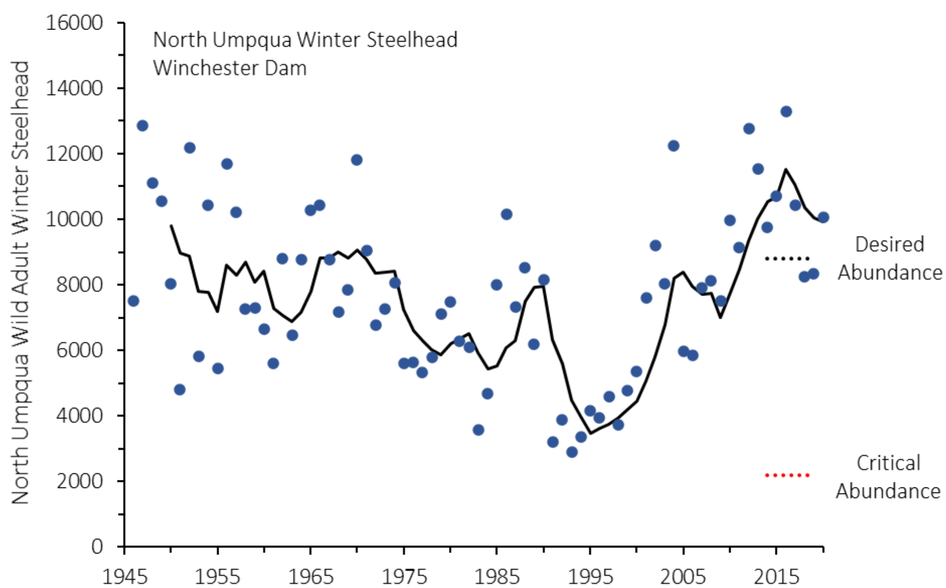

Figure III-8. Abundance estimates (•) for wild winter steelhead above Winchester Dam (1946-2020), after accounting for a change in enumeration methods in 1992, hatchery strays from the South Fork program beginning in 1971, hatchery summer steelhead counted during the winter period, and harvest above Winchester Dam. The solid black line is the running 5-year geometric mean. Desired and Critical Abundance thresholds are shown as dashed black and red lines, respectively.

Harvest

Retention of wild winter steelhead is prohibited in the Umpqua Stratum.

Hatchery Influence

The CMP allows for the release of up to 150,000 winter steelhead into the South Umpqua River. ODFW uses random spawner surveys to support annual estimates of pHOS within each stratum. Because recovery of steelhead carcasses is generally low, live spawners are inspected for the presence of intact adipose fins, and un-clipped fish are assumed to be wild. In the Umpqua Stratum, these surveys are not conducted in areas above Winchester Dam on the North Umpqua River. Estimates of pHOS above Winchester Dam are calculated based on counts of wild and hatchery origin fish at Winchester Dam adjusted for harvest based on angler harvest cards. pHOS targets are evaluated as a running nine-year average to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets (Table III-11). Except for the North Umpqua population, pHOS in the Umpqua Stratum cannot be assessed at the population level. However, the stratum-level pHOS estimates (excluding the North Umpqua above Winchester Dam) have been lower than the stratum's population-level targets.

The CMP allows for higher pHOS in areas within 4 stream miles of acclimated hatchery release sites in some populations (hotspots; see parenthetical values in Table III-11). Beginning in 2016, survey sites were stratified to aid in reducing bias associated with hotspots and to assess management goals for the strata and hotspots separately. To-date, sample size within hotspots has been insufficient to provide annual estimates of hotspot pHOS at the stratum scale; pHOS within hotspot areas was estimated at a SMU scale (50%, 17%, 93%, 0%, and 9% in 2016, 2017, 2018, 2019, and 2020 respectively). Some of the volatility in these estimates may be attributable to relatively few surveys in hotspot areas (5 to 8 surveys SMU-wide).

Spatial Structure

Spatial structure will be evaluated for each population at the next assessment called for in the CMP. Occupancy in random spawning ground surveys is shown below (Table III-12). Survey sites are considered occupied based on the presence of at least one steelhead redd. At the next assessment, occupancy will be assessed with the goal being occupancy in all major tributaries over the assessment period.

Table III-11. Percent hatchery origin spawners (pHOS) for Umpqua Stratum winter steelhead. pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (within 4 stream miles) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat. Estimates for the Umpqua Stratum are based on observations of live fish during random spawning surveys, excluding un-surveyed areas above Winchester Dam on the North Umpqua; estimates for the North Umpqua are based on counts at Winchester Dam, adjusted for harvest.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	pHOS Estimate	
			pHOS (%)	9-year Average (%)
Umpqua Stratum, Excluding above Winchester Dam	No Stratum-Level Target *Population Targets are:* *L. Umpqua ≤30* *Middle Umpqua (<30/<60)* *N. Umpqua ≤10 (<30/<60)* *S. Umpqua ≤30*	2014	26[1]	7
		2015	0	7
		2016	2	7
		2017	0	4
		2018	0	4
		2019	1[2]	4
		2020	1[2]	4
North Umpqua (Population)	≤10 (<30/<60)	2014	6	7
		2015	3	6
		2016	6	5
		2017	4	4
		2018	4	5
		2019	1	4
		2020	3	4

[1] In 2014, all hatchery steelhead observed in the Umpqua basin, not inclusive of unsurveyed areas above Winchester Dam, were in Canyon Creek, which encompasses a hatchery acclimation site (13 of 15 steelhead observed in this survey were hatchery origin - 87%).

[2] In 2019, an extended period of poor survey access due to heavy snowfall and extensive downed timber contributed to a lower survey success rate in the Umpqua Stratum, excluding the North Umpqua above Winchester Dam. Fewer than 10 known fin-clip status (live or dead) were observed, so the wild abundance estimate was based on an alternative method, incorporating data from prior years. The same approach was necessary in 2020 due to small sample size.

Table III-12. Percent of random spawning ground survey sites occupied by adult winter steelhead in the Umpqua Stratum, excluding unsurveyed areas upstream of Winchester Dam on the North Umpqua. Survey sites were considered occupied based on the presence of at least one steelhead redd.

ADULT OCCUPANCY, STEELHEAD		
Spatial Extent	Year	Observed Occupancy (%)
Umpqua Stratum	2014	71
	2015	64
	2016	64
	2017	67
	2018	73
	2019	80
	2020	70

WILD FISH MONITORING SUMMARY

SMU: Coastal Winter Steelhead

Stratum: Mid-South Coast

Population: Multiple Population Aggregate

Abundance

Spawner abundance of winter steelhead in the Mid-South Coast Stratum is evaluated based on redd surveys (redd abundance expanded to fish abundance) (Table III-13; Figure III-9). As previously described, the CMP's stratum-scale abundance thresholds for winter steelhead were recalculated using a revised redds-to-fish expansion factor. This does not change assessment results, however, because both the thresholds and redd abundance estimates are adjusted using the same expansion equation. Regardless, for transparency, Table III-13 provides thresholds and annual abundance estimates calculated using the current and original (values in parentheses) expansion equations.

Table III-13. Natural origin spawner abundance targets and estimates for Mid-South Coast winter steelhead. Desired and Critical Abundance Targets are from CMP Table A-III:2, with stratum-scale estimates adjusted using a revised redds-to-fish expansion factor. For comparison, the original abundance thresholds and annual abundance estimates derived using the CMP's original expansion factor are shown in parentheses.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate
	Desired	Critical		
Mid-South Coast Stratum	33,719 (20,700)	13,032 (8,000)	2014	18,495 (11,354)
			2015	19,635 (12,052)
			2016	23,887 (14,653)
			2017	11,749 (7,227)
			2018	18,503 (11,359)
			2019	9,179 (5,655)
			2020	20,909 (12,831)

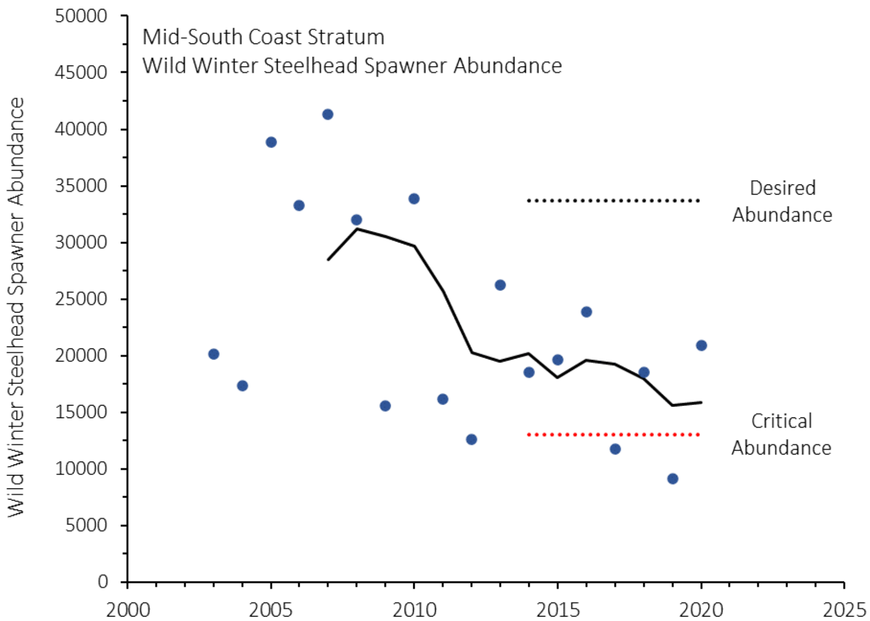

Figure III-9. Abundance estimates for the Mid-South Coast Stratum of wild winter steelhead (•) derived from random redd surveys (expanded to abundance), 2003-2020. The solid black line is the running five-year geometric mean of abundance estimates. Revised Desired and Critical Abundance thresholds are shown as dashed black and red lines, respectively.

Harvest

Within the Mid-South Coast Stratum, harvest of wild winter steelhead is allowed only in the East Fork Coquille Management Area (beginning in 2018) and in the Sixes Population, where harvest of wild winter steelhead was allowed prior to the adoption of the CMP. Harvest rates of wild winter steelhead in the Mid-South Coast Stratum have been assessed using stratum abundance estimates downscaled to the population or management area using estimates of historical abundance ratios (Kenaston 1980) and harvest card estimates of wild steelhead retention. Harvest rates are below CMP thresholds in the East Fork Coquille Management Area (Table III-14). The CMP does not provide a specific harvest rate target for the Sixes Population. However, harvest estimates in the Sixes are approximately equal to the 10% target applied elsewhere. Estimates based on creel and spawning ground surveys are available for verification of harvest rates in the Sixes River beginning in 2020. The creel-based harvest rate in 2020 (6%) is higher than that estimated using downscaled abundance and angler reporting (2%), but both estimates are below the 10% target.

Hatchery Influence

ODFW uses randomly selected spawner surveys to support annual estimates of pHOS within each stratum. Because recovery of steelhead carcasses is generally low, live spawners are inspected for the presence of intact adipose fins, and un-clipped fish are assumed to be wild. Estimates in any given year should be interpreted cautiously as they may be subject to considerable error due to issues including low sample sizes and few observations of hatchery origin spawners. For example, a pHOS estimate of zero may indicate that pHOS is low (e.g., see 2020 estimate, Table III-15), but an absence of hatchery fish in an entire stratum is unlikely. Targets for pHOS targets are evaluated as a running nine-year average to account for this error and to allow for some variability in the level of naturally spawning hatchery fish while ensuring that the long-term impact from hatchery fish is at, or below, targets (Table III-15). In the Mid-South Coast Stratum, pHOS cannot be assessed at the population level. However, stratum-level estimates have been higher than targets set for most Mid-South Coast populations.

The CMP allows for higher pHOS in areas within 4 stream miles of acclimated hatchery release sites in some populations (hotspots; see parenthetical values in Table III-15). Beginning in 2016, survey sites were stratified to aid in reducing bias associated with hotspots and to assess management goals for the strata and hotspots separately. To-date, sample size within hotspots has been insufficient to provide annual estimates of hotspot pHOS at the stratum scale; pHOS within hotspot areas was estimated at a SMU scale (50%, 17%, 93%, 0%, and 9% in 2016, 2017, 2018, 2019, and 2020, respectively). Some of the volatility in these estimates may be attributable to relatively few surveys in hotspot areas (5 to 8 surveys SMU-wide).

Table III-14. Estimates of harvest rates for wild winter steelhead in the East Fork Coquille Management Area (Coquille Population) and the Sixes Population. Downscaled abundance estimates are stratum-scale abundance estimates apportioned to the population or management area using historic abundance ratios (Kenaston 1980).

Spatial Extent	Target (%)	Year	Harvest Rate, Monitoring Approach	
			Spawning Surveys & Creel (%)[1]	Downscaled Abundance & Harvest Cards (%)
East Fork Coquille (Management Area)	<10	2015	*n/a*	Wild Retention Not Allowed
		2016	*n/a*	Wild Retention Not Allowed
		2017	*n/a*	Wild Retention Not Allowed
		2018	*n/a*	2
		2019	*n/a*	8
		2020	*n/a*	4
Sixes (Population)	*n/a*[(2)]	2015	*n/a*	10
		2016	*n/a*	7
		2017	*n/a*	9
		2018	*n/a*	11
		2019	*n/a*	14
		2020	6	2

[1]Estimates of harvest rates based on spawning surveys and creel are available in the Sixes population beginning in 2020.
[2]Harvest of wild steelhead in the Sixes River was allowed prior to adoption of the CMP; the CMP does not specify harvest rate target Sixes Population, but harvest rates are generally expected to be low as in other areas.

Table III-15. Percent hatchery origin spawners (pHOS) for Mid-South Coast Stratum winter steelhead. pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (within 4 stream miles) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	pHOS Estimate	
			pHOS (%)	9-year Average (%)
Mid-South Coast Stratum	No Stratum-Level Target *Population Targets are:* *Tenmile ≤30 (<60/<90)* *Coos ≤10 (<30/<60)* *Coquille ≤10 (<30/<60)* *Floras <10* *Sixes <10*	2014	21	17
		2015	12	16
		2016	30	19
		2017	2	17
		2018	*n/a*[1]	17
		2019	37	20
		2020	0[1]	17

[1]pHOS for Mid-South Coast winter steelhead was not calculated in 2018 due to small sample size of known origin live fish or carcasses. Due to low sample size in 2020, pHOS was calculated the wild abundance estimate was based on an alternative method, incorporating data from prior years.

Spatial Structure

Spatial structure will be evaluated for each population at the next assessment called for in the CMP. Occupancy in random spawning ground surveys is shown below (Table III-16). Survey sites are considered occupied based on the presence of at least one steelhead redd. At the next assessment, occupancy will be assessed with the goal being occupancy in all major tributaries over the assessment period.

Table III-16. Percent of random spawning ground survey sites occupied by adult winter steelhead in the Mid-South Coast Stratum. Survey sites were considered occupied based on the presence of at least one steelhead redd.

ADULT STEELHEAD, OCCUPANCY		
Spatial Extent	Year	Observed Occupancy (%)
Mid-South Coast Stratum	2014	75
	2015	79
	2016	81
	2017	64
	2018	83
	2019	69
	2020	78

Section IV. Coastal Summer Steelhead

Abundance

The abundance of Coastal Summer Steelhead is assessed in two population areas – Siletz and South Umpqua. Since 2014, abundance has been above Critical Abundance and below Desired Abundance in both populations (Figure IV-1). A roll-up of population abundance thresholds and annual abundance estimates to the SMU level is provided in Figure IV-2, and additional population-specific abundance data are presented in the population summaries that follow.

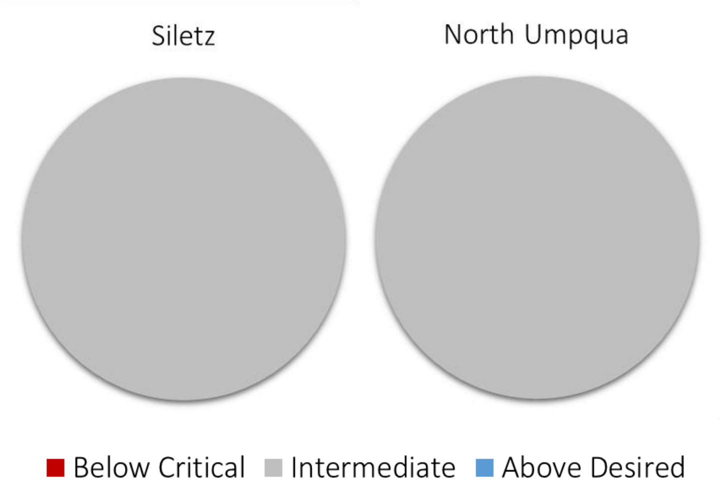

Figure IV-1. Coastal Summer Steelhead Populations. Percent of years from 2014 to 2020 with abundance estimates in the following categories: Below Critical Abundance (Red), Above Desired Abundance (Blue), or Intermediate between Critical Abundance and Desired Abundance (Gray).

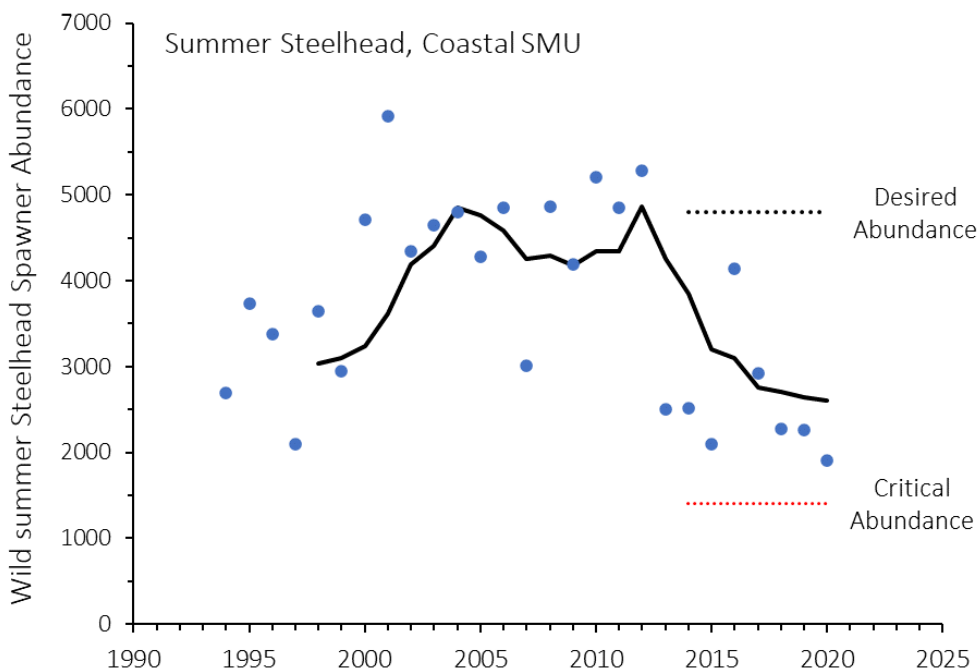

Figure IV-2. Abundance of Coastal Summer Steelhead (Adults) for the period of concurrent estimates for both constituent populations (Siletz and North Umpqua, 1994-2020 (•).The solid black line is the running 5-year geometric mean of abundance estimates; dashed black and red lines are the CMP Desired and Critical Abundance thresholds, respectively, calculated as the sum of abundance thresholds for the SMU's constituent populations.

Hatchery Influence

Hatchery influence is addressed separately in each population summary below.

Harvest

Retention of wild summer steelhead is prohibited in both the Siletz basin and the Umpqua Stratum.

Productivity

ODFW conducts random juvenile surveys in wadeable streams to provide information on juvenile distribution, density, and abundance. Methods to distinguish juvenile winter and summer steelhead will be needed to draw conclusions specific to summer steelhead (See Section III, Table III-1).

Spatial Structure

Spatial structure will not be assessed for Siletz or North Umpqua summer steelhead because sampling is not conducted throughout the range of spawning or rearing habitat.

Diversity

Monitoring of phenotypic diversity is limited to estimates of run timing at Siletz Falls and Winchester Dam on the North Umpqua River. ODFW will evaluate run timing at the next assessment period called for in the CMP.

WILD FISH MONITORING SUMMARY

SMU: Coastal Summer Steelhead

Stratum: Mid Coast

Population: Siletz

Abundance

The Siletz wild summer steelhead population spawns almost exclusively in the areas above Siletz Falls. ODFW indexes the spawner abundance of adult summer steelhead in the Siletz population through trap counts at the falls (Table IV-1; Figure IV-3). Wild fish are distinguished from hatchery fish by the presence of intact adipose fins. Only wild fish are passed above the falls.

Table IV-1. Natural origin spawner abundance estimates and targets for Siletz Summer Steelhead. Desired and Critical Abundance Targets are from CMP Table A-III:2.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Year	Abundance Estimate (Trap Count)
	Desired	Critical		
Siletz Population	600	200	2014	335
			2015	493
			2016	501
			2017	449
			2018	458
			2019	334
			2020	459

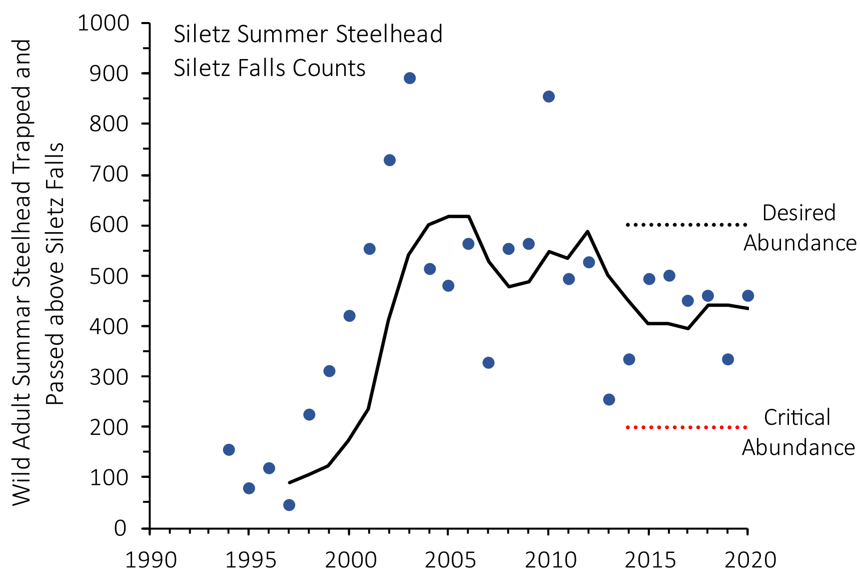

Figure IV-3. Counts of wild adult summer steelhead trapped and passed above Siletz Falls, 1994-2020 (•). Only wild fish are passed above the falls. The solid line is the running 5-year geometric mean of the counts. The CMP targets for Desired Abundance and Critical Abundance are shown as black and red dashed lines, respectively.

Hatchery Influence

The proportion of natural steelhead spawners comprised by hatchery-origin steelhead is targeted for a level of 5% or less in the spawning areas above Siletz Falls. The CMP does not specify annual monitoring of pHOS for Siletz summer steelhead because no hatchery-origin fish are passed upstream of the falls. However, the CMP acknowledged uncertainty regarding trap efficiency for summer steelhead. In 2014 and 2015, snorkel surveys upstream of Siletz Falls showed pHOS to be 5% and 20%, respectively. Volitional passage of the falls by hatchery summer steelhead was addressed by modification of a gap under the trap’s main doors and efforts to divert more flow through the trap during low flows (ODFW 2016).

WILD FISH MONITORING SUMMARY

SMU: Coastal Summer Steelhead

Stratum: Umpqua

Population: North Umpqua

Abundance

Abundance estimates for North Umpqua Summer Steelhead are based on counts of wild summer steelhead at Winchester Dam (May 1 to November 30). Counts are adjusted for a change in counting methods in 1992 and harvest mortality. After implementation of catch-and-release regulations for wild summer steelhead, estimates include an estimate of mortality incidental to harvest of hatchery summer steelhead above Winchester Dam (Table IV-2; Figure IV-4).

Table IV-2. Natural Origin Spawner Abundance estimates for the North Umpqua Population of summer steelhead. Desired and Critical Abundance Targets are from CMP Table A-III:2.

NATURAL ORIGIN SPAWNER ABUNDANCE				
Spatial Extent	Abundance Thresholds		Run Year	Abundance Estimate
	Desired	Critical		
North Umpqua Population	4,200	1,200	2014	2,182
			2015	1,598
			2016	3,652
			2017	2,472
			2018	1,820
			2019	1,924
			2020	1,452

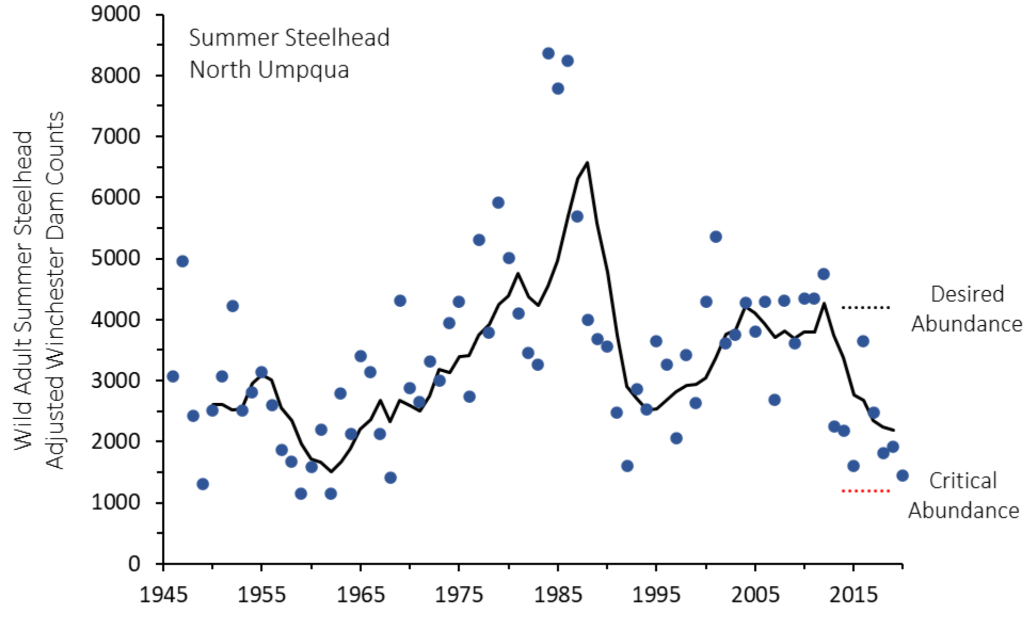

Figure IV-4. Abundance estimates for wild adult summer steelhead above Winchester Dam on the North Umpqua River (•), 1946-2020. Estimates are based on counts of unmarked summer steelhead at Winchester Dam (May 1 to November 30), adjusted to account for a change of counting methods in 1992 and harvest above Winchester Dam. Harvest after implementation of catch-and-release regulations for wild fish is an estimate of mortality incidental to harvest of hatchery summer steelhead. The solid line is the running 5-year geometric mean of abundance estimates. The CMP targets for Desired Abundance and Critical Abundance are shown as black and red dashed lines, respectively.

Hatchery Influence

The proportion of hatchery summer steelhead on the spawning grounds in the North Umpqua summer steelhead population area is targeted for a level less than or equal to 10% for most of the wild spawning areas. Estimates of the abundance of naturally spawning hatchery fish are derived by subtracting the sum of angler-tag estimates of fin-clipped fish in the North Umpqua upstream of Winchester Dam and fin-clipped fish retained at Rock Creek Hatchery. This estimate is used with the estimate of naturally produced spawners to provide an estimate of pHOS (Table III-14).

Table III-14. Percent hatchery origin spawners (pHOS) for North Umpqua Summer Steelhead. pHOS targets are from CMP Table AIII:4. Targets inside parentheses are for the immediate area (2-mile radius) around acclimation and hatchery release sites and whether they contain significant (lower value) or less significant (higher value) spawning habitat.

PERCENT HATCHERY ORIGIN SPAWNERS				
Spatial Extent	pHOS Target	Year	pHOS Estimate	
			pHOS (%)	9-year Average (%)
North Umpqua Population	≤10 (<30/<60)	2014	42	28
		2015	40	28
		2016	41	29
		2017	34	30
		2018	20	30
		2019	25	31
		2020	38	33

Estimates of pHOS for North Umpqua summer steelhead above Winchester Dam have been higher than the CMP target (Table III-14), but the pHOS estimates provided in Table III-14 were calculated assuming complete spatial overlap of spawning by hatchery and wild fish. Radio telemetry data in the North Umpqua from 1998-2000 indicated significant spatial segregation of hatchery and wild fish; 90% of radio-tagged hatchery summer steelhead (fish passing Winchester Dam from May 1 through November 31) spawned in Rock Creek and the North Umpqua below the confluence with Rock Creek, while 74% of tagged wild summer steelhead spawned upstream from the confluence with Rock Creek (most in the Steamboat Creek sub-basin; ODFW 2003).

If the distributions of hatchery and wild summer steelhead are currently similar to those derived from radio telemetry, pHOS since plan adoption would have averaged 33% in the Lower Umpqua (below Rock Creek, including Little River), 77% in Rock Creek, 19% in the upper basin (excluding Steamboat Creek), and 0% in Steamboat Creek. Comparable pHOS levels were observed during snorkel surveys of holding pools in the Rock Creek basin and at Soda Springs Dam passage facilities in the upper basin (RM 70), averaging 69% and 32%, respectively, from 2014 through 2019.

The predominance of wild fish in the Steamboat Creek basin (including Canton Creek) is supported by observations during snorkel surveys of holding pools. Peak counts of summer steelhead in the Steamboat and Canton creek basins during a 29-year period of continuous monitoring (1991-2019) are well correlated to counts of wild summer steelhead at Winchester Dam, but there is no significant correlation to counts of hatchery summer steelhead at Winchester Dam (Figure IV-5). Observations of marked hatchery fish in Steamboat and Canton creek holding pools have also been rare since 1998, when records of hatchery fish observations are available (average peak count$_{(1998\text{-}2019)}$ hatchery + wild = 574 ± 79; maximum peak count of ad-clipped fish = 2). These data suggest that the pHOS estimates in Table III-14 substantially overestimate pHOS in upper basin spawning habitat preferred by wild summer steelhead.

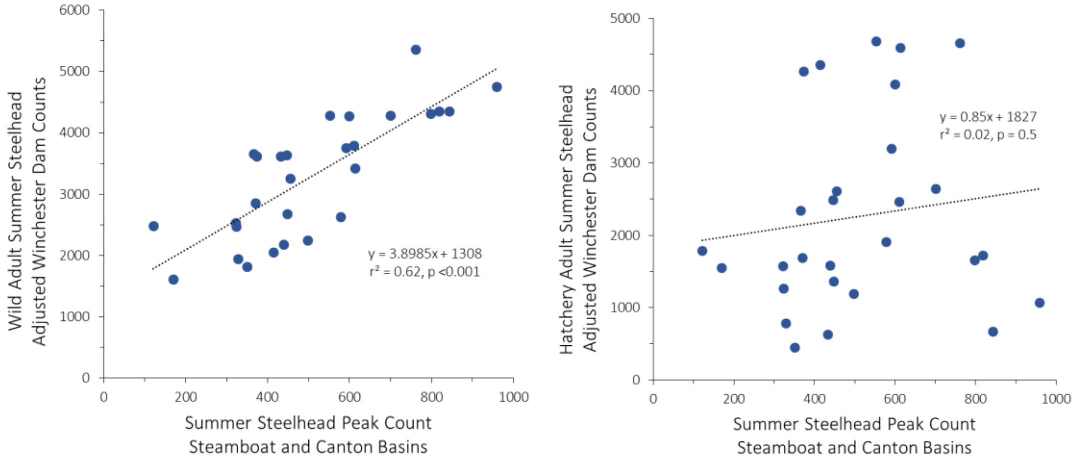

Figure IV-5. (Left) Relationship between peak counts of summer steelhead observed during summer snorkel surveys in the Steamboat and Canton creek basins and counts of wild summer steelhead at Winchester Dam, adjusted to account for a change of counting methods in 1992 and harvest above Winchester Dam, 1991-2019. (Right) Relationship between peak counts of summer steelhead observed during summer snorkel surveys in the Steamboat and Canton creek basins and counts of hatchery summer steelhead at Winchester Dam, adjusted to account for a change of counting methods in 1992, harvest above Winchester Dam and retention at hatchery facilities, 1991-2019.

ODFW will continue to investigate options for assessing pHOS more accurately for North Umpqua Summer Steelhead and will implement additional actions to reduce pHOS, if needed.

Section V. Coastal Chum Salmon

WILD FISH MONITORING SUMMARY

SMU: Coastal Chum Salmon

Stratum: Aggregate of Multiple Strata

Population: Aggregate of Multiple Populations

Abundance

ODFW assesses abundance of coastal chum salmon through counts of spawning adults on standard spawning surveys in the Necanicum, Nehalem, Tillamook, Netarts Bay, Nestucca, Siletz and Yaquina basins. Peak counts of spawners at additional sites in the Salmon River and Coos Bay population areas are also provided below (Table V-1). Trends in peak counts across surveys are shown by SMU (Figure V-1) and population areas within the North and Mid Coast strata (Figures V-2 and V-3).

Table V-1. Abundance Index (Peak Count of Adult Spawners/mile) of chum salmon in standard index spawning surveys. The CMP does not include abundance targets for Coastal Chum Salmon. 5-year geometric means for the period preceding the CMP are provided for context.

ABUNDANCE INDEX – PEAK COUNT/MILE, STANDARD INDEX SURVEYS									
Stratum	Population	Peak Count/Mile in Standard Index Surveys							
		2014	2015	2016	2017	2018	2019	2020	*5-yr Geometric Mean (2009-2013)*
North Coast	Necanicum	42	14	43	24	35	36	33	9
	Nehalem	334	686	878	441	265	143	531	201
	Tillamook	425	1022	914	259	467	263	792	319
	Netarts Bay[1]	39	177	137	47	16	198	804	42
	Nestucca	1	8	9	6	3	0	76	*n/a*[2]
Mid Coast	Salmon	1	3	1	5	0	0	9	*n/a*[3]
	Siletz	16	95	138	64	134	13	188	26
	Yaquina	144	362	370	89	302	92	153	152
Mid-South Coast	Coos	2	2	2	3	3	0	60	*Not Surveyed*

[1]Netarts Bay chum salmon are not known to be a historically independent population.
[2]The survey in the Nestucca River was not surveyed in 2010-2012. Peak Count/mile was 0 and 11 in 2009 and 2013, respectively.
[3]Geomean for the Salmon River could not be calculated; peak densities = 0, 0.5, 0, 0, and 0 in 2009, 2010, 2011, 2012, and 2013, respectively.

Harvest

Retention of chum salmon is prohibited in the Coastal SMU.

Hatchery Influence

Coastal chum salmon are not systematically assessed for pHOS because no hatchery programs exist in the Coastal SMU.

Productivity

Adult-to-Adult Survival (AAS) may be estimated at standard survey sites in some basins where age composition can be estimated through analysis of scales from carcasses. Analysis of age composition is ongoing (See *Diversity* below). However, due to budget reductions, surveyors will be subsampling chum carcasses for scales beginning in 2020. This will reduce the data available for analysis of age composition.

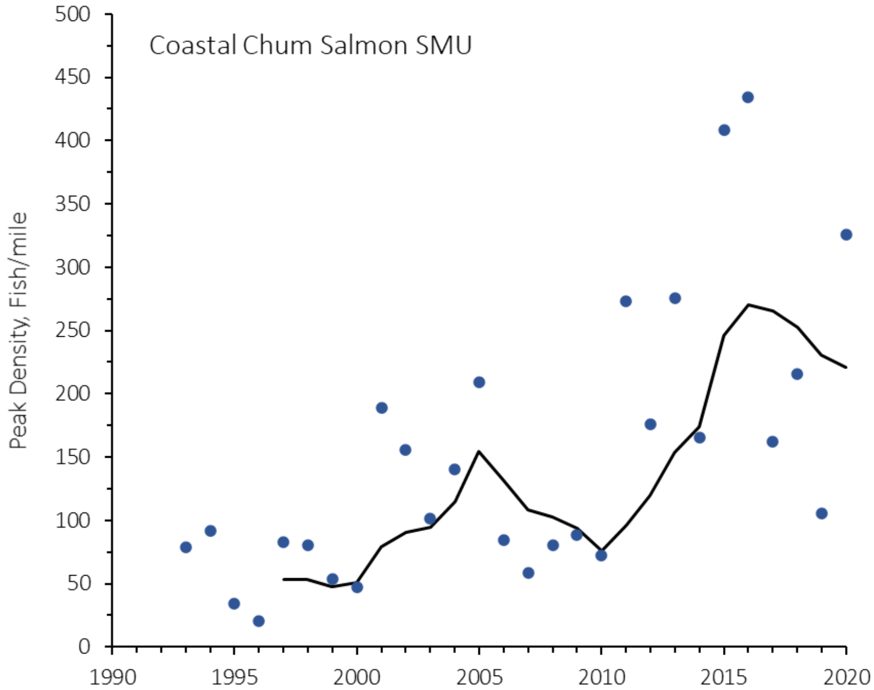

Figure V-1. Running 5-year geometric means of the peak densities (fish/mi) of chum salmon on standard surveys in the Coastal SMU. The period shown, 1993-2020, is a period in which surveys were conducted with greater regularity than earlier in the record. Estimates do not include imputation of values for missing surveys.

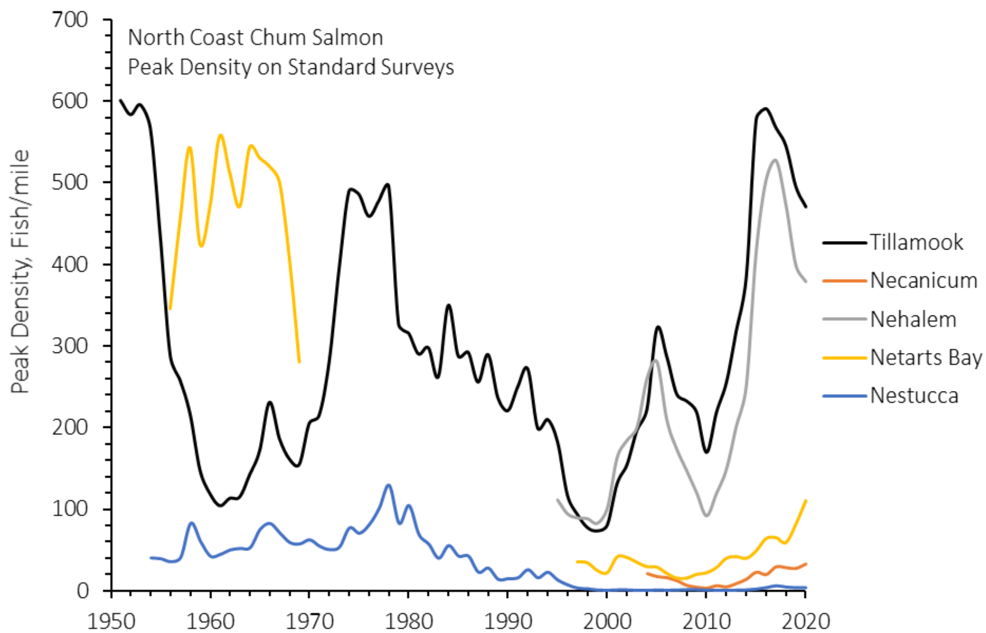

Figure V-2. Running 5-year geometric means of the peak densities (fish/mi) of chum salmon on standard index surveys in North Coast population areas. Individual data points are omitted for figure clarity.

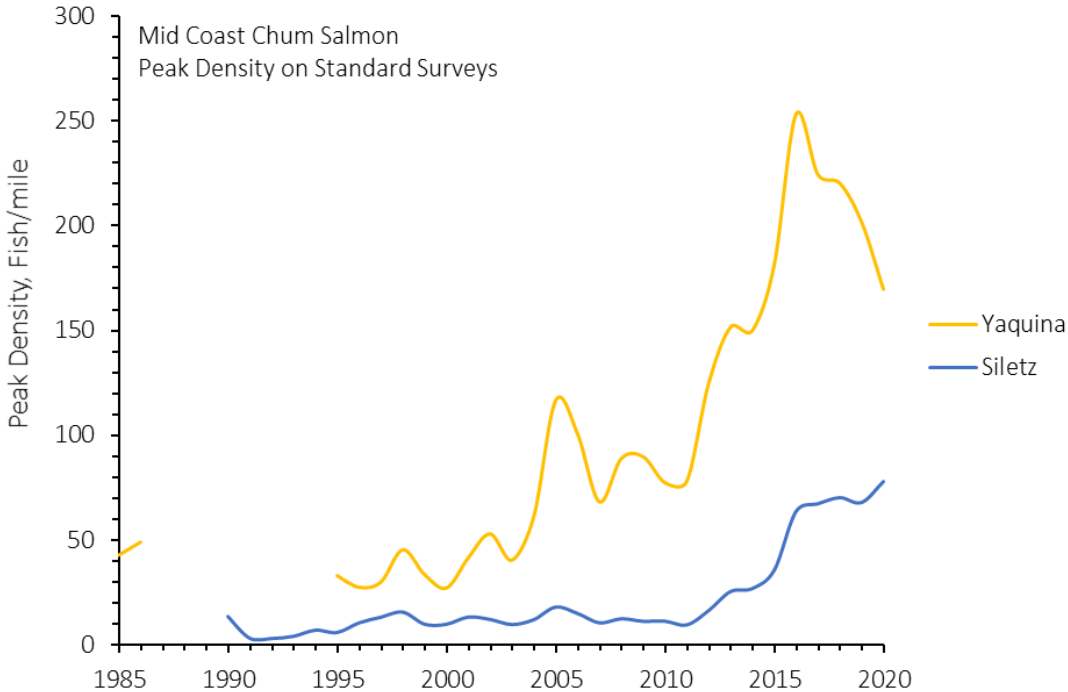

Figure V-3. Running 5-year geometric means of the peak densities (fish/mi) of chum salmon on standard index surveys in the Yaquina and Siletz population areas (Mid Coast Stratum). Individual data points are omitted for figure clarity.

Distribution

Specific distribution benchmarks have not been developed for Coastal Chum Salmon. Because of their limited distribution, trends in spatial structure will be evaluated at the next assessment period called for in the CMP.

Diversity

The CMP identifies annual estimates of age composition of spawners as a critical uncertainty for chum salmon. Annual estimates of age composition based on scales obtained from carcasses at standard surveys in some basins are reported below (Table V-2). ODFW will evaluate phenotypic diversity, including spawner age composition, spawning timing, and spawner size composition at the next assessment period called for in the CMP. Age composition analysis from scales collected in 2020 has not been completed; data will be updated in future annual reports.

Table V-2. Coastal Chum Salmon age composition from scales retrieved from carcasses on standard index surveys.

DIVERSITY – AGE COMPOSITION						
Population	Return Year	Percentage				Scales Aged (n)
		Age 3	Age 4	Age 5	Age 6	
Necanicum[1]	2014	20	80	0	0	5
	2015	67	33	0	0	6
	2016	0	100	0	0	1
	2017	-	-	-	-	0
	2018	100	0	0	0	1
	2019	-	-	-	-	0
	2020	TBD	TBD	TBD	TBD	TBD
Nehalem	2014	14	68	17	0	249
	2015	33	65	3	0	120
	2016	15	76	8	0	249
	2017	11	70	18	0	245
	2018	28	66	6	0	287
	2019	40	58	1	0	280
	2020	TBD	TBD	TBD	TBD	TBD
Tillamook	2014	16	57	27	0	191
	2015	40	55	5	0	250
	2016	7	88	5	0	271
	2017	16	57	27	<1	304
	2018	71	29	0	0	105
	2019	32	65	2	0	174
	2020	TBD	TBD	TBD	TBD	TBD
Netarts Bay[1]	2014	100	0	0	0	1
	2015	75	25	0	0	4
	2016	33	67	0	0	3
	2017	100	0	0	0	1
	2018	-	-	-	-	0
	2019	-	91	5	-	56
	2020	TBD	TBD	TBD	TBD	TBD
Siletz	2014	-	-	-	-	0
	2015	-	-	-	-	0
	2016	32	61	7	0	28
	2017	3	90	7	0	62
	2018	93	6	1	0	117
	2019	-	100	-	-	1
	2020	TBD	TBD	TBD	TBD	TBD

Table V.2, Continued.

Population	Return Year	Percentage				Scales Aged (n)
		Age 3	Age 4	Age 5	Age 6	
Yaquina	2014	7	67	25	0	405
	2015	78	21	2	0	327
	2016	6	89	5	0	572
	2017	11	61	27	1	232
	2018	91	9	<1	0	381
	2019	53	45	1	0	256
	2020	TBD	TBD	TBD	TBD	TBD

[1]Age composition is not well-resolved in some population areas where sample sizes are small.

Section VI. Coastal Cutthroat Trout

WILD FISH MONITORING SUMMARY

SMU: Coastal Cutthroat Trout

Stratum: North Coast, Umpqua

Populations: Tillamook Bay, Nestucca, North Umpqua

Abundance

The abundance of coastal cutthroat trout is not systematically monitored, but ODFW assesses the abundance of anadromous forms through snorkel surveys of resting holes in the Wilson, Trask, and Nestucca Rivers (Table VI-1; Figure VI-1) and through passage counts at Winchester Dam (North Umpqua) (Table VI-II; Figure VI-2).

Table VI-1. Density (fish/resting hole) of sea-run coastal cutthroat trout observed during resting hole surveys for early-run Chinook salmon in the Tillamook (Wilson & Trask Basins) and Nestucca populations. The CMP does not include abundance targets for sea-run coastal cutthroat trout. 5-year geometric mean densities for the period preceding the CMP are provided for context.

TILLAMOOK & NESTUCCA ADULT ABUNDANCE INDEX RESTING HOLE DENSITY[1]				
Population	Management Area	Year	Resting Holes Surveyed	Fish Density (#/Resting Hole)
Tillamook	Wilson	2014	16	3.3
		2015	16	0.6
		2016	16	2.0
		2017	16	2.9
		2018	16	2.9
		2019	16	2.3
		2020	16	4.1
		5-yr Geometric Mean (2009-13)		*3.5*
	Trask	2014	13	21.7
		2015	13	10.7
		2016	13	13.6
		2017	13	10.7
		2018	13	25.5
		2019	13	13.8
		2020	13	5.7
		5-yr Geometric Mean (2009-13)		*20.1*
Nestucca	*n/a*	2014	13	1.4
		2015	13	1.7
		2016	13	2.5
		2017	13	4.0
		2018	13	2.5
		2019	13	3.8
		2020	13	2.5
		5-yr Geometric Mean (2009-13)		*3.4*

[1]This abundance index for sea-run coastal cutthroat trout is based on the number of observations per pool surveyed. Snorkel surveys were initiated primarily for determining relative abundance of spring Chinook salmon in resting holes; timing may not coincide with the peak abundance of sea-run coastal cutthroat trout in freshwater.

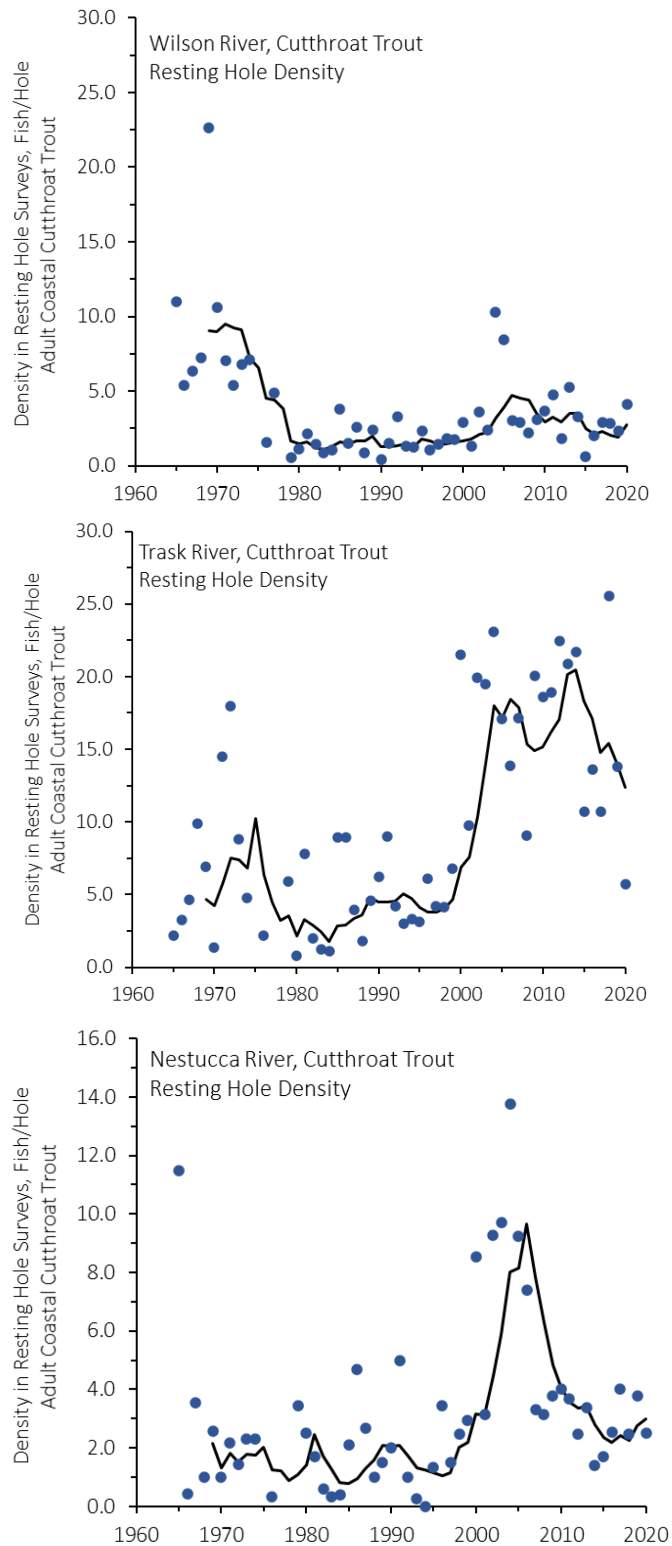

Figure VI-1. Density (fish/hole) of coastal cutthroat trout (•) in resting holes in the Wilson (Top), Trask (Middle), and Nestucca (Bottom) river basins, 1965-2020. Numbers prior to the early 1990s may be influenced by releases of hatchery cutthroat into North Coast basins. Solid line shows a running 5-year geometric mean of densities in resting holes.

Table VI-2. Counts of wild sea-run coastal cutthroat trout at Winchester Dam, North Umpqua River, April 1 – March 31. The CMP does not include abundance targets for sea-run coastal cutthroat trout. The 5-year geometric mean of counts for the period preceding the CMP is provided for context.

Spatial Extent	Run Year (April 1 to March 31)	Passage Count at Winchester Dam
North Umpqua Population	2014-15	117
	2015-16	58
	2016-17	141
	2017-18	133
	2018-19	198
	2019-20	324
	5-yr Geometric Mean *(2009/10 to 2013/14)*	*200*

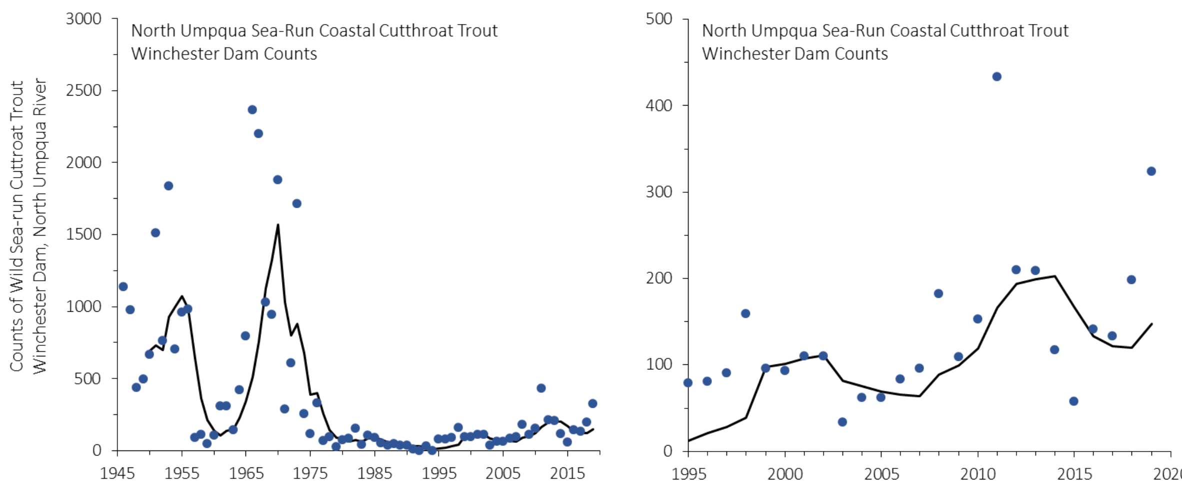

Figure VI-2. Counts of wild sea-run coastal cutthroat trout at Winchester Dam on the North Umpqua River (•), run years 1945-1946 through 2019-20 (Left). Counts prior to the 1990s may be influenced by releases of hatchery cutthroat trout into the North Umpqua River and elsewhere in the Umpqua basin. Data from run years 1994-1995 through 2019-20 are shown on the right panel to expand the scale for recent trends. Solid black lines show the running 5-year geometric mean of passage counts.

Harvest

The CMP calls for ODFW to consider closure of tidally influenced sections of mainstem rivers to the harvest of coastal cutthroat trout during periods of very low coho marine survival. Amendment 13 of the Pacific Salmon Treaty uses a marine survival index for the Oregon Coast Coho harvest matrix that is based on biological and oceanographic indicators. This index classifies marine survival into four categories, High, Medium, Low, and Extremely Low. The index has not been classified as Extremely Low in the period after adoption of the CMP (Table VI-3; data from Table V-8, PFMC, 2021).

Table VI-3. Coho Marine Survival Indicator. Data are from Table V-8 in PFMC (2020).

Spatial Extent	Fishery Year	Oregon Coast Coho Marine Survival Indicator
Oregon Coast Coho SMU	2014	Medium
	2015	Medium
	2016	Medium
	2017	Medium
	2018	Low
	2019	Low
	2020	Low
	2021	Medium

The CMP also calls for ODFW to consider modifying harvest of coastal cutthroat trout if winter steelhead abundances fall below stratum-level Critical Abundances in consecutive years. Since adoption of the CMP, stratum-scale winter steelhead abundance has fallen below Critical Abundances in consecutive years only in the North Coast Stratum (2018 and 2019; See Winter Steelhead Stratum Summaries for data). However, North Coast index pool surveys did not indicate significant declines in cutthroat trout in 2018 and 2019 (Table VI-1) (Fig. VI-1).

Hatchery Influence

Coastal cutthroat are not assessed for pHOS because no hatchery programs exist in the Coastal SMU.

Productivity

Productivity will not be assessed for coastal cutthroat. There are no available data on all demographic factors needed to assess productivity criteria for this species.

Distribution

ODFW will monitor changes in the distribution of coastal cutthroat based on occurrence during snorkel surveys targeting juvenile coho in wadeable streams.

Diversity

Specific metrics for phenotypic diversity are not yet developed for coastal cutthroat trout.

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