Oregon Coast Coho Conservation Plan

12-Year Plan Assessment

Appendix III. 2020 Decision Support System Assessment

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2020 Decision Support System (DSS) Assessment
Oregon Coast Coho ESU

Overview of the Decision Support System

Separate from the OCCCP, the Oregon Coast Workgroup of the Oregon and Northern California Coasts Technical Recovery Team (TRT) developed a formal decision support framework for assessing the biological status of the OC Coho ESU with respect to listing under the federal Endangered Species Act (ESA; Wainwright *et al*. 2008).[1] This framework, the Oregon Coast Coho Decision Support System (DSS), integrates numerous metrics from multiple monitoring projects and data analyses into a logical basis for decisions regarding the biological status of the OC Coho ESU.

While the DSS is separate from the measurable criteria assessment for the OCCCP, it is used by NOAA to inform federal status reviews and provides an additional tool for status assessment. Importantly, the DSS acknowledges that Oregon's desired status for the OC Coho ESU (i.e., broad-sense recovery) is substantially beyond recovery under the federal ESA (i.e., delisting). The DSS does not include specific criteria for broad-sense recovery, but the DSS criteria does provide a means for assessing the ESU's sustainability and persistence along the path to this ambitious desired status. Metrics for assessing DSS criteria are calculated largely based on data from ODFW monitoring programs. DSS criteria and assessment results through return year 2019 are summarized below.

DSS Criteria

DSS criteria reflect varying spatial scales including the entire ESU, individual strata (aggregates of several populations), populations, and watersheds within populations. Criteria are centered on two concepts: persistence and sustainability. Wainwright *et al*. (2008) define persistence criteria as those related to the ability of the population or ESU to maintain its genetic legacy and long-term adaptive potential for the foreseeable future. Sustainability criteria are those related to stability of habitat availability and other conditions necessary for the full expression of the population's life history diversity into the foreseeable future. Additional details on the criteria and the linkages among criteria are provided below and in Wainwright *et al*. (2008).

DSS Metric Scoring

The DSS acknowledges uncertainty[2] in the decision framework by scoring metrics using "truth values", which reflect the degree of confidence in the result. Scores conceptually range from +1.0 (True with 100% Certainty) to -1.0 (False with 100% Certainty); a value of 0 is completely uncertain. Additional details about how each metric is assigned membership to varying degrees of certainty (truth membership functions) can be found in Wainwright *et al*. (2008). Truth values can be categorized by the degree of certainty using Figure 6 in Wainwright *et al*. 2008. Based on that figure, ODFW applied the threshold values in Table A-III:1 to categorize truth values for the current assessment.

[1] The Oregon Coast Workgroup was comprised of staff from the NOAA Northwest Fisheries Science Center, ODFW, the U.S. Forest Service, Oregon Watershed Enhancement Board, and Clearwater Biostudies, Inc.
[2] Uncertainty refers to both the parameters included in the DSS as well as uncertainty associated with measurement/calculation of metrics (Wainwright *et al*. 2008).

Table A-III:1. Truth values ranges characterizing various degrees of certainty for DSS criteria scores. Ranges are based on analysis of Figure 6 in Wainwright *et al*. 2008.

Truth Value Range	Degree of Certainty
Greater than +0.54	High Certainty True
+0.41 to +0.54	Moderate to High Certainty True
+0.28 to +0.40	Moderate Certainty True
+0.16 to +0.27	Low to Moderate Certainty True
+0.11 to +0.15	Low Certainty True
-0.10 to +0.10	Uncertain
-0.11 to -0.15	Low Certainty False
-0.16 to -0.27	Low to Moderate Certainty False
-0.28 to -0.40	Moderate Certainty False
-0.41 to -0.54	Moderate to High Certainty False
Less than -0.54	High Certainty False

DSS Criteria and Assessment

The following descriptions of each criterion and evaluation metric are excerpts from Wainwright *et al*. (2008). Assessment details (data and current assessment results) are provided by ODFW for assessment through run year 2019. Assessment results are also compared to previous assessments in 2012 and 2015, which used data through run years 2009 and 2014, respectively.

Population-Level Persistence Criteria

PP-1, Population Productivity

Criterion: Productivity at low abundance (i.e., that experienced when spawner densities are low, and compensation is not substantially reducing productivity) is sufficient to sustain an Independent Population through an extended period of adverse environmental conditions (12 years with marine survival equivalent to the 1990–2001 brood-year average).

Metric: Productivity at low abundance is estimated as the geometric mean of the natural return ratio (NRR) for brood years with spawner abundances below the median of the last 4 generations (12 years). Specifically, the metric is the statistical probability (Student's t-test) that NRR is greater than 1, based on available data. NRR is the ratio N/T, where N is naturally produced spawners and T is total (hatchery produced plus naturally produced) spawners in the previous generation. The truth value of the criterion is evaluated by a straight line relationship where zero is false (–1.0) and one is true (+1.0) (See Figure 10 in Wainwright *et al*. 2008).

Data: Estimated annual abundance of coho spawners by origin (wild and hatchery) by population (only includes Independent Populations).

Current Assessment: Scores for Criterion PP-1 ranged from -0.83 to 1.0, with an average of 0.58 (Table A-III:2). For most populations (17 of 21), the score indicated a high certainty

(Necanicum; Nehalem; Tillamook; Nestucca; Siletz; Yaquina; Alsea; Tahkenitch; Tenmile; L. Umpqua; M. Umpqua; Coos; Coquille; Floras; Sixes), moderate to high certainty (Siuslaw) or moderate certainty (North Umpqua) that productivity at low abundance is sufficient to sustain an Independent Population through an extended period of adverse environmental conditions. Remaining 4 populations were characterized as uncertain (Beaver Creek; Siltcoos; S. Umpqua) or high certainty false (Salmon River). The average score in 2020 (0.58) is lower than in the previous two DSS runs (2012 = 0.69; 2015 = 0.71) (Table A-III:3). The lower average for the current analysis likely reflects the generally poorer ocean conditions during the 12-years used in the 2020 PP-1 analysis (e.g., See NMFS stoplight table for ocean conditions[3]).

PP-2, Probability of Persistence

Criterion: The population has a high likelihood of persisting over the next 100 years.

Metric: To evaluate extinction risk, a variety of population viability models were applied to estimate the expected probability of extinction for the population. To evaluate the truth of the criterion, the results of all the models for each population were averaged. A persistence probability of 80% is considered to have a truth value of false (–1.0), 95% is uncertain (0), and 100% is true (+1.0) (See Figure 11 in Wainwright *et al*. 2008).

Data: The original values for criterion PP-2 were based on probabilities of persistence were derived from four population viability models using two extinction thresholds. Additional details of the models are provided in Wainwright *et al*. (2008). The PVAs have not been updated for this assessment; criterion PP-2 was the most impacted during sensitivity testing of the DSS (See Appendix A in Wainwright *et al*. 2008).

Current Assessment: Scores for Criterion PP-2 range from -1.0 to 1.0, with an average of 0.58 (Table A-III:2). For most populations (18 of 21), the score indicated a high certainty (Nehalem; Nestucca; Siletz; Yaquina; Beaver Creek; Alsea; Siuslaw; Siltcoos; Tahkenitch; Tenmile; L. Umpqua; M. Umpqua; S. Umpqua; Coos; Coquille; Floras) or moderate to high certainty (Tillamook; N. Umpqua) that the population has a high likelihood of persisting over the next 100 years. The remaining three populations were characterized as moderate to high certainty false (Necanicum) or high certainty false (Salmon; Sixes). *Note that this assessment is based on the original PVAs; PVAs have not been updated for this assessment.*

PP-3, Critical Abundance

Criterion: Population abundance is maintained above levels where small-population demographic risks (depensation or Allee effects[4]) are likely to become significant, even during periods of adverse environmental conditions.

Metric: This is measured by the average peak spawner density (peak adults per mile of occupied spawning habitat) in the lowest 3 of the last 12 years. Any value of this metric below 1 adult per mile (0.6 per km) is considered to be false (–1.0), 4 per mile (2.5 per km) is uncertain (0), 10 per mile (6 per km) is highly certain (+0.8), and 20 or more per mile (12 per km) is true (+1.0) (See Figure 12 in Wainwright *et al*. 2008).

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[3] https://www.fisheries.noaa.gov/west-coast/science-data/ocean-ecosystem-indicators-pacific-salmon-marine-survival-northern

[4] Depensation refers to decreased population productivity (production or survival) at low breeding population size or density; Allee effects refer to decreased individual fitness at low population size or density.

Data: Average peak density of wild adult coho in occupied random surveys (i.e., at least 1 adult coho. These data are the same wild adult peak count data used for criterion PD-3. Random surveys were discontinued in the lakes populations (Siltcoos, Tahkenitch and Tenmile Populations) starting in 2014, and in the North Umpqua Population (above Winchester Dam) in 2012. Thus, random survey data is available only in the first 6 or 4 (respectively) years of the last 12 years in these populations. Therefore, for the most recent 12 years used in the current analysis, average density in these four populations was calculated as the annual abundance divided by the spawning mileage. This method was used for the North Umpqua population in the 2015 DSS, but it is new for the Lakes populations in the 2020 DSS. Annual abundance in the North Umpqua is the Winchester Dam count. In the three Lakes Populations, annual abundance is based on calibrated standard surveys.

Current Assessment: Scores for Criterion PP-3 ranged from -0.31 to 1.0, with an average of 0.65 (Table A-III:2). For most populations (19 of 21), the score indicated a high certainty (Tillamook; Siletz; Yaquina; Beaver Creek; Alsea; Siuslaw; Siltcoos; Tahkenitch; Tenmile; L. Umpqua; N. Umpqua; Coos; Coquille), moderate to high certainty (Necanicum; Nehalem; Nestucca; Salmon), or moderate certainty (S. Umpqua; Floras) that the population abundance is maintained above levels where small-population demographic risks are likely to become significant, even during periods of adverse environmental conditions. The remaining two populations were characterized as low to moderate certainty true (M. Umpqua) or moderate certainty false (Sixes). The average score in 2020 (0.65) is higher than in the 2012 DSS run (0.40) and near the score from the 2015 assessment (0.66) (Table A-III:3).

PP, Population Persistence (Combined Criterion):

Criterion: The population will persist for the next 100 years.

Metric: This requires that populations meet each of three sub-criteria: Population Productivity (PP-1), Probability of Persistence (PP-2), and Critical Abundance (PP-3).

Current Assessment: Scores for Criterion PP ranged from -1.0 to 0.93, with an average of 0.45 (Table A-III:2). For most populations (16 of 21), the score indicated a high certainty (Nehalem; Tillamook; Nestucca; Siletz; Yaquina; Alsea; Siuslaw; Tahkenitch; Tenmile; L. Umpqua; Coos; Coquille; Floras) or moderate to high certainty (Siltcoos; M. Umpqua; N. Umpqua) that the population will persist for the next 100 years. The remaining five populations were characterized as low to moderate certainty true (Beaver Creek; S. Umpqua), low to moderate certainty false (Necanicum) or high certainty false (Salmon; Sixes). The average score in 2020 (0.45) is higher than in 2012 (0.35) and lower than in 2015 (0.52) (Table A-III:4). *Note that the 2020 assessment of criterion PP relies in part on the original PVAs (criterion PP-2), which have not been updated in the DSS. Differences in scoring among years are attributable to changes in scores for component criteria PP-1 and PP-3.*

Stratum-Level Persistence Criteria

SP, Stratum Persistence

Criterion: Most of the historically Independent Populations in the stratum are persistent according to the Population Persistence Criterion, PP, defined above.

Metric: This is measured as the median Population Persistence Criterion truth value of Independent Populations in the stratum.

Current Assessment: Values for Criterion SP ranged from 0.47 to 0.73, with an average of 0.65 (Table A-III:5). These values represent high certainty (North Coast; Mid Coast; Lakes; Mid-South Coast) or moderate to high certainty (Umpqua) that most of the historically Independent Populations in the strata are persistent. The average score in 2020 (0.65) is higher than in 2012 (0.54) and lower in 2015 (0.74) (Table A-III:5. *Note that these values reflect, in part, the original PVAs (population criterion PP-2), which have not been updated in the DSS. Differences in scoring among years are attributable to changes in scores for component population criteria PP-1 and PP-3.*

ESU-Level Persistence Criteria

EP, ESU Persistence Criterion

Criterion: Persistence of the ESU requires that all of the biogeographic strata be persistent.

Metric: This requires that all biogeographic strata meet the Stratum Persistence criteria.

Current Assessment: In the current assessment, Criterion EP, has a truth value of 0.60, representing a high certainty that all biogeographic strata are persistent. The score in 2020 (0.60) is higher than in 2012 (0.44) and lower than in 2015 (0.73) (Table AIII:6). *Note that these values reflect, in part, the original PVAs (population criterion PP-2), which have not been updated in the DSS. Differences in scoring among years are attributable to changes in scores for component population criteria PP-1 and PP-3.*

Population-Level Sustainability Criteria

Population diversity is evaluated using four population-level criteria: Spawner Abundance (PD-1), Artificial Influence (PD-2), Spawner Distribution (PD-3), and Juvenile Distribution (PD-4), which are then combined into a Population Diversity Criterion (PD).

PD-1, Spawner Abundance

Criterion: The population has sufficient naturally produced spawners to prevent loss of genetic variation due to random processes over a 100-year time frame.

Metric: Spawner abundance is measured as the long-term harmonic mean of naturally produced spawners (both 3-year-old adults and 2-year-old jacks) based on annual surveys. "Long-term" means including all available data (up to 100 years). The harmonic mean is calculated as the reciprocal of the mean of reciprocals (i.e., $n/[1/x1 + 1/x2 + ... + 1/xn]$, where xi is the abundance in year i, and n is the number of years of data). Any mean value below 85 naturally produced spawners is considered false (–1.0), a value of 450 is uncertain (0), and any value above 5,000 is true (+1.0) (See Figure 15 in Wainwright *et al*. 2008).

Data: Estimated annual abundance of naturally produced coho spawners by population (only includes Independent Populations). Data are from spawning surveys and Winchester Dam Counts (North Umpqua Population) for the period of 1958-2019. All adult estimates are expanded to total (adults & jacks) based on the average percentage of jacks in standard survey data from 1981 through 2004. The percent jacks are calculated from peak counts in all but the Siltcoos and Tahkenitch populations, where percent jacks are calculated based on Area-Under-The-Curve (AUC). Populations without standard surveys use the average percent jacks for their stratum.

Current Assessment: Population scores for criterion PD-1 range from -1.0 (Salmon River) to 1.0 (Siuslaw; Coos; Coquille), with a mean score of 0.26 (Table A-III:2). Scores for individual populations correspond to the following categories:

High Certainty True: Nehalem; Siuslaw; Tenmile; L. Umpqua; M. Umpqua; Coos; Coquille
Moderate to High: Siltcoos
Moderate Certainty True: Yaquina
Low to Moderate Certainty True: Nestucca; Alsea; Tahkenitch; S. Umpqua
Low Certainty True: Tillamook; Siletz; Floras
High Certainty False: Salmon; N. Umpqua; Sixes

The average score in 2020 (0.26) is slightly higher than in 2012 (0.24) and equal to the score in 2015 (0.26) (Table A-III-3).

PD-2, Artificial Influence

Criterion: The abundance of naturally spawning hatchery fish will not be so high as to be expected to have adverse effects on natural populations.

Metric: This is measured as the six-year (two-generation) mean of annual estimates of the proportion of naturally produced fish (one minus the proportion of hatchery fish) in spawning surveys for the population. Only years with adequate data to provide a reliable estimate are included in the average. Adequate data in any year is defined as at least 10 fish observed for marks denoting hatchery origin. The associated truth value is false (–1.0) for values below 50%, uncertain (0) for a value of 90%, and true (+1.0) at 100% (See Figure 17 in Wainwright *et al*. 2008).

Data: Estimated annual abundance of coho spawners by origin (wild and hatchery) by population (only independent populations). Sample size for estimating proportion of naturally produced fish must be at least 10; estimates from years with < 10 observed fish with known fin clip status are not used.

Current Assessment: Population scores for criterion PD-2 range from -0.04 to 1.0, with a mean score of 0.88 (Table A-III:2). The score for the South Umpqua Population (-0.04) indicates uncertainty with respect to Criterion PD-2, and the score for the North Umpqua Population (0.34) indicates moderate certainty. Scores for the 19 other populations indicate high certainty that the abundance of naturally spawning hatchery fish will not be so high as to be expected to have adverse effects on natural populations. It is notable that the previous scores for the South Umpqua population were 0.50 in 2012 and 0.53 in 2015. The lower score in 2020 (-0.04) appears to reflect a year of high pHOS (37%) in 2016.[5] The DSS was designed to be relatively conservative; the relatively short assessment timeframe for criterion PD-2 (6 years) and a steep truth value membership curve (See Figure 17 in Wainwright *et al*. 2008) mean that a single year of high pHOS can have a large impact on the score. The average score across populations in 2020 (0.88) is higher than in 2012 (0.55) and 2015 (0.87) (Table A-III:3).

[5] pHOS in the South Umpqua Population in 2016 was also based on a relatively small sample size (3 carcasses and 16 live fish).

PD-3, Spawner Distribution

Criterion: On average, the historically occupied watersheds in the population's range have spawners occupying the available spawning habitat.

Metric: Evaluating this criterion at the population level requires first evaluating a sub-criterion regarding occupancy of each watershed within the population (Spawner Watershed Occupancy,W-Sp). The truth value for the population is then the average of the watershed values.

Sub-criterion W-Sp, Spawner Watershed Occupancy

Spawners occupy a high proportion of the available spawning habitat within the watershed.

Metric: Watershed occupancy is measured by the average occupancy rate of watersheds during the most recent 12 years. The distribution of spawners is analyzed by fifth-field hydrologic units (HUC5) for each population by examining data from randomly selected survey reaches. Average occupancy is the 12-year average of the annual fraction of habitat occupied, calculated within each watershed (HUC5) as the proportion of surveyed reaches in any year that have a minimum peak count (highest count on any single survey date) of at least four naturally produced spawners per mile (2.5 per km). Truth values for each watershed are false (–1.0) for occupancy less than 20%, uncertain (0) for occupancy of 50%, and true (+1.0) for occupancy greater than 80% (See Figure 18 in Wainwright *et al*. 2008).

Data: Annual percent of random surveys, by 5th field HUC (HUC5), that meet the criteria for an occupied site. Occupied sites have a peak density of at least four adult wild coho per mile.

Current Assessment: Scores for PD-3 ranged from -0.66 to 1.0, with an average of 0.56 (Table A-III:2). For most populations (16 of 21), the score indicated a moderate or higher certainty that, on average, the historically occupied watersheds in the population's range have spawners occupying the available spawning habitat. The remaining five populations were characterized as low to moderately certain true (Nehalem); uncertain (S. Umpqua; M. Umpqua), or moderate to high certainty false (N. Umpqua, Sixes). The average score in 2020 (0.56) is higher than in 2012 (0.49) and lower than in 2015 (0.65) (Table A-III:3).

PD-4, Juvenile Distribution

Criterion: On average, the historically occupied watersheds in the population's range have juveniles occupying the available juvenile habitat.

Metric: Evaluating this measure at the population level requires first evaluating a sub-criterion regarding occupancy of each watershed within the population (Juvenile Watershed Occupancy, W-Ju). The truth value for the population is the average of the watershed values.

Sub-criterion W-Ju, Juvenile Watershed Occupancy

Juveniles occupy a high proportion of the available rearing habitat within the watershed.

Metric: Juvenile occupancy is measured by the average occupancy rate of surveyed reaches in each HUC5 watershed during the most recent 12 years. Occupancy is defined as the presence of fish in at least two pools within any survey reach that contains two or more pools; survey reaches with fewer pools are excluded from the statistics. Truth values for each watershed are false (–1.0) for occupancy less than 20%, uncertain (0) for occupancy of 50%, and true (+1.0) for occupancy greater than 80% (Figure A-II:6, above).

Data: Annual percent of random surveys, by 5th field HUC, that meet the criteria for an occupied site. Occupied sites have juvenile coho present in at least two pools, calculated for all survey sites containing two or more pools.

Current Assessment: Scores for Criterion PD-4 ranged from -0.50 to 1.0, with an average of 0.75 (Table A-III:2). For most populations (18 of 21), the score indicated a moderate or higher certainty that, on average, the historically occupied watersheds in the population's range have juveniles occupying the available juvenile habitat. The remaining three populations had scores indicating low to moderate certainty true (Sixes), low certainty true (Nestucca), and moderate to high certainty false (North Umpqua). The average score in 2020 (0.75) was higher than in 2012 (0.60) and 2015 (0.69) (Table A-III:3).

PD, Population Diversity

Criterion: The population has sufficient diversity and distribution to ensure continued fitness in the face of environmental change.

Metric: This requires that the population meet each of four subcriteria above: Spawner Abundance, PD-1; Artificial Influence, PD-2; Spawner Distribution, PD-3; and Juvenile Distribution, PD-4.

Data: See component criteria: PD-1, PD-2, PD-3, and PD-4

Current Assessment: Scores for Criterion PD ranged from -1.0 to 0.93, with an average of 0.37 (Table A-III:2). For most populations (16 of 21), the score indicated a high certainty (Nehalem; Yaquina; Alsea; Siuslaw; Siltcoos; Tahkenitch; Tenmile; L. Umpqua; Coos; Coquille), moderate to high certainty (Tillamook; Siletz; Floras) or moderate certainty (Beaver Creek; M. Umpqua; Nestucca) that the population has sufficient diversity and distribution to ensure continued fitness in the face of environmental change. The remaining five populations were characterized as low to moderate certainty true (Necanicum), uncertain (South Umpqua), moderate to high certainty false (North Umpqua) or high certainty false (Salmon; Sixes). The average score in 2020 (0.37) was higher than in 2012 (0.25) and 2015 (0.36) (Table A-III:3).

PF, Population Functionality

Criterion: Habitat quality and quantity are adequate to support sufficient abundance to maintain long-term genetic integrity of the population.

Metric: This criterion was measured as the estimated smolt capacity for the basin as estimated by the ODFW limiting factors model (Habitat Limiting Factors Model. Truth of the criterion was evaluated according to whether this smolt capacity is sufficient to produce spawners to meet the Population Diversity Criterion, PD-1, under poor ocean conditions (i.e., at 2% marine survival). Thus, the criterion for smolt capacity is 50 (=1/0.02) times the PD-1 spawner criterion. This results in truth values of false (–1.0) for smolts below 4,250, uncertain (0) at 22,500 smolts, and true (+1.0) for greater than 250,000 smolts.

Current Assessment: Criterion PF has not been included in the DSS since 2010 because it required substantial analysis to update and was unlikely to be sensitive to small changes in habitat conditions (Stout *et al*. 2012).

PS, Population Sustainability

Criterion: The population is able to sustain itself into the foreseeable future.

Metric: This requires that the population is persistent and has sufficient diversity and distribution (Population Persistence Criterion, PP, and the Population Diversity Criterion, PD).

Data: See component criteria: PP and PD.

Current Assessment: Scores for Criterion PS ranged from -1.0 to +0.87, with an average of 0.36 (Table A-III:2). For most populations (15 of 21), the score indicated a high certainty (Nehalem; Siletz; Yaquina; Alsea; Siuslaw; Tahkenitch; Tenmile; L. Umpqua; Coos; Coquille), moderate to high certainty (Tillamook; Siltcoos; Floras) or moderate certainty (M. Umpqua; Nestucca) that the population is able to sustain itself into the foreseeable future. The remaining six populations were characterized as low to moderate certainty true (Beaver Creek), low certainty true (S. Umpqua), low to moderate certainty false (Necanicum), moderate to high certainty false (N. Umpqua), or high certainty false (Salmon; Sixes) (Table A-II:2). The average score in 2020 (0.36) is higher than the score in 2012 (0.25) and lower than the score in 2015 (0.36) (Table A-III:4). Changes in scores for criterion PS among assessments are attributable to scores for component criteria PP-1, PP-3, PD-1, PD-2, PD-3 and PD-4. Note that this assessment relies in part on the original PVAs because it incorporates scoring for criterion PP. The original PVA analysis resulted in the Salmon and Sixes having PP-2 values of -1.00. The DSS uses an "AND" function to create the PP and PS scores. The "AND" function requires all truth values to be at least partly true or it defaults to -1.00. Until the PP-2 is recalculated with updated PVAs, the Salmon and Sixes PP and PS scores cannot exceed -1.00.

Stratum-Level Sustainability Criteria

SD, Stratum Diversity:

Criterion: Most historically Independent Populations in the stratum are presently sustainable according to the population-level sustainability criteria.

Metric: This is measured as the median Population Sustainability Criterion, PS, truth value of Independent Populations in the stratum.

Data: See component criterion PS.

Current Assessment: Values for Criterion SD ranged from 0.46 to 0.66, with an average of 0.53 (Table A-III:5). These values represent high certainty (Mid Coast; Lakes; Mid-South Coast), moderate to high certainty (North Coast), and low to moderate certainty (Umpqua) that most historically Independent populations in the strata are presently sustainable. The average score in 2020 (0.53) is higher than in 2012 (0.43) and lower than in 2015 (0.59) (Table A-III:5). *Note that this assessment relies in part on the original PVAs (Criterion PP-2 influences scores for criterion PS). Changes in scores for criterion SD among assessments are attributable to scores for component criteria PP-1, PP-3, PD-1, PD-2, PD-3 and PD-4.*

SF, Stratum Functionality:

Criterion: All of the historically Independent Populations in the stratum are functional according to the Population Functionality Criterion, PF.

Metric: The criterion was evaluated using the Population Functionality Criterion, PF. This criterion was eliminated from the DSS after 2010 with the elimination of the component criterion PF.

Current Assessment: Criterion PF is not included in the current assessment.

SS, Stratum Sustainability

Criterion: The stratum is self-sustaining (in terms of both diversity and functionality) into the foreseeable future.

Metric: This requires that the stratum meets both the Stratum Diversity Criterion, SD, and the Stratum Functionality Criterion, SF. However, Criterion SF was eliminated from the DSS in 2010; Criterion SS is effectively equal to Criterion SD in the present assessment.

Data: See component criterion SD.

Current Assessment: Due to elimination of Criterion SF, Criterion SS is effectively equal to Criterion SD in the present assessment (See Current Assessment for Criterion SD).

ESU-Level Sustainability Criteria

ES-1, All Biogeographic Strata Sustainable

Criterion: All of the biogeographic strata within the ESU are sustainable.

Metric: This is evaluated based on truth values for the Stratum Sustainability Criterion, SS.

Data: See component criterion SS.

Current Assessment: Criterion ES-1 was assessed a truth value of 0.43, reflecting moderate certainty that all biogeographic strata within the ESU are sustainable (Table A-III:6). The score for 2020 (0.43) is higher than scores in 2012 (0.39) and 2015 (0.40). *Note that this assessment relies in part on the original PVAs (Criterion PP-2 is included in scoring for component metrics for criterion SS: See Current Assessments for Criteria SD and SS, above).*

ED-1, Genetic Diversity (Expert Panel)

Criterion: ESU-level genetic diversity is sufficient for long-term sustainability of the ESU.

Metric: This is evaluated as the average of four sub-criteria: Genetic Structure, ED-1a; Effects of Selection, ED-1b; Effects of Migration, ED-1c; and Effects of Introgression, ED-1d.

Data: Criterion ED-1 was based on the expert panel scores of the sub-criteria below during the initial assessment of the DSS in Wainwright *et al*. (2008).

Sub-Criterion ED-1a, Genetic Structure (Expert Panel)

Genetic diversity within the ESU is comparable to healthy coho salmon ESUs (e.g., Olympic Peninsula, Southeast Alaska) and forms the basis for some life history diversity.

Metric: This was evaluated by answering the question: Are populations genetically distinguishable (based on allozyme or DNA variation) from each other such that they form groups based on geography, ecology, or life history types?

Data: Sub-Criterion ED-1a was scored by an expert panel.

Current Assessment, Sub-Criterion ED-1a: In the initial assessment provided in Wainwright *et al*. 2008, the expert panel score for Sub-Criterion ED-1a was 3.55, corresponding to a truth value of 0.28. This truth value indicates low to moderate certainty that genetic diversity within the ESU is sufficient for long-term sustainability of the ESU. *This metric is included in the current DSS analysis, but scoring has not been updated since the original assessment.*

Sub-Criterion ED-1b, Effects of Selection (Expert Panel)

Human-driven selection is not sufficient to decrease genetic diversity.

Metric: This criterion is evaluated by answering the question: Has selection decreased genetic diversity? The five possible scores were:

5 = Genetic diversity has not been decreased by selection relative to the historical template.

4 = Genetic diversity has been mildly decreased by selection.

3 = Genetic diversity has been moderately decreased by selection or no evidence is available to determine the degree of alteration by selection.

2 = Genetic diversity has been fairly severely decreased by selection.

1 = Genetic diversity has been severely decreased by selection to the point that they have little in common with the historical template.

Data: Sub-Criterion ED-1b was scored by an expert panel.

Current Assessment, Sub-Criterion ED-1b: In the initial assessment provided in Wainwright *et al*. (2008), the expert pane scored Sub-Criterion ED-1b as 2.98, resulting in a truth value of –0.01. This truth value indicated uncertainty that human-driven selection is not decreasing genetic diversity. *This metric is included in the current DSS analysis, but scoring has not been updated since the original assessment.*

Sub-Criterion ED-1c, Effects of Migration (Expert Panel)

Genetic diversity is not compromised by changes in the movements of fish.

Metric: This criterion is evaluated by answering the question: Have normal movement patterns been restricted or altered either within or between populations? The five possible scores were:

5 = Normal movement patterns within and between populations have not been altered; they represent the historical template.

4 = Normal movement patterns within and between populations have been mildly altered.

3 = Normal movement patterns within and between populations have been moderately altered or no information is available to determine whether they have been altered.

2 = Normal movement patterns within and between populations have been fairly severely altered.

1 = Normal movement patterns within and between populations have been severely altered; they no longer represent the historical template.

Data: Sub-Criterion ED-1c was scored by an expert panel.

Current Assessment, Sub-Criterion ED-1c: In the initial assessment provided in Wainwright *et al*. (2008), the expert panel scored Sub-Criterion ED-1c as 3.52, resulting in a truth value of 0.26. This truth value indicated a low to moderate certainty that genetic diversity is not compromised by changes in the movements of fish. *This metric is included in the current DSS analysis, but scoring has not been updated since the original assessment.*

Current Assessment, Criterion ED-1: In the initial assessment provided in Wainwright *et al*. (2008), Criterion ED-1 was scored by expert panel to a value of 0.18 (Table A-II-3), representing a low to moderate certainty that the ESU-level genetic diversity is sufficient for long-term

sustainability. *This metric is included in the current DSS analysis, but scoring has not been updated since the original assessment.*

ED-2, Phenotypic and Habitat Diversity (Expert Panel)

Criterion: ESU-level phenotypic and habitat diversity are sufficient for long-term sustainability of the ESU.

Metric: This criterion is evaluated as the average of two sub-criteria: Phenotypic Diversity, ED-2a, and Habitat Diversity, ED-2b.

Data: Criterion ED-2 was based on the expert panel scores of the sub-criteria below during the initial assessment of the DSS in Wainwright *et al*. (2008).

Sub-Criterion ED-2a, Phenotypic Diversity (Expert Panel)

Phenotypic diversity is present within the ESU at levels comparable to healthy ESUs or the historical template.

Metric: This criterion is evaluated by answering the question: Do populations display variation in life history traits such as smolt age, age and size at maturity, juvenile run timing, adult run timing, and spawn timing (do upstream and downstream migrations extend for more than 2 months), comparable to healthy ESUs or the historical template? The five possible scores were:

5 = There is extensive variation in life history traits comparable to healthy ESUs and the historical template.

4 = There is considerable variation in life history traits, although slightly less than in healthy ESUs or the historical template.

3 = There is moderate variation in life history traits, somewhat diminished from healthy ESUs or the historical template, or there is no evidence to indicate changes in life history diversity.

2 = Life history trait variation has been reduced and is well below that of healthy ESUs or the historical template.

1 = Life history trait variation has been greatly reduced and no longer represents either healthy ESUs or the historical template.

Data: Sub-Criterion ED-2a was scored by an expert panel.

Current Assessment, Sub-Criterion ED-2a: In the initial assessment provided in Wainwright *et al*. (2008), the expert panel scored Sub-Criterion ED-2a as 3.61, resulting in a truth value of +0.30. This truth value represents a moderate certainty that phenotypic diversity is present within the ESU at levels comparable to healthy ESUs or the historical template. *This metric is included in the current DSS analysis, but scoring has not been updated since the original assessment.*

Sub-Criterion ED-2b, Habitat Diversity (Expert Panel)

Habitats are sufficiently productive, diverse, and accessible to promote phenotypic plasticity.

Metric: This is evaluated by answering the question: Do multiple habitat types exist within basins, are they accessible to coho salmon, and are they structured by processes that support and maintain each habitat type? The five possible scores were:

5 = Habitats within basins are as accessible, productive, and diverse as those of healthy ESUs or the historic template.

4 = Habitats within basins are slightly less accessible, productive, or diverse as those of healthy ESUs or the historic template.

3 = Habitats within basins are not as accessible, productive, or diverse as those of healthy ESUs or the historic template, or nothing is known about habitat productivity or diversity or coho salmon access.

2 = Habitats within basins are considerably less accessible, productive, or diverse as those of healthy ESUs or the historic template.

1 = Habitats within basins bear little resemblance to healthy ESUs or the historic template with respect to accessibility, productivity, or diversity.

Data: Sub-Criterion ED-2b was scored by an expert panel.

Current Assessment, Sub-Criterion ED-2b: In the initial assessment provided in Wainwright *et al*. (2008), the expert panel scored Sub-Criterion ED-2b as 2.60, resulting in a truth value of –0.20. This truth value corresponds to a moderate certainty that habitats are not sufficiently productive, diverse, and accessible). *This metric is included in the current DSS analysis, but scoring has not been updated since the original assessment.*

Current assessment, Criterion ED-2: In the initial assessment provided in Wainwright *et al*. (2008), the expert panel scored criterion ED-2 as +0.05, indicating uncertainty whether ESU-level phenotypic and habitat diversity are sufficient for long-term sustainability of the ESU. *This metric is included in the current DSS analysis, but scoring has not been updated since the original assessment.*

ED-3, Small Populations (Expert Panel)

Criterion: Dependent Populations within the ESU are not permanently lost.

Metric: This is evaluated by answering the question: Is there any evidence that Small Populations have been permanently lost from the ESU? The five possible scores are:

5 = All Dependent Populations that were historically present in the ESU still currently exist.

4 = Most Dependent Populations that were historically present in the ESU still currently exist.

3 = Some Dependent Populations that were historically present in the ESU still currently exist, or no information exists to indicate whether Dependent Populations have been lost.

2 = Only a few Dependent Populations that were historically present in the ESU still currently exist.

1 = All Dependent Populations that were historically present in the ESU have been lost.

Data: Criterion ED-3 was based on the expert panel scores of the sub-criteria below during the initial assessment of the DSS in Wainwright *et al*. (2008).

Current Assessment: In the initial assessment provided in Wainwright *et al*. (2008), the expert panel scored this criterion as 3.80, resulting in a truth value of 0.40. This truth value indicates moderate certainty that Dependent Populations within the ESU are not permanently lost. *This*

metric is included in the current DSS analysis, but scoring has not been updated since the original expert panel assessment.

ES-2, ESU-level Diversity (Expert Panel)

Criterion: The ESU has sufficient broad-scale diversity to maintain its ecological and evolutionary functions into the foreseeable future.

Metric: This criterion requires meeting each of three criteria: the Genetic Diversity Criterion, ED-1; Phenotypic and Habitat Diversity Criterion, ED-2; and Small Populations Criterion, ED-3.

Data: Criterion ED-3 was based on the expert panel scores of the sub-criteria below during the initial assessment of the DSS in Wainwright *et al*. (2008). See component criteria ED-1, ED-2, and ED-3.

Current assessment: The analysis combines the results of the expert panel criteria for Genetic Diversity, ED-1; Phenotypic Diversity, ED-2; and Small Populations, ED-3. In Wainwright *et al*. (2008), Criterion ES-2 was scored with a truth value of 0.13. This truth value represents a low certainty the ESU has sufficient broad-scale diversity to maintain its ecological and evolutionary functions into the foreseeable future. *This metric is included in the current DSS analysis, but scoring has not been updated since the original expert panel assessment.*

ES, ESU Sustainability

Criterion: The ESU is self-sustaining into the foreseeable future.

Metric: The ESU Sustainability Criterion requires sustainability of the strata (All Strata Sustainable, ES-1) and the ESU-level Diversity Criterion, ES-2, but with reduced weight placed on ES-2. Thus the truth value is derived by combining the biogeographic Stratum Sustainability Criterion, SS, values into ES-1, then combining the resulting value with the ES-2 value, with a weight of 0.5 placed on the ES-2 value.

Current assessment: The truth value for the ESU Sustainability Criterion, ES, is 0.24, indicating low to moderate certainty that the ESU will be self-sustaining into the foreseeable future. The score for 2020 (0.24) is higher than in 2012 (0.23) and lower than in 2015 (0.29) (Table A-III:6). *Note that this assessment relies in part on the original PVAs (See Current Assessment for Criteria SS and SD, above).*

Table A-III:2. DSS output for assessment (Population-Scale Metrics) in 2020 (using data through 2019 return year). Green shading indicates moderate or higher certainty true, yellow shading indicates low certainty true, gray shading indicates uncertain, and red shading indicates low to high certainty false.

Stratum	Population	Metric									
		PP-1	PP-2	PP-3	PD-1	PD-2	PD-3	PD-4	PP	PD	PS
North Coast	Necanicum	0.63	-0.44	0.45	0.02	0.89	0.80	0.36	-0.26	0.27	-0.16
	Nehalem	1.00	0.92	0.54	0.89	0.90	0.27	0.77	0.76	0.55	0.63
	Tillamook	0.95	0.50	0.66	0.15	0.94	0.47	0.99	0.65	0.43	0.51
	Nestucca	0.92	0.74	0.41	0.16	1.00	0.49	0.13	0.61	0.31	0.41
Mid Coast	Salmon	-0.83	-1.00	0.43	-1.00	0.72	0.35	1.00	-1.00	-1.00	-1.00
	Siletz	0.83	0.66	0.84	0.11	0.99	0.97	1.00	0.76	0.48	0.58
	Yaquina	0.97	0.76	0.92	0.35	0.94	0.93	1.00	0.87	0.66	0.74
	Beaver	-0.10	0.62	1.00	0.04	0.99	1.00	1.00	0.17	0.41	0.24
	Alsea	0.59	0.96	0.84	0.22	1.00	0.92	1.00	0.76	0.57	0.64
	Siuslaw	0.52	0.98	0.82	1.00	1.00	0.79	0.98	0.71	0.93	0.80
Lakes	Siltcoos	0.09	1.00	1.00	0.45	0.93	1.00	1.00	0.42	0.74	0.53
	Tahkenitch	0.58	0.70	1.00	0.24	0.96	1.00	1.00	0.72	0.59	0.64
	Tenmile	0.84	0.98	1.00	0.81	1.00	1.00	0.63	0.93	0.82	0.87
Umpqua	Lower Umpqua	0.89	0.86	0.81	0.88	0.99	0.77	0.92	0.85	0.88	0.87
	Middle Umpqua	0.74	0.84	0.19	0.29	1.00	0.09	0.91	0.43	0.35	0.38
	North Umpqua	0.38	0.52	0.86	-0.59	0.34	-0.48	-0.50	0.52	-0.54	-0.41
	South Umpqua	0.07	0.94	0.29	0.24	-0.04	0.06	0.64	0.26	0.09	0.14
Mid-South Coast	Coos	0.76	0.86	0.80	1.00	0.98	0.64	0.89	0.80	0.84	0.82
	Coquille	0.67	0.96	0.80	1.00	1.00	0.62	0.80	0.79	0.81	0.80
	Floras	0.88	0.92	0.37	0.14	1.00	0.73	1.00	0.61	0.47	0.52
	Sixes	0.82	-1.00	-0.31	-0.95	1.00	-0.66	0.27	-1.00	-0.93	-1.00
Mean Scores		*0.58*	*0.58*	*0.65*	*0.26*	*0.88*	*0.56*	*0.75*	*0.45*	*0.37*	*0.36*

Table A-III:3. Summary of Population-Scale DSS Component Criteria scores from assessments in 2012, 2015 and 2020 using data through run years 2009, 2014 and 2019, respectively. Green shading indicates moderate or higher certainty true, yellow shading indicates low certainty true, gray shading indicates uncertain, and red shading indicates low to high certainty false.

Stratum	Population	PP-1 Population Productivity			PP-2 Prob. of Persistence	PP-3 Critical Abundance			PD-1 Spawner Abundance			PD-2 Artificial Influence			PD-3 Spawner Distribution			PD-4 Juvenile Distribution		
		2012	2015	2020	All Years	2012	2015	2020	2012	2015	2020	2012	2015	2020	2012	2015	2020	2012	2015	2020
North Coast	Necanicum	0.95	0.89	0.63	-0.44	0.30	0.68	0.45	0.01	0.02	0.02	0.35	0.92	0.89	0.82	0.92	0.80	0.97	0.71	0.36
	Nehalem	0.80	0.99	1.00	0.92	0.81	0.83	0.54	0.83	0.87	0.89	0.66	0.79	0.90	0.45	0.53	0.27	0.51	0.78	0.77
	Tillamook	0.90	0.95	0.95	0.50	0.42	0.76	0.66	0.12	0.14	0.15	0.42	0.79	0.94	0.23	0.61	0.47	0.64	0.85	0.99
	Nestucca	0.82	0.95	0.92	0.74	0.38	0.43	0.41	0.14	0.16	0.16	0.92	0.86	1.00	0.20	0.52	0.49	0.92	0.50	0.13
Mid Coast	Salmon	-0.51	-0.81	-0.83	-1.00	-0.94	-0.71	0.43	-1.00	-1.00	-1.00	-1.00	0.92	0.72	0.64	0.57	0.35	1.00	1.00	1.00
	Siletz	0.91	1.00	0.83	0.66	0.11	0.86	0.84	0.08	0.10	0.11	0.67	0.93	0.99	0.51	0.90	0.97	0.93	1.00	1.00
	Yaquina	0.97	0.89	0.97	0.76	0.44	0.93	0.92	0.30	0.33	0.35	0.69	0.93	0.94	0.84	0.95	0.93	1.00	1.00	1.00
	Beaver Cr.	0.97	0.99	-0.10	0.62	0.93	1.00	1.00	0.03	0.04	0.04	0.86	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00
	Alsea	0.63	0.86	0.59	0.96	0.02	0.68	0.84	0.18	0.20	0.22	0.97	0.98	1.00	0.45	0.85	0.92	0.83	1.00	1.00
	Siuslaw	0.89	0.77	0.52	0.98	0.07	0.81	0.82	0.98	1.00	1.00	0.81	0.91	1.00	0.53	0.72	0.79	0.68	0.89	0.98
Lakes	Siltcoos	0.81	0.88	0.09	1.00	1.00	1.00	1.00	0.45	0.49	0.45	0.99	0.99	0.93	1.00	1.00	1.00	1.00	1.00	1.00
	Tahkenitch	0.69	0.84	0.58	0.70	1.00	1.00	1.00	0.24	0.26	0.24	0.95	0.99	0.96	1.00	1.00	1.00	1.00	1.00	1.00
	Tenmile	0.96	0.78	0.84	0.98	1.00	1.00	1.00	0.91	0.97	0.81	0.98	0.98	1.00	1.00	1.00	1.00	-0.36	-0.23	0.63
Umpqua	L. Umpqua	0.68	0.76	0.89	0.86	0.73	0.84	0.81	0.80	0.85	0.88	0.42	0.93	0.99	0.78	0.85	0.77	0.61	0.85	0.92
	M. Umpqua	0.73	0.66	0.74	0.84	0.22	0.48	0.19	0.26	0.28	0.29	0.35	0.99	1.00	0.25	0.39	0.09	0.22	0.66	0.91
	N. Umpqua	-0.96	-0.50	0.38	0.52	0.50	0.89	0.86	-0.69	-0.64	-0.59	-0.96	0.13	0.34	-0.52	-0.42	-0.48	-0.66	-0.64	-0.50
	S. Umpqua	0.92	0.61	0.07	0.94	0.64	0.82	0.29	0.21	0.24	0.24	0.50	0.53	-0.04	0.06	0.28	0.06	0.14	0.35	0.64
Mid-South Coast	Coos	0.92	0.91	0.76	0.86	0.58	0.91	0.80	1.00	1.00	1.00	0.94	0.97	0.98	0.73	0.88	0.64	0.85	0.70	0.89
	Coquille	0.96	0.92	0.67	0.96	0.84	0.91	0.80	1.00	1.00	1.00	0.98	0.96	1.00	0.68	0.78	0.62	0.80	0.93	0.80
	Floras	0.99	0.88	0.88	0.92	-0.46	0.14	0.37	0.12	0.15	0.14	0.81	1.00	1.00	0.21	0.74	0.73	1.00	1.00	1.00
	Sixes	0.52	0.76	0.82	-1.00	-0.25	-0.35	-0.31	-0.96	-0.96	-0.95	0.17	0.74	1.00	-0.66	-0.42	-0.66	-0.42	0.17	0.27
	Mean	*0.69*	*0.71*	*0.58*	*0.58*	*0.40*	*0.66*	*0.65*	*0.24*	*0.26*	*0.26*	*0.55*	*0.87*	*0.88*	*0.49*	*0.65*	*0.56*	*0.60*	*0.69*	*0.75*

Table A-III:4. Summary of Population-Scale DSS Criteria scores from assessments in 2012, 2015 and 2020 using data through run years 2009, 2014 and 2019, respectively. Green shading indicates moderate or higher certainty true, yellow shading indicates low certainty true, gray shading indicates uncertain, and red shading indicates low to high certainty false.

Stratum	Population	PP Population Persistence			PD Population Diversity			PS Population Sustainability		
		2012	2015	2020	2012	2015	2020	2012	2015	2020
North Coast	Necanicum	-0.24	-0.21	-0.26	0.28	0.33	0.27	-0.14	-0.10	-0.16
	Nehalem	0.84	0.91	0.76	0.57	0.69	0.55	0.67	0.78	0.63
	Tillamook	0.55	0.68	0.65	0.25	0.40	0.43	0.35	0.50	0.51
	Nestucca	0.57	0.63	0.61	0.37	0.36	0.31	0.44	0.45	0.41
Mid Coast	Salmon River	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
	Siletz	0.36	0.81	0.76	0.34	0.45	0.48	0.35	0.58	0.58
	Yaquina	0.65	0.85	0.87	0.57	0.64	0.66	0.60	0.73	0.74
	Beaver Creek	0.80	0.82	0.17	0.39	0.41	0.41	0.53	0.56	0.24
	Alsea	0.28	0.81	0.76	0.43	0.54	0.57	0.33	0.64	0.64
	Siuslaw	0.38	0.85	0.71	0.70	0.86	0.93	0.49	0.85	0.80
Lakes	Siltcoos	0.92	0.95	0.42	0.75	0.77	0.74	0.83	0.85	0.53
	Tahkenitch	0.78	0.82	0.72	0.58	0.61	0.59	0.66	0.70	0.64
	Tenmile	0.98	0.90	0.93	-0.04	0.12	0.82	0.20	0.34	0.87
Umpqua	Lower Umpqua	0.74	0.81	0.85	0.58	0.87	0.88	0.65	0.84	0.87
	Middle Umpqua	0.45	0.61	0.43	0.25	0.48	0.35	0.31	0.53	0.38
	North Umpqua	-0.95	-0.30	0.52	-0.95	-0.60	-0.54	-0.95	-0.57	-0.41
	South Umpqua	0.80	0.75	0.26	0.15	0.31	0.09	0.33	0.45	0.14
Mid-South Coast	Coos	0.75	0.89	0.80	0.86	0.86	0.84	0.80	0.87	0.82
	Coquille	0.91	0.93	0.79	0.83	0.90	0.81	0.87	0.91	0.80
	Floras	-0.21	0.43	0.61	0.35	0.48	0.47	-0.10	0.45	0.52
	Sixes	-1.00	-1.00	-1.00	-0.96	-0.95	-0.93	-1.00	-1.00	-1.00
	Mean	*0.35*	*0.52*	*0.45*	*0.25*	*0.36*	*0.37*	*0.25*	*0.40*	*0.36*

Table A-III:5. Summary of Stratum-Scale DSS Criteria scores from assessments in 2012, 2015 and 2020 using data through run years 2009, 2014 and 2019, respectively. Green shading indicates moderate or higher certainty true, yellow shading indicates low certainty true, gray shading indicates uncertain, and red shading indicates low to high certainty false.

Stratum	SP Stratum Persistence			SD Stratum Diversity			SS Stratum Sustainability		
	2012	2015	2020	2012	2015	2020	2012	2015	2020
North Coast	0.56	0.65	0.63	0.39	0.47	0.46	0.39	0.47	0.46
Mid Coast	0.37	0.82	0.73	0.42	0.61	0.61	0.42	0.61	0.61
Lakes	0.92	0.90	0.72	0.66	0.70	0.64	0.66	0.70	0.64
Umpqua	0.60	0.68	0.47	0.32	0.49	0.26	0.32	0.49	0.26
Mid-South Coast	0.27	0.66	0.70	0.35	0.66	0.66	0.35	0.66	0.66
Mean	*0.54*	*0.74*	*0.65*	*0.43*	*0.59*	*0.53*	*0.43*	*0.59*	*0.53*

Table A-III:6. Summary of ESU-Scale DSS Criteria scores from assessments in 2012, 2015 and 2020 using data through run years 2009, 2014 and 2019, respectively. Green shading indicates moderate or higher certainty true, yellow shading indicates low certainty true, gray shading indicates uncertain, and red shading indicates low to high certainty false.

EP ESU Persistence			ES-1 All Biogeographic Strata Sustainable			ES ESU Sustainability		
2012	2015	2020	2012	2015	2020	2012	2015	2020
0.44	0.73	0.60	0.39	0.56	0.43	0.23	0.29	0.24

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